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Vegetation of the Angmagssalik District, Southeast Greenland, IV. Shrub, dwarf shrub and terricolous lichens

F. J. A. Daniëls

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Instructions to authors. – See page 3 of cover.

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Contents

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This paper deals with part of the results of the Dutch phytosociological expeditions in 1968 and 1969 to the Angmagssalik District, Southeast Greenland.

Shrub, dwarf shrub and terricolous lichen vegetation is treated here. The general part contains a description of the Angmagssalik District with emphasis on the applied methods.

The vegetation has been studied according to concepts of the French–Swiss School. The typology is based on about 250 records. The procedure of differentiation and classification of the plant communities is discussed. The term "decisive" differential taxon is introduced and defined. The association concept is considered from a regional point of view. The plant communities are arranged in a floristic hierarchic system.

Concerning habitat factors, the altitude a.s.l., slope and wind direction were measured. Other factors were roughly estimated. The soil types are indicated.

The following part contains a discussion of the vegetation units, with their floristic composition and physiognomy, habitat and distribution, and syntaxonomic position. This includes 24 vegetation units, 1 complex of communities, 11 communities and 12 associations. These are designed to the classes Oxycocco–Sphagnetea, Scheuchzerio–Caricetea, Betulo–Adenostyletea, Loiseleurio–Vaccinietea, Carici–Kobresietea, Salicetea herbaceae and Juncetea trifidi. Eight new associations and 1 new alliance are presented. Some syntaxa have been revised or validated.

The classification by Molenaar (1976) of mire vegetation and chionophytic herb communities is discussed and a new classification is proposed. Dwarf shrub vegetation with *Empetrum hermaphroditum* and/or *Vaccinium microphyllum* on acid, mainly mineral soil is extremely varied in composition and physiognomy and is considered a zonal formation, which largely determines the aspect of the region. The *Empetrum–Vaccinium* community is the climax vegetation of the district.

The greater part of the communities and associations can be assigned to alliances described from Scandinavia, and the phytosociological relationship with that region is emphasized. Only the Dryadion integrifoliae and the Cladonio–Viscarion all. nov. are not known from Scandinavia. The vegetation of the Angmagssalik District has its own character, as shown on the association level by the Sphagno–Salicetum, the Rhododendro–Vaccinietum, the Gymnomitrio–Loiseleurietum, the Carici–Dryadetum and the Cladonio–Viscarietum (all new), which are actually restricted to the area. The other 7 associations are also found at the southern and western coasts of Greenland. Most vegetation types (associations and communities) have a lowarctic-oceanic distribution. A few types are also found in Iceland and Scandinavia.

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Introduction

This paper* deals with part of a phytosociological investigation, carried out by Dutch botanists in the Angmagssalik District, Southeast Greenland. After a preliminary survey in 1966, the actual fieldwork was carried out during 2½ and 3 months in the summers of 1968 and 1969 respectively. In concert with Professor, Dr. T. W. Böcher, Copenhagen, the Angmagssalik District was selected, because it belongs to the comperatively poorly known regions of Greenland, i.e., the north and east coast; this largest ice-free area of Southeast Greenland is rather easily accessible. The vegetation is well developed but poorly known in detail. Kruuse (1912) made some excellent phytogeographical studies, and Böcher (1933) spent a few weeks studying the vegetation (see p. 10).

* A shortened version of a thesis defended at the State University of Utrecht (Daniëls 1980).

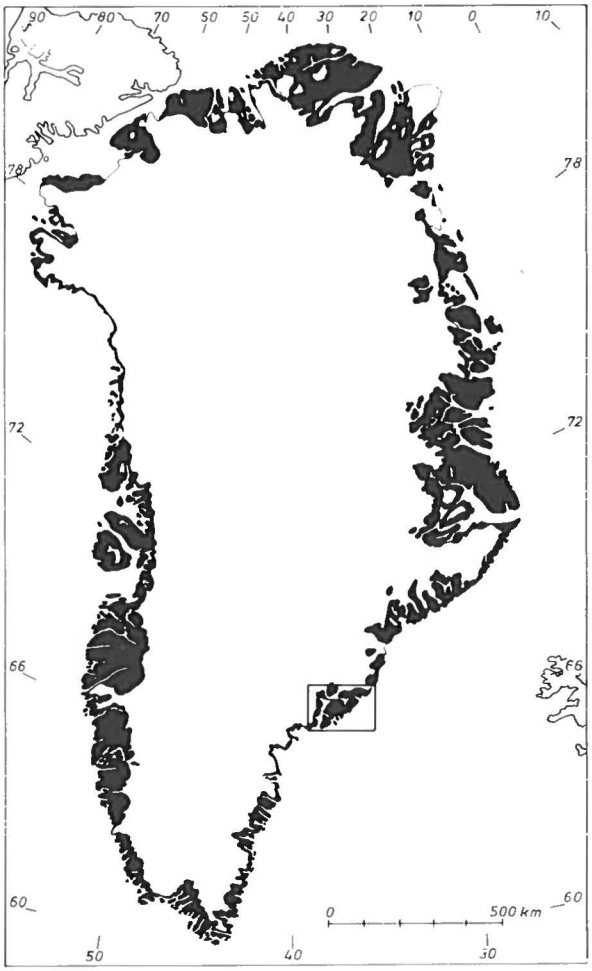


Fig. 1. Map of Greenland showing the location of the Angmagssalik District.

A more comprehensive and detailed study of the vegetation, with special emphasis on mosses and lichens and classification of plant communities on floristic criteria would facilitate a comparison with the better known vegetation of the south and west coasts of Greenland, where Böcher (1949, 1954, 1959, 1963), Gelting (1955), Fredskild (1961) and Knapp (1964) studied the vegetation in detail by means of relevés (records). Böcher (1954) classified the vegetation of Southwest Greenland in a hierarchic system with "indicator"-, "guiding"- and "type"species, and Knapp (1.c.) distinguished communities and associations according to Braun-Blanquet (1964) in South Greenland. The present study should contribute to a better comparison with the related, more intensively studied vegetation of Fennoscandia and the mountains of the European continent.

This research can be summarized as follows: Distinction and classification of the plant communities of the Angmagssalik District in relation to habitat and distribution, with special attention to mosses and lichens. The fieldwork was carried out in cooperation with J. G. De Molenaar who studied principally the littoral, snowbed and herb vegetation (Molenaar 1974, 1976). In 1969 H. F. Ferwerda studied the fell-field vegetation. The present author concentrated his attention to the shrub, dwarf shrub, and lichen vegetation. A study on the saxicolous lichen vegetation, was published by Daniëls (1975).

General part

The Angmagssalik District

The following description of the Angmagssalik District is largely from Kruuse (1912) and Molenaar (1974, 1976) to which the reader is referred for further information. The topographical names used in this paper are from the maps 1: 250000 (1965) and 1: 5000 (1950), published by the Geodetic Institute, Copenhagen, with subsequent emendations.

Topography

The Angmagssalik District is situated at the southeast coast of Greenland between 65° N and 67°20' N. The term Angmagssalik District in this paper applies to the area in stricter sense, i.e., to the deglaciated part of the southeast coast between Ikertivaq Bay to the south and the K. J. V. Steenstrup Bræer (glaciers) to the north, thus approximately from 65°30' N to 66°30' N (Figs 1 and 2). The investigations cover a part of this area, of approximately 80 × 80 km (Fig. 2).

Following Polunin (1951), the Angmagssalik District belongs to the Arctic region. The Arctic is commonly divided in a high- and lowarctic part, based on climatological and floristic criteria. In Greenland the borderline between these two zones is drawn at about 71° N. (Böcher, in "Greenland, Past and Present"; undated) and the Angmagssalik District belongs to the lowarctic zone.

Geomorphology

The Angmagssalik District is the largest ice free area on the southeast coast of Greenland. It is intersected by many fiords and fiord systems, amongst which the Sermilik, the Angmagssalik Fjord and the Sermiligâq are the widest. The coastal area mainly consists of islands with comparatively low mountains (less than 1000 m). Angmagssalik Ø (island) has a few local ice caps and large lakes, and is intersected by many small fiords and bays (Fig. 3). The inland area has a more pronounced alpine landscape with higher mountains (up to 3300 m), and is intersected by deep, narrow fiords. It carries

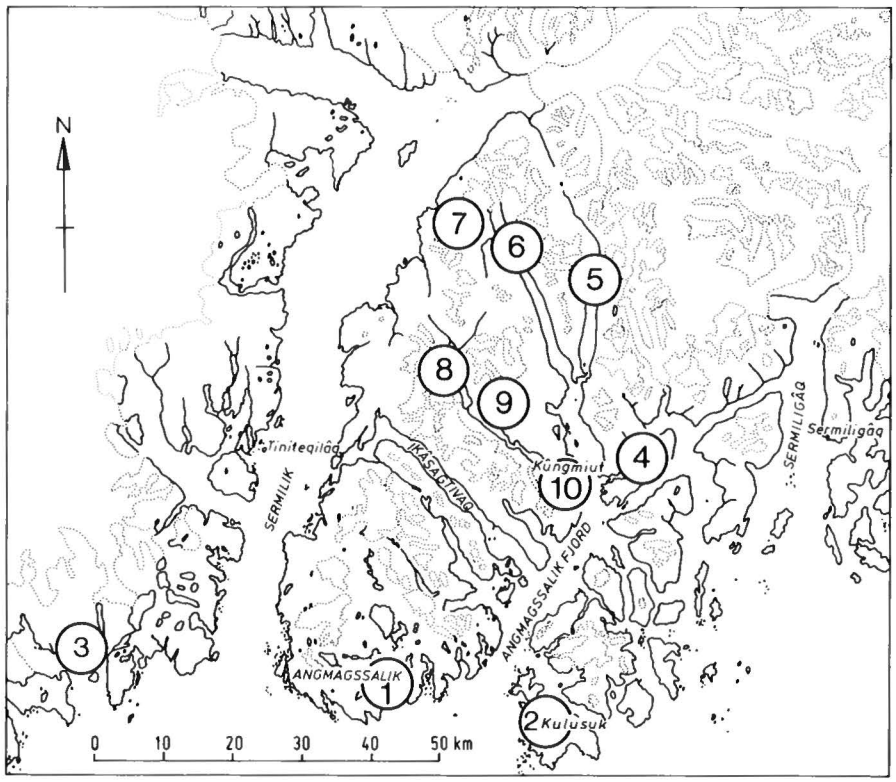


Fig. 2. The Angmagssalik District showing the localities where phytosociological investigations have been carried out.

many corries and firn fields, with tonguelike glaciers descending into the valleys (Fig. 4). The still higher nunatak area represents the transition to the central Greenland ice cap. This area was not included in our investigation.

Climate

For detailed information on the climate of the Angmagssalik District the reader is referred to Hastings (1960), Molenaar (1974, 1976) and Daniëls (1975). Based on the meteorological data from the weather station in the town of Angmagssalik (see also Figs 7, 8 and 9 and Summaries of weather observations at weather stations in Greenland), the coastal area of the Angmagssalik District belongs to the lowartic oceanic climate regime (Böcher 1954); this probably also applies to the greater part of the inland area visited by us. However, no climatological data on the inland area are available to prove certain continental climate features of some inland localities.

Fig. 3. The coastal area, showing the surroundings of Angmagssalik with Kong Oscar Havn in the center. June 1969.

Fig. 4. Part of the inland area, loc. 6, showing the Qíngertivaq fiord seen to the south. July 1969.

Fig. 5. Blomsterdalen, locality 1.2, showing the southern slopes to the left and the river to the right. June 1969.

Fig. 6. Locality 9, view to the northwest. 8 Aug. 1969.

Geology

The geology of the Angmagssalik District was studied by Wager (1934), Bridgwater & Gormsen (1968) and Wright et al. (1971, 1973). Here only the most common rock types occurring in the district are mentioned (see also Figs 10 and 11, and Daniëls 1975):

1. Grey gneisses, mostly consisting of biotite or hornblende with amphibolite bands. Mainly in the northern parts, and some in the southwestern part of the district.

2. Metasedimentary schists, infolded with the grey gneisses in the same region, but less common.

3. Garnet gneiss is the bedrock in many places of the southern parts of the district.

4. Rocks of the Anorthosite–Granulite Complex are present in the vicinity of Angmagssalik and Kulusuk. The major part is a charnokitic rock, rich in quartz, feldspar, biotite, pyroxene and garnet.

5. A late orogenic series of picrites, gabbros, diorites and several types of granites is found in the central part.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	A	B
a	–6.54	–5.84	–7.42	–3.38	1.12	4.62	7.02	6.2	2.98	0.2	–5.66	–7.24	–1.04	
b	170.54	109.26	140	72.64	37.36	51.44	47.74	38.86	57	99.16	81.24	75.84		981.24

Fig. 7. Temperature and precipitation in Angmagssalik 1961–1965. a: Mean monthly temp. (°C), and annual mean (A). b: Mean monthly precipitation (mm), and annual mean (B). – Data from: Summaries of weather observations at weather stations in Greenland 1961–1965. Charlottenlund, 1968.

	fog	rain	drizzle	snow	sleet	hail ice pellets	freezing precip.	blowing snow	thunder storm	total number of observations undertaken
January	14	56	2	244	21			35		1239
February	16	82	3	207	25			27		1128
March	19	66	3	274	31	1	1	4	1	1240
April	8	66	3	227	17					1200
May	32	102	6	54	20					1240
June	59	142	8	10	19					1200
July	48	151	10	6						1240
August	23	146	8	2	2					1240
September	21	137	1	40	26					1200
October	29	172	5	190	18					1240
November	17	37	9	238	12		1	10		1200
December	7	18	1	222	5			3		1240
Total	293	1175	69	1714	196	1	2	83	1	14607

Fig. 8. Number of occurrences of fog, precipitation, blowing snow, and thunderstorm in Angmagssalik 1961–1965. – Source of data, see Fig. 7.

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
N											1	
NNW	2	2	1								6	2
NW		1	1	4						3		
WNW		2										
Calm	724	616	769	769	879	733	767	880	854	800	764	827
Total number observations	1239	1128	1240	1200	1240	1200	1240	1240	1200	1235	1200	1236

Fig. 9. Survey of the number of observations of high wind speed and calm in Angmagssalik 1961–1965. Wind direction indicated. – Source of data, see Fig. 7.

Soil

The most important soil types of the Angmagssalik District will be briefly presented. The classication is mainly according to the "Definitions of Soil Units by the FAO" (Dudal 1968). Soil profiles for most of the studied community stands were schematically presented in the thesis. Copies can be obtained from the author.

Terrestrial soils: Soils which originated without the influence of ground water or surface water.

a. Lithosols. Shallow, slightly developed (no diagnostic or extremely poorly developed horizons), mineral, stony soils with bedrock less than 5 cm below the soil surface. These soils are very common. An extreme example is rock covered with lichens. If present the 0 horizon is 5 cm or less thick. The A_1 horizon may be (very) poorly developed.

b. Regosols. Rather thick soils, with bedrock more than 5 cm below the soil surface. These soils are mineral but also poorly developed without any influence of ground water. The A_1 horizon may be poorly developed. They are mainly present in the lowlands, where weathering products are deposited, e.g., at the foot of slopes, on deltas and in moraines. By progressive development these soils may be assigned to the following group.

c. Rankers. These soils show a well developed A – C (or A –(B?)–C) sequence. Here they resemble particularly the tundra ranker (Kubiëna 1950). They are common under dwarf shrub communities, especially those with *Empetrum hermaphroditum* and *Vaccinium microphyllum*. Underneath a thick 0 horizon an A_1 horizon is found, gradually passing into the C horizon, which generally consists of a few cm of weathering products on debris or bedrock. It is possible that chemical analyses will prove a number of these soils to belong to the Arctic Brown soils (Tedrow & Hill 1955, Tedrow et al. 1958, Ugolini 1966).

Semi-terrestrial soils: Soils which originated under comparatively wet conditions (under the influence of ground water or surface water).

d. Histosols. Organic soils (peat soils) characterized by an accumulation of organic material. These soils meet one of the following requirements: 1. The presence of an 0 horizon of at least 40 cm, either as one unit or cumulatively within the upper 80 cm of the soil. 2. An 0 horizon of 5 cm or more, on solid rock or on fragmental rock, the interspaces of which are filled up with organic material, or twice as thick as the comparatively fine grained mineral soil overlying the bedrock or the fragmented rock.

Fig. 10. Geological map of the Angmagssalik District (Taken from Wright et al. 1971).

	1	2	3	4			5			
	grey gneisses	metasedimentary gneisses	garnet gneiss	charnokitic complex ultramafic granulites	charnokitic complex basic granulites	charnokitic complex meta-anothosites	late orogenic suite granites	late orogenic suite diorites	late orogenic suite gabbros	late orogenic suite picrites
Samples analysed	41	48	56	11	25	37	33	21	14	4
SiO_2	67.17	63.80	65.85	51.54	51.07	53.54	71.8	57.1	51.7	47.0
TiO_2	0.31	0.31	0.74	0.60	1.25	1.30	0.26	1.63	1.26	0.94
Al_2O_3	15.79	15.09	15.88	7.10	12.45	18.70	14.5	14.1	15.5	7.7
Fe_2O_3	1.68	6.62	2.19	1.98	3.39	2.65	1.2	3.6	3.8	5.0
FeO	1.41		2.92	6.45	6.57	4.79	1.1	4.6	5.1	8.9
MnO	0.04	0.07	0.05	0.13	0.13	0.09	0.04	0.11	0.11	0.18
MgO	1.09	2.81	2.19	17.22	10.02	4.16	0.32	4.27	7.10	21.3
CaO	3.54	4.67	3.76	11.93	9.13	7.42	1.36	6.72	9.12	4.73
Na_2O	4.74	3.09	3.46	1.18	2.15	4.05	3.68	3.40	3.04	1.60
K_2O	2.10	1.94	1.89	0.77	1.35	1.05	5.08	2.30	0.89	0.72
P_2O_5	0.12	0.15	0.10	0.20	0.43	0.50	0.06	0.83	0.65	0.24
Total[x]	97.99	98.55	99.03	99.10	97.94	98.05	99.4	98.7	98.3	98.3

Fig. 11. Mean analyses of East Greenland rocks. x: Total do not include water and carbon dioxide. – Data from Wright et al. (1973).

e. Fluvisols: Soils developed in recent alluvial deposits, without diagnostic horizons, except a light-coloured A horizon, an 0 horizon and/or a gley horizon.

f. Gleysols: Other soils with a gley horizon within 50 cm of the surface. These are generally poorly developed.

Flora

Apart from 94 non-indigenous plants, the flora of the higher plants of Greenland consists of 485 indigenous species (Böcher et al. 1959). More than half has a circumpolar or amphi-atlantic distribution. 114 are western, American species, with their main distribution from North America to Greenland; 82 have an eastern, Eurasiatic distribution, and 35 species are endemic.

The major part of the Angmagssalik Distict belongs to the middle southeastern flora province (SEm, see Böcher et al. 1959); a small part of the interior, north of 66°N, belongs to the southern part of the central eastern flora province (CEs). Except in SE Greenland (61°–69°N), the western flora element is predominant (Böcher et al. 1959). On the basis of the distribution patterns of the higher plants, SE Greenland is floristically more closely related to Eurasia than to North America. The lowarctic widely distributed flora element (LM distribution type) and, in particular, the lowarctic oceanic-montane flora element (LO distribution type) (see also p. 13) are well represented (Böcher et al. 1959).

Anthropogenous and zoogenous influences

In 1968 the Angmagssalik District had a population of about 2300 in 6 settlements. Angmagssalik with about 800 inhabitants is the most densely populated settlement of the east coast of Greenland. Until World War II the influence of human activities in the district was hardly noticeable. According to Kruuse (1912) the human influence was limited to settlements and other dwelling places, where eutrophication was the most important factor. Kruuse (l.c.) listed species which prefer these places, e.g., *Rhodiola rosea, Stellaria humifusa, Oxyria digyna,* and *Polygonum viviparum.* He also mentioned half a dozen plants, which were probably introduced by Europeans after the foundation of Angmagssalik in 1895, e.g., *Plantago major* and *Sinapis arvensis. Polygonum aviculare* can be added now.

After World War II the population strongly increased, and settlements including Angmagssalik expanded rapidly. This caused the loss of part of the natural vegetation and of habitats of rare species. As an example, the probably last remaining habitat of *Triglochin palustre* in the district disappeared by the building of oiltanks at "Igtimin", near Angmagssalik (Daniëls & Molenaar 1970). Because of stronger eutrophication, oligotrafent species make place for comparatively eutrafent species. Also the increased trampling in the settlements has an adverse effect on chamaephytes, particularly on dwarf shrubs and lichens. Collecting (parts of) plants by the population for consumption, such as fruits of *Empetrum hermaphroditum, Vaccinium microphyllum* and stems of *Angelica norvegica,* has no noticeable lasting effect on the vegetation.

The effect of the fauna on the vegetation is hardly conspicuous. The macrofauna is poor, without large land mammals, such as musk-ox. Some caribou have been imported after 1970. The avifauna is poor, but its influence on some types of vegetation is evident. In some places, particularly on rocks and boulders, accumulations of bird excrements are found. The communities of *Xanthoria elegans,* for example, are conspicuous outside the settlements by their orange-red colour, and they are confined to these places; from a distance they offer information on locally prevailing ecological conditions (Daniëls 1975). Kruuse (1912) reported differences in higher plant vegetation at the foot of birdrocks with excrements of eiders.

Botanical exploration

In the years 1898–1899 and 1901–1902 the Angmagssalik District was, for the first time, intensively studied by Kruuse. His paper is considered a major contribution to the plantgeography of the district. He presented species lists of accurately determined and amply discussed fysiognomic-ecologic vegetation types, while he also carried out environmental observations with special attention to the climate (Kruuse 1912). Böcher (1933) visited the district during a few weeks in 1932. He studied the vegetation according to the Raunkiaer frequency-method and distinguished associations (with suffix-etum), based on frequency and cover of the species. The associations were classified according to the system of Rübel (1930). He also presented a synopsis of dwarf shrub communities. However, at that time neither Kruuse (l.c.) nor Böcher (l.c.) were able to pay much attention to the mosses and lichens.

At the end of the sixties and in the beginning of the seventies, a number of expeditions visited the district, including our expeditions. Grønlands Botaniske Undersøgelse (1970, 1971) visited parts of the district in 1970 and 1971. The main purpose was to study the flora of these areas intensively and to collect specimens on a large scale. Earlier, Japanese, Swiss and English expeditions collected plants. Results were published, e.g., by Gribbon (1968), Hawksworth (1968), Elsley & Halliday (1971) and Kobayasi et al. (1971).

Localities

For practical reasons it was not possible to stay equally long in all locations. The longest time was spent near Angmagssalik (loc. 1), and only one day each in Ilivnera (loc. 7), Ikâsaulaq (locs 8, 9 and 10), and Torssukâtak ("Tunok", loc. 4). Generally, most of the time was spent in the lowlands up to about 400 m; occasio-

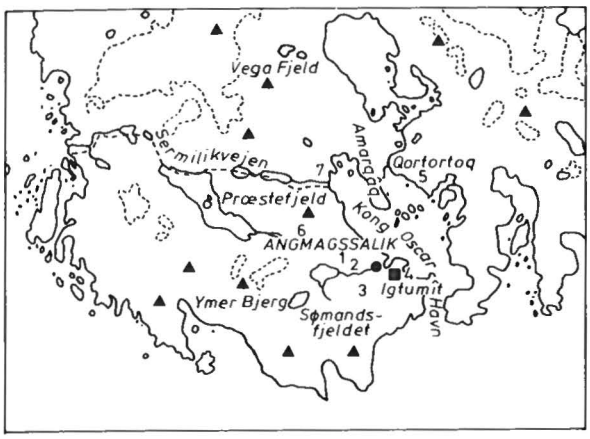


Fig. 12. Map of the surroundings of Angmagssalik (locality 1), showing the sites visited (1–7).

nally we ascended to about 750 m (Cassiopefjeld, loc. 6.1) and to 1200 m (Tasîlaq, loc. 5.5).

1: The southern part of Angmagssalik Ø (approx. 65°37'N 36°37'W, Figs 2, 3 and 12). **1.1:** Elvbakker area. This is the area west and northwest of Angmagssalik; it is bordered by Kong Oscar Havn, the valley south of the Præstefjeld and Blomsterdalen (loc. 1.2.). The large lake west of Angmagssalik is included in this area. **1.2:** Blomsterdalen (Fig. 5). West of Angmagssalik a stream running through a very attractive valley debouches into Kong Oscar Havn at Angmagssalik. The valley is bordered to the north by southfacing slopes, which again border the Elvbakker table land (loc. 1.1.). To the south the valley is bordered by the northfacing slopes of the mountain range of the Sømandsfjeldet (just over 600 m) (loc. 1.3.). **1.3:** Sømandsfjeldet. This locality contains the mountain range south of Blomsterdalen (1.2.), including the summit with a height of just over 600 m. **1.4:** Igtumît. An (old) tent place on Kong Oscar Havn, just southeast of Angmagssalik. **1.5:** Qortortoq. A comparatively low (less than 150 m) area, northeast of Angmagssalik beyond Kong Oscar Havn. **1.6:** The valley between the Ymer Bjerg (809 m) and the Præstefjeld (633 m). **1.7:** Sermilikvejen. The valley north of the Præstefjeld, in winter used by the Greenlanders as sledge route to the Sermilik. The vegetation of the valley bottom and the southfacing slopes has been studied up to a height of approximately 300 m; this area borders the valley to the north and is close to Kong Oscar Havn.

2: Kulusuk (approximately 65°34'N 37°13'W), Fig 2. The investigated area is roughly bounded by the village of Kulusuk, the northern coast of the island, Kulusuk Airfield and a line connecting the airstrip with the lake south of Kulusuk.

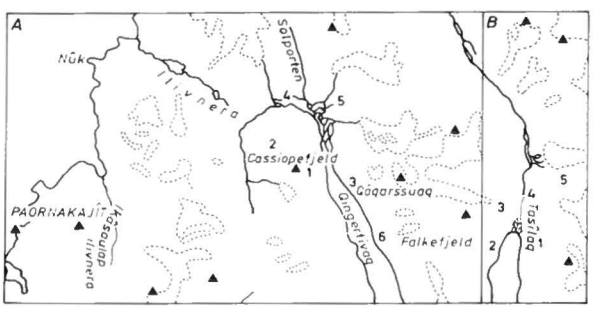


Fig. 13. Sites visited in the inland: A. Qíngertivaq (locality 6). B. Tasîlaq (locality 5).

3: Nagtivit–Tasîlâlik ("Nagdluit"–"Tasitalik") (approx. 65°39'N 38°31'W), Fig. 2. Tasîlâlik is a curved fiord branching of Nagtivit kangertivat; it is bordered to the east by the Nagtivit peninsula. This peninsula is low and hilly with two separate higher parts and several lakes in between. The lower part and the southfacing slopes up to 200 m have been studied.

4: Torssukâtak ("Tunok") (approx. 65°52'N 36°54' W), Fig. 2. A detailed description of this area and its vegetation along the sheltered northern side of the fiord east of Kûngmiut was presented by Kruuse (1912: 87–88, 138–139). We visited the northern side of the fiord up to 400 m and the low lake area at Sarpaq.

5: Tasîlaq ("Tasîssârssik", "Tasiusak Misutok"), (approx. 66°01'N 37°09'W), Figs 2 and 13B. The Tasîlaq is the eastern branch of the most inland ramifications of the Angmagssalik Fjord. It has a narrow entrance and is bordered on both sides by high and steep mountains. The northern extension of the fiord is a long and narrow valley with glaciers descending from the mountains. The valley is filled with fluvioglacial deposits, which are continuously deposited, eroded and redistributed by branching melt water streams draining the valley and forming a large delta, the Tasîlaq kûa, at the head of the fiord. The bedrock in this area is grey gneiss. Kruuse (1912) briefly visited the fiord in 1902. During our investigations the following places have been visited: **5.1:** The eastern side of the fiord, about two kilometres from the delta, and up to 400 m. **5.2:** The western side of the fiord opposite loc. 5.1. Only one day was spent here. **5.3:** The delta. **5.4:** The valley. Particularly the lichen communities on the frontal moraines were studied. **5.5:** The mountain (1200 m) on the eastern side of the valley (5.4.) between the first and second glacier, approximately 3.5 km north of the head of the fiord. The area between the northern lateral moraine and the summit was visited.

6: Qíngertivaq ("Kingorsuak", "Qingorssuaq") (approx. 66°N37°16'W), Figs 2, 4, 13A. The Qíngertivaq is the western and longest branch of the inland ramifications of the Angmagssalik Fjord. We visited the coasts, the lower slopes of the adjacent mountains, the delta and the valley. Kruuse (1912: 73–83, 125–136, Tab. 1) visited this area twice and gave a description with a map.

The Qíngertivaq is a long, narrow fiord, flanked by high and steep mountains, with descending corry glaciers. The lower and less steep slopes along the fiord carry densely covered stretches of vegetation alternating with bare and mobile screes and moraines of retraiting corry glaciers. The bedrock in this area consists mainly of grey gneiss. The following areas have been visited: **6.1:** The western side of the fiord, between the last glacier and the valley north of the Cassiopefjeld. **6.2:** The western side of the Cassiopefjeld facing Ilivnera (7). **6.3:** The eastern side of the fiord, mainly the area at the foot of the Qáqarssuaq massif (over 1500 m). **6.4:** The lower slopes of the massif west of Solporten, a hanging glacier valley in the extension of the Qíngertivaq fiord, and bordering loc. 6.5 and the taluscone west of the lake. **6.5:** The area of the fluvioglacial valley deposits north of Cassiopefjeld with a large lake. **6.6:** Falkefjeld, an area south of Qáqarssuaq.

7: Ilivnera (approx. 66°09'N 37°22'W), Fig. 2. The area between the Qíngertivaq valley and the Sermilik fiord at Nûk. This is a broad valley with a large moor, with several pools and ponds, and with a stream running towards the Sermilik. In one place a glacier reaches the valley.

8–10: Ikâsaulap ilivnera, Fig. 2. This fiord is a western, long and narrow branch of the Angmagssalik Fjord, located in the centre of the district. Three localities have been visited: **8:** An area at approx. 65°59'30"N 37°27'W, situated on the western bank just beyond a spit of land extending far into the fiord. The area was visited up to 400 m. **9:** An area situated at approx.

65°55'05"N 37°20'W, half way along the eastern shore of the fiord (Fig. 6). **10:** A granite area, approx. 65°51'N 37°10'W, near Qârtulagik, at the entrance to the fiord about 2 km west of Marie Havn and Griseøen.

Methods

Methods in the field

Analysis of the vegetation. – The phytosociological investigations have been carried out principally according to the concepts of the French–Swiss School of Phytosociology (Braun–Blanquet 1964, Westhoff & Maarel 1973). In total just over 300 records have been made of phytocoenoses which were uniform (cf. Westhoff & Maarel 1973) in composition and structure over a certain minimum area. The shape of the sample plot was square or rectangular.

In general, the lichen vegetations (and also most of the mire vegetations) were analysed if they were uniform throughout at least 4 m^2, other vegetations at least 10 m^2 (cf. minimum area and resistance area, Meyer Drees 1951). This restriction was made to reduce beforehand the possibility of analysing fragmental community stands or stands affected by vincinism, as may appear in the synthetic research phase. Analyses of such stands are hardly useful for typological purposes.

When the sample plot was established, the following properties of the vegetation within the plot were measured or estimated: the height in cm, the actual cover % of the entire vegetation, and of the separate layers. A distinction was made between a shrub layer consisting of woody plants over 25 cm height, sometimes including herbs of that height, a field layer (herb- or dwarf shrub layer) of woody plants up to 25 cm height and/or herbs up to that height, and a moss layer (ground layer) of mosses and/or lichens, occasionally including dwarf shrubs (e.g., *Salix herbacea*). In addition, the actual total cover % of all shrubs together, the dwarf shrubs, the herbs, the mosses and the lichens have been estimated separately. A detailed inventarisation of taxa was carried out. Contrary to Braun–Blanquet (1964), only the actual cover % of each taxon was estimated as follows according to a modified Hult–Sernander–Du Rietz scale (Du Rietz 1921):

r: cover % very minute, negligible; +: cover % less than 1; 1: cover % 1 to 6; 2: cover % 6 to 12.5; 3: cover % 12.5 to 25; 4: cover % 25 to 50; 5: cover % 50 to 75; 6: cover % 75 or more.

The higher plants have been identified as far as possible in the field. Critical specimens were collected to be studied in the laboratory. The same principle applies to mosses and lichens. After a detailed examination of mosses and lichens in the sample plot, several random samples of the mosslayer of 10–20 cm^2 were collected for a complete inventarisation. Taxa outside the sample plot but within the stand have been indicated in parentheses.

Environmental conditions. – After analysing the vegetation, a number of habitat factors were measured or estimated. The altitude was measured with an altimeter (Compens 53941) with an accuracy of 10 m. The slope and wind directions were determined with a Bézard compass with clinometer (model UBK/3).

General conditions for the vegetation in relation to the surroundings were noted. Prevailing snow conditions in winter could only be estimated on the basis of the actual snow distribution, and the situation of the plot in the field in relation to the prevailing wind directions in winter. In most of the analysed community stands a test pit was made. The soil horizons were described and schematically indicated with: thickness and type, contents, degree of decomposition of organic substances, colour, textural composition, moisture conditions, root patterns, acidity, and presence of $CaCO_3$.

The humus contents were estimated with three subjective scales: slightly, moderately and strongly humic. The colours were determined with the "Revised Standard Colour Charts" (Japan). The pH was colorimetrically determined with a Hellige Bodenindikator, which is useful in comparative studies. With some experience, the pH can be determined with an accuracy of 0.25. The pH was measured in all soils, except in peat soils, taken from 10 cm below the mineral surface layer (A or C horizon). A test for $CaCO_3$ was made with 10% HCl.

The following textural classes were distinguished. Stones: particle size over 25 cm; cobbles: 7.5–25 cm; gravel: 2 mm–7.5 cm; coarse sand: 0.42–2 mm; medium fine sand: 0.21–0.42 mm; fine sand: 0.05–0.21 mm; silt: less than 0.05 mm. The predominant types were estimated by eye. The types smaller than gravel were determined with a "particle size ruler", a series of standard gravel embedded in transparent plastic (Institute of Soil Science, State University of Utrecht). The depth of the ground water , if present, was measured. The moisture and other hydrological conditions of the soil, such as inundation, lateral water supply and desiccation could only be estimated. Notes were taken on processes affecting the soil stability, such as solifluction, erosion, cumulization and redistribution.

Laboratory methods

Processing of field data. – The plants were identified according to the following works. Higher plants: Böcher et.al. (1966). Mosses: primarily Nyholm (1954/1969); the genus *Dicranum* was partly identified by aid of an unpublished key by the late Dr. K. Holmen, Copenhagen. Liverworts: McVicar (1926), Arnell (1956), Müller (1951/1958). Macrolichens: mainly Poelt (1963, 1969), Dahl (1950), Thomson (1967). Microlichens: Lynge (1940), Ozenda & Clauzade (1970). A representative part of the collection of the genus *Stereocaulon* was identified by Lamb (see also Daniëls & Ferwerda 1972). Several other specialists advised on the determinations of critical material.

After identification of the higher plants, mosses and

lichens, the synthetic research phase was carried out according to a procedure described in the next chapter. After having determined the vegetation types, their phytosociological area type spectra were constructed on the basis of the higher plants only, since the distribution areas of the mosses and lichens are less well known. The distribution types of higher plants for this purpose are based on Böcher et al. (1959, 1966) and Böcher (1963). The following types can be distinguished: The Arctic Widely Distributed Type (AM), the High Arctic Type (HA), the Arctic Widely Distributed Continental Type (AC), the Medium Arctic Type (MA), the Low Arctic Type (LM), the Low Arctic Oceanic–Montane Type (LO), the Low Arctic Continental Type (LC), the Boreal Type (BW), the Boreal Suboceanic Type (BL), and the Boreal Sylvicolous–Hygrophilous Type (BS).

In constructing the phytosociological area type spectra, the following transformation scale was used: cover r/+ = 0.5%; cover 1 = 3%; cover 2 = 8%; cover 3 = 18%; cover 4 = 35%; cover 5 = 60%; cover 6 = 85%. Total cover % of all distribution types in all records of the vegetation types have been calculated. On the basis of 100 for the total of the cover percentages, the share of each distribution type was calculated.

Finally, an attempt was made to find correlations between plant communities and their habitats. Unfortunately, chemical soil analyses and microclimatological measurements could not be carried out; prevailing snow conditions in autumn, winter and in the greater part of spring could not be studied. As a consequence, terms such as oligotrafent, mesotrafent, eutrafent, humic, thermophytic, psychrophytic, xerophytic, mesophytic, hygrophytic, hydrophytic, chionophytic, achionophytic (syn. chionophobous) etc., and indications such as strong, moderate and weak should be rated as approximations only.

Unless otherwise stated the terminology for the relation plant (community) – habitat is in accordance with Molenaar (1976: 23–27). As to snow cover, some additional remarks can be made.

In this paper a plant (community) in a snow bed or snow patch habitat is termed chionophytic. Plants or plant communities, which do not become free of snow before July (snow bed habitat) are termed extreme chionophytic. The term achionophytic is used for plants outside a snow bed or snow patch habitat. Such plants and plant communities are found in wind exposed habitats, where snow cover in winter is either thin and temporarily discontinuous or absent. Consequently, these habitats are rather dry during the whole year, and the vegetation is exposed to low temperatures and strong winds. Extreme achionophytic means plants or communities in habitats that are most probably free of snow during (the greater part of) the winter due to their strongly windswept habitat.

Differentiation and classification of the vegetation types. – The purpose of this study is to obtain a vegetation typology which shows, in a simplified manner, the variation in plant cover. The basic frame work would facilitate the determination of the phytocoenoses and allow a comparison with vegetation types described from other places, and it may also serve as a basis for synecological studies. The approach by the French–Swiss School (Braun–Blanquet 1964) is, in my opinion, the most useful method. Westhoff & Maarel (1973) explained this method as follows:

> a. Plant communities are types of vegetation, recognized by their floristic composition. The complete species composition of communities expresses the mutual relationship and the relation to environment better than any other feature.
>
> b. Some of the species of a community express a given relation better than others. For practical classification (and characterization of the environment), it is attempted to use the species whose ecological relations make them the most effective indicators; they are called diagnostic species (character species, differential species, and constant companions).
>
> c. Diagnostic species are used to arrange communities in a hierarchical classification, in which the "association" is the basic unit.

A comparison of records collected in tables is a primary activity in the synthetic research phase. The arrangement of taxa and records in the tables results in a distinct differentiation. The groups of records obtained by this procedure are distinguished from each other by so-called differential species, and are considered as vegetation types, which are classified next. For the present study the applied procedure will be broadly outlined. First, most of the 300 records were arranged in separate tables on the basis of field impressions; records which should belong together were placed in one table. For example, all records of shrub vegetation were entered in one table and all records of lichen vegetation in another. Next, the records which proved to be either too poor or too rich in taxa, or otherwise outstanding, were eliminated for the time being. After having determined the vegetation types, it was attempted to fit these records in the designed system; in most cases this proved to be possible. About 250 records have been used in determining the vegetation types. About 12.5% was eliminated (cf. Tüxen 1974).

Next, an attempt was made to obtain a bipartite division in each table by rearranging the taxa and records. When the result proved to be unsatisfactory, a tripartite division was tested. During this procedure, a search was made in the table for taxa of the same behaviour, viz., present more frequently in one group than in another group of records, or restricted to one specific group. Consequently, we are dealing with differential taxa, by which two groups of records or vegetation types can be distinguished. These taxa are more frequent in a certain vegetation type or group of records than in a comparable group or type (cf. Braun–Blanquet 1964, Westhoff & Held 1969, Mueller-Dombois & Ellenberg 1974). A problem in handling the concept of differential taxa is that it has never been quantified in a uniform manner. How much more are differential taxa to be present in one type than in another? The answer to this question

has a strong effect on the final result of the typology. Another related problem is how many differential taxa are required for a vegetation type, and on how many records must a vegetation type be based. In regard to the above, several aspects should be considered:

a. Since a typology is expected to produce a clear result, the types determined should be distinctly recognizable. The more differential taxa are included, the better these can be recognized. The presence of the differential taxa, however, is also important: can a vegetation type with, e.g., 20 differential taxa, each of low presence, be more readily recognized than another type with two more common taxa?

b. In general, vegetation types should be distinguished by at least two differential taxa (except types in extremely species-poor environments). If vegetation types were to be distinguished by one differential taxon only, it would be possible to distinguish as many vegetation types as there are taxa, and this leads to a confusing situation. Therefore, vegetation types should be based also on records of different communities. Otherwise, theoretically and probably also practically, just as many vegetation types can be distinguished as the number of phytocoenoses investigated, because sample plot analyses are never identical. As a consequence, the system would not be a simplification of actual conditions, as it should be.

c. The criteria used for distinguishing vegetation types should be handled as consistent as possible during the whole typological procedure in order to establish comparable vegetation types. This will strengthen the interpretation and facilitate the typology to be reproduced.

Presence is the frequency of a taxon in a vegetation table. It is usually indicated by the number of records in which the taxon occurs, expressed as a percentage of the total number of records. Presence degree is expressed in percentage classes according to Tüxen (1974), with symbols and Roman figures for groups of 5 or more records:

Class r = taxon in less than 5% of the records, Class + = 5–10%, Class I = 10–20%, Class II = 20–40%, Class III = 40–60%, Class IV = 60–80%, Class V = taxon in 80–100% of the records.

If a group of 4 or less records is concerned, presence degree is indicated in Arabic figures. Taxa in more than 60% of the records of a type will be considered as constant taxa.

The following considerations and criteria have to be taken into account in distinguishing vegetation types:

1. A vegetation type should have the highest possible number of frequent differential taxa, which may, however, be scarce or absent in a comparable vegetation type. In this study, each vegetation type must contain at least two socalled "decisive" differential taxa. Their presence is high in a certain vegetation type and they are significantly more frequent in this type than in other types. Their presence and cover values in two types at the same hierarchical level, are as follows:

a. Two vegetation types, A and B, consist of 5 or more records each:

Type A		Type B	
presence	cover	presence	cover
V	arbitrary	11/1,+, r or absent	as in type A or less
IV	id.	1,+, r or absent	id.
III	id.	id.	id.

b. One type, C, is based upon 2–4 records, and the other type, D, is based upon 5 or more records:

Type C		Type D	
presence	cover	presence	cover
b1. in all records	arbitrary	1,+, r or absent	as in C or less
b2. in 2 of 3 or in 2 or 3 of 4 records	id.	absent	–

c. One type, E, is based on 5 or more records, and the other type, F, on 2–4 records:

Type E		Type F	
presence	cover	presence	cover
V	arbitrary	absent	–
IV	id.	id.	–
III	id.	id.	–

d. The two vegetation types, G and H, are based upon 2–4 records each:

Type G		Type H	
presence	cover	presence	cover
in at least 2 records	arbitrary	absent	–

2. If only two "decisive" differential taxa are found in a type, one of these has to be a constant taxon; which means present in more than 60% of the records of the type.

3. Each record contributing to a given type is required to have at least one "decisive" differential taxon or a differential taxon of lower presence but significantly more frequently present in the type under consideration, and absent in the comparable types.

4. If there were other choices to distinguish vegetation types, the one that produces types with the highest homotoneity (Nordhagen 1928) would be preferred. The homotoneity of a type is determined by the ratio between the number of taxa with presence degree of 60% or more in the records of the type and the number of taxa with presence degree of 20% or more, but less than 60%. The higher this ratio, the higher the homotoneity.

5. The fewer the number of records constituting a type, the better the type must be differentiated against others and the more homotone it must be.

As mentioned before, it has been attempted to determine from the tables vegetation types according to the above method. When a table showed a distinct bipartition or tripartition, which was considered as a division of first hierarchy, it was then tested with the same procedure to find a division of second hierarchy in the separate groups of records or vegetation types. This procedure is repeated, until groups of records of the highest possible homotoneity are obtained with differential taxa, which can be considered as vegetation types (phytocoena).

Following this, a large synoptic table was made, which incorporates all recognized vegetation types with their composing taxa and with their presence and range of cover values. Such a table shows the relationship between the various vegetation types, and these can be classified into units in several ways. In this paper the classification methods of the French–Swiss School will be followed. The vegetation units are arranged in a hierarchic system, while the units of each hierarchic level have their own character (= faithful) and/or differential taxa. For further information the reader is referred to Westhoff & Maarel (1973).

The basal unit in the French–Swiss School is the association, the lowest unit in hierarchy with character and differential taxa and constant companions. According to modern concepts, units of the same level of hierarchy are sometimes described with only differential taxa and constant companions. Character or faithful taxa are restricted or nearly restricted to one vegetation type, or they show a rather strong preference to the type. This preference cannot be easily quantified (cf. differential taxa). The criteria used by Szafer & Pawlowski (Braun–Blanquet 1964, Westhoff & Maarel 1973) will be followed in order to determine character taxa according to their degree of fidelity. A differentiation is made in exclusive, selective and preferential faithful taxa, which are also called character taxa. In this study preference will be given to the term "faithful taxon" instead of the character taxon. Companion taxa (companions) do not show any preference for a certain vegetation type.

As a result, a preliminary system of vegetation units of the Angmagssalik District has been established. The units of this system will be compared with units from other, floristically closely related areas, in particular from the arctic region (*sensu* Lam, 1965: 282, fig. 10), which comprises the northernmost part of the Holarctic, including (in Europe) Iceland and the Scandinavian mountains.

These comparisons are made for two reasons: to examine the distribution of the vegetation type, and to determine whether the type has been described before or must be considered as a new syntaxon. Such comparisons may be rather problematic, because in many areas the vegetation has not been analysed and classified according to uniform methods and information is often scarce. The comparisons lead to the conclusion that the faithful taxa of associations provisionally distinguished in the field work area are also present in other, related plant communities outside that area. Should all these communities be arranged in one association based on the first validly described community? Thus, the problem of geographical variation is introduced. For various opinions on this subject, the reader is referred to Westhoff & Maarel (1973).

In the present study the incorporation of local associations in large, floristically varied, and widely distributed associations has been rejected. The most important reason is that for establishing such large associations consisting of many local types, the association is to be very well known, not from literature only but also in the field, in order to avoid unrealistic subdivisions. Most of the associations under consideration were less completely investigated elsewhere, or taxa, especially cryptogams, were not well distinguished or noticed.

The concept of the association is interpreted here rather sharp and regional, in accordance with the modern trend in the French–Swiss School. Nearly all associations in this paper contain one or more regional faithful taxa, viz., taxa that are faithful taxa of the association in the area of the association. Outside this area, however, they are also found in other, often related plant communities (Barkman 1958). In general, most of these taxa are faithful taxa of the alliance or of a unit of higher syntaxonomic level to which the association under consideration belongs. The regional association is distinguished from other associations belonging to the same unit of higher syntaxonomic level by the presence of at least two "decisive" regional differential taxa. The presence of these taxa can often be plausibly explained as being either of a historical-geographical or of a present climatological-edaphical nature. In this context the terms area-differential and habitat-differential taxa may be used. An area-differential taxon differentiates two vegetation units because the taxon is absent in the area of one of the units owing to historical-geographical factors. A habitat-differential taxon is found in the areas of both vegetation units but is restricted to one of these as a result of ecological factors.

The following example is an illustration of the above: The Phyllodoco–Salicetum callicarpaeae (p. 37) of Greenland belongs to the Phyllodoco–Myrtillion (p. 36) to which the scandinavian Phyllodoco–Vaccinietum myrtilli belongs also. The Greenlandic association has as regional faithful taxon *Phyllodoce coerulea,* which is also present in the Scandinavian association, and is considered as a faithful taxon of the alliance. As regional differential taxa the association contains two area-differential taxa, *Salix callicarpaea* and *Coptis trifolia,* which are absent in Scandinavia. Moreover, it

contains a number of habitat-differential taxa such as *Bartsia alpina* and *Polygonum viviparum,* which in Scandinavia show a strong preference to other syntaxa. As a consequence, most of the associations are regional associations ("Gebietsassoziationen") in the sense of Matuszkiewicz & Matuszkiewicz (1973).

Geographical variation within a regional association can be expressed in terms of geographical races (cf. Matuszkiewicz & Matuszkiewicz, 1973). These races can be recognized also by means of area-differential taxa. The chionophytic dwarf shrub communities of the west coast of Greenland that belong to the lowarctic, Greenlandic Phyllodoco-Salicetum callicarpaeae (p. 37, containing also *Salix callicarpaea, Coptis trifolia, Bartsia alpina,* and *Polygonum viviparum*) can be considered as a southwestern Greenlandic geographical race of this association by the presence of taxa such as *Cornus suecica, Carex deflexa* and *Ledum groenlandicum,* which are absent in Southeast Greenland (p. 41, Remarks on the Phyllodoco-Salicetum).

Occasionally, some vegetation types have been incorporated in validly described and commonly accepted associations, on a very poor floristic basis. Most of these have only one differential taxon, or they may even be characterized negatively. This applies mainly to widely distributed arcto-alpine associations with a fragmentary development in Greenland, and not having faithful and regional differential taxa. Most of these are found in extreme habitats (Polygono–Salicetum, p. 66, and the Empetro–Betuletum, p. 49).

Associations may be subdivided into subassociations, these into variants and these again into subvariants; these subunits can be distinguished by at least two differential taxa, except the subass. typicum and subass. inops (cf. Westhoff & Held, 1969) and the (sub) variant inops and the typical (sub) variant. A subassociation typicum does not have its own differential taxa, but contains only diagnostic taxa of the association; a subassociation inops only has a part of the diagnostic taxa of the association. An inops type is a depauperated form of the typical type.

If vegetation types cannot be assigned to associations, the name communities has been used. Some of these are subdivided into types by differential taxa. More often they can be assigned to syntaxa of higher syntaxonomic level. Associations and communities are grouped into alliances, and these into orders and classes.

Little attention was paid in Scandinavia to the classification of alliances into higher syntaxa. Generally, alliances were incorporated into orders described from middle Europe (e.g., Nordhagen, 1936, Kalliola, 1939). In this paper, alliances will be incorporated as far as possible into orders and classes, but in some cases this classification must be considered as a preliminary one. The naming and description of the syntaxa in this study follow the new version by "Moravec" (sept. 1979) of the "Code of Phytosociological Nomenclature" (Barkman et al. 1976). All communities are presented in Table 26.

The plant communities

Explanation

The present study is primarily a description of the composition of vegetation types and their local habitat in the Angmagssalik District. Some attention will be paid to distribution within and beyond the area. The nomenclature of the plants is in accordance with Böcher et al. (1966). For practical reasons the following abbrevations have been used in text and tables, except in Table 26: *Empetrum hermaphroditum* (= *E. nigrum* ssp. *hermaphroditum*), *Vaccinium microphyllum* (= *V. uliginosum* ssp. *microphyllum*), *Salix callicarpaea* (=*S. glauca* ssp. *callicarpaea*), *Juniperus nana*(=*J. communis* ssp. *nana*), *Huperzia arctica* (= *H. selago* ssp. *arctica*), *Angelica norvegica* (= *A. archangelica* ssp. *norvegica*), *Cerastium lanatum* (= *C. alpinum* ssp. *lanatum*), *Armeria sibirica* (= *A. scabra* ssp. *sibirica*), *Diapensia lapponica* (= *D. lapponica* ssp. *lapponica*), *Carex arctogena* (= *C. capitata* ssp. *arctogena*), *C. spaniocarpa* (= *C. supina* ssp. *spaniocarpa*), *Scirpus austriacus* (= *S. caespitosus* ssp. *austriacus*) and *C. capillaris* (= *C. capillaris* ssp. *capillaris*). The synoptic table (Tab. 26) containing all communities shows the complete name of all taxa and the author(s). The nomenclature of taxa which are absent in Greenland follows Hultén (1968), Lid (1963), or Oberdorfer (1970). All critical taxa are given with the name(s) of the author(s). The nomenclature of the mosses follows Nyholm (1954/1969), except for *Dicranum acutifolium* C. Jens. The nomenclature of the liverworts follows Schuster & Damsholt (1974), that of the lichens Hale & Culberson (1970).

The synoptic table (Tab. 26) contains the communities. For printing reasons Arabic figures have been used in Tables 25 and 26 in stead of the usual Roman figures. The ranges of cover values can be found in the separate tables, which are set up to show in the first place the faithful and differential taxa of the community, then the differential taxa of the subunits, and finally the other taxa, in order of decreasing presence. Nomenclatoric type records* of associations are marked △, of subassociations ( ).

In cases where it was not possible to judge the cover degree of a taxon in a relevé, only its presence was noted (×); a line under a cover degree notation of a taxon, in a relevé, e.g., $\underline{1}$, means that this taxon, together with another, also indicated with $\underline{1}$, has a cover degree of 1 in the same relevé. Taxa with low presence are not included in the tables.**

* Hereafter abbreviated NTR in the text.

** A full list of these taxa can be obtained from the author on request.

The faithful taxa of the higher syntaxonomic units, to which a community belongs, are mentioned in the chapter preceding the description of the plant community, in which the floristic composition, synecology and distribution of the units are briefly discussed.

Under synonyms (syn.) only valid names of syntaxa are presented. Under literature (lit.) other syntaxa/phytocoena are mentioned, which (partly) belong to the syntaxon/phytocoenon under consideration, or literature is mentioned, in which they are dealt with. Some remarks have been added on distribution and habitat.

Only the most conspicuous area types of the phytosociological area type spectra are mentioned. The relief was termed as follows. A slope of 0–2° = flat; 2–4° = slightly sloping; 4–8° = sloping; 8–15° = moderately steep; 15–30° = steep; and 30° and more = very steep. The acidity of the soil was defined as follows: pH 4.5, strongly acid; pH 4.5–5.5, moderately acid; pH 5.5–6.5, weakly acid; pH 6.5–7.5, neutral; and pH 7.5 or more, basic. In the terminology for the relations between plants or plant communities and environment, the neutral suffix -phytic has been preferred to -philous (cf. Barkman 1958).

Mire communities

This chapter deals with vegetation in areas where the ground water level is permanently high, where the vegetation is mainly affected by lack of oxygen in the root zone, and where organic material (peat) is often accumulated (Godwin 1941, 1956). Most of the soil types in these areas are histosols, fluvisols or gleysols.

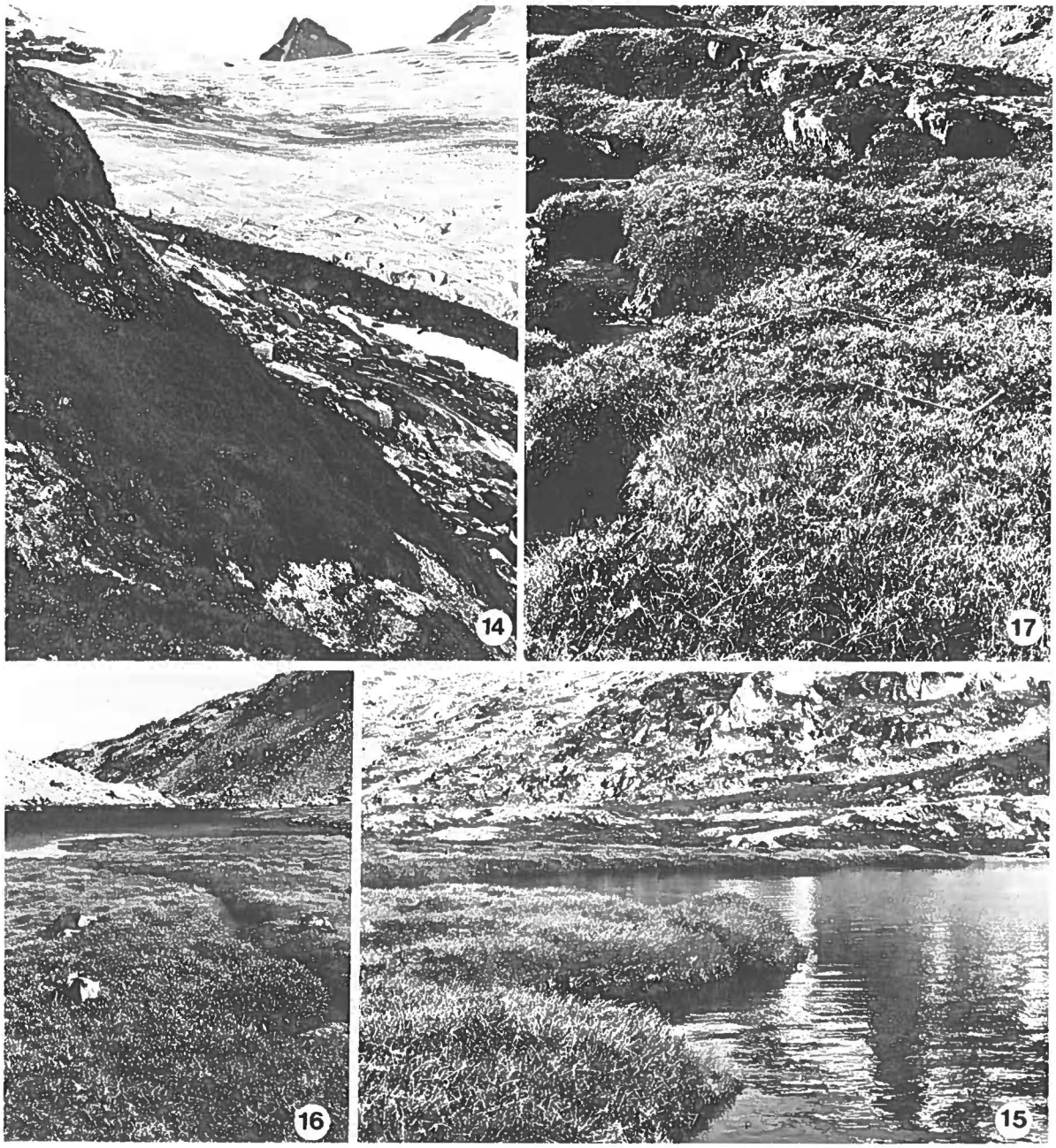
In the mire vegetation of the Angmagssalik District, dwarf shrubs are mostly absent. The communities were studied in detail by Molenaar (1976). The present author selected those mire communities that contained dwarf shrubs, locally found in small drier parts of the large mire complexes, on the banks of lake margins and slow running rivers and brooklets, and occasionally also higher in the mountains on slopes with a more or less permanent lateral water supply. The mire vegetation of the district is of the fen type (cf. Persson 1961).

The synecology and typology of the northern mire vegetation is a classical field of study in Scandinavia, particularly in Sweden and Finland. For a summary on this subject, the reader is referred to Molenaar (1976). In addition, some other papers can be mentioned. A review of the alpine mire vegetation of Scandinavia was given by Persson (1965). Other valuable contributions to the syntaxonomy of mire vegetations of more than local importance were presented by Moore (1968), Malmer (1968), Westhoff & Held (1969), Tüxen et al. (1972), Tüxen (1969), and Dierssen (1977). Molenaar (1976) distinguished four groups of mire communities in the Angmagssalik District: the Caricion bicolori–atrofuscae; the Campylio–Tomenthypnion, a new alliance which is placed together with the first alliance in the Tofieldietalia; the Caricion curto–nigrae (= Caricion fuscae), which is placed in the Caricetalia curto–nigrae (= Caricetalia fuscae); and a group of communities with *Sphagnum riparium* and/or *S. lindbergii,* which has not been placed in a unit of higher syntaxonomic level. The other three alliances are placed in the Parvocaricetea.

Also on the basis of additional data obtained during the fieldwork, a division is proposed into two classes, the Oxycocco–Sphagnetea and the Scheuchzerio–Caricetea. The latter comprises two orders in the District: the Tofieldietalia including at least two alliances, viz., the Caricion bicolori–atrofuscae and the Sphagno–Tomenthypnion, and the Caricetalia fuscae (= Caricetalia nigrae) including one alliance, the Caricion fuscae (= Caricion curto–nigrae). Apart from the *Sphagnum rubellum–Vaccinium microphyllum* community (p. 20), which shows a certain relationship to the Oxycocco–Sphagnetea and therefore is assigned to this class, and possibly also the *Vaccinium microphyllum–Carex rariflora–Sphagnum fuscum* community (p. 23), all other communities are placed in one class, the Scheuchzerio–Caricetea fuscae. In middle Europe this class comprises communities found in hollows of raised bogs and intermediate fens, in the "lagg" zone and in the oligotrophic and comperatively eutrophic pools, and in marshes. In northern Europe, Iceland and Greenland, the class also contains communities on predominantly wet mineral soils. The class comprises three orders: the oligotrafent Scheuchzerietalia palustris Nordh. 1936 and the meso–eutrafent orders of the Caricetalia fuscae and the Tofieldietalia.

All mire communities of the Angmagssalik District except the *Vaccinium microphyllum–Sphagnum rubellum* community are shown in Table 23. This table, however, contains only the faithful and most important differential taxa of syntaxa belonging to the S–Caricetea, and it clearly shows the possibility to distinguish the Caricion bicolori–atrofuscae Nordh. 1936, a differentiation correctly made by Molenaar (1976) on the strength of his own data (Tab. 23, ref. 3–9). The Caricion bicolori–atrofuscae Nordh. 1936 is, however, invalid; but the alliance is accepted here and should be correctly named Caricion bicolori–atrofuscae Nordh. 1936 ex Daniëls (nomenclatoric type association Junco–Caricetum bicoloris De Mol. 1976).

This alliance covers eutrafent, calciphytic (occasionally alkaliphytic) and basiphytic communities hardly forming peat. They occur on flat to slightly sloping mineral soils affected by moving water, and with oxidizing conditions in the rhizosphere. Even in the field the alliance can easily be recognized, at least in the present district, where it is restricted to slightly calcareous deltas at the head of fiords in the interior. The alliance is characterized by a group of arcto-alpine taxa, particularly Juncaceae. Many of the mosses are acrocarpous and calciphytic. Faithful or differential taxa in the district are: *Juncus biglumis, J. castaneus, J.*



Figs 14–17: **14.** *Sphagnum rubellum–Vaccinium microphyllum* community, loc. 5.5. Tab. 1, ref. 2, August 1969. **15.** Communities of the Complex of *Vaccinium microphyllum–Carex rariflora* communities along a lake margin, loc. 4, 21 July 1969. **16.** *Comarum palustre–Salix callicarpaea* community, loc. 1.2, July 1968. **17.** Sphagno–Salicetum callicarpaeae, loc. 6.1. Tab. 4, ref. 1, July 1969.

arcticus, Bryum pseudotriquetrum, Catoscopium nigritum, Distichium inclinatum s.l. (incl. *D. cappillacium*), *Angstroemia longipes, Carex bicolor, C. microglochin, C. rufina, Leptobryum pyriforme* and *Drepanocladus revolvens.*

The following communities belong to the alliance: the *Juncus castaneus–Juncus biglumis* community (Molenaar (1976, tab. V: 1–3; this paper Tab. 23, ref. 5), the Junco–Caricetum bicoloris De Mol. 1976 (Molenaar 1.c., tab. V: 4–8; this paper Tab. 23, ref. 6), the Caricetum microglochinis Nordh. (1928) 1943 (Molenaar 1.c., tab. V: 9–11; this paper Tab. 23, ref. 7) and the Equiseto–Caricetum rariflorae De Mol. 1976 (Molenaar 1.c., tab. VI: 1–5; this paper Tab. 23, ref. 8). The

Pohlio–Caricetum rufinae De Mol. 1976 (Molenaar 1976, tab. XXVI: 1–11; this paper Tab. 23, ref. 3 and 4), however, also belongs to the Caricion bicolori–atrofuscae. This association was placed, with some reservation, by Molenaar (1.c.) in the Calamagrostion neglectae Nordh. 1936, mainly for ecological reasons. This comparatively little known and heterotone alliance was incorporated in the Thlaspietea rotundifoliae. The Drepanoclado–Campylietum stellatae De Mol. 1976 (Molenaar 1976, tab. VI: 6–7; this paper Tab. 23, ref. 9) also, in my opinion, belongs to the Caricion bicolori–atrofuscae. This association was considered by Molenaar (1976) to belong to the new Campylio–Tomenthypnion De Mol. 1976.

The following taxa are considered as faithful taxa of the Campylio–Tomenthypnion: *Carex chordorrhiza, C. heleonastes, C. saxatilis, Scirpus hudsonianus, S. caespitosus* ssp. *austriacus, Eriophorum medium, Tomenthypnum nitens, Aulacomnium palustre, Campylium stellatum, Drepanocladus revolvens* and *D. vernicosus.* The alliance is further subdivided by Molenaar (1.c.) into two suballiances: the Campylio–Drepanocladion De Mol. 1976, on wet habitats, with the faithful taxa *Campylium stellatum* and *Drepanocladus revolvens,* and the Sphagno–Tomenthypnion (Dahl 1957) De Mol. 1976 stat. nov., on drier habitats, with the faithful taxa *Sphagnum warnstorfii, Aulacomnium palustre, Tomenthypnum nitens* and *Pedicularis oederi.*

The proposal for a new alliance, the Campylio–Tomenthypnion, by Molenaar (1976) is not relevant in my opinion for the Angmagssalik District and is rejected. None of the higher plants, considered faithful of the Campylio–Tomenthypnion by Molenaar (1976) is actually faithful in the district. Most of them are absent, others such as *Carex saxatilis* and *Scirpus caespitosus* ssp. *austriacus* are indeed faithful taxa of the Caricion fuscae (see Tab. 23; also Molenaar 1.c., tab. VII: 13–14, the *Drepanocladus–Carex saxatilis* sociation in which *Carex saxatilis* has cover values of 5 and 6 respectively. This sociation rightly belongs to the Caricion fuscae, in which it has been placed also by Molenaar).

Campylium stellatum, however, is also a questionable faithful taxon. This species has the highest cover values (1, 1, 6, 6 and 6) in the Equiseto–Caricetum rariflorae De Mol. 1976 (Molenaar 1976, tab. VI: 1–5; this paper Tab. 23, ref. 8), and this association is correctly placed by Molenaar (1.c.) in the Caricion bicolori–atrofuscae Nordh. 1936. In the Angmagssalik District, *Campylium stellatum* is consequently a good faithful taxon of the Tofieldietalia. It is true that the Drepanoclado–Campylietum stellatae De Mol. 1976 (Molenaar 1976, tab. VI: 6–7; this paper Tab. 23, ref. 9), which is placed by Molenaar in the suballiance Campylio–Drepanocladion belonging to the Campylio–Tomenthypnion, contains *Drepanocladus revolvens* as faithful species with a high cover value. On the strength of the presence of the taxa *Campylium stellatum, Bryum pseudotriquetrum* and *Equisetum variegatum,* it is logical to incorporate this association also in the Caricion, as done here on the basis of the total floristic composition. As a consequence, *Drepanocladus revolvens* is considered as faithful taxon of the Caricion bicolori–atrofuscae (see Tab. 23). The Drepanoclado–Campylietum stellatae can probably be better incorporated in the Equiseto–Caricetum rariflorae.

According to Molenaar (1976), the *Carex rariflora–Philonotis tomentella–Paludella* community (Molenaar 1976, tab. VII: 1–2; this paper Tab. 23, ref. 13) and the *Tomenthypnum nitens–Paludella squarrosa* community Molenaar 1976, tab. VII: 3; this paper Tab. 23, ref. 14) belong to the Sphagno–Tomenthypnion. The former community, however, does not contain any faithful taxa of this (sub)alliance, the latter only *Tomenthypnum nitens.* In both communities *Paludella squarrosa* has high cover values (5 and 6). This species is faithful of the Caricion fuscae (Tab. 23; also Molenaar 1976 and Dahl et al. 1971). In my opinion, the *Carex–Philonotis–Paludella* community takes an intermediate position between the Tofieldietalia and the Caricion fuscae; the *Carex–Tomenthypnum–Paludella* community is considered as intermediate between the Caricion fuscae and the Sphagno–Tomenthypnion. The latter will be considered as second alliance within the Tofieldietalia. This alliance was first described by Dahl (1957) from Rondane, southern Norway, and as such discussed also by Persson (1961, 1965), because it is difficult to distinguish from the Caricion atrofuscae–saxatilis Nordh. 1943 in northern Scandinavia. In the Angmagssalik District, the alliance can be easily recognized and, just as in Rondane, it can be well distinguished from the so-called rich fen vegetation, i.e., the Caricion bicolori–atrofuscae Nordh. 1936 ex Daniëls.

The Sphagno–Salicetum callicarpaeae ass. nov. (p. 25) belongs to the Sphagno–Tomenthypnion (Tab. 23, ref. 10). The syntaxonomic status of two mire communities that are rather rich in dwarf shrubs and both occurring on comparatively dry soils, viz., the Rhododendro–Vaccinietum ass. nov. (p. 26; Tab. 23, ref. 1 and 2) and the Pediculari–Vaccinietum ass. nov. (p. 28; Tab. 23, ref. 11 and 12) is not completely clear. The first association probably belongs to an alliance within the Tofieldietalia. The Pediculari–Vaccinietum is placed in the Scheuchzerio–Caricetea, because many of its species, viz., *Aulacomnium turgidum, A. palustre, Tomenthypnum nitens, Sphagnum warnstorfii, S. teres, Calliergon stramineum,* show some preference for this class, but particularly because of the absence of taxa with their main occurrence in other syntaxa not belonging to this class.

All other mire communities of the district can be grouped in the Caricion fuscae (Tab. 23, ref. 15–35; p. 21). This alliance also includes the communities with *Sphagnum riparium/lindbergii* (Molenaar 1976, tab. XI: 1–9; this paper Tab. 23, ref. 25, 26, 34), which were not assigned by Molenaar to a unit of higher syntaxonomic level. As many faithful taxa of the class and the

Caricion fuscae are found in these communities, they have now been placed in this alliance. The Calamagrosto–Ditrichetum De Mol. 1976 (Molenaar 1976, tab. XXVII: 1–7; this paper Tab. 23, ref. 33), which is placed by Molenaar in the "ecological" Calamagrostion Nordh. 1936, belongs also to the Caricion fuscae.

Class Oxycocco–Sphagnetea Br.–Bl. et R.Tx. 1943

This class comprises communities from the drier parts of ombrotrophic mires (bogs) and some floristically related dwarf shrub communities on peaty soils ("wet heath communities") (e.g., Moore 1968, Westhoff & Held 1969, Tüxen et al. 1972, Oberdorfer 1977). Faithful taxa are: *Oxycoccus palustris, Andromeda polifolia, Sphagnum tenellum, S. rubellum, S. magellanicum, S. subnitens, Drosera rotundifolia, Scirpus casespitosus, Cephalozia connivens, C. macrostachya, Carex pauciflora* and *Calypogeia sphagnicola* (Tüxen et al. 1972). The class has a circumpolar distribution and is predominantly present in cool, humid atlantic, boreal and montane regions.

Moderately humid climate or locally permanent high humidity, warmth and a sufficiently long vegetation period, and poor soil conditions are, in combination, the essential prerequisites for bog formation (Ellenberg 1978) and as such for the development of bog communities. As these conditions are normally not present in arctic areas, bogs do not occur and the Oxycocco–Sphagnetea is hardly of any importance.

Sphagnum rubellum–Vaccinium microphyllum community (Tab. 1, ref. 1–3; Tab. 26, ref. 1; Fig. 14).

Composition and physiognomy: Characteristic taxa are *Sphagnum rubellum* (3/3,* 4/6•) and *Calypogeia sphagnicola* (2/3, +/1). Other constant taxa are *Vaccinium microphyllum* (3/3, 3/5), *Empetrum hermaphroditum* (3/3, +/5), *Aulacomnium palustre* (3/3, +/1), *Polygonum viviparum* (2/3, +) and *Calliergon stramineum* (2/3, +). The community is stratified, with two well developed layers. The field layer is 10 cm higher than the 8 cm high moss layer. The aspect of the community is determined by the red mat of Sphagna overgrown by dwarf shrubs. The species number varies from 10 to 14. As such it is a species poor community.

Habitat and distribution: The community may be characterized as strongly acidophytic, oligo- to weakly mesotrafent, minerotrafent, strongly hygrophytic and moderately chionophytic. Superficially, the community seems to be located in rather different habitats. The stands of records 1 and 2 are situated on very steep southwestern slopes of 30° and 40°, at 50 m and 490 m respectively. The soil consists of a thick moss carpet of about 25/30 cm on solid rock and debris with a permanent lateral water supply. The bedrock is grey gneiss.

* presence/number of records. • range of cover values.

Table 1. *Sphagnum rubellum–Vaccinium microphyllum* community.

Analysis no.	Distribution type	69 190	69 202	69 119	Presence	Range of cover values
Reference no.		1	2	3		
Sample plot surface in m2		21/4	21/4	1		
Total cover %		100	100	100		
Cover % of dwarfshrubs		(100	65	65		
Cover % of herbs		(1	(1	(1		
Cover % of mosses/lichens		(50	90	80		
Cover % of mosses		(50	90	80		
Cover % of lichens		(1	–	–		
Altitude a.s.l. in m		50	490	60		
Direction of exposure		SW	SSW	E		
Slope		40	30	0/5		
Number of taxa		14	14	10		
pH of rhizosphere		4½	4	.		
Locality		9	5.5	4		
Constant taxa:						
Vaccinium microphyllum	LM	4/5	3/4	5	3	3/5
Empetrum hermaphroditum	LM	4/5	3/4	+	3	+/5
Sphagnum rubellum		4	6	6	3	4/6
Aulacomnium palustre		1	1	+	3	+/1
Calypogeia sphagnicola		+	1	.	2	+/1
Polygonum viviparum	AM	.	+	+	2	+
Calliergon stramineum		.	+	+	2	+
Other taxa:						
Pohlia nutans		+	.	.	1	+
Peltigera scabrosa		+	.	.	1	+
Cladina rangiferina		+	.	.	1	+
Peltigera aphthosa		+	.	.	1	+
Listera cordata	BL	+	.	.	1	+
Betula nana	LM	3	.	.	1	3
Tofieldia pusilla	LM	+	.	.	1	+
Potentilla tridentata	LO	+	.	.	1	+
Aulacomnium turgidum		+	.	.	1	+
Salix herbacea	LO	.	2	.	1	2
Lophozia ventricosa		.	+	.	1	+
Cephalozia bituspidata		.	+	.	1	+
Cephaloziella spec.		.	+	.	1	+
Lophozia alpestris		.	+	.	1	+
Carex bigelowii	LM	.	+	.	1	+
Gymnocolea inflata		.	+	.	1	+
Salix callicarpaea	LM	.	.	+	1	+
Drepanocladus uncinatus		.	.	+	1	+
Polytrichum juniperum		.	.	+	1	+
Sphagnum spec.		.	.	+	1	+

Record 3 was made in a stand located in a slow running brooklet; a floating *Sphagnum* carpet extended 20 cm from the bank. Exposure is east, altitude is 60 m. a.s.l. The soil on which the *Sphagnum rubellum–Vaccinium microphyllum* community is found is a histosol consisting of *Sphagnum* peat (the soil actually is a Sphagnofibrist, cf. Soil Survey Staff 1975). The soil is moist to wet, and acid. In winter the community is probably covered with permanent but thin snow, which disappears rather early (in May).

The community was only found inland, in a very few places. In the phytosociological area type spectrum, the LM distribution type strongly dominates. The community is rather uncommon in the district, and also elsewhere in Greenland, because closely related communities are to my knowledge not mentioned in the literature on Greenland.

Class Scheuchzerio–Caricetea fuscae R. Tx. 1937

Syn. Scheuchzerietea Den Held, Barkman et Westhoff, 1969, Parvocaricetea Den Held et Westhoff 1969.

Lit.: Scheuchzerieto–Caricetales fuscae Tx. 1937, see also Molenaar (1976).

This class comprises communities from the hollows in bogs and intermediate mires, from the lagg zone, and from oligotrophic–eutrophic pools and marshes. Most of these communities are moss-rich, minerotrafent, oligo-/eutrafent, acidophytic–basiphytic, occasionally

calciphytic communities of wet, commonly peaty but sometimes also mainly mineral soils with stagnant or fluctuating high ground water. The class covers the Eurosiberian region. Faithful taxa are *Carex nigra, C. rariflora, C. dioica, Eriophorum angustifolium, Juncus triglumis, J. arcticus, J. castaneus, Pedicularis palustris, P. sceptrum–carolinum, Menyanthes trifoliata, Comarum palustre, Calamagrostis neglecta, Hydrocotyle vulgaris, Equisetum variegatum, Calliergon cordifolium, Drepanocladus revolvens, D. exannulatus, D. sendtneri, Sphagnum subsecundum, Tomenthypnum nitens* (Westhoff & Held 1969, Braun–Blanquet 1971, Oberdorfer 1977, Ellenberg 1978). Some of these taxa are also faithful of lower syntaxa in the same class in the Angmagssalik District. *Carex rariflora, Eriophorum scheuchzeri* and *Calamagrostis neglecta* are faithful taxa of this class (Tab. 23).

Following Braun–Blanquet (1971) and Oberdorfer (1977), three orders are distinguished within the class, two of which occur in the Angmagssalik District viz., the Caricetalia fuscae Koch 1926 em. R. Tx. 1937 and the Tofieldietalia Preising in Oberdorfer 1950.

Order Caricetalia fuscae W. Koch 1926 em. R. Tx. 1937.

Lit.: See Westhoff & Held (1969). Non Caricetalia nigrae Dahl 1957 (nom. illeg.). For details, see below.

Alliance Caricion fuscae W. Koch 1926 em. Klika 1934 (Tab. 23, ref. 15–35).

Syn.: Eriophorion scheuchzeri Hadač 1939, Caricion canescentis–fuscae Dahl 1957.
Lit.: See also Molenaar (1976). Caricion canescentis–goodenowii Nordh. 1936, Caricion canescentis Kalliola 1939 (nomina invalida); Caricion curto-nigrae W. Koch 1926 em. Nordh. 1936.
Remark: The Calamagrosto–Ditrichetum De Mol. 1976 and the *Sphagnum lindbergii/Sphagnum riparium* complex (Molenaar 1976) are included in this alliance.

This alliance covers oligotrafent to eutrafent, mostly mesotrafent, non calciphytic, acidophytic to neutrophytic, hygrophytic to hydrophytic widely distributed arcto-alpine communities characteristic of localities with running water, in so-called intermediate fens where the water contains a minor amount of dissolved electrolytes (Sjörs 1946, 1952), or in flooded places along springs, rivulets, brooks and lakes. The alliance is characterized by the absence of calcicolous indicators (Nordhagen 1943: 482) and by the presence of indicator taxa of oxygen–rich surface water (mainly pleurocarpous bryophytes; cf. Dahl 1957: 216); sometimes sulfide originates deeper in the organic substrate. The soil is a histosol or it is of the mineral type.

In Scandinavia many shrubforming willows are present in the communities of the alliance, particularly *Salix glauca* (not ssp. *callicarpaea* = *S. callicarpaea,* which is absent on the mainland of Scandinavia, Røer & Elven 1975), *S. lapponum, S. phylicifolia* and *S. lanata* (e.g., Persson 1965, Dahl et al. 1971). Faithful taxa are mentioned by, e.g., Braun–Blanquet (1948a, 1971), Westhoff & Held (1969) and Oberdorfer (1977). In northern and alpine areas the following taxa are considered as faithful of the alliance: *Eriophorum scheuchzeri, Calliergon sarmentosum, C. stramineum, Drepanocladus badius, D. exannulatus, Sphagnum teres, Paludella squarrosa* (Nordhagen 1943, Dahl 1957, Persson 1965, Dahl et al. 1971, Molenaar 1976). In the Angmagssalik District *Comarum palustre, Carex saxatilis* and *Scirpus caespitosus* ssp. *austriacus* are faithful also (Tab. 23). Differential taxa of the alliance with regard to the Caricion bicolori – atrofuscae and the Sphagno–Tomenthypnion (both Tofieldietalia) are, e.g., *Salix herbacea, Polytrichum commune, Pleuroclada albescens* and *Oncophorus wahlenbergii.*

In the following chapters, the communities dominated by dwarf shrubs are dealt with. These communities occur in comparatively drier habitats, than the other Caricion fuscae communities, which were described in detail by Molenaar (1976).

Complex of *Vaccinium microphyllum – Carex rariflora* communities. (Tab. 2, ref. 1–10; Tab. 23, ref. 29–32, 35; Tab. 26, ref. 2–6; Fig. 15).

General remarks: As *Vaccinium microphyllum* and *Carex rariflora* are widely distributed in the lower and middle parts of the Arctic (LM distribution type), communities of this complex can be expected to occur in the fen vegetation of this region (Hultén 1968).

Böcher (1954: 287) mentions, from the west coast of Greenland ("Menyanthes Lake", Hassell Fjeld at Søndre Strømfjord) a *Betula nana – Vaccinium microphyllum – Aulacomnium* sociation with *Carex rariflora* as subdominant species. *Empetrum hermaphroditum – Vaccinium microphyllum – Oxycoccus quadripetalus microphyllus – Carex rariflora – Sphagnum girgensohnii* sociations were reported from Nuerssorfiarqap avangnatunga (Böcher 1963, tab. 30: 11–15), *Vaccinium uliginosum* (= *V.u.* ssp. *microphyllum*) – *Carex rariflora* communities from Iceland by Mølholm Hansen (1930) and Steindórsson (1945, 1964a).

Composition and physiognomy: This complex is characterized by the combination of the constant taxa *Vaccinium microphyllum* (V 4/6), *Salix herbacea* (V +/4), *Empetrum hermaphroditum* (IV +/4)), *Carex bigelowii* (IV +/3), *C. rariflora* (V +/4), *Calliergon stramineum* (V +) and *Sphagnum teres* (IV +/4). It contains closed, two layered communities, generally with a well developed moss layer from 1 to 6 cm high and a field layer, which covers 55 to nearly 100% and rises up to 20 cm above the moss layer. The biomass of the field layer above the ground is concentrated close to the moss layer and consists mainly of dwarf shrubs. Stems and inflorescences of herbs are higher than the moss layer. Although the general aspect may be different, the dwarf shrubs remain dominant.

Table 2. Complex of *Vaccinium microphyllum–Carex rariflora* communities.

Analysis no.		69	69	68	69	68	68	68	68	69	69					
		157	158	165	110	194	149	148	172	111	112					
Reference no.		1	2	3	4	5	6	7	8	9	10	1/2	3	4	5/8	9/10
Sample plot surface in m2		1	½	6	1	4	3	3	9	1	1					
Total cover %		100	100	100	100	100	100	100	100	100	100					
Cover % of dwarfshrubs		80	70	95	70	50	60	70	(80	50	50					
Cover % of herbs		25	30	30	10	15	25	30	(25	5	(8					
Cover % of mosses/lichens		(25	(5	20	50	55	60	30	80	(90	(85					
Cover % of mosses		(25	(5	(20	(50	55	60	(30	80	(90	(85					
Cover % of lichens		–	–	(1	(5	(1	(1	(1	(5	(1	(1					
Altitude a.s.l. in m		35	35	25	15	60	15	15	25	15	15					
Direction of exposure		–	N	–	–	SE	–	–	SW	0/2 S	0/2 S					
Slope		–	5	–	–	1	–	–	5							
pH rhizosphere		5½	5½	5	4½	4½	5	5	4½	4	5					
level of groundwater in -cm below surface of mosslayer		37	35	.	30	27	20	20	20	35	20					
Number of taxa		11	11	17	26	22	24	22	24	10	15					
Locality		7	7	3	4	1.1	3	3	3	4	4					
Constant taxa:																
Vaccinium microphyllum	LM	6	5	5	4	4	5	5	5	4/5	4	$2^{5}/6$	1 5	1 4	$4^{4}/5$	$2^{4}/5$
Carex rariflora	LM	4	3	+	2	1	3	+/1	2	1	2	$2^{3}/4$	1 +	1 2	$4^{+}/3$	$2^{1}/2$
Salix herbacea	LO	1	1	3/4	+	1	+	+	+	+	+	2 1	1 4	1 +	$4^{+}/1$	2 +
Calliergon stramineum		+	+	+	+	+	+	+	+	.	+	2 +	1 +	1 +	4^{+} +	1 +
Carex bigelowii	LM	.	+	2	+	.	1	+	3	1	1	1 +	1 2	1 +	$3^{+}/3$	2 1
Empetrum hermaphroditum	LM	.	.	+	4	+	+	1	1	+	1	.	1 +	1 4	$4^{3}/1$	$2^{+}/1$
Sphagnum teres		+	+	1	+	4	4	3	4	.	.	2 +	1 1	1 +	$4^{2}/4$	.
Differential taxa:																
Equisetum arvense	BW	+	1	.	.	.	.	.	.	.	.	$2^{*}/1$	.	.	.	.
Nardia geoscyphus		+	+	.	.	.	.	.	.	.	.	2 +	.	.	.	.
Polytrichum alpinum		.	.	+	.	.	.	.	.	.	.	.	1 +	.	.	.
Mnium cinclidioides		.	.	+	.	.	.	.	.	.	.	.	1 +	.	.	.
Kiaeria glacialis		.	.	+	.	.	.	.	.	.	.	.	1 +	.	.	.
Salix callicarpaea	LM	.	.	1	.	.	.	.	.	.	.	.	1 1	.	.	.
Dicranum elongatum		.	.	.	3	.	.	.	.	.	.	.	.	1 3	.	.
Cladonia bellidiflora		.	.	.	+	.	.	.	.	.	.	.	.	1 +	.	.
Cladonia crispata		.	.	.	+	.	.	.	.	.	.	.	.	1 +	.	.
Cetraria ericetorum		.	.	.	+	.	.	.	.	.	.	.	.	1 +	.	.
Sphagnum nemoreum		.	.	.	+	.	.	.	.	.	.	.	.	1 +	.	.
Tritomaria quinquedentata		.	.	.	+	.	.	.	.	.	.	.	.	1 +	.	.
Sphagnum warnstorfii		.	.	.	.	4	4	3	4	+	.	.	.	.	$4^{3}/4$	1 +
Aulacomnium palustre		.	.	.	.	1	+	2	3	.	.	.	.	.	$4^{+}/3$	.
Peltigera aphthosa		.	.	.	.	+	+	.	+	.	.	.	.	.	3 +	.
Pinguicula vulgaris	BW	.	.	.	.	.	+	+	+	.	.	.	.	.	3 +	.
Paludella squarrosa		.	.	.	.	.	+	+	.	.	.	.	.	.	2 +	.
Carex saxatilis	LM	.	.	.	.	.	.	+	+	.	.	.	.	.	2 +	.
Lophozia alpestris		.	.	.	.	+	+	.	.	.	.	.	.	.	2 +	.
Sphagnum fuscum		.	.	.	.	.	.	.	.	6	5	.	.	.	.	$2^{5}/6$
Other taxa:																
Polygonum viviparum	AM	.	.	2	+	1	+	+	.	+	.		1 2	1 +	$3^{+}/1$	1 +
Drepanocladus uncinatus		2	+	3	+	+	.	1	.	.	.	$2^{1}/2$	1 3	1 +	$2^{+}/1$	.
Pleuroclada albescens		2	+	.	+	.	+	.	+	.	.	$2^{1}/2$	.	1 +	2 +	.
Oncophorus wahlenbergii		+	.	+	.	+	+	+	+	.	.	1 +	1 +	.	4^{+}	.
Polytrichum juniperinum		.	.	.	2	1	.	.	+	+	+	.	.	1 2	$2^{+}/1$	2 +
Peltigera scabrosa		.	.	.	1	+	.	.	1	.	+	.	.	1 1	$2^{+}/1$	1 +
Pohlia nutans		.	.	.	+	+	+	.	+	.	.	.	.	1 +	3 +	.
Betula nana	LM	.	.	.	.	.	+	2	3	.	+	.	.	.	$3^{+}/3$	1 +
Dicranum fuscescens		.	.	.	3	1	.	.	.	.	+	.	.	1 3	1 1	1 +
Cladina mitis		.	.	.	r	.	+	.	.	r	.	.	.	1 r	1 +	1 r
Lophozia ventricosa		.	.	.	.	+	.	.	+	.	+	.	.	.	2 +	1 +
Mylia anomala		.	.	.	1	.	.	.	.	.	+	.	.	1 1	.	1 +
Cladina rangiferina		.	.	.	+	.	.	.	+	.	.	.	.	1 +	1 +	.
Cladonia ecmocyna		.	.	.	+	.	+	.	.	.	.	.	.	1 +	1 +	.
Cephalozia spec.		.	.	.	+	.	.	+	.	.	.	.	.	1 +	1 +	.
Cephaloziella spec.		.	.	.	+	.	.	.	+	.	.	.	.	1 +	1 +	.
Dicranum scoparium		.	.	+	.	.	3	.	3	.	.	.	1 +	.	2 3	.
Polytrichum commune		+	.	.	.	.	+	.	.	.	.	1 +	.	.	1 +	.

Presence
Range of cover values

Habitat and distribution: The complex can be characterized as strongly to moderately acidophytic, preponderantly mesotrafent, minerotrafent, meso-to strongly hygrophytic and moderately chionophytic. It contains typical "mire margin" communities. These communities are locally found in slightly drier places than those occupied by the surrounding "wetter" mire communities dominated by mosses and/or graminoids. The altitude is less than 100 m, the relief is flat to slightly sloping. Soils are gleysols, but more often histosols of at least 25 cm thick overlaying debris. Nearly always, ground water was found at less than 40 cm depth. The ground water is stagnant, vertically fluctuating. The communities were found both on the coast and inland. In the phytosociological area type spectrum of the complex the LM type is dominating.

Vaccinium microphyllum–Carex rariflora–Equisetum arvense community. (Tab. 2, ref. 1–2; Tab. 23, ref. 29; Tab. 26, ref. 6).

Composition and physiognomy: Differential taxa are *Equisetum arvense* (2/2 +/1) and *Nardia geoscyphus* (2/2 +). Dwarf shrubs and graminoids determine the aspect of this species-poor community. The vegetation is low, the moss layer is 1 cm high, the field layer is up to 10 cm.

Habitat and distribution: within the complex these communities can be characterized as moderately acidophytic, mesotrafent and rather strongly chionophytic. The community is found in the outermost marginal zone of a mire complex adjoining a broad, shallow, slow-running river, which serves as overflow for the extensive mire complex in Ilivnera (loc. 7) towards the Sermilik at Nûk. It occurs on the higher but sheltered parts.

The soil type is an acid gleysol with oxydation-reduction phenomena at –10 cm. Ground water was measured at –35 cm in summer when the soil dries up at the surface. Because of the sheltered situation, snow cover is probably persistent, as reflected in the low vegetation and the presence of chionophytic liverworts such as *Nardia geoscyphus* and *Pleuroclada albescens.*

Vaccinium microphyllum – Carex rariflora – Salix callicarpaea community. (Tab. 2, ref. 3; Tab. 23, ref. 30; Tab. 26, ref. 5).

Composition and physiognomy: Differential taxa are *Salix callicarpaea* (1/1 1), *Mnium cinclidioides* (1/1 +), *Kiaeria glacialis* (1/1 +) and *Polytrichum alpinum* (1/1 +). Dwarf shrubs and pleurocarpous mosses determine the aspect of the community. The moss layer covers 20% and is 3 cm high; the overlying field layer is closed and up to 16 cm high.

Habitat and distribution: Found at Nagtivit (loc. 3), 25 m a.s.l., along a ditch, covering about 10 m^2. The soil is a histosol (sphagnofibrist), 25 cm thick, overlying debris. Ground water was absent, but in spring it is probably present just below the surface, probably moving laterally.

Vaccinium microphyllum – Carex rariflora – Dicranum community. (Tab. 2, ref. 4; Tab. 23, ref. 31; Tab. 26, ref. 4).

Composition and physiognomy: Differential taxa are *Dicranum elongatum* (1/1 3), *Cladonia bellidiflora* (1/1 +), *C. crispata* (1/1 +), *Cetraria ericetorum* (1/1 +), *Sphagnum nemoreum* (1/1 +) and *Tritomaria quinquedentata* (1/1 +). The community is rather rich in taxa (26 species). The aspect is determined by dwarf shrubs and acrocarpous mosses. The moss layer is well developed and 4 cm high, the field layer occupies 75% and reaches up to 12 cm above the moss layer.

Habitat and distribution: the community is found on a small 30 cm high extension of the shore, of a large, shallow lake with clean oligotrophic water that belongs to a large mire complex, 15 m a.s.l., in Torssukâtak (loc. 4; Fig. 15). The soil is a histosol (sphagnofibrist), consisting of 40 cm peat overlying debris. Ground water was observed at –30 cm. The uppermost soil dries out due to wind exposure. Probably as a result of these conditions, fruticose lichens are present also. The community is rather mesophytic.

Vaccinium microphyllum –Carex rariflora – Sphagnum warnstorfii community. (Tab. 2, ref. 5–8; Tab. 23, ref. 32; Tab. 26, ref. 3).

Composition and physiognomy: Differential taxa are *Sphagnum warnstorfii* (4/4 3/4), *Aulacomnium palustre* (4/4 +/3), *Peltigera aphthosa* (3/4 +), *Pinguicula vulgaris* (3/4 +), *Paludella squarrosa* (2/4 +), *Carex saxatilis* (2/4 +) and *Lophozia alpestris* (2/4 +). The community is rich in species (22-24 per record). The aspect of the community is determined by dwarf shrubs and Sphagna. The moss layer covers 30 to 80% and is 2 to 4 cm high. The field layer is 20 cm higher than the moss layer and covers 55 to 85%.

Habitat and distribution: Found only at the coast, near Blomsterdalen (loc. 1.2) and Nagtivit (loc. 3). In Blomsterdalen, locally on small ridges in a varied and relief-rich mire complex with depressions with stagnant, but laterally moving ground water. In Nagtivit along the shore of a shallow clean-water lake, and in a slightly sloping place below a plateau with stagnant water. The soils are histosols (sphagnofibrists), at least 25 cm thick, overlying debris. The soils are wet; ground water was found at less than 27 cm depth. In comparison with the other communities of the complex, the present one can be characterized as moderately acidophytic and strongly hygrophytic.

Vaccinium microphyllum – Carex rariflora – Sphagnum fuscum community. (Tab. 2, ref. 9–10; Tab. 23, ref. 35; Tab. 26, ref. 2).

Composition and physiognomy: Characteristic and differential species is *Sphagnum fuscum* (2/2 5/6). *Sphagnum teres* is absent. The community is poor in taxa (10–15 species). The moss layer is nearly closed and 6 cm high; the field layer is open and up to 20 cm high. Dwarf shrubs and Sphagna determine the aspect of the community.

Habitat and distribution: Locally the community is found in a narrow zone, about 2 m wide, bordering a shallow lake containing clean, probably oligotrophic water. On the land side the vegetation borders a depression at the foot of a dry and higher plateau covered mainly with *Empetrum hermaphroditum* and *Vaccinium microphyllum.* The depression might be considered as a lagg zone. Exposure is south; altitude 15 m. The soil is a histosol (sphagnofibrist), 35–40 cm thick, overlaying coarse debris. The ground water table was found at –35 and –20 cm; the pH varies from 4 to 5.

Comarum palustre – Salix callicarpaea community. (Tab. 3, ref. 1–5; Tab. 23, ref. 27–28; Tab. 26, ref. 7–8; Fig. 16).

Composition and physiognomy: The community is characterized by the combination of *Comarum palustre* (V 1/3) and *Salix callicarpaea* (V 6). Other constant

Table 3. *Comarum palustre–Salix callicarpaea* community.

Analysis no.	Distribution type	69 114	68 196	68 80	68 195	68 203	Presence	Range of cover values
Reference no.		1	2	3	4	5		
Sample plot surface in m2		1	9	4	9	6		
Total cover %		100	(100	95	(100	(100		
Cover % of dwarfshrubs		90	80	95	80	90		
Cover % of herbs		15	35	(2	5	15		
Cover % of mosses/lichens		-	(1	-	(20	10		
Cover % of mosses		-	(1	-	(20	(10		
Cover % of lichens		-	-	-	-	(1		
Altitude a.s.l. in m		10	85	50	80	45		
Direction of exposure		NE	SW	S	SW	-		
Slope		3	0/3	10	0/2	-		
pH of rhizosphere		.	5	43/4	41/4	5		
Level of groundwater in -cm		35		50		15		
Number of taxa		7	9	9	14	19		
Locality		4	1.1	1.2	1.1	1.2		
Constant taxa:								
Salix callicarpaea	LM	6	6	6	6	6	V	6
Comarum palustre	BW	1	3	1	1	3	V	1/3
Carex bigelowii	LM	1	+	+	1	+	V	+/1
Polygonum viviparum	AM	+	1	+	+	+	V	+/1
Salix herbacea	LO	+	.	+	+	+	IV	+
Diff. taxa:								
Calamagrostis neglecta	BW	+	+	.	.	.	II	+
Deschampsia alpina	LO	.	+	+	.	.	II	+
Festuca rubra	BW	.	+	.	.	.	I	+
Timmia austriaca		.	+	.	.	.	I	+
Equisetum arvense	BW	.	.	+	.	.	I	+
Sphagnum teres		.	.	.	3	1	II	1/3
Sphagnum warnstorfii		.	.	.	+	1	II	+/1
Polytrichum alpinum		.	.	.	+	+	II	+
Aulacomnium palustre		.	.	.	+	+	II	+
Drepanocladus uncinatus		.	.	.	+	+	II	+
Sedum rosea	LO	.	.	.	+	.	I	+
Euphrasia frigida	LM	.	.	.	+	.	I	+
Carex lachenalii	LM	.	.	.	+	.	I	+
Cerastium cerastioides	LO	.	.	.	.	+	I	+
Climacium dendroides		.	.	.	.	+	I	+
Dicranum scoparium		.	.	.	.	+	I	+
Cetraria delisei		.	.	.	.	+	I	+
Bryum spec.		.	.	.	.	+	I	+
Helodium blandowii		.	.	.	.	+	I	+
Other taxa:								
Mnium rugicum		.	+	.	.	+	II	+
Poa arctica	HA	1	.	.	.	+	II	+/1
Vaccinium microphyllum	LM	.	.	+	+	.	II	+
Empetrum hermaphroditum	LM	.	.	3	.	+	II	+/3

taxa are *Salix herbacea* (IV +), *Carex bigelowii* (V +/1) and *Polygonum viviparum* (V +/1). Dwarf shrubs are dominant, herbs are frequently present. The aspect of the community is determined by a 15–25 cm high, closed grey cover of *Salix callicarpaea*. The moss layer may be well developed or absent.

Two subtypes can be distinguished: one poor in mosses and species (Tab. 3, ref. 1–3) and one rich in mosses and species (Tab. 3, ref. 4–5).

Habitat and distribution: The community can be characterized as moderately acidophytic, mesotrafent, minerotrafent, hygrophytic, somewhat rheophytic and chionophytic. It is found as local zone-shaped stands on ridges bordering slow running brooklets in stabilized areas, or on the stable shores of large wind exposed lakes (Fig. 16). The locations are flat to slightly sloping, all lower than 80 m a.s.l.

In comparison to the communities of the *Vaccinium microphyllum – Carex rariflora* complex, this one is found in places where ground water moves laterally and vertically, flooded during spring. Soils are moist to wet and classified as gleysols. In many places, ground water was found 15–50 cm below the surface, which dries up in summer. The uppermost 10–15 cm of the profiles is peaty, and underneath mainly with sand.

The community occurs at the coast (loc. 1.1 and 1.2) as well as inland (loc. 4). In the phytosociological area type spectrum the LM distribution type dominates the BW distribution type which is fairly well represented.

Remarks: Floristically closely related communities have not been found in the literature. Ecologically and physiognomically related communities, however, are reported from Iceland and Scandinavia. Mølholm-Hansen (1930) and Steindórsson (1946) mentioned "Myri" communities with *Salix glauca* (possibly *S. glauca* ssp. *callicarpaea*) and *Comarum palustre*. "Graskrautmoor-Gebüsche" dominated by related, in part vicarious Salices such as *Salix lanata, S. lapponum,* and *S. phylicipholia,* and with *Comarum palustre* in the field layer, were reported from Scandinavia by Fries (1913), Nordhagen (1928), and others. Particularly the Saliceto-Caricetum goodenowii subarcticum Nordh. 1943 is floristically somewhat, and synecologically strongly, related to the *Comarum palustre – Salix callicarpaea* community.

Order Tofieldietalia Preising in Oberdorfer 1950. (Tab. 23, ref. 1–10).

Lit.: See Molenaar (1976).

This order comprises hygrophytic and tropohydrophytic, eutrophytic to basiphytic, often calciphytic, eutrafent and minerotrafent mire communities, generally rich in taxa, mainly in bryophytes and Cyperaceae. The distribution is Eurosiberian.

The order contains many faithful taxa including transgressive taxa: e.g., *Blysmus compressus, Carex adelostoma, C. capillaris, C. flava, C. frigida, C. lepidocarpa, Eleocharis pauciflora, Equisetum variegatum, Eriophorum latifolium, Juncus triglumis, Molinea coerulea* var. *minima, Orchis incarnata, Pinguicula vulgaris, Primula farinosa, Tofieldia calyculata, Bryum marratii, B. pseudotriquetrum, Calliergon giganteum, Campylium elodes, C. polygamum, C. stellatum, Catoscopium nigritum, Cinclidium stygium, Drepanocladus revolvens, D. vernicosus, Tomenthypnum nitens, Mnium cinclidioides, M. pseudopunctatum, Pellia endiviaefolia, Riccardia multifida* (Nordhagen 1928, 1936, 1943, Braun–Blanquet 1948a, Dahl 1957, Oberdorfer 1957, 1977, Westhoff & Held 1969, Molenaar 1976).

In the Angmagssalik District, *Equisetum variegatum* and *Campylium stellatum* are considered faithful taxa of the order. In the district, two alliances of the order are known: The Caricion bicolori–atrofuscae (p. 17), discussed in detail by Molenaar (1976), and the Sphagno–Tomenthypnion. Here, the latter contains one association only, the Sphagno–Salicetum callicarpaeae ass. nov. (Tab. 23, ref. 10). The other two dwarf shrub rich mire communities, the Rhododendro– Vaccinietum ass. nov. (p. 26; Tab. 23, ref. 1–2) and the Pediculari–Vaccinietum ass. nov. (p. 28; Tab. 23, ref. 11–12) could not be placed in an alliance. The former is placed in the

Table 4. Ass. Sphagno–Salicetum callicarpaeae.

Analysis no.	Distribution type	69 92	69 175	69 171	69 213	69 173	69 172	Presence	Range of cover values
Reference no.		1	2	3	4	5	6		
Sample plot surface in m2		2¼	2¼	2¼	2¼	2¼	2¼		
Total cover %		100	100	100	100	100	100		
Cover % of (dwarf)shrubs		80	(60	85	60	70	95		
Cover % of herbs		15	(15	(10	(5	(2	(5		
Cover % of mosses/lichens		60	90	60	(90	90	(10		
Cover % of mosses		60	(90	(60	(90	90	(10		
Cover % of lichens		(1	-	(1	(1	-	(1		
Altitude a.s.l. in m		60	15	25	120	15	35		
Direction of exposure		SE	SSE	SSW	NE	SSE	SSW		
Slope		0/2	15	5/10	10/15	10	5		
pH of rhizosphere		6¼	5	5	6	5	5		
Level of groundwater in -cm below surface of mosslayer		35	40	.	10	30	.		
Number of taxa		20	13	19	17	14	16		
Locality		6.1	6.4	6.4	5.2	6.4	6.4		
Faithful (F)/differential taxa of the ass.:									
Sphagnum warnstorfii (F)		4/5	6	5	5	6	1	V	1/6
Bartsia alpina	LM	+	+	+	+	+	+	V	+
Listera cordata	BL	+	+	1	.	+	+	V	+/1
Poa arctica	AM	.	(+)	+	.	+	+	IV	+
Other taxa:									
Salix callicarpaea	LM	4	4	3	4	4	4	V	3/4
Vaccinium microphyllum	LM	4	3	5	1	4	4	V	1/5
Empetrum hermaphroditum	LO	+	+	+	1	+	1	V	+/1
Polygonum viviparum	AM	+	+	1	+	+	+	V	+/1
Equisetum arvense	BW	+	+	+	.	+	+	V	+
Tomenthypnum nitens		1	.	1	1	1	+	V	+/1
Carex bigelowii	LM	2	+	+	1	+	.	V	+/2
Aulacomnium palustre		+	+	.	.	1	+	IV	+/1
Drepanocladus uncinatus		+	.	+	+	.	.	III	+
Betula nana	LM	(+)	.	.	.	1	5	III	+/5
Peltigera aphthosa		+	.	.	+	.	+	II	+
Peltigera canina		+	.	+	.	.	.	II	+
Equisetum variegatum	LM	.	+	+	.	.	.	II	+
Polytrichum juniperinum		+		.	+	.	.	II	+

Tofieldietalia (p. 24), the latter is placed directly in the Scheuchzerio–Caricetea (for argumentation, see p. 19).

Alliance Sphagno–Tomenthypnion Dahl 1957.
(Tab. 23, ref. 10).

This alliance comprises strongly eutrafent, occasionally calciphytic, minerotrafent, weakly acidophytic to mostly neutro–/basiphytic, hygrophytic communities on stable peat soils, characteristic of edaphical gradients, and situated in the field between wet, very nutrient rich soil and drier, nutrient poor soil.

In Rondane, Norway, the communities of the alliance are situated between (1) either communities of poor dry sites or oligotrafent, ombrotrafent mire vegetation of the Oxycocco–Empetrion hermaphroditi, and (2) the wetter and eutrafent/calciphytic communities of the Caricion atrofuscae–saxatilis Nordh. 1943 (*sensu* Dahl 1957 and Dahl et al. 1971).

In the Angmagssalik District the communities of the Sphagno–Tomenthypnion are situated in the transition from wet, mineral nutrient rich, unstable soil (sites of the Caricion bicolori–atrofuscae, or a brooklet) to dry, moderately nutrient rich and stable soil (sites of the *Empetrum hermaphroditum–Vaccinium microphyllum* community, p. 41, or the Festuco–Salicetum callicarpaeae, p. 31). Preferential faithful taxa are *Sphagnum warnstorfii* and *Tomenthypnum nitens;* regional faithful taxa are *Aulacomnium palustre* and *Pedicularis oederi* (in Rondane, Norway). The alliance is found in the southern (sub)alpine areas of Scandinavia (Dahl 1957, Dahl et al. 1971), but also in the continental and montane areas of central Europe (Passarge 1978) and Greenland.

Ass. Sphagno–Salicetum callicarpaeae **ass. nov.**
(Tab. 4, ref. 1–6; Tab. 23, ref. 10; Tab. 26, ref. 9; Fig. 17. NTR: Tab. 4, ref. 4).

Composition and physiognomy: Preferential faithful taxa are *Sphagnum warnstorfii* (V 1/6), and *Tomenthypnum nitens* (V +/1). Differential taxa as against the Scandinavian Aulacomnio–Sphagnetum warnstorfii Dahl 1957 (Sphagno–Tomenthypnion) are *Salix callicarpaea* (area-differential species, V 3/4), *Bartsia alpina* (V +), *Vaccinium microphyllum* (V 1/5), *Listera cordata* (V +1), and *Poa arctica* (IV +). Constant companions are *Empetrum hermaphroditum* (V +/1), *Polygonum viviparum* (V +/1), *Equisetum arvense* (V +), *Carex bigelowii* (V +/2) and *Aulacomnium palustre* (IV +1).

The association has a high homotoneity. Its species number varies from 13 to 20. The aspect is largely determined by rather dense dwarf shrubs of blue-grey to light violet colour, overlying a closed moss layer of dirty red hue with green and golden yellow spots, in which Sphagna dominate.

The vegetation is generally two-layered, in some places with three layers. In the first, the well developed moss layer is 7 to 10 cm high. The overlying field layer is not completely closed and up to 35 cm high. In the

second, the moss layer covers about 10%, and is 10 cm high; the field layer covers 40% and is 40 cm; the highest layer, the shrub layer, covers about 60% and is 75 cm high at the most (Tab. 4, ref. 6).

Habitat and distribution: Synecologically, the association may be characterized as weakly to moderately acidophytic, eutrafent, minerotrafent, strongly hygrophytic, comparatively thermophytic and moderately chionophytic. It forms rather large but narrow stands. All of these were found below 120 m on sheltered, nearly always south exposed flat to moderately steep sites (slope 0–15°). The communities occur on rather high, stabilized banks of brooklets (Fig. 17) and in the transitional zone from the fluvioglacial delta in Qíngertivaq to the high and drier sloping parts of the adjacent mainland. The soils are at least 20 cm thick, and most of them are histosols (sphagnofibrists). In some places ground water was found at 10–40 cm below the surface of the moss layer. The pH varies from 5 to 6.25.

In contrast with the habitat of the *Salix callicarpaea–Comarum palustre* community (p. 23), which belongs to the Caricion fuscae, the habitat of the Sphagno–Salicetum callicarpaeae is never flooded. In spring, however, the ground water level rises to just below the surface of the moss layer. As to the sheltered situation (low altitude and southern exposure), the habitat is snow covered in winter and rather warm in summer.

The association was found only inland: in Qíngertivaq at the foot of the Cassiopefjeld (loc. 6.1), at the foot of the massif west of Solporten (loc. 6.4), and on the slopes adjacent to the Tasîlaq fiord (loc. 5.2). In the phytosociological area type spectrum, the widely distributed lowarctic distribution type (LM) dominates. The association is not known from other parts of Greenland.

Ass. Rhododendro–Vaccinietum microphylli **ass. nov.** (Tab. 5, ref. 1–7; Tab. 23, ref. 1–2; Tab. 26, ref. 31–32. NTR: Tab. 5, ref. 7).

Composition and physiognomy: Regional faithful taxa are *Rhododendron lapponicum* (V +/3), *Fissidens osmundioides* (111 +), *Carex capillaris* (111 +) and *Drepanocladus badius* (11 +). *Gentiana amarella* is also considered as faithful taxon. This species was discovered by us in the district in 1966. It was found at 520 m a.s.l. at loc. 5.1 in a phytocoenosis definitely belonging to this association (Daniëls & Molenaar 1970). Before that time, this species was only known from South Greenland (Böcher et al. 1966). Differential taxa with high presence in regard to the other Tofieldietalia communities of the Angmagssalik District are *Diapensia lapponica* (V 1/3), *Juncus trifidus* (IV +), *Pinguicula vulgaris* (IV +), *Loiseleuria procumbens* (111 +/3), *Tofieldia pusilla* (V +/1), *Aulacomnium turgidum* (IV +/2), *Cetraria ericetorum* (IV +/2), *Cladina mitis* (V +/1), *Ochrolechia frigida* (V +/2), *Anastrophyllum minutum* (V +), *Cladonia chlorophaea* (IV +), *Psoroma hypnorum* (IV +), *Stereocaulon alpinum* (IV +/1), *Pedicularis flammea* (III +) and *Cladonia coccifera* (III +). Other constant taxa are *Polygonum viviparum* (V +/3), *Empetrum hermaphroditum* (V +/3), *Carex bigelowii* (IV +), and *Bryum* sp. (IV +). Microlichens (V +) are frequently present.

The association consists of low, closed, species rich (24–27) communities of compact, xeromorphic physiognomy, primarily containing dwarf shrubs (viz., the dominant *Vaccinium microphyllum*) and also pleurocarpous mosses and fruticose lichens.

The stratification is as follows. The moss layer is rather well developed and covers 10–40%, but it is ex-

Table 5. Ass. Rhododendro–Vaccinietum microphylli.

Analysis no.		69 138	68 234	69 121	69 118	69 98	69 196	69 117		
Reference no.		1	(2)	3	4	5	6	(A)	1/3	4/7	1/7
Sample plot surface in m^2		1	3	1½	1	2½	1	1			
Total cover % of plants		90	80	(100	80	90	(100	(100			
Cover % of dwarfshrubs		(85	60	80	60	70	85	90			
Cover % of herbs		(5	5	(5	(5	(5	(1	5			
Cover % of mosses/lichens		15	10	30	(40	(30	20	30			
Cover % of mosses		.	7½	12½	.	(5	(10	(25			
Cover % of lichens		.	7½	(20	.	(30	(15	(7			
Altitude a.s.l. in m		450	150	720	275	360	800	270			
Direction of exposure		WSW	S	WSW	E	E	E	E			
Slope		45	30	20	30	35	15	40			
pH rhizosphere		6	5½	6½	6½	6½	5½	6½			
Number of taxa		35	33	35	45	47	24	37			
Locality		6.3	1.7	6.2	4	6.1	5.5	4			
Faithful taxa of the Rhododendro -Vaccinietum:											
Rhododendron lapponicum	AC	1	+	2	1/2	+	3	1	3 +/2	4 +/3	V +/3
Fissidens osmundioides		+	.	+	+	.	.	+	2 +	2 +	III +
Carex capillaris	LM	.	+	+	.	.	+	.	2 +	1 +	III +
Drepanocladus badius		.	+	.	.	.	.	+	1 +	1 +	II +
Diff. taxa of subassociations:											
Anthelia juratzkana		1	1	+	.	.	.	.	3 +/1	. .	III +/1
Cephalozia spec.		+	+	+	+	.	.	.	3 +	1 +	III +
Pedicularis flammea	MA	+	+	+	.	+	.	.	3 +	1 +	III +
Oncophorus wahlenbergii		+	+	+	.	.	.	.	3 +	1 +	III +
Alectoria ochroleuca		.	.	.	+	+	+	+	.	4 +	III +
Cetraria nivalis		.	.	.	1	1	1	+	.	4 +/1	III +/1
Dicranum acutifolium		.	.	2	1	+	1	2	1 2	4 +/2	III +/2
Cetraria ericetorum		.	.	+	+	1	2	+	1 +	4 +/2	IV +/2
Saxifraga oppositifolia	AM	.	.	.	+	.	.	+	.	2 +	II +
Cladina rangiferina		.	.	.	+	+	.	.	.	2 +	II +
Salix callicarpaea	LM	.	.	.	.	+	.	+	.	2 +	II +
Cladonia phyllophora		.	.	.	.	+	+	.	.	2 +	II +
Betula nana	LM	.	.	.	1	.	.	1	.	2 1	II 1
Bartsia alpina	LO	.	.	.	+	+	.	.	.	2 +	II +
Ditrichum flexicaule		.	.	.	+	.	.	+	.	2 +	II +
Tortella spec.		.	.	.	+	+	.	.	.	2 +	II +
Cornicularia muricata		.	.	.	+	.	.	+	.	2 +	II +
Other taxa:											
Vaccinium microphyllum	LM	4	4	3/4	3	3	5	4	3 3/4	4 3/5	V 3/5
Polygonum viviparum	AM	+	+	+	+	+	+	+	3 +	4 +	V +
Cladina mitis		+	.	1	+	+	+	+	2 +/1	4 +	V +/1
Ochrolechia frigida		+	1	1	2	+	+	+	3 +/1	4 +/2	V +/2
Empetrum hermaphroditum	LM	+	3	2	3	1	.	3	3 +/3	3 1/3	V +/3
Anastrophyllum minutum		+	+	+	+	+	.	.	3 +	3 +	V +
Tofieldia pusilla	LM	+	1	+	+	1	.	+	3 +/1	3 +/1	V +/1
Cladonia chlorophaea		.	+	+	+	.	+	+	2 +	3 +	IV +
Diapensia lapponica	LM	3	1	1	1	1	3	.	3 1/3	3 1/3	V 1/3
Microlichens div. spec.		+	+	+	+	+	.	+	3 +	3 +	V +
Aulacomnium turgidum		.	1	+	+	.	+	2	2 +/1	3 +/2	IV +/2
Pinguicula vulgaris	BW	+	+	+	+	.	.	+	3 +	2 +	IV +
Juncus trifidus	LO	+	+	.	+	+	.	+	2 +	3 +	IV +
Psoroma hypnorum		+	.	+	+	+	.	+	2 +	3 +	IV +
Stereocaulon alpinum		.	+	1	+	1	.	+	2 +/1	3 +/2	IV +/1
Bryum spec.		+	.	+	+	+	.	+	2 +	3 +	IV +
Cladonia amaurocraea		.	.	+	+	+	+	.	1 +	3 +	III +
Campylium stellatum		+	.	+	+	.	.	+	2 +	2 +	III +
Cladonia coccifera		+	.	+	.	+	+	.	2 +	2 +	III +
Carex bigelowii	LM	+	+	.	+	+	+	.	2 +	3 +	IV +
Carex scirpoidea	LM	.	.	+/1	+	+	.	+	1 +/1	3 +	III +/1
Peltigera rufescens		+	+	.	+	.	.	+	2 +	2 +	III +
Loiseleuria procumbens	LO	+	+	.	+	3	.	.	2 +	2 +/3	III +/3
Polytrichum juniperinum		.	+	.	+	.	+	.	1 +	2 +	III +
Dryas integrifolia	AM	1	.	.	+	.	.	1	1 1	2 +/1	III +/1
Drepanocladus uncinatus		.	.	+	.	+	.	+	1 +	2 +	III +
Salix herbacea	LO	.	+	.	.	+	+	.	1 +	2 +	III +
Cladonia gracilis		.	.	+	.	+	+	.	1 +	2 +	III +
Peltigera malacea		.	+	.	+	+	.	.	1 +	2 +	III +
Thamnolia subuliformis		.	+	.	+	.	+	.	1 +	2 +	III +
Dicranum fuscescens		.	+	.	1	+	.	.	1 +	2 +/1	III +/1
Dicranum muehlenbeckii		.	+	.	+	.	.	2	1 +	2 +/2	III +/2
Solonostoma sphaerocarpum		.	+	.	.	.	.	+	2 +	1 +	III +
Harrimanella hypnoides	LO	+	+	.	.	+	.	.	2 +	1 +	III +
Pertusaria oculata		.	+	.	.	+	.	.	1 +	1 +	II +
Cephaloziella spec.		.	+	.	.	+	.	.	1 +	1 +	II +
Cetraria delisei		.	.	1	.	.	+	.	1 1	1 +	II +/1
Cladonia pyxidata		1	.	.	.	+	.	.	1 1	1 +	II +/1
Cassiope tetragona	AC	.	.	3	.	3	.	.	1 3	1 3	II 3

tremely low (at the most 1 cm). The covering field layer is well developed and consists largely of dwarf shrubs forming a closed and compact cover of max. 5 cm height. Herbs cover max. 5% and conspicuously raise their stems and inflorescences to 10 cm above the dwarf shrubs.

Habitat and distribution: synecologically the association may be considered as weakly acidophytic to neutrophytic, minerotrafent, mesotrafent, mesophytic to hygrophytic, more or less psychrophytic, and weakly chionophytic to weakly achionophytic. The conditions of the habitat are a combination of (a) comparatively dry and cold conditions in winter by the absence of a thick isolating and permanent snow cover; (b) moist conditions in the growing season by more or less permanent supply of water from higher sites; (c) desiccation of the soil surface layer during the growing season by the wind.

The association was found at altitudes from 150 to 800 m. All stands are situated on a thin soil on steep to very steep slopes (15 to 45°, average 32°), always exposed to eastern or southern winds. The stands are found on terrace-forming parts of steep slopes, just above, below or on the outside of the plateau, terrace or ledge. As a result of the steepness of the slope and of the exposure to wind, the snow cover is thin and not permanent in winter and disappears early in spring. The snow accumulates in the more sheltered places, viz., the "hollows" between the plateaus, terraces or ledges, and produces melt water during part of the growing season. Also by percolating melt and rain water from higher sites the soil is moistened more or less permanently. The soil is of colluvial origin or is formed in situ. The soil is less than 20 cm thick. The pH varies from 5.5 to 6.5. The soils are moist to wet by lateral water movement, humic to peaty, and classified as rankers or histosols. The habitats are local and of limited dimensions and the association is generally small, mostly as band shaped phytocoenoses of a few tenths of square meters.

The association is mainly restricted to the inland areas. In the phytosociological area type spectrum the LM distribution type dominates. Outside the district the association is absent (see p. 27, Remarks on *Rhododendron lapponicum*). Two subassociations can be recognized.

Subass. anthelietosum juratzkanae **subass. nov.**
(Tab. 5, ref. 1–3; Tab. 23, ref. 1; Tab. 26, ref. 31. NTR: Tab. 5, ref. 2).

Differential taxa are *Anthelia juratzkana* (3/3 +/1), *Cephalozia* sp. (3/3 +), *Pedicularis flammea* (3/3 +) and *Oncophorus wahlenbergii* (3/3 +). The subassociation was found in one locality at the coast (loc. 1.7), and inland on southern exposed slopes, probably covered in winter by a thin snow cover because of the rather sheltered position in respect to the northern winds. Compared with the habitat of the next subassociation, the habitat is slightly more moist, more snow covered, and less cold.

Subass. alectorietosum ochroleucae **subass. nov.**
(Tab. 5, ref. 4–7; Tab. 23, ref. 2; Tab. 26, ref. 32. NTR: Tab. 5, ref. 7).

Differential taxa are *Alectoria ochroleuca* (4/4 +), *Cetraria nivalis* (4/4 +/1), *Dicranum acutifolium* (4/4 +/2), *Cetraria ericetorum* (4/4 +/2), *Saxifraga oppositiofolia* (2/4 +), *Cladina rangiferina* (2/4 +), *Salix callicarpaea* (2/4 +), *Cladonia phyllophora* (2/4 +), *Betula nana* (2/4 1), *Bartsia alpina* (2/4 +), *Ditrichum flexicaule* (2/4 +), *Tortella* sp. (2/4 +) and *Cornicularia muricata* (2/4 +).

This subassociation is found in strongly wind open places exposed to the east. Snow cover in winter is thin, temporary to absent. The soil is drier and less humid than that of the first subassociation. The subass. alectorietosum may be considered as achionophytic, more psychrophytic and less hygrophytic than the other subassociation.

Remarks on *Rhododendron lapponicum*

Rhododendron lapponicum is a widely distributed arctic species with its main distribution in continental areas in Alaska, Canada, Greenland and Scandinavia, while it is absent in Iceland. Its ecological range is rather wide but with a preference for calcareous or neutral to weakly acid soils. The species is present on very dry as well as on very moist soils (Böcher 1938, 1954, 1963). In Scandinavia it is faithful of the Caricion nardinae (*sensu* Nordhagen 1935; = Elynion Bellardii, Dryadion octopetalae, Kobresieto–Dryadion; e.g., Nordhagen 1935, 1936, 1943, Kalliola 1939, Gjaerevoll & Bringer 1965, Dahl et al. 1971). This syntaxon contains communities of rather dry, wind exposed habitats on mostly neutral to basic soils in the alpine areas of Scandinavia.

In Greenland and North America, *Rhododendron lapponicum* is also known from similar habitats (Polunin 1948, Böcher 1954, 1963). In North America, however, (Polunin 1948, Bliss 1963) and in South Greenland (Knapp 1964) the species is also found in wind-exposed places on acid soils. As to its species composition, the *Rhododendron lapponicum–Hylocomium splendens* Ass. (Knapp 1964) of South Greenland should be assigned to the Loiseleurio-Diapension (Br.–Bl., Siss. et Vlg. 1939) stat. nov. (see p. 44). *Rhododendron lapponicum* is also common in plant communities on moist soils, such as moist dwarf shrub heath or "fen" vegetations (Böcher 1938, 1954, 1963, Polunin 1948, Hanson 1953, Bliss 1963, and this paper). As an example Böcher (1954) described a *Rhododendron–Carex amblyorrhyncha* Type inland from the surroundings of Søndre Strømfjord on the west coast of Greenland. Lowarctic continental moist heath and mire vegetations from circumneutral soils were assigned to this type (Böcher 1954: 228 ff.). The type is

assigned to the *Carex inserrulata–Juncus arcticus* Complex, which is considered by Böcher as closely related to the Scandinavian Salicion myrsinitis Kalliola 1939 and the Caricion atrofuscae–saxatilis Nordh. 1943. Both West Greenlandic vegetation types undoubtedly belong to the Tofieldietalia (p. 24) because of the great number of faithful taxa of this order.

Many of Böchers *Rhododendron–Vaccinium uliginosum microphyllum* sociations (Böcher 1954, tab. 30: 1–7/9–10) are floristically closely related to the Rhododendro–Vaccinietum of Southeast Greenland, as indicated by the presence of *Tofieldia pusilla, Carex bigelowii, Empetrum hermaphroditum, Polygonum viviparum, Salix callicarpaea, Vaccinium microphyllum, Aulacomnium turgidum, Drepanocladus uncinatus, Rhododendron lapponicum* and others.

Dryas integrifolia, Betula nana, Tomenthypnum nitens, Equisetum arvense and *Pedicularis lapponica,* which is absent in the Angmagssalik District, however, differentiate these continental West Greenland sociations in snow covered, very moist habitats, from the Rhododendro–Vaccinietum, which occurs on less snow-covered and less moist habitats. The last mentioned association contains as differential taxa *Diapensia lapponica, Loiseleuria procumbens, Juncus trifidus* and a number of lichens. The West Greenland *Rhododendron–Vaccinium* sociations and the Southeast Greenland Rhododendro–Vaccinietum belong to the same syntaxon of alliance or higher level. Provisionally they are placed directly in the Tofieldietalia, the Rhododendro–Vaccinietum because of the presence of *Campylium stellatum, Carex capillaris* and *Tofieldia pusilla.*

Ass. Pediculari–Vaccinietum microphylli **ass. nov.**
(Tab. 6, ref. 1–10; Tab. 23, ref. 11–12; Tab. 26, ref. 27–28. NTR: Tab. 6, ref. 3).

Composition and physiognomy: Regional faithful taxon is *Pedicularis hirsuta* (IV +). Differential taxa in the district as compared to all other Scheuchzerio–Caricetea communities are *Dicranum majus* (V +/4), *Cetraria islandica* (III +), *Hylocomium splendens* (IV +/2), *Peltigera canina* (III +) and *Festuca vivipara* (II +).

Constant companions are: *Vaccinium microphyllum* (V 3/6), *Empetrum hermaphroditum* (V +/4), *Carex bigelowii* (V +/3), *Polygonum viviparum* (V +/1), *Drepanocladus uncinatus* (V +/2), *Salix herbacea* (V +/2), *Aulacomnium turgidum* (V +/4), *Cladonia gracilis* (IV +/1), *Polytrichum juniperinum* (IV +/1), *Peltigera aphthosa* (IV +/1), *Aulacomnium palustre* (IV +/4), *Salix callicarpaea* (IV 1/4), *Pohlia nutans* (IV +), *Cladina mitis* (IV +/1), *Stereocaulon alpinum* (IV +/1), *Psoroma hypnorum* (IV +/1) and *Lophozia ventricosa* (IV +).

The communities of this association are closed, and rich in taxa (on the average 34 taxa per record), and their aspects are determined by (blue)grey dwarf shrubs and fresh green to yellow-green mosses (*Aulacomnium, Dicranum* and *Drepanocladus* taxa). Vertically, the communities have two well separated layers. The moss layer is well developed and covers 25–80%; the height varies from 1 to 5 cm. The overlying field layer is generally closed (coverage 60–95%, on the average 75%) and consists mainly of dwarf shrubs, the canopies of which are about 10 cm high. Some herbs are max. 20 cm high.

Habitat and distribution: the association is found as small (10 m^2) to large (over 100 m^2) phytocoenoses and is a typical "slope mire" (cf. blanket bog) association. It is most often found on steep slopes (0°–40°, average 15°), not exposed to southern winds. Apart from one stand (Tab. 6, ref. 1) all the others are located below 110 m a.s.l. The habitat is rather cool. All habitats are influenced (at least temporarily) by shallow laterally moving ground water. Most of the community stands are situated along or close to meltwater streams, brooklets or lake shores, or on thin soils with water from higher places running down over the underlying bedrock or debris. The soils are acid (pH 4.5–5.5) and of colluvial origin, generally moderately thick and humic to peaty. They are moist to wet, but in summer the top dries up, just as the vegetation, which forms polygons in the moss layer by shrinkage. The soils have been classified as histosols, gleysols or rankers. In some places, thufurs are present together with the association. Snow cover in winter is probably thin but not always permanent.

The association is found at the coast as well as inland. Especially at the foot of the Cassiopefjeld (loc. 6.1) it is well developed, extending over many hundreds of square metres. In the phytosociological area type spectrum the LM distribution type strongly dominates. In conclusion, synecologically the association might be characterized as mainly moderately acidophytic, minerotrafent, mesotrafent, hygrophytic to mesophytic, weakly psychrophytic and weakly chionophytic to weakly achionophytic. It is restricted to the lowarctic areas of Greenland. Two subassociations can be distinguished.

Subass. typicum **subass. nov.**
(Tab. 6, ref. 1–4; Tab. 23, ref. 11; Tab. 26, ref. 27. NTR: Tab. 6, ref. 3).

This subassociation was found at the coast as well as inland on steep to very steep and rather moist to temporarily wet slopes. The soils are gleysols, histosols or rankers. The association is found near brooklets and meltwater streams in places with hummocks. Compared with the next subassociation, subass. typicum is more hygrophytic and chionophytic.

Subass. cladonietosum cocciferae **subass. nov.**
(Tab. 6, ref. 5–10; Tab. 23, ref. 12; Tab. 26, ref. 28. NTR: Tab. 6, ref. 9).

Table 6. Ass. Pediculari–Vaccinietum microphylli.

Analysis no.		69 183	68 65	69 93	68 188	68 133	68 134	68 189	68 64	68 63	68 191						
Reference no.		1	2	(A)	4	5	6	7	8	(9)	10	1/4		5/10		1/10	
Sample plot surface in m2		1	4	2¼	6	4	9	4	4	9	4						
Total cover % of plants		100	(100	100	95	(100	95	100	95	(100	90						
Cover % of dwarfshrubs		(90	95	70	70	(80	65	60	60	75	80						
Cover % of herbs		(2	(2	(2	(5	(2	25	(5	(2	(3	10						
Cover % of mosses/lichens		(40	30	80	30	(40	40	55	60	75	25						
Cover % of mosses		.	30	(80	20	(40	(40	40	60	75	20						
Cover % of lichens		.	(1	10	10	(2	(1	15	(2	(3	5						
Altitude a.s.l. in m		310	70	30	40	65	25	40	80	100	110						
Direction of exposure		N	NW	E	NW	–	N	NW	NW	NE	–						
Slope		40	15	15	20	–	10	20	20	10	–						
pH rhizosphere		4½	5	5½	5½	5	4½	5½	5	5	5						
Number of taxa		24	26	30	35	29	32	45	37	45	37						
Locality	Distribution type	8	1.1	6.1	1.1	2	2	1.1	1.1	1.1	1.1	Presence	Range of cover values	Presence	Range of cover values	Presence	Range of cover values
Faithful taxon of the Pediculari-Vaccinietum microphylli :																	
Pedicularis hirsuta	AC	+	+	+	+	.	+	+	.	+	+	4	+	IV	+	IV	+
Diff. taxa of the ass:																	
Dicranum majus		3	3	+/1	+/1	2	2	3	x	4	.	4	+/3	V	2/4	V	+/4
Hylocomium splendens		+	+	+	.	.	+	+	x	2	.	3	+	IV	+/2	IV	+/2
Cetraria islandica		.	.	+	+	+	.	+	+	+	.	2	+	IV	+	III	+
Peltigera canina		.	+	.	.	+	.	+	+	+	+	1	+	V	+	III	+
Festuca vivipara	LO	.	+	.	.	.	.	+	+	.	+	1	+	III	+	II	+
Diff. taxa of subass. cladonietosum:																	
Ochrolechia frigida		.	.	.	.	+	+	+	+	+	+	.		V	+	III	+
Cladonia coccifera		.	.	.	.	.	+	+	+	+	+	.		V	+	III	+
Cynodontium strumiferum		.	.	.	.	.	.	.	+	+	+	.		III	+	II	+
Peltigera malacea		.	.	.	.	.	.	+	.	.	+	.		II	+	I	+
Solorina crocea		.	.	.	.	.	.	+	.	.	+	.		II	+	I	+
Cladonia macrophylla		.	.	.	.	+	.	.	.	+	.	.		II	+	I	+
Cyrtomnium spec.		.	.	.	.	.	.	.	+	+	.	.		II	+	I	+
Luzula confusa	AM	.	.	.	.	.	2	+	.	.	+	.		III	+/2	II	+/2
Dicranum elongatum		.	.	.	.	.	+	3	.	.	.	.		II	+/3	I	+/3
Blepharostoma trichophyllum		.	.	.	.	.	+	+	.	.	.	.		II	+	I	+
Tortula ruralis		.	.	.	.	.	.	.	x	+	.	.		II	+	I	+
Tritomaria quinquedentata		.	.	.	.	.	.	.	+	+	.	.		II	+/x	I	+
Scapania spec.		.	.	.	.	.	+	.	.	.	+	.		II	+	I	+
Poa arctica	AM	.	.	.	.	+	.	.	.	+	.	.		II	+	I	+
Cornicularia muricata		.	.	.	.	+	.	.	+	.	.	.		II	+	I	+
Other taxa:																	
Vaccinium microphyllum	LM	5	3	4	3/4	5	4	3	4	4	6	4	3/5	V	3/6	V	3/6
Empetrum hermaphroditum	LM	3	4	3	3/4	+/1	1	3	1	+	+	4	3/4	V	+/3	V	+/4
Carex bigelowii	LM	+	+	1	1	+	3	1	+	+	1	4	+/1	V	+/3	V	+/3
Polygonum viviparum	AM	+	+	+	+	+	1	+	+	+	+	4	+	V	+/1	V	+/1
Drepanocladus uncinatus		+	2	1	3	2	3	1	x	+	+	4	+/3	V	+/2	V	+/2
Salix herbacea	LO	1	+	.	+	+	2	2	+	2	+	2	+/1	V	+/2	V	+/2
Aulacomnium turgidum		+	.	4	+	2	3	1/2	x	4	+	3	+/4	V	+/4	V	+/4
Cladonia gracilis		+	.	+	+	+	+	1	+	+	.	2	+	V	+/1	IV	+/1
Polytrichum juniperinum		+	+	+	+	+	+	1	.	+	.	4	+	IV	+/1	IV	+/1
Peltigera aphthosa		.	1	+	+	.	+	+	+	+	+	3	+/1	V	+	IV	+/1
Aulacomnium palustre		.	1	3	+	2	3	1/2	.	4	3	3	+/3	V	2/4	IV	+/4
Salix callicarpaea	LM	.	3	1	3	3	.	3	3	4	.	3	1/3	V	3/4	IV	1/4
Pohlia nutans		.	.	+	+	+	+	+	+	+	.	2	+	V	+	IV	+
Cladina mitis		+	+	+	+	.	.	1	+	+	+	4	+	IV	+/1	IV	+/1
Stereocaulon alpinum		.	+	1	+	+	.	+	+	.	+	3	+/1	IV	+	IV	+/1
Psoroma hypnorum		.	+	+	.	.	+	+	+	+	1	2	+	V	+/1	IV	+/1
Lophozia kunzeana		.	.	+	+	.	+	+	.	1	.	2	+	III	+/1	III	+/1
Pedicularis flammea	MA	.	+	.	+	+	.	.	.	+	+	2	+	III	+	III	+
Cephaloziella spec.		+	.	+	.	+	.	+	.	+	+	2	+	IV	+	III	+
Cladina rangiferina		+	.	+	.	.	.	+	+	+	.	2	+	III	+	III	+
Peltigera scabrosa		1	.	.	.	+	+	.	+	+	.	1	+	IV	+	III	+/1
Lophozia excisa		+	.	.	.	.	+	+	+	+	.	1	+	IV	+	III	+
Lophozia hatcheri		.	.	1	+	.	.	+	.	+	.	2	+/1	II	+	II	+/1
Lophozia ventricosa		+	+	.	+	.	.	+	+	+	+	3	+	IV	+	IV	+
Dicranum scoparium		.	3	.	+	2	.	.	.	4	.	2	+/3	I	4	II	+/4
Cetraria ericetorum		.	.	.	+	.	.	+	.	+	.	1	+	II	+	II	+
Cerastium lanatum	LM	.	.	.	+	.	.	+	+	+	.	1	+	II	+	II	+
Ptilidium ciliare		.	.	+	+	+	.	+/1	.	.	.	2	+	II	+/1	II	+/1
Anastrophyllum minutum		+	.	.	.	+	+	1	.	.	.	1	+	III	+/1	II	+/1
Peltigera spuria		.	+	.	.	.	.	.	+	.	+	1	+	II	+	II	+
Cetraria delisei		.	.	.	+	+	+	.	.	.	.	1	+	II	+	II	+
Rhacomitrium canescens		.	.	1	+	.	.	.	+	.	.	2	+/1	I	+	II	+/1
Cladonia chlorophaea		.	.	.	+	.	.	.	.	+	.	1	+	I	+	I	+
Calliergon stramineum		.	.	.	+	.	+	+	.	.	.	1	+	II	+	II	+
Cladonia ecmocyna		.	.	.	+	+	.	+	.	.	.	1	+	II	+	II	+
Tomenthypnum nitens		.	.	+	.	.	2	.	.	4	.	1	+	II	2/4	II	+/4
Bryum spec.		.	.	.	+	.	.	.	+	.	.	1	+	I	+	I	+
Peltigera polydactyla		.	.	+	.	.	.	.	.	+	.	1	+	I	+	I	+
Cladonia amaurocraea		.	.	1	.	+	.	.	.	.	.	1	1	I	+	I	+/1
Dicranum acutifolium		.	.	2/3	.	.	.	.	.	4	.	1	2/3	I	4	I	2/4
Polytrichum alpinum		.	.	.	+	.	.	.	+	.	.	1	+	I	+	I	+
Sphagnum warnstorfii		.	.	.	+	.	+	.	.	.	.	1	+	I	+	I	+
Kiaeria glacialis		3	.	.	.	.	.	1	.	.	.	1	3	I	1	I	1/3
Cephalozia spec.		.	+	.	.	.	+	.	.	.	+	1	+	II	+	II	+
Sphagnum teres		+	2	.	.	.	.	.	.	.	.	2	+/2	.		I	+/2

Differential taxa are *Ochrolechia frigida* (V +), *Cladonia coccifera* (V +), *Cynodontium strumiferum* (III +), *Luzula confusa* (III +/2), *Peltigera malacea* (II +), *Solorina crocea* (II +), *Cladonia macrophylla* (II +), *Cyrtomnium* sp. (II +), *Dicranum elongatum* (II +/3), *Blepharostoma trichophyllum* (II +), *Tortula ruralis* (II +), *Tritomaria quinquedentata* (II +/x), *Scapania* sp. (II +), *Poa arctica* (II +) and *Cornicularia muricata* (II +).

This subassociation is restricted to Kulusuk (loc. 2) and Elvbakker (loc. 1.1.) in the coastal area. It was found on flat places or on steep slopes under rather windy, open conditions. Exposure is north. Owing to the windy conditions, the upper part of these communities dries out rather strongly (occurrence of lichens), and generally the habitats are less moist than those of the subass. typicum. The soils are rankers or histosols. The subass. cladonietosum may be characterized as mesophytic, and chionophytic to probably weakly achionophytic.

Remarks on *Pedicularis hirsuta*

Pedicularis hirsuta is an arctic species known from the eastern part of the north-american continent and from the western part of the Eurosiberian region (Böcher 1938). In Greenland its distribution is of the AC type; it is a northern species, absent south of 64°N. The species was reported from the west coast of Greenland in a number of plant communities, which in my opinion belong to the Pediculari–Vaccinietum, e.g., the sociations described by Fredskild (1961, tab. III, 4–6) from similar habitats near Jacobshavn. The communities described by Lesse (1952, tab. 1:5) and by Böcher (1954, tab. 17:8) also belong to this association. The association is present also in other parts of West Greenland (Böcher 1954, 1959, and Gelting 1955).

The distribution of the association in other areas along the east coast is less easy to determinate, as records or exact descriptions of the vegetation are not available. *Pedicularis hirsuta* has been reported there from similar habitats by Hartz & Kruuse (1911), Seidenfaden (1931), Gelting (1934), Seidenfaden & Sørensen (1937) and Schwarzenbach (1961). Holmen (1957) reported the species from Peary Land, North Greenland, as "rather frequent in moist, sandy soil, rich in mosses, especially along the rivers".

In other higharctic areas, e.g., in northern Canada (Polunin 1948) and Svalbard (Hadač 1946, Rønning 1965, Hofmann 1968), *Pedicularis hirsuta* is known to occur together with other taxa particularly associated with Kobresio–Dryadetalia communities (p. 55) on rather moist soils. To distinguish this order from the "rich fen vegetation" (the Scheuchzerio–Caricetea) is often problematic in these areas (Ohba 1974, Hofmann 1968). The extreme tundra environment with stagnant water conditions caused by permafrost, hardly any peat formation due to little precipitation and low temperatures, slight acidification of the soil, and strong dessication of the soil surface in summer, hardly contribute to a differentiation into "peaty/wet" (Scheuchzerio–Caricetea) and "mineral/dry" (Kobresio–Dryadetalia), which is found in more southern areas under influence of the climate; e.g., in lowarctic oceanic Greenland, and in Scandinavia where, according to Lid (1963), *Pedicularis hirsuta* is found in mire vegetation only.

In the Angmagssalik District, several taxa which are widely distributed on dry, mineral soil occur in the Pediculari–Vaccinietum, e.g., *Festuca vivipara, Carex bigelowii, Cerastium lanatum.* In view of the above and of the floristic composition of the association with species such as *Aulacomnium turgidum* (1 +/4), *A. palustre* (IV +/4), *Pedicularis hirsuta* (IV +), *Calliergon stramineum* (II +), *Sphagnum teres* (1 +/2), *S. warnstorfii* (1 +) and *Tomenthypnum nitens* (II +/4), it seems plausible at this moment to incorporate the Pediculari–Vaccinietum in the Scheuchzerio–Caricetea, because the mentioned taxa are distinctly associated with minerotrafent mire vegetations (many examples in literature). The association is provisionally placed as an intermediate between the Caricion fuscae and the Tofieldietalia, because it contains faithful taxa of these syntaxa in the same proportion: *Calliergon stramineum* (II +) and *Sphagnum teres* (1 +/2) of the Caricion, and *Tomenthypnum nitens* (II +/4) and *Sphagnum warnstorfii* (1 +) of the Tofieldietalia.

Shrub and related dwarf shrub vegetation

Shrub vegetation is defined here as a vegetation mainly characterized by woody and strongly branching plants, more than 25 cm high and without a central trunk. In the Angmagssalik District, the shrub vegetation is stratified. The upper stratum is the shrub layer, the lower the field layer and/or the moss layer.

Dwarf shrub vegetation is mainly characterized by dwarf shrubs, woody and strongly branching plants lower than 25 cm and without a central trunk. The stratification is less pronounced, because the other plants are found between instead of below the dwarf shrubs.

In (sub)arctic and (sub)alpine areas of the western northern hemisphere, Salices play an important role in the structure of shrub vegetation (e.g., Nordhagen 1943, Polunin 1948, 1967, Hanson 1953, Knapp 1965). This is also the case in the Angmagssalik District, where *Salix callicarpaea* mainly determines the aspect of the shrub vegetation. *Betula nana* and *Juniperus nana* also occur as shrub but hardly ever attain dominance in the communities. *Salix callicarpaea* is often present as dwarf shrub, dominant in communities such as the *Comarum palustre–Salix callicarpaea* community (p. 23) and the Sphagno–Salicetum callicarpaeae (p. 25). Other dwarf

shrub communities containing *Salix callicarpaea* are floristically and ecologically so closely related to the *Salix callicarpaea* shrub vegetation, that they are considered to belong to the same association, which will be dealt with in this chapter.

Salix callicarpaea shrub vegetation is very common in the lowarctic part of Greenland, where it is one of the characteristic features (Böcher 1963). It is mainly found in the lowlands, particularly along rivulets and brooklets. In the Angmagssalik District the *Salix callicarpaea* shrub vegetation is the highest vegetation. The maximum height measured is 120 cm (Qíngertivaq, loc. 6.1, Fig. 18). Generally, however, the height is 30–40 cm.

Class Betulo–Adenostyletea Br.–Bl. 1948

This class comprises shrub, open woodland and "Hochstauden" communities on moist, nutrient-rich, slightly or not dunged soils with laterally moving ground water, in high montane, (sub)alpine and (sub)arctic areas of the western part of the northern hemisphere. Faithful taxa are *Milium effuse* L. var. *violaceum* Hall., *Polygonatum verticillatum, Ranunculus platanifolius, Geranium sylvaticum, Myosotis sylvatica, Cirsium heterophyllum, Lactuca alpina, Athyrium alpestre, Viola biflora* (e.g., Braun–Blanquet 1948, 1950, Oberdorfer 1957), and *Salix hastata, Tozzia alpina, Adenostyles alliaria* and *A. alpina* (Ellenberg 1978).

Order Adenostyletalia alliariae Br.–Bl. 1930

Syn.: Calamagrostidetalia villosae Pawl., Sok. et Wall. 1928 p. min. p., Adenostyletalia Br.–Bl. 1931.
Lit.: Aconitetalia septentrionalis Nordh. 1936 (nom. inval.), Betulo–Adenostyletalia Br.–Bl. 1948 (nom. inval.).
For details, see the class.

Alliance Lactucion alpinae Nordh. 1943

Syn.: Mulgedion alpini Nordh. 1943, Lactucion alpini Dahl 1957.
Lit.: Aconition septentrionalis Nordh. 1936 (nom. inval.), Geranio–Cirsion heterophylli Kalliola 1939 (nom. inval.).

This alliance contains high herb communities and some *Betula tortuosa* and willow shrub communities from the northern highmontane, sub- to lowalpine and (sub)arctic areas of the East American and European parts of the northern hemisphere. Faithful taxa of the alliance are the northern *Angelica norvegica, Aconitum septentrionale* and *Calamagrostis purpurea,* and also the faithful taxa of the order and class, viz., *Lactuca alpina, Ranunculus platanifolius, Myosotis sylvatica, Hieracium* Prenanthoidea group, *Cirsium heterophyllum, Milium effuse, Polygonatum verticillatum* (Nordhagen 1943), in Rondane (Norway), *Stellaria calycantha, Melandrium rubrum, Chamaenerion angustifolium* (Dahl 1957), and in northern Scandinavia *Trollius europaeus* (Kalliola 1939). Salices are often dominant: *Salix glauca, S. lanata, S. lapponum* and *S. phylicifolia.* The number of faithful taxa decreases towards the north.

The Greenlandic Lactucion communities are distinguished from the Scandinavian communities by the area differential taxa *Salix callicarpaea* and *Coptis trifolia* and by the absence of a great number of faithful boreal taxa, e.g., *Lactuca alpina, Ranunculus platanifolius, Aconitum septentrionale, Cirsium heterophyllum, Polygonatum verticillatum,* and by the absence of a number of companions with the same distribution. In Greenland the alliance is floristically best developed in the south, where it contains *Geranium sylvaticum* and *Athyrium alpestre* (Knapp 1964). *Angelica norvegica* is a good faithful taxon of the alliance in Greenland. It is, however, rather rare in the shrub vegetation of the Angmagssalik District, where the alliance is characterized by the opulence of *Salix callicarpaea* and the faithful taxa of its only association, viz., *Festuca rubra* and *Hieracium hyparcticum.*

Ass. Festuco–Salicetum callicarpaeae **ass. nov.**
(Tab. 7, ref. 1–25; Tab. 26, ref. 10–12; Figs 18 and 19. NTR: Tab. 7, ref. 5).

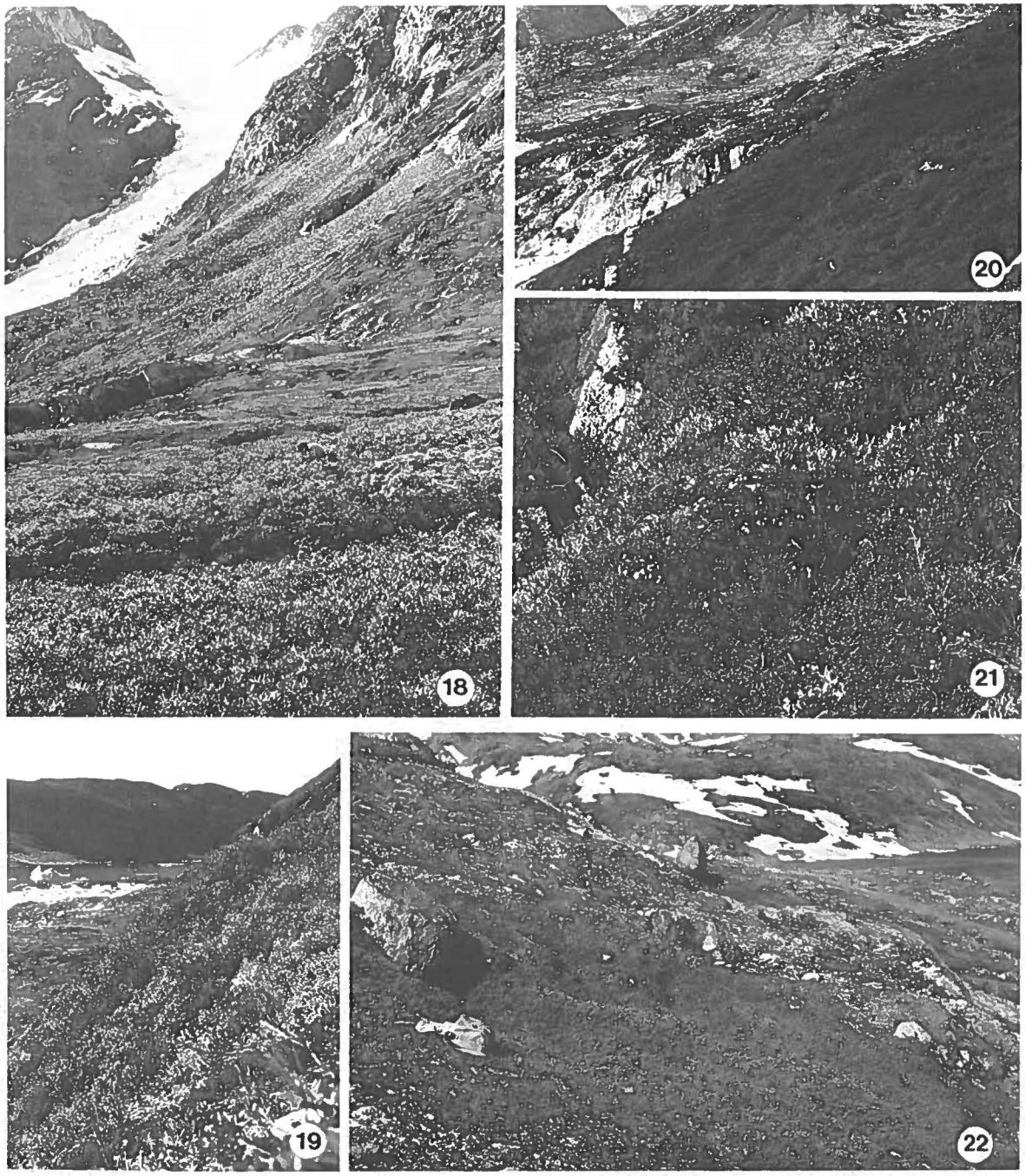
Lit.: Salicetum glaucae Böcher 1933 p. maj. p. (nom. inval. acc. to art. 3d of the Code of Phytosociological Nomenclature, Barkman et al. 1976, "Moravec 1979").

Composition and physiognomy: Opulent taxon (with optimum vitality in a vegetation unit, see Westhoff & Held 1969) is *Salix callicarpaea* (V 4/6). Regional faithful taxa are *Festuca rubra** (III +/1) and *Hieracium hyparcticum* (II +/2). Constant companions are *Chamaenerion angustifolium* (IV +/2), *Campanula gieseckiana* (IV +/2) and *Carex bigelowii* (IV +/2). Grey shrubs or dwarf shrubs of *Salix callicarpaea* determine the aspect.

Herbs are frequently present, but bryophytes and lichens are scarce, probably due to unfavourable light conditions under the rather closed (dwarf) shrub layer where abundant *Salix* leaves are slowly decomposing.

The vegetation is distinctly stratified, the higher stratum protecting the plants in the undergrowth. The stratification in shrub vegetation is as follows: The moss layer is absent or poorly developed (except ref. 4 and 8). The overlying field layer of dwarf shrubs and herbs is 20 cm high on the average (inflorescences and stems occasionally up to 50 cm) and covers about 15% (from 1 to 40%). The upper shrub layer is 30 to 40 cm high, but may be as much as 120 cm high (Figs 18, 19). This layer covers 65 to 100%. The shrub layer also contains tall herbs, such as *Hieracium hyparcticum* and *Chamaenerion angustifolium.* In the dwarf shrub vegetation, the moss layer is often absent or poorly developed. The field layer, mainly consisting of dwarf shrubs, is 20 cm high on the average. Herbs may be as high as 40 cm.

* within the nonhalophytic communities of the district.



Figs 18–22: **18.** Festuco–Salicetum callicarpaeae typicum, loc. 6.1, 14 July 1969. **19.** Festuco–Salicetum callicarpaeae chamaenerietosum variant of *Cystopteris fragilis*, loc. 3, July 1968. **20.** Communities of the Phyllodoco–Myrtillion, loc. 9, 8 Aug. 1969. **21.** Phyllodoco–Salicetum callicarpaeae sedetosum, loc. 1.2, June 1968. **22.** *Empetrum hermaphroditum–Vaccinium microphyllum* community, *Drepanocladus* type, loc. 1.6, Tab. 9, ref. 21, 30 June 1968.

Habitat and distribution: Synecologically the association may be characterized as moderately to strongly acidophytic, rarely neutrophytic, mesophytic to hygrophytic, mesotrafent to eutrafent, occasionally weakly to moderately rheophytic, rather thermophytic and chionophytic (see also Kruuse 1912, Böcher 1933, 1963 and Knapp 1964).

In the Angmagssalik District, the association is de-

Table 7. Ass. Festuco–Salicetum callicarpaeae.

Analysis no.	Distribution type	69 73	69 169	69 133	69 134	69 74	68 190	68 219	68 228	68 218	68 181	68 209	69 33	69 34	69 36	68 23	68 146	68 185	69 170	69 140	68 84	68 174	68 155	68 173	68 156	68 175	Presence	Range of cover values
Reference no.		1	2	3	4	(A)	6	7	8	9	10	11	12	(13)	14	15	16	17	18	19	20	21	22	23	24	25		
Sample plot surface in m2		4	4	4	4	4	9	7½	6	6½	9	6	4	4	4	6	9	9	4	4	6	9	9	9	9	9		
Total cover %		90	75	90	90	75	95	(100	100	90	(100	90	65	70	90	95	90	80	85	75	90	95	100	90	100	100		
Cover % of (dwarf) shrubs		90	75	90	90	75	95	(100	(80	90	95	85	(60	65	(90	90	90	55	75	70	(80	90	(95	90	95	90		
Cover % of herbs		(1	(1	(3	(25	(25	5	20	30	2	(10	10	(10	(20	(20	15	(1	25	15	35	10	(15	40	15	(15	25		
Cover % of mosses/lichens		(1	(1	(1	(10	(1	–	–	(5	(2	(1	–	(1	(2	(1	(1	(1	(2	–	(1	(1	(1	(1	(1	(1	(2		
Cover % of mosses		(1	(1	(1	(10	(1	–	–	(5	(2	(1	–	(1	(1	(1	(1	(1	(2	–	(1	(1	(1	(1	(1	(1	(2		
Cover % of lichens		–	(1	–	–	–	–	–	(1	(2	–	–	(1	(1	(1	(1	(1	(2	–	(1	(1	(1	–	(1	–	(2		
Altitude a.s.l. in m		10	20	20	20	10	60	20	20	10	80	150	25	50	55	60	10	30	60	430	80	90	120	70	160	110		
Direction of exposure		SSW	SW	SSW	S	ENE	SE	SE	E	SE	SE	SSE	SE	ESE	SE	S	SE	SE	SE	SW	S	SW	S	SW	SE	SW		
Slope		2	0/2	0/5	3	5	25	30	5/10	20	15	25	20	5/10	15	20	15	25	20	30	40	40	50	40	35	45		
pH of rhizosphere		5	7½	.	4½	4½	5	5	5	5	5	5	.	4	4½	5	5	5	5	.	5½	5	4½	5	4½	4½		
Locality		6.1	6.5	6.3	6.3	6.1	1.2	1.7	1.7	1.7	1.2	1.4	1.2	1.2	1.2	1.2	3	1.2	6.4	6.3	1.2	3	3	3	3	3		
Number of taxa		6	7	8	15	16	10	14	13	20	19	9	11	15	13	18	15	21	8	15	14	16	15	22	16	23		
Opulent (O) and faithful taxa of the Festuco - Salicetum callicarpaeae:																												
Salix callicarpaea (O)	LM	5	5	6	6	5	6	6	5	6	4	6	5	5	5	6	5	5	5	5	5	6	6	6	4	4	V	4/6
Festuca rubra	BW	.	.	+	.	+	.	+	+	+	+	1	+	+	.	.	+	+	.	.	.	.	.	+/1	.	.	III	+/1
Hieracium hyparcticum	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	+	+	1/2	II	+/2
Diff. taxa of subass. chamaenerietosum:																												
Chamaenerion angustifolium	BL	+	.	.	.	.	+	+	.	+	+	+	1	+/1	+	+	.	+	1	1	+	+	1/2	+/1	+	+	IV	+/2
Campanula gieseckiana	LM	.	.	.	.	.	1	.	.	+	+	+	.	+/1	+	+	.	2	1	1	1	+	+	+	+	+	IV	+/2
Stereocaulon spec.		.	.	.	.	.	.	.	+	+	.	.	+	+	.	.	+	+	.	.	+	+	+	+	.	+	III	+
Thalictrum alpinum	LO	.	.	.	.	.	1	+	+	+	+	.	1	+/1	.	+	.	.	+	+	.	.	.	.	.	.	II	+/1
Sedum rosea	LO	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	+	1	+	+	+	II	+/1
Coptis trifolia	BL	.	.	.	.	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	.	+	1	+	+	+	II	+/1
Cetraria islandica		.	.	.	.	.	.	.	+	+	.	.	.	+	.	+	.	+	.	.	+	.	.	+	.	.	II	+
Poa glauca	AM	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	1	+	.	.	.	+	.	.	II	+/1
Cladonia spec. (prim.thallus)		.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	+	+	.	+	.	.	.	.	.	.	I	+
Luzula spicata	LO	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	+	.	.	.	.	.	I	+
Tortula ruralis		.	.	.	.	.	.	.	.	+	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	I	+
Lophozia hatcheri		.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	+	.	.	I	+
Cladonia chlorophaea		.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	I	+
Thymus drucei	BS	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	1	.	.	.	.	.	.	.	.	I	+/1
Viscaria alpina	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	I	+
Cladina mitis		.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	+
Draba norvegica	LO	.	.	.	.	.	.	.	.	.	.	.	.	+/1	.	+	.	.	.	.	.	.	.	.	.	.	+	+/1
Diff. taxa of variant:																												
Cystopteris fragilis	BW	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	2	2	2	+	.	II	+/2
Trisetum spicatum	AM	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	.	.	I	+
Juniperus nana	BO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	3/4	.	.	.	.	+	I	+/4
Potentilla tridentata	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	1	I	+/1
Hieracium alpinum	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	1/2	I	+/2
Alchemilla alpina	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	+	+
Bartsia alpina	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+/1	+	+	+/1
Desmatodon latifolius		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	+	+
Pohlia nutans		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	+
Other taxa:																												
Carex bigelowii	LM	+	.	.	1	1	+	+	2	+	+	+	1	+	+	+	.	+	.	.	.	+	.	+	+	.	IV	+/2
Polygonum viviparum	AM	.	.	.	+	+	.	+	2	+	1	.	.	+	+	+	+	.	.	.	.	+	.	+	+	+	III	+/2
Cerastium lanatum	LM	.	+	+	.	+	.	+	.	+	+	.	1	+/1	+	+	.	+	.	1	+	.	.	+	.	.	III	+/1
Empetrum hermaphroditum	LM	1	.	.	+	+	+	.	.	+	4	.	+	.	3	+	5	.	.	.	1	.	3	+	4	4	III	+/4
Taraxacum croceum	LO	.	.	.	.	+	+	+	.	.	+	.	1	.	+	+	.	+	.	.	.	+	+	.	.	.	II	+/1
Pyrola minor	BL	.	.	+	1	+	+	1	.	.	+	.	.	+/1	+	+	.	.	.	.	.	.	.	+	.	.	II	+/1
Poa arctica	AM	.	.	+	+	+	.	1	1	+	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	II	+/1
Vaccinium microphyllum	LM	4	.	+	1	+	+	.	.	+	4	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	II	+/4
Bryum spec.		.	+	.	.	+	.	.	.	.	+	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	II	+
Poa alpina	LO	.	+	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+	+	+	.	.	.	.	I	+/1
Salix herbacea	LO	.	.	.	.	+	.	.	3	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	+/3
Dicranum scoparium		.	.	+	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I	+
Lycopodium dubium	LO	.	.	.	1	1	.	.	.	.	.	.	.	.	1/2	.	.	.	.	.	.	.	.	.	.	.	I	1/2
Betula nana	LM	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I	+/1
Stellaria calycantha	BL	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I	+/1
Drepanocladus uncinatus		+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+	+/1

veloped in extensive stands. It is found at low altitudes (below 150 m a.s.l.), in flat to slightly sloping places or on moderately to very steep slopes exposed to southern winds. All locations are sheltered. The snow in winter is permanent and thick, but disappears early, probably by the end of May. The association seems to avoid north and west exposures, which is in accordance with Kruuse (1912), who attributed this to the warm winter foehn winds blowing from the northwest. These winds cause melting of the snow cover, resulting in harmful exposure to drying out, and later again to very low temperatures.

The soils are heterogeneous and coarsely textured. They are of colluvial, partly niveo-aeolian, sometimes of alluvial or fluvio-glacial origin, well drained and aerated; they are predominantly acid, and classified as gleysols, fluvisols, histosols, regosols and rankers.

In the phytosociological area type spectrum the LM type strongly dominates.

Boreal distribution types, however, frequently occur. Two subassociations, for which the moisture conditions of the soil are different can be distinguished in the district. A similar difference was found by Dahl (1957) in Rondane, Norway, in the shrub vegetation of the "Rumiceto–Salicetum lapponum" Dahl 1957, which belongs to the Lactucion alpinae also.

Subass. typicum **subass. nov.**
(Tab. 7, ref. 1–5; Tab. 26, ref. 10; Fig. 18. NTR: Tab. 7, ref. 5).

Differential taxa are absent. The unit is rather heterotone and poor in taxa. The only two constant taxa are *Salix callicarpaea* (V 5/6) and *Vaccinium microphyllum* (IV +/4). The number of taxa is about 10 per record.

The subassociation is developed as shrub vegetation. The moss layer is poorly to moderately well developed; the field layer covers about 15% and is up to 50 cm high. The overlying shrub layer is closed (cover 75–90%) and 60 to 70 cm high. This subassociation contains the highest shrub vegetation of the district (120 cm). It was only found inland in Qíngertivaq (loc. 6.1, 6.3, 6.5), nearly always in flat to slightly sloping areas (slope 0–5°) next to brooklets in stable places that are well covered with closed vegetation, or in recently deposited fluvioglacial material along brooks with strong current in spring, but drying up in summer. All habitats are flooded in spring. The soils dry out superficially later in the season, but the subsoil remains moist. The soil types are gleysols or fluvisols.

Compared with the next subassociation, subass. typicum may be characterized synecologically as hygrophytic and rheophytic.

Subass. chamaenerietosum angustifoliae **subass. nov.**
(Tab. 7, ref. 6–12; Tab. 26, ref. 11–12; Fig. 19. NTR: Tab. 7, ref. 13).

Differential taxa are *Chamaenerion angustifolium* (V +/2), *Campanula gieseckiana* (IV +/2), *Stereocaulon* sp. (III +), *Thalictrum alpinum* (III +/1), *Sedum rosea* (II +/1), *Coptis trifolia* (II +/1), *Cetraria islandica* (II +), *Poa glauca* (II +/1), *Cladonia* sp. (prim. thallus) (II +), *Luzula spicata* (I +), *Tortula ruralis* (1 +), *Lophozia hatcheri* (1 +), *Cladonia chlorophaea* (I +), *Thymus drucei* (I +/1), *Viscaria alpina* (1 +), *Cladina mitis* (+ +), and *Draba norvegica* (+ +/1).

The subassociation is rich in herbs. It is developed as shrub vegetation and as dwarf shrub vegetation. The moss layer is poorly developed and mostly covers less than 1%. In the dwarf shrub vegetation, the field layer is rather closed and 15–25 cm high. Herbs are sometimes up to 40 cm high. In the shrub vegetation, the field layer covers 10–40%. Some herbs are up to 40 cm. The shrub layer is rather closed and is 30–70 cm high.

This vegetation unit was found up to 430 m a.s.l., but it is mainly found at the coast below 100 m: in Blomsterdalen (loc. 1.2), Sermilikvejen (loc. 1.7) and Nagtivit (loc. 3). It distinctly prefers steep to very steep slopes (average about 25°) exposed to southern winds. The habitats are rather warm, and sheltered against the northwestern winds. The soils are rankers, regosols and histosols. The steep slopes together with the coarse texture render the soils well aerated and well drained. In spring they are richly supplied with melt water, which later in the season comes from higher places.

Compared with the subass. typicum, subass. chamaenerietosum may be characterized as mesophytic to weakly hygrophytic, and more thermophytic. Two variants can be distinguished:

Typical variant **var. nov.** (Tab. 7, ref. 6–17; Tab. 26, ref. 11). – This variant has no decisive differential taxa. *Pyrola minor* and *Poa arctica* (III +/1) distinguish this variant from the next one. The variant is found on moderately steep to steep slopes (5–10° to 30°) with southern exposure; particularly in Blomsterdalen (locality 1.2) and Sermilikvejen (loc. 1.7), it is nearly always found below 100 m. The variant is commonly present as shrub vegetation.

The soils are thick and finely textured. In Sermilikvejen, they are rankers, with at least 40 cm thick coarse sand overlying coarse debris. In Blomsterdalen, the soils are regosols probably 100 cm thick, and developed mainly in niveo-aeolian sand deposits. Locally in the profile, humic bands indicate repeated deposition in the past of (air born) sand over the vegetation. One histosol was found.

The vegetations are located at the foot of slopes; in spring they receive melt water that disappears rapidly in the soil and runs off on the underlying bedrock at max. 1 m depth. The water can be reached by the *Salix* roots. The variant is often found adjoining the "Caricetum bigelowii", a grass heath dominated by *Carex bigelowii* on still thicker sandy soils (see also Molenaar 1976).

Variant of *Cystopteris fragilis* **var. nov.** (Tab. 7, ref. 18–25; Tab. 26, ref. 12; Fig. 19). – Differential taxa are *Cystopteris fragilis* (V +/2), *Hieracium hyparcticum* (IV +/2), also faithful taxon of the association), *Trisetum spicatum* (III +), *Juniperus nana* (II +/4), *Potentilla tridentata* (II +/1), *Hieracium alpinum* (II +/2), *Alchemilla alpina* (II +), *Bartsia alpina* (II +/1), *Desmatodon latifolius* (II +) and *Pohlia nutans* (II +).

The variant occurs both as shrub and dwarf shrub vegetation. It is found on steep to very steep slopes (20–50°) with southern, mainly southwestern exposure, under very steep to perpendicular rock walls; throughout nearly the whole growth season water trickles down and moistens the vegetation and the soil. The locations are found at heights from 60 to 160 m, only one at 430 m a.s.l.

The soils are thin and moist. Bedrock or coarse debris is found, in most places, less than 30 cm below the surface. The soils are classified as rankers and regosols in coarse sandy weathering deposits, or as histosols, consisting of decomposing and decomposed *Salix* leaves (and other material) overlying the bedrock.

Compared with the typical variant, this variant may be characterized as more hygrophytic and probably, in view of its sheltered location, more thermophytic. It is found at the coast and inland; especially in Nagtivit (loc. 3) it is well developed.

Remarks on *Salix callicarpaea* shrub vegetation

In the literature, much information is presented on the *Salix callicarpaea* shrub vegetation in Greenland. Records and synoptic tables were published by Böcher (1933, 1954, 1959, 1963), Fredskild (1961), Knapp (1964), and in this paper (Tab. 7: 1–25). Studying the information, three floristically more or less distinct groups of communities with different distributions can be distinguished. They are mainly confined to one or two of the climates distinguished by Böcher (1954) in West Greenland, which are also represented in Southeast Greenland. These types and their main characteristics are (Böcher 1.c.: 17–19):

a. The lowarctic-oceanic regime (LAO) with annual precipitation about 500–1000 mm. Annual range of mean monthly temperature: 10 to 18°C. Mean temperature of the warmest month 6–8°C.

b. The lowarctic-suboceanic regime (LASO), intermediate between LAO and c.

c. The lowarctic-subarctic continental regime (LSAC). Annual precipitation from 100 to about 250 mm. The annual range of mean monthly temperature: 20 to 30°C. Mean temperature of warmest month about 10°C.

d. The lowarctic-subcontinental regime (LASAC). Annual precipitation about 200 to 500 mm. Annual range of mean monthly temperature: 20 to 30°C. Mean temperature of the warmest month 6–8°C.

e. The subarctic oceanic-suboceanic regime (SAOSA). Annual precipitation 700–1400 mm. Annual range of mean monthly temperature: 15 to 20°C. Mean temperature of the warmest month 9–11°C.

The willow shrub vegetation in South Greenland can be distinguished from the shrub vegetation in the other parts of Greenland, e.g., by *Poa nemoralis, Carex atrata, Anthoxantum odoratum* ssp. *alpina* and *Alchemilla alpina* (Böcher 1954, tab. 8–10; Knapp 1964, tab. 5A–C); it is found in areas with a subarctic oceanic-suboceanic climate (SAOSO).

Another group of shrub communities has its main distribution in areas with more continental climate regimes, viz., the lowarctic-subarctic continental regime (LSAC) and the lowarctic subcontinental regime (LASAC). This group contains as differential taxa *Pyrola grandiflora, Stellaria monantha, Orthilia secunda* and *Poa pratensis* (Böcher 1954, tab. 9: 1–3; tab. 28: 1–13; tab. 37: 5–11; 1963, tab. 10: 7–16; tab. 9: 8–15; 1959, tab. 4: 1–5; Fredskild 1961, V: 1–3).

Finally, a group can be distinguished with the differential taxa *Carex bigelowii, Empetrum hermaphroditum* (weakly), *Poa arctica,* and less common, *Sedum rosea* and *Festuca rubra.* This group has its main distribution in the areas of the lowarctic oceanic climate regime (LAO), to which the Angmagssalik District belongs (Böcher 1963, tab. 10, this paper Tab. 7: 1–25).

The willow shrub vegetation at Holsteinsborg (Böcher 1963, tab. 10) is located in the area of the lowarctic continental climate regime. Floristically, however, it belongs to the last-mentioned community group. These shrub communities from Holsteinborg occur in relatively moist places, with possibly an oceanic microclimate within continental macroclimate.

Comparing the different types of shrub vegetation described by Kruuse (1912) and Böcher (1933) from the east coast of Greenland with the typology presented in this paper, it may be concluded that the mentioned types easily fit the presented system. Kruuse distinguished three main types in the Angmagssalik District: a) A mixed shrub (composed of *Salix* and *Juniperus,* or *Salix* and *Betula,* or *Salix* and *Empetrum*). b) A *Salix* shrub, with 5 habitat types. c) A fragmentary *Juniperus* shrub. The floristic composition of these shrub types can be evaluated from 8 species lists based on 8 different stands. Numbers 1, 2, 4, 7 and 8 belong to the subass. chamaenerietosum, the other numbers to the subass. typicum.

Kruuse (1912) also listed the most common and less common species of the shrub vegetation. It is remarkable that among the 24 most common species *Potentilla maculata* (= *P. crantzii*), *Alchemilla wichurae, Arabis alpina, Veronica alpina, Saxifraga cernua* and *Luzula spicata* were mentioned. These species are not common at all here. On the other hand, Kruuse considered the very common *Campanula rotundifolia* (= *C. gieseckiana*) and *Carex bigelowii* as not so common in the willow shrub vegetation.

Böcher (1933) distinguished 4 types in his "Salicetum glaucae". The shrub vegetation of Scoresby Sund in East Greenland belongs to the community group of the continental climate regime; the other southern types can be assigned as follows: The shrub at Watkins Fjord in Kangerdlugssuaq belongs to the subass. chamaenerietosum, even to the variant of *Cystopteris fragilis*; the shrubs ascribed by Böcher to the so called moist mould copse belong to the subass. typicum (Miki Fjord, no. 1) and the subass. chamaenerietosum (Angmagssalik no. 2), whereas the "heath copse" of Tugtilik (nos 3, 4, 5) is partly fragmentary, partly intermediate between the two subassociations.

Dwarf shrub vegetation on strongly to moderately acid, mainly mineral soils.

Dwarf shrub vegetations with *Empetrum hermaphroditum* and/or *Vaccinium microphyllum* play an important role in the Angmagssalik District with its predominantly acid soils. They cover extensive areas and largely determine the aspect of the landscape. Just as elsewhere in Greenland (Böcher 1933, 1954, 1963) the dwarf shrub vegetation in the district is extremely varied in floristic composition and physiognomy. The most dominant taxa are *Empetrum* and/or *Vaccinium,* but to a lesser degree *Salix callicarpaea* and *Betula nana* are present, and higher inland also *Cassiope tetragona.* Some communities are rich in herbs, others in mosses and/or lichens. The vegetation is low (the average height is less than 15 cm) and two layered. It consists of

a moss layer and a field layer. The stratification, however, is not distinct and a proper undergrowth as in the shrub vegetation (Festuco–Salicetum callicarpaeae, p. 31) is generally absent.

Most of the dwarf shrub communities are found in intermediate habitats, not affected by extreme environmental factors, such as high ground-water level, frequent flooding, or inundation, long lasting snow cover or complete absence of snow cover, unstable soil, etc. These vegetations will be considered as zonal vegetations (cf. Ellenberg 1978). In the Angmagssalik District they represent the final stage of the succession on acid soils, and may be considered as climatic climax formation, just as elsewhere in the lowarctic parts of West Greenland (Böcher 1963: 168). The soil types under the dwarf shrub communities are rather varied, but rankers are common.

The *Empetrum/Vaccinium* dwarf shrub communities are mainly distributed in sub- and lowarctic regions (see Rikli 1916, Hanson 1953), but they are also found in the sub- and lowalpine zones in boreal and temperate regions of the northern hemisphere (Nordhagen 1943, Dahl 1957, Ellenberg 1978).

Class Loiseleurio–Vaccinietea Eggler 1952 em. Schubert 1960

Syn.: Vaccinio–Piceetea Br.–Bl. apud Br.–Bl., Siss. et Vlg. 1939 p.p.

The class contains only one order. For details see below.

Order Rhododendro–Vaccinietalia Br.–Bl. in Br.–Bl. et Jenny 1926 **em.** (Tab. 26, ref. 13–26, 29, 35).

Syn.: Rhodoreto–Vaccinietalia Br.–Bl. apud Br.–Bl. et Jenny 1926, Vaccinio–Piceetalia Br.–Bl. apud Br.–Bl., Siss et Vlg. 1939 p. maj. p., Loiseleurio–Vaccinietalia Eggler 1952 p.p., Empetretalia hermaphroditi Schubert 1960, Rhodoretalia Br.–Bl. 1931, Deschampsio–Myrtilletalia Dahl 1957 p. min. p., Carcicetalia curvulae Br.–Bl. 1926 em. Krajina 1933 p. min. p., Cladonio–Vaccinietalia Kielland Lund 1967 p.min.p., Caricetalia curvulae p.p. (*sensu* Mc Vean & Ratcliffe 1962). Non Deschampsio–Myrtilletalia (*sensu* Mc Vean & Ratcliffe 1962).

The class and order contain mainly dwarf shrub communities rich in chamaephytes on stable, dry to occasionally moist, acid, mainly humus rich to peaty, mineral soils, distributed in (sub)arctic and (sub)alpine regions of the northern hemisphere. Some related open and low forest communities with *Betula tortuosa* and/or *Pinus sylvestris* rich in dwarf shrubs and cryptogams are included, e.g., Calamagrostio lapponicae–Pinetum Br.–Bl. et Siss. in Br.–Bl., Siss. et Vlg. 1939 em. K. Lund 1967.

Faithful taxa are (see also Schubert 1960): *Empetrum hermaphroditum* (preferential), *Arctostaphylos alpina, Loiseleuria procumbens* and in the district also *Betula nana.* Moreover, a number of faithful taxa of the lower syntaxa of the order might be considered as transgressive faithful taxa of the order and class, for example *Phyllodoce coerulea* and *Diapensia lapponica.* Differential taxa as against the coniferous forest communities (Piceetalia excelsae) are *Carex bigelowii, Salix herbacea, Polygonum viviparum, Salix glauca* L. coll., *Vaccinium microphyllum, Betula nana, Hieracium alpinum, Juncus trifidus, Poa arctica, Cassiope tetragona, Psoroma hypnorum, Stereocaulon paschale, Cetraria ericetorum, Peltigera malacea,* and others. Differential taxa as against the Carici–Kobresietea Ohba 1974 (p. 55), containing dwarf shrub and other chamaephytic communities of the district on less acid soils, are *Stereocaulon paschale, Cladonia crispata, C. carneola, C. bellidiflora, Dicranum fuscescens, Hieracium alpinum, Betula nana* and *Cetraria cucullata* (see Tab. 26).

In accordance with Schubert (1960), six alliances can be distinguished within the order. The Juniperion nanae Br.–Bl., Siss. et Vlg. 1939, containing arctic-alpine thermophytic and xerophytic communities, is only locally developed in the Angmagssalik District. A single Juniper (dwarf)shrub close to a south facing rock shows some association with this alliance. The chionophytic and achionophytic communities of the north are distinguished at the alliance level from the corresponding central European communities.

The northern Phyllodoco–Myrtillion ("Phyllodoco–Vaccinion") and the Loiseleurion–Diapension ("Loiseleurio–Arctostaphylion") are vicarious in respect to the middle European "Rhododendro–Vaccinion" and the "Cetrario–Loiseleurion" (Schubert 1960). Both the Phyllodoco–Vaccinion (= Phyllodoco–Myrtillion Nordh. 1943) and the Loiseleurio–Arctostaphylion (= Loiseleurio–Diapension Br.–Bl., Siss. et Vlg. 1939 stat. nov.) are well developed in the Angmagssalik District.

Alliance Phyllodoco–Myrtillion Nordh. 1943 (Tab. 26, ref. 13–21; Fig. 20).

Syn.: Phyllodoco–Vaccinion Nordh. 1936 em. K. Lund 1967 (nom. illeg.), Phyllodoco–Vaccinion myrtilli Dahl 1957 p.maj.p. (nom. illeg.), Phyllodoco–Vaccinion myrtilli Nordh. 1936, 1943, Dahl 1957 p.p. (*sensu* Hadač 1971) (nom. illeg.). Lit.: Phyllodoco–Vaccinion Myrtilli Nordh. 1936 (nom. inval.), Phyllodoceto–Vaccinion myrtilli Kalliola 1939 (nom. inval.), Myrtillion alpinum Du Rietz 1942 (nom. nud. et nom. illeg.). See further Hedberg et al. (1952), Gjaerevoll & Bringer (1965), Du Rietz (1950), Thannheiser (1975). Non Phyllodoco–Vaccinion myrtilli (*sensu* Mc Vean & Ratcliffe 1962). Incl. *Phyllodoce coerulea–Lycopodium alpinum* type (Böcher 1954, p.p.).

The Phyllodoco–Myrtillion contains the chionophytic communities of the order. Floristically it is poorly characterized and transitions to the achionophytic Loiseleurio–Diapension (p. 44) are common. The alliance was discussed in detail by Nordhagen (1943). Faithful taxon is *Phyllodoce coerulea.* In Scandinavia (Nordhagen 1943, 1954, Dahl 1957) and Iceland (Steindórsson 1945, Hadač 1972) *Vaccinium myrtillus* is generally dominant, which is also a characteristic of the alliance. *Vaccinium myrtillus,* however, is nearly absent in Greenland. In its typical form the alliance is distinguished from the Loiseleurio–Diapension (p. 44)

by a number of mesophytic herbs and mosses, and by the absence of typical "Windflechten"; the latter determine the aspect of the Loiseleurio–Diapension (Nordhagen 1936, 1943, 1954, Kalliola 1939, Du Rietz 1942, Hedberg et al. 1952, Dahl 1957, Dahl et al. 1971, Gjaerevoll & Bringer 1965, Thannheiser 1975).

Differential taxa as against the Loiseleurio–Diapension in the Angmagssalik District are: *Pyrola minor, Coptis trifolia, Sedum rosea, Taraxacum croceum, Lycopodium dubium, Bartsia alpina, Pleurozium schreberi, Hylocomium splendens, Kiaeria glacialis, Aulacomnium palustre, Cladonia ecmocyna* and *Peltigera spuria* (Tab. 26).

In view of the characteristics mentioned above, the Phyllodoco–Salicetum callicarpaeae (p. 37), the *Empetrum hermaphroditum–Vaccinium microphyllum* community (p. 41) and the Cassiopetum tetragonae (p. 43) are assigned to the Phyllodoco–Myrtillion; the last two, however, are physiognomically and floristically closely related to the Loiseleurio–Diapension.

The Phyllodoco–Myrtillion is reported as common from Scandinavia (e.g., Kalliola 1939, Nordhagen 1943, 1954, Thannheiser 1975). It is also found in Iceland (Steindórsson 1945, Hadač 1972) and probably also in Scotland (McVean & Ratcliffe 1962). It is common in Greenland (Böcher 1954, 1963; this paper), and is probably present in the eastern part of the North American continent (Polunin 1948: 142). The alliance is mainly restricted to (sub-)lowarctic, and (sub)alpine areas with (sub)oceanic climates.

Ass. Phyllodoco–Salicetum callicarpaeae Böcher 1933 **em. et nom. nov.**
(Tab. 8, ref. 1–63; Tab. 26, ref. 13–18; Fig. 21. NTR: Böcher 1933, tab. 21, no. d).

Syn.: Empetreto–Vaccinietum Böcher 1933 p.p. (nom. illeg.), *Empetrum hermaphroditum–Deschampsia montana* Assoziation Knapp 1964 p.p.
Lit.: Phyllodocetum coeruleae Böcher 1933 (nom. nud.).
Remarks: incl. *Phyllodoce coerulea–Lycopodium alpinum* type p.maj.p. (Böcher 1954). Heaths rich in *Phyllodoce* and heaths with boreal sylvicolous species p.maj.p. (Böcher 1963, tab. 12: 1–17; tab. 13: 1–2). Non Empetreto–Vaccinietum Br.–Bl. 1926, non Vaccinio–Empetreto hermaphroditi scandinavicum Hadač 1971 (nom. illeg.), non Empetreto–Phyllodocetum coeruleae Hadač 1971 (nom. nud.), non *Vaccinium–Empetrum* ass. Steindórsson 1936, non Vaccinieto–Empetretum McVean & Ratcliffe 1962.

Composition and physiognomy: Regional faithful taxa in the Angmagssalik District are *Phyllodoce coerulea* (111 +/3, preferential) and *Diphasium alpinum* (11 +/2, exclusive). Differential taxa as against the Cassiopetum tetragonae (p. 43) are *Salix callicarpaea* (IV +/4), *Bartsia alpina* (III +/2), *Taraxacum croceum* (II +/3), *Sedum rosea* (II +/2), *Coptis trifolia* (II +/1), *Hieracium alpinum* (II +/2), *Pyrola minor* (II +), *Cladonia ecmocyna* (II +/1), *Poa arctica* (III +/1) and *Juncus trifidus* (II +).

Differential taxa as against the vicarious Scandinavian Phyllodoco–Vaccinietum myrtilli Nordh. 1943 are *Salix callicarpaea* (area differential taxon), *Coptis trifolia* (area differential taxon), *Poa arctica, Bartsia alpina,* and *Polygonum viviparum* (V +/2). Differential taxa as against the related Scottish and Icelandic associations are *Salix callicarpaea* (area differential taxon), *Coptis trifolia* (area diffential taxon), *Poa arctica, Hieracium alpinum, Phyllodoce coerulea,* and probably also *Stereocaulon alpinum* (II +/3), *Cladina mitis* (II +/1) and *Cladonia ecmocyna.* Constant companions are: *Empetrum hermaphroditum* (V +/6), *Salix herbacea* (V +/3), *Vaccinium microphyllum* (V 1/6) and *Carex bigelowii* (IV +/1). *Empetrum* and/or *Vaccinium* are dominant.

Depending on the habitat, the association varies distinctly in floristic composition and physiognomy. The number of taxa varies from 7 to 54, and averages nearly 20 per record. Dwarf shrubs make up 50–100%, herbs 1–40% and mosses/lichens 0–70%.

The vegetation is low and stratified. A moss layer is nearly always present, in some places well developed, up to 4 cm high; mosses are dominant in most cases. Dwarf shrubs dominate in the well developed field layer, the height of which varies but is generally lower than 20 cm. Herbs may be as high as 40 cm. The vegetation is fresh green, in some places containing broad-leaved herbs.

Habitat and distribution: Synecologically the association may be characterized as strongly to moderately acidophytic, oligo- to mesotrafent, xero- to weakly hygrophytic, chionophytic and thermophytic.

The vegetation is found in depressions, between ridges, at the foot of rock walls or very steep slopes, and always sheltered against the northern winds. Snow does not melt until the end of May or later, but by the end of June it has disappeared. The altitude is less than 200 m, and the slopes are steep (average about 23°). The vegetation is nearly always exposed to southern winds. Soils are rather varied. They are coarse sandy, shallow, with a well developed morlike humic horizon. The upper soil may be peaty. Rankers are common.

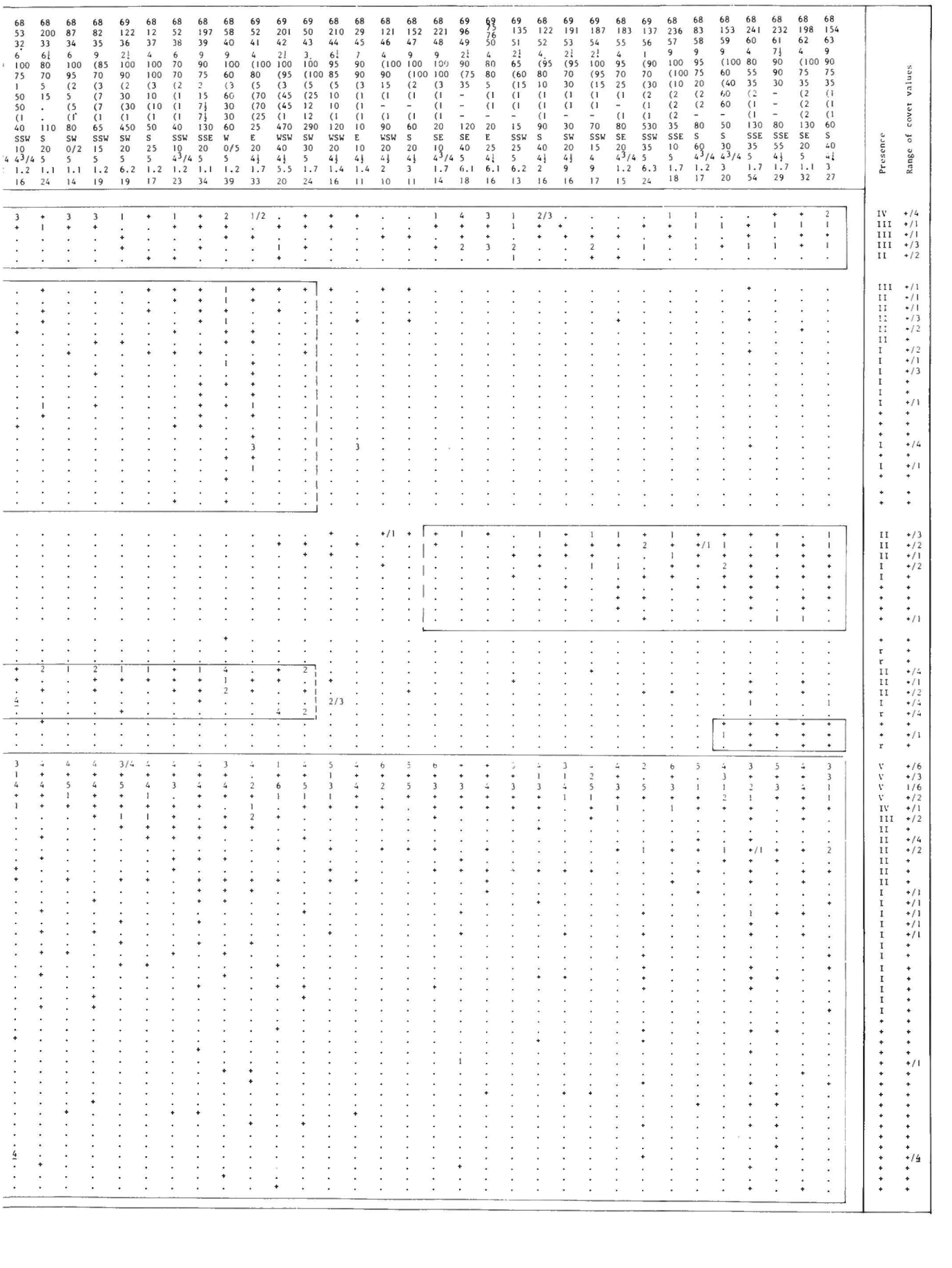
The association is common both at the coast and inland. In the phytosociological area type spectrum the LO distribution type strongly dominates. Two subassociations can be distinguished. Ref. nos 44–47 (Tab. 8) represent intermediate community stands.

Subass. cladonietosum ecmocynae **subass. nov.**
(Tab. 8, ref. 1–43; Tab. 26, ref. 16–18. NTR: Tab. 8, ref. 8).

Differential taxa are *Cetraria islandica* (III +/1), *Cladina mitis* (III +/1), *Cladonia ecmocyna* (III +/1), *Stereocaulon alpinum* (II +/1), *Lophozia hatcheri* (III +/2), *Cladonia chlorophaea* (II +), *Peltigera rufescens* (II +/2), *Cetraria ericetorum* (II +/1), *Stereocaulon paschale* (II +/3), *Cladonia carneola* (1 +), *Cladina*

Table 8. Phyllodoco–Salicetum callicarpaeae.

Analysis no.		69 203	68 231	68 223	68 75	68 89	68 132	69 92	68 67	68 211	68 31	68 120	68 159	69 188	69 53	68 162	68 242	68 88	68 118	68 117	68 13	68 59	69 125	69 79	68 212	68 160	68 55	68 54	69 126	68 157
Reference no.		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
Sample plot surface in m^2		2½	6½	6½	6	4½	4	2½	5	6½	1	9	6	2½	4	6	4	4	9	9	1	4	2½	2½	4	9	9	4	2½	9
Total cover %		100	100	100	70	90	100	90	95	70	100	95	80	(100	(100	100	100	80	90	75	90	80	100	100	70	(95	(95	85	100	95
Cover % of dwarfshrubs		75	50	(100	(70	90	100	90	90	70	100	95	75	(100	(100	100	100	80	(90	75	80	80	95	100	70	75	85	85	(100	90
Cover % of herbs		(15	5	(2	(3	(2	(2	(10	(3	2	(1	5	(5	(1	(2	(1	(1	(2	(1	(1	10	5	(15	(3	(2	(5	(10	(2	(10	(5
Cover % of mosses/lichens		(1	50	(3	(1	(2	(3	(1	5	(1	–	(2	(2	(2	(5	(1	(1	(1	(3	(1	–	(2	(10	(2	(1	(5	(1	(3	(10	45
Cover % of mosses		(1	20	(2	(1	(2	(3	(1	(5	(1	–	(1	(1	(2	(5	(1	(1	(1	(3	(1	–	(2	(10	(2	(1	(1	(1	(2	.	45
Cover % of lichens		(1	40	(2	(1	(2	(3	(1	(1	(1	–	(1	(1	(2	(1	(1	(1	(1	(3	(1	–	(2	(1	(2	(1	(15	(1	(2	.	(1
Altitude a.s.l. in m.		500	10	30	150	40	60	20	70	110	25	90	60	60	20	75	135	30	80	20	50	60	95	10	40	100	50	50	90	180
Direction of exposure		WNW	E	SE	E	W	S	E	E	S	N	SE	SSW	W	SSE	S	SE	SE	SSE	S	S	SE	NW	E	S	SSW	S	S	NW	S
Slope		35	20	7½	40	30	20	10	20	45	15	35	20	12½	15	25	20	30	30	25	30	45	10	25	15	35	5	2½	10	30
pH of rhizosphere		4	4¾	5	4¾	4¾	4¾	5	5	4½	5	5	4¾	4¾	4¾	4¾	5	4¾	4½	4½	4¾	5	5	5½	4¾	4¾	4½	4¾	5	4½
Locality		5.5	1.7	1.7	1.1	2	2	6.1	1.1	1.4	1.4	2	3	9	1.5	3	1.7	2	2	2	1.2	1.1	7	6.1	1.4	3	1.1	1.1	7	3
Number of taxa		19	32	16	20	16	14	15	18	20	7	12	24	15	18	14	14	19	21	18	13	20	14	17	24	26	20	24	14	17
Faithful (F) and diff. taxa of the ass.:																														
Salix callicarpaea	LM	.	.	.	1	.	.	+	3	3	+	4	.	.	.	+	.	.	.	.	1	1	3	2	.	+	.	.	1	+
Bartsia alpina	LO	+	.	.	+	.	.	+	.	+	.	-1	+	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	+
Poa arctica	AM	.	+	.	+	+	+	+	+	+	.	+	.	+	.	.	.	+	+	+	.	+	+	+/1	+	.	.	.	.	.
Phyllodoce coerulea (F)	LO	2	.	.	.	.	.	2/3	.	.	.	.	1	.	.	+	.	.	.	.	1	2	.	.	2	.	+	1	.	+
Diphasium alpinum (F)	LO	2	.	+/1	1	.	.	.	1	.	.	.	1	+	1	.	.	.	.	.	+	.	.	.	1	+	2	1	.	.
Diff.taxa of subass. cladonietosum:																														
Cetraria islandica		.	+	+	+	+	.	.	+	.	.	.	+	.	+	.	.	+	+	.	.	.	.	.	+	+	+	+	.	.
Cladina mitis		+	+	+	+	+	+	.	.	.	.	+	+	+	+	+	+	+	+	.	.	+	.	.	+	+	+	+	.	.
Cladonia ecmocyna		+	1	+	.	+	.	.	+	.	.	.	+	.	+	.	.	+	+	+	.	.	.	.	+	+	+	+	.	.
Stereocaulon alpinum		.	3	+	+	.	+	.	+	+	.	.	+	.	.	.	+	.	.	+	.	.	.	.	+	.	+	+	.	.
Lophozia hatcheri		+	2	+	.	+	.	.	1	.	.	.	+	.	+	.	.	+	+	.	.	.	1	+	+	.	.	+	.	.
Cladonia chlorophaea		.	+	+	.	.	+	.	.	+	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.
Peltigera rufescens		.	2	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.
Cetraria ericetorum		.	+	.	+	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	.	.	.
Stereocaulon paschale		.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	.	+	.	.	.	.	.	.	2/3	.	.	.	+
Cladina rangiferina		.	+	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Cladonia carneola		.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	+	+	.	.	.	.	+	+	.	.	.	.
Peltigera scabrosa		.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Cladonia uncialis		.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.
Peltigera polydactyla		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.
Cladonia crispata		.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Betula nana	LM	.	.	.	.	.	.	.	.	.	.	.	+	+	.	4	.	.	.	.	.	.	4	.	.	+	.	.	3	1
Cladonia gracilis		.	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Peltigera malacea		+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	+	.	.
Cephaloziella spec.		.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.
Cladonia bellidiflora		.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	+	.	.
Cladonia coccifera		.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.
Diff.taxa of subass. sedetosum:																														
Taraxacum croceum	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sedum rosea	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Coptis trifolia	BL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sibbaldia procumbens	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica alpina	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phleum commutatum	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gnaphalium supinum	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gentiana nivalis	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla filicaulis	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Diff.taxa of variants:																														
Solorina crocea		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.
Gymnomitrion concinnatum		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.
Kiaeria starkei		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.
Aulacomnium palustre		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polytrichum juniperinum		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Peltigera aphthosa		.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum teres		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4
Sphagnum warnstorfii		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola palustris	BS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Listera cordata	BL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium anagallidifolium	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Other taxa:																														
Empetrum hermaphroditum	LM	1	4	6	4	6	5	1	5	4	4	4	5	4	6	5	6	6	4	5	5	3	4	2	5	4	5/6	5	4	4
Salix herbacea	LO	+	+	+	+	+	+	+	.	+	1	+	+	+	+	.	1	+	1	1	+	+	1	+	+	+	1	2/3	1	+
Vaccinium microphyllum	LM	4	.	.	2	.	4	5	1	4	4	3	3	4	1	3	.	.	4	.	1	3	4	6	.	4	.	.	5	4
Polygonum viviparum	AM	+	.	+	+	.	1	+	+	+	1	+	+	+	+	+	+	+	1	+	+	+	1	+	+	+	.	.	1	+
Carex bigelowii	LM	.	1	+	+	.	.	.	+	.	+	.	.	+	+	.	.	+	+	+	+	+	1	+	+	.	+	+	1	.
Dicranum scoparium		+	2	.	+	.	+	.	1	.	.	+	+	+	+	+	.	+	+	+	.	.	+	+	+	+	.	.	.	.
Pohlia nutans		.	+	.	.	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+
Loiseleuria procumbens	LO	.	.	.	.	.	.	.	.	.	.	.	1	4	.	.	.	.	.	.	+	+	.	.	.	+	+	1	.	.
Hieracium alpinum	LO	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	+
Juncus trifidus	LO	.	+	+	.	.	.	.	.	.	.	.	.	.	+	+	+	.	+	.	.	+	.	.	.	.	+	+	.	.
Pyrola minor	BL	.	.	.	.	.	.	+	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Drepanocladus uncinatus		.	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	.
Cerastium lanatum	LM	.	+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Peltigera spuria		.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.
Thalictrum alpinum	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Harrimanella hypnoides	LO	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	+	1	.	.
Poa alpina	MA	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+/1	.	.	.	.	.	.	.	.
Lophozia spec.		.	+	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.
Bryum spec.		.	+	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Lophozia ventricosa		.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.
Trisetum spicatum	AM	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Tofieldia pusilla	LM	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	+
Pohlia spec.		.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.
Desmatodon latifolius		.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.
Lophozia alpestris		.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	+	+	.	.
Agrostis borealis	LO	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Oncophorus spec.		.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Luzula spicata	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	+	.	.	.	.	.
Lycopodium dubium	LO	.	.	.	.	.	1	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Peltigera canina		.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Pinguicula vulgaris	BW	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chamaenerion angustifolium	BL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Campanula gieseckiana	LM	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.
Cetraria delisei		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.
Festuca vivipara	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Polytrichum alpinum		.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.
Viscaria alpina	LO	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.
Sphagnum girgensohnii		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Carex scirpoidea	LM	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Polytrichum piliferum		.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.
Brachythecium spec.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.


Presence
Range of cover values

rangiferina (1 +), *Peltigera scabrosa* (1 +/1), *Cladonia uncialis* (1 +), *Peltigera polydactyla* (I +), *Cladonia crispata* (I +), *Betula nana* (1 +/4), *Cladonia gracilis* (1 +), *Peltigera malacea* (1 +/1), *Cephaloziella* sp. (+ +), *Cladonia bellidiflora* (+ +) and *C. coccifera* (+ +).

The subassociation is rather poor in herbs but rich in cryptogams. The subassociation is a local one, and is found in stands of a few tenths of square metres. Compared with the subass. sedetosum (p. 40), it occurs on less steep slopes and in less sheltered habitats, which are probably poorer in nutrients. The subass. cladonietosum may be considered as moderately to slightly chionophytic, xerophytic to moderately hygrophytic, and oligo- to mesotrafent. Three variants can be recognized:

Typical variant **var. nov.** (Tab. 8, ref. 1–23; Tab. 26, ref. 18). – This variant is found on rather dry, steep (average 24.5°), particularly east and south slopes. All stands but one are located in sheltered places. After the melting of the snow, the soil is not affected by additional lateral water. The soils are dry and thicker than 15 cm. In some places they consist of organic material. Most of them are rankers. The variant is rather oligotrafent and xerophytic.

Variant of *Gymnomitrion concinnatum* **var. nov.** (Tab. 8, ref. 24–27; Tab. 26, ref. 17). – Differential taxa are *Solorina crocea* (3/4 +), *Gymnomitrion concinnatum* (3/3 +) and *Kiaeria starkei* (2/3 +). This variant is found in wind sheltered higher places, which have a thick snow cover in winter. The exposure is S to SW. The slope is less steep than for the first variant. The soils are rankers. The variant was only found at the coast. Compared with the typical variant it may be considered as mesophytic and strongly chionophytic.

Variant of *Aulacomnium palustre* **var. nov.** (Tab. 8, ref. 28–43; Tab. 26, ref. 16). – Differential taxa are *Aulacomnium palustre* (IV +/2), *Polytrichum juniperinum* (IV +/1), *Peltigera aphthosa* (III +/2, *Sphagnum teres* (II +/4) and *S. warnstorfii* (1 +/4). This variant is rather rich in mosses. Its aspect varies. Some stands are rich in Sphagna, which might be facies forming. The variant is found in moist habitats influenced by brooklets or lakes, or in places where water from higher places is supplied more or less continuously. In some places laterally moving ground water was found at –17 to –25 cm. The soils, moist to temporarily wet, are classified as gleysols, histosols, regosols or rankers.

The variant was found up to 500 m. Compared with the other variants, it may be characterized as meso- to moderately hygrophytic and less chionophytic, probably mesotrafent.

Subass. sedetosum roseae **subass. nov.**
(Tab. 8, ref. 48–63; Tab. 26, ref. 13–14; Fig. 21. NTR: Böcher 1933, tab. 21, no.d.).

Differential taxa are *Taraxacum croceum* (V +/1), *Sedum rosea* (IV +/2), *Coptis trifolia* (IV +/1), *Sibbaldia procumbens* (III +/1), *Veronica alpina* (III +), *Phleum commutatum* (III +), *Gnaphalium supinum* (1 +), *Gentiana nivalis* (1 +) and *Alchemilla filicaulis* (1 +/1). Dwarf shrubs are dominant, but the aspect is also determined by herbs, which on the average cover about 23%. Lichens are rare. The subassociation consists of fresh, grey-green stands of dwarf shrubs with violet (*Bartsia alpina*) and, in summer, yellow colours (flowers of *Hieracium alpinum* and *Taraxacum croceum*).

This rather strongly chionophytic, mesophytic to strongly hygrophytic, meso- to eutrafent and strongly thermophytic subassociation is found on steep to very steep (mean slope 30°), sheltered, warm slopes with southern exposure, with a thick and continuous snow cover in winter. The subassociation is often found at the foot of rocks or rock walls with mineral rich water trickling down from the higher parts. Soils are moist and rich in organic material, and are classified as rankers and histosols.

The subass. sedetosum is found both at the coast and inland. Its distribution is rather local and patchy, but particularly in locality 9 (Ikâsaulaq) it is found well developed over larger areas. Two variants can be distinguished:

Typical variant **var. nov.** (Tab. 8, ref. 48–58; Tab. 26, ref. 14; Fig. 21). – This variant is generally found on steep SE to SW slopes that are somewhat drier than those on which the next variant is found.

Variant of *Viola palustris* **var. nov.** (Tab. 8, ref. 59–63; Tab. 26, ref. 13). – Differential taxa are *Viola palustris* (V +), *Listera cordata* (V +/1), and *Epilobium anagallidifolium* (III +). This variant is rich in taxa. The number per record averages 32. Herbs are prominent and cover 35%. It is mostly found on steep (average inclination 36°) wind sheltered south to southwest slopes, close to the foot of rock walls, over which water runs down and moistens the vegetation throughout nearly the whole growth season. Sometimes the water stagnates, which leads to the presence of a *Sphagnum* facies (Tab. 8, ref. 57). The vegetation borders a herb vegetation in a narrow fringe around the rock wall. Soils are shallow (less than 35 cm), moist, and humic or peaty. They are classified as rankers and histosols.

All well developed community stands were found at the coast and below 150 m. Fragmentarily developed the variant was found also inland at high altitudes, on sheltered, light-open, warm and moist ledges, e.g. in Qíngertivaq (locality 6) and Tasîlaq (locality 5). This variant represents the most luxuriously developed vegetation of the Angmagssalik District. The combination of a continuous, but not long lasting snow cover, enough moisture, a rich supply of minerals, and much warmth results in the many taxa and the abundant plant cover (see also Böcher 1933).

Remarks on the Phyllodoco–Salicetum callicarpaeae

The Phyllodoco–Salicetum callicarpaeae is considered a regional Greenlandic association (Greenlandic "Gebietsassoziation"). It is closely related to the Icelandic Alchemillo alpinae–Vaccinietum uliginosi Steindórsson 1936 (see Hadač 1972), which is found on soils that are somewhat richer in nutrients and less acid, but in otherwise strongly related habitat. The last association is distinguished from the Phyllodoco–Salicetum by the many, more or less eutrafent taxa in boreal and temperate regions: *Galium boreale, G. verum* (area differential taxa), *Geranium sylvaticum, Luzula multiflora,* and mosses, e.g., *Rhacomitrium canescens* and *Rhytidiadelphus squarrosus.*

The Phyllodoco–Vaccinietum myrtilli Nordh. 1943 is a closely related Scandinavian association occurring on acid, nutrient poor podzol soils. Differential taxa as against the Greenlandic and Icelandic associations together are *Vaccinium vitis–idaea, Solidago virgaurea, Trientalis europea* (area differential taxa), *Pedicularis lapponica* and lichens such as *Cladonia uncialis* and *Cladina arbuscula.*

The Phyllodoco–Salicetum callicarpaeae seems to be restricted to Greenland; it may occur in North America, but concrete evidence is not available. In Greenland it is common in the sub- to lowarctic areas with (sub) oceanic climate. The communities of West, Southwest and South Greenland are considered as a geographical race, with area differential taxa such as *Ledum groenlandicum, Cornus suecica* and *Carex deflexa,* which are absent in Southeast Greenland. The communities described by Böcher (1959, tab. 6: rec. 1–4) from central West Greenland belong to the subass. cladonietosum; the communities of records 1 and 3 are referrable to the typical variant, and those of records 2 and 4 to the variant of Gymnomitrion concinnatum. The communities described by Böcher (1963, tab. 12:1–17) from other areas in West Greenland belong partly to the typical variant of the subass. sedetosum roseae (rec. 1–5), partly to the subass. typicum subass. nov. (rec. 6–17. NTR: Böcher 1963, tab. 12, rec. 7).

In Southwest Greenland the subass. cladonietosum is also present, (Böcher 1954, tab. 10, rec. 3–7, 9–11), just as the subass. sedetosum (Böcher 1954, tab. 10, rec. 8). The *Empetrum–Deschampsia* Ass. described by Knapp (1964) from South Greenland partly belongs to the Phyllodoco–Salicetum, viz., the communities of the records in his table 1, columns A–C.

The Phyllodoco–Salicetum callicarpaeae is common in Southeast Greenland, especially in the lowarctic oceanic areas (Böcher 1933; this paper, p. 37). It probably also occurs up to 69°05'N (D'Aunay Bugt) where Böcher (1933, tab. 19: 36) reported a Saliceto–Vaccinietum closely related to the Phyllodoco–Salicetum callicarpaeae.

Empetrum hermaphroditum–Vaccinium microphyllum community. (Tab. 9, ref. 1–15; Tab. 26, ref. 19–20; Fig. 22).

Lit.: Empetretum Böcher 1933 (nom. nud.), *Empetrum nigrum hermaphroditum* sociations p.maj.p. (Böcher 1954). Non Empetreto–Vaccinietum div. auct.

Composition and physiognomy: No differential taxa; the absence of *Phyllodoce coerulea* is a negative characteristic. Constant taxa are: *Empetrum hermaphroditum* (V 3/6), *Cladina mitis* (V +/4), *Salix herbacea* (IV +/3), *Carex bigelowii* (IV +/1), *Stereocaulon alpinum* (IV +/5), *Ptilidium ciliare* (IV +/3), *Psoroma hypnorum* (IV +/1) and *Cladonia ecmocyna* (IV +/1). *Empetrum hermaphroditum* is generally dominant, in some places together with *Vaccinium microphyllum* or *Stereocaulon alpinum.* The vegetation is closed and low (mean height less than 10 cm), rich in mosses and lichens, and rather rich in taxa (on the average over 21 per record). Dwarf shrubs cover nearly 70%, herbs less than 2% and cryptogams almost 50%. There is no distinct stratification in moss layer and field layer. The higher plants and cryptogams occur next to each other and are intermingled. The few herbs may be as high as 15 cm. The vegetation has a xeromorphic aspect, determined by dark green dwarf shrubs and light coloured fruticose lichens.

Habitat and distribution: The community, found both at the coast and inland, covers rather large areas at a height of less than 150 m a.s.l. It follows the relief of the landscape, which in the lower parts would be covered completely by this community, if not prohibited by local extreme conditions. This community is probably the climatic climax vegetation on the acid soils of the lowlands (see p. 42, Remarks). It occurs generally on slopes (5–30°) with various exposures, but not too much wind exposed. The thin winter snow disappears probably in the second half of May.

The soil is strongly to moderately acid (pH from 4 to 5), well drained, dry and stable. It is not affected by water from other places. The soil profiles are conspicuously uniform. A well developed humic horizon is present, with many roots and root-rests gradually passing into a humic, generally coarse sandy mineral horizon, which becomes less humic with depth, and overlying bedrock or coarse debris. Most of the soils are rankers, but in some places the humic horizon is so thick that the soil is to be classified as a histosol.

Synecologically the community may be considered as strongly to moderately acidophytic, oligotrafent, meso- to xerophytic and moderately to weakly chionophytic. In the phytosociological area type spectrum, the LM distribution type strongly dominates. The community is common also in the sub- to lowarctic (sub)oceanic areas of Greenland (see also Böcher 1954).

Two types can be distinguished in the Angmagssalik District:

Table 9. *Empetrum hermaphroditum–Vaccinium microphyllum* community.

Analysis no.		68	68	69	69	69	69	69	68	69	68	69	68	69	68	68	68	68	68	68	68	68	69	69	69	69		
		144	143	29	88	61	192	220	30	154	166	136	169	70	106	163	74	69	73	39	213	72	201	89	78	32		
Reference no.		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		
Sample plot surface in m²		4	4	2¼	2¼	2¼	2¼	2¼	6	2¼	5	2¼	9	1	2	4	9	2¼	4	2¼	4	9	4	2¼	2¼	2¼		
Total cover %		(100	100	(100	100	(100	(100	(100	(100	(100	(100	(100	(100	100	(100	100	(100	(100	(100	(100	85	100	(100	100	(100	100		
Cover % of dwarfshrubs		95	100	50	50	50	50	45	95	(100	(50	25	45	75	80	(50	(70	(80	65	70	85	(100	55	(90	70	60		
Cover % of herbs		(1	(1	(5	(1	(1	(2	(1	(1	(1	(1	(5	(2	–	(1	(1	(1	(1	(1	(1	(1	(1	(1	(2	(5	(2		
Cover % of mosses/lichens	Distribution type	(1	(1	90	(70	80	75	(90	(1	(5	60	(100	75	50	(20	50	(50	35	(30	40	10	(2	80	(25	(80	(60		
Cover % of mosses		(1	–	75	(15	(25	(30	35	(1	(3	(15	(10	(2	(20	(10	(1	(15	(20	20	35	7	(2	50	(20	(40	(60		
Cover % of lichens		(1	(1	50	(60	(60	(50	60	(1	(3	(50	(100	(75	(30	(10	(50	(30	(20	(10	5	3	(2	30	(15	(40	(5		
Altitude a.s.l. in m.		20	10	120	30	10	3	10	20	2	30	130	30	15	80	55	140	75	125	25	45	100	130	60	20	90		
Direction of exposure		SE	SW	NE	ESE	S	NE	S	N	SSE	S	SW	–	SSE	W	SSW	N	NE	NE	N	NNW	N	NNW	NE	NNE	NE		
Slope		5	5	5	10	10	5	5	5	10	5	15	–	5	20	20	25	10	20	30	10	20	20	10	5	20		
pH of rhizosphere		4½	5	4½	4½	4½	4½	4½	5	4½	43/4	4½	5	4	5	5	4 3/4	4½	4 3/4	4 3/4	5	4½	4½	4½	5	5		
Number of taxa		11	9	25	15	31	21	23	8	11	26	26	21	12	21	19	30	22	29	23	17	16	42	22	27	32		
Locality		3	3	1	6.1	1.5	10	5.1	1.4	7	3	6.3	3	6.1	2	3	1.3	1.1	1.6	1.3	1.3	1.6	1.3	6.1	6.1	1.1	Presence	Range of cover values
Constant taxa of the community:																												
Empetrum hermaphroditum	LM	6	6	5	3	4	4	4	5	6	3	.	.	5	5	3	4	4	4	5	4	6	4	5	3	4	V	3/6
Cladina mitis		.	+	2	+	2	1	4	.	+	+/1	2	+	+	1	.	1	1	+	+	+	.	1	1	+	+	V	+/4
Salix herbacea	LO	1	1	.	+	+	1	2	+	+	+	.	+	2	3	.	+	+/1	+	+	+	+	2	.	.	2	IV	+/3
Carex bigelowii	LM	+	+	1	+	+	1	+	.	+	.	1	.	.	+	.	+	+	+	+	+	+	+	1	1	1	IV	+/1
Stereocaulon alpinum		.	+	4	5	3	+	2	.	.	4	5	5	3	1	4	2	+	1	+	+	+	+	.	4	.	IV	+/5
Ptilidium ciliare		.	.	3	+	1	2	1	.	.	+	1	+	+	+	.	1	1	1	+	+	+	1	.	+	+	IV	+/3
Psoroma hypnorum		.	+	+	.	1	1	+	+	.	+	.	+	.	+	+	+	.	+	+	+	+	+	.	+	+	IV	+/1
Cladonia ecmocyna		.	.	1	+	+	+	1	.	.	+	+	+	+	+	.	+	1	+	+	.	.	+	+	.	.	IV	+/1
Diff.taxa of the Drepanocladus type:																												
Drepanocladus uncinatus		.	.	.	.	.	.	.	.	1	.	.	+	3	.	.	+	+	2	+	1	+	+	+	+	+	III	+/3
Peltigera scabrosa		.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	1	+	+	.	+	+	1	.	+	II	+/1
Polytrichum juniperinum		.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	+	.	.	+	+	+	+	1	II	+/1
Kiaeria glacialis		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	.	1	1	.	.	.	I	1/4
Pleurozium schreberi		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	+	+
Betula nana	LM	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	+	2
Aulacomnium turgidum		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	+	+/1
Gymnomitrion concinnatum		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	+	+
Lophozia kunzeana		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	+	+
Lophozia excisa		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	+
Diapensia lapponica	LM	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	+	+
Dicranum acutifolium		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1/2	.	.	.	+	+/2
Nephroma arcticum		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	+	+/1
Other taxa:																												
Vaccinium microphyllum	LM	.	.	.	3	.	.	.	4	.	3	3	4	.	.	3	4	4	4	.	4	2	+	1	4	4	III	+/4
Lophozia hatcheri		.	.	4	+	1	.	.	.	.	+	.	+	.	+	.	+	2	+	+	.	+	+/1	1	+	+	III	+/2
Polygonum viviparum	AM	+	.	.	.	.	.	.	+	.	+	+	.	.	+	.	+	+	+	+	+	+	+	.	.	.	III	+
Cladonia gracilis		.	.	1	.	2	+	.	.	.	1	+	1	.	+	+	+	+	+	+	.	.	1	.	+	+	III	+/2
Dicranum scoparium		+	.	4	1	2	.	.	.	.	2	1	+	.	1/2	+	+	3	.	.	.	1	.	1	3	.	III	+/4
Cetraria delisei		.	+	.	+	+	+	+	.	+	+	.	1	+	.	.	+	.	+	+	+	.	.	.	+	.	III	+/1
Pohlia nutans		.	.	+	.	+	+	.	+	.	+	.	.	+	+	+	+	.	.	1	.	.	.	+	+	+	III	+/1
Cladina rangiferina		.	.	1	.	1	+	+	.	.	.	3	.	.	+	+	2	+	+	+	.	.	+	.	.	+	III	+/3
Dicranum fuscescens		.	.	.	1	.	2	3	.	+	.	1	.	+	1/2	.	2	.	2	+	.	.	4	.	.	4	III	+/4
Cetraria islandica		r	.	1	.	+	.	.	.	.	.	+	+	.	+	+	+	1	.	.	.	.	+	.	+	+	III	+/1
Salix callicarpaea	LM	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	+	.	.	3	1	1	II	+/3
Cladonia coccifera		.	.	.	.	+	+	.	.	.	+	+	.	.	+	+	+	+	.	.	+	.	+	.	.	.	II	+
Cetraria ericetorum		.	.	1	.	.	.	.	.	.	+	1	.	.	.	+	+	.	+	.	.	.	.	.	.	+	II	+/1
Cladonia crispata		.	.	+	.	+	1	+	.	.	+	+	.	.	.	+	+	+	.	.	.	.	+	.	.	+	II	+/1
Lophozia ventricosa		.	.	.	.	.	1	2	.	+	.	.	.	.	.	.	.	.	+	+	.	+	1	+	.	+	II	+/2
Cladonia uncialis		.	.	+	.	.	+	.	.	.	+	+	+	.	.	+	+	+	.	.	.	.	.	.	.	+	II	+
Stereocaulon paschale		r	.	.	.	.	3	.	.	.	+	.	+	3	.	+	.	.	.	.	.	.	.	1	.	1	II	+/3
Cladonia chlorophaea		.	.	.	.	+	+	+	.	+	.	+	+	.	.	.	+	.	.	.	.	.	.	.	+	.	II	+
Peltigera malacea		.	.	+	+	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	1	+	.	II	+/1
Cynodontium strumiferum		.	.	.	+	+	.	+	.	.	1/2	+	+	.	.	.	.	.	.	.	.	.	.	.	1	.	II	+/2
Cephaloziella spec.		.	.	.	.	+	.	.	.	.	.	+	.	.	.	+	.	.	.	.	+	.	+	.	+	+	II	+
Cladonia phyllophora		.	.	+	.	+	+	+	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	II	+
Cladonia amaurocraea		+	.	+	.	.	.	.	.	.	.	1	.	.	+	.	+	.	.	.	.	.	.	.	.	.	II	+/1
Lophozia spec.		.	.	+	.	.	.	2	+	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	II	+/2
Ochrolechia frigida		.	.	+	.	.	.	.	.	.	.	1	.	.	+	.	+	.	.	.	.	.	.	.	.	+	II	+/1
Cladonia bellidiflora		.	.	.	.	.	.	+	.	.	+	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	II	+
Stereocaulon arcticum		+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	.	.	I	+/1
Polytrichum piliferum		.	.	+	+	+	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I	+
Peltigera spuria		.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	+	+	I	+/1
Lophozia alpestris		.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	I	+
Cladonia carneola		.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	I	+
Conostomum tetragonum		.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I	+
Lepraria neglecta		.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	+
Microlichens		.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	I	+
Cladonia macrophyllodes		.	+	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	I	+
Juncus trifidus	LO	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	I	+

Typical type. (Tab. 9, ref. 1–15; Tab. 26, ref. 19). – In this type the fruticose lichens are generally dominant. Most of the habitats are exposed to the south, and warmer and drier than those of the next type.

Drepanocladus uncinatus type. (Tab. 9, ref. 16–25; Tab. 26, ref. 20; Fig. 22). – In this type the mosses are generally dominant. Differential taxa of high presence (III–V) are *Drepanocladus uncinatus, Peltigera scabrosa,* and *Polytrichum juniperinum.* It is found on moderately steep to steep slopes with northern exposure, and is especially well developed along the coast. The habitat is rather cold and (air)humid. Consequently, the type is less xerophytic than the previous type, and slightly psychrophytic.

Remarks. – Compared with the other dwarf shrub communities on acid soils, the *Empetrum hermaphroditum–Vaccinium microphyllum* community is found in intermediate habitats, which are not affected by extreme environmental factors such as an extremely persistent snow cover or completely absence of snow cover in winter, continuous additional water supply and other factors. In view of the wide distribution both at the coast and inland, the non-dependance of exposure to a definite wind direction, the uniform soils and the intermediate habitat, this type might be considered as the climatic climax vegetation of the Angmagssalik District.

The absence of faithful taxa is explained by the type

of habitat. In these extreme, comparatively species poor areas, the extreme habitats particularly produce "specialists", which characterize very well the communities of these habitats (often "Dauergesellschaften"), and which may be considered as faithful taxa. Intermediate habitats are rich in species with a broad ecological amplitude, but these are hardly or not useful as faithful taxa of lower syntaxonomic units.

The *Empetrum–Vaccinium* community is floristically, but particularly physiognomically related to the achionophytic Loiseleurio–Diapension communities (p. 44). It is assigned, however, to the Phyllodoco–Myrtillion because of the total absence of the faithful and differential taxa of the Loiseleurio–Diapension, but mostly by the constant presence of *Cladonia ecmocyna*, a typical chionophytic species, which is absent in the last mentioned alliance.

Ass. Cassiopetum tetragonae Böcher 1933 **em.**
(Tab. 10, ref. 1–7; Tab. 26, ref. 21. NTR: Böcher 1933, tab. 23, no. 57).

Syn.: Cassiopetum tetragonae Böcher 1933 p.min.p. (table 23, ref. no. 57, Böcher 1933).
Lit.: "*Cassiope* snowpatch" (Sørensen 1943); incl. *Cassiope tetragona* sociations without *Dryas* p.maj.p. (Böcher 1954), *Cassiope tetragona–Cetraria delisei* sociations (Fredskild 1961), *Cassiope* heaths p.maj.p. (Böcher 1959), Heath rich in *Cassiope tetragona* (Böcher 1963).
?Lande à *Cassiope tetragona* (Lesse 1952),? Ericaceous heaths (Seidenfaden & Sørensen 1937). – Non *Cassiope tetragona – Empetrum hermaphroditum* Ass. prov. Br.–Bl., Siss. et Vlg. 1939, non *Cassiope tetragona–Dicranum fuscescens* association (Nordhagen 1954), non *Cassiope tetragona* heath (Holmen 1957), non *Cassiope*–Tundra (Schwarzenbach 1961).

Composition and physiognomy: Regional faithful taxon is *Cassiope tetragona* (V 3/6). In the Angmagssalik District, *Hylocomium splendens* (V +/4), *Anastrophyllum minutum* (IV +/1), *Dicranum majus* (III 1/3), *Harrimanella hypnoides* (III +), *Timmia austriaca* (III +), *Oxyria digyna* (III +) and *Huperzia arctica* (III +) are differential taxa within the alliance. Constant companions are *Salix herbacea* (V +/1), *Cladina mitis* (V +), *Stereocaulon alpinum* (V +/2), *Cladonia gracilis* (V +/1), *Drepanocladus uncinatus* (V +/3), *Lophozia hatcheri* (V 1/2), *Peltigera aphthosa* (V +/3), *Empetrum hermaphroditum* (IV 1/4), *Polygonum viviparum* (IV +), *Dicranum fuscescens* (IV 2/5), *D. scoparium* (IV 2/5), *Polytrichum juniperinum* (IV +/1), *Lophozia ventricosa* (IV +) and *Pohlia nutans* (IV +).

The vegetation is closed (total cover about 100%) and rich in taxa (almost 35 per record). The moss layer is well developed and covers 50–100%, generally 4 to 5 cm high. The field layer is about 10 cm high, and 20 cm at the most. The aspect of the vegetation is determined by the dark green *Cassiope tetragona* and the mosses. The white flowers of *Cassiope* are conspicuous.

Habitat and distribution: Synecologically the association may be characterized as moderately to strongly acidophytic, oligo- to slightly mesotrafent, mesophytic, rather aerohygrophytic, psychrophytic and weakly chionophytic. All community stands are found above 260 m on steep to very steep slopes (15–40°) with mainly northern exposure. The association occurs as patchy phytocoenoses of a few square metres in rather sheltered places in rocky and wind open surroundings. In winter, the snow is probably thin but continuous. In spring and summer, the vegetation might be affected by some lateral water. The habitat is cool an air humid. Soils are shallow (max. 25 cm over solid rock or debris) and humic to peaty. The pH varies from 4.25 to 5.5.

Table 10. Ass. Cassiopetum tetragonae.

Analysis no.	Distribution type	69 184 185	69 149 150	69 142	69 143 144	69 146	69 100	69 151	1/7 Presence Range of cover values
Reference no.		1	2	3	4	5	6	7	
Sample plot surface in m^2		1	1	1½	1½	1½	1	2½	
Total cover %		100	(100	(100	100	100	100	100	
Cover % of dwarfshrubs		(85	65	(80	(65	80	50	75	
Cover % of herbs		(2	(1	(1	(2	(3	(1	(5	
Cover % of mosses/lichens		(65	(85	(50	(80	(50	(100	(60	
Cover % of mosses		(65	85	(50	(70	(30	(100	(60	
Cover % of lichens		(2	(1	(5	(15	(20	(30	(2	
Altitude a.s.l. in m		410	720	260	395	600	350	500	
Direction of exposure		N	N	ESE	ENE	E	WNW	NE	
Slope		15	25	40	30	40	30	35	
pH of rhizosphere		4½	5	5½	5	43/4	4½	5	
Number of taxa		28	39	34	40	26	32	43	
Locality		8	6.1	6.1	6.1	6.1	6.1	6.1	
Faithful (F) and diff. taxa of the ass.:									
Cassiope tetragona (F)	AC	4	5	5	4	6	4	3	V 3/6
Hylocomium splendens		.	3	+	4	1	1	+	V +/4
Anastrophyllum minutum		+	1	+	+	.	1	.	IV +/1
Dicranum majus		.	3	1	3	2	.	.	III 1/3
Huperzia artica	BW	+	+	.	.	.	+	+	III +
Harrimanella hypnoides	LO	+	.	+	+	+	.	.	III +
Timmia austriaca		.	+	.	.	.	+	+	III +
Oxyria digyna	AM	.	.	+	+	.	.	+	III +
Other taxa:									
Salix herbacea	LO	1	1	1	+	+	+	1	V +/1
Cladina mitis		+	+	+	+	+	+	+	V +
Stereocaulon alpinum		+	+	1	2	+	1	+	V +/2
Cladina gracilis		+	+	1	1	.	1	+	V +/1
Drepanocladus uncinatus		+	2	3	1	+	+	.	V +/3
Lophozia hatcheri		.	1	1	1	2	1	1	V 1/2
Peltigera aphtosa		.	+	+	+	3	1	1	V +/3
Empetrum hermaphroditum	LM	4	.	1	3	.	2	3	IV 1/4
Polygonum viviparum	AM	+	+	.	+	+	.	+	IV +
Dicranum fuscescens		5	2	3	.	.	5	4	IV 2/5
Dicranum scoparium		5	2	2	3	.	.	4	IV 2/5
Polytrichum juniperinum		1	1	.	+	.	+	+	IV +/1
Lophozia ventricosa		+	.	+	.	+	+	+	IV +
Pohlia nutans		.	.	+	+	+	+	+	IV +
Cladonia chlorophaea		.	+	+	+	.	.	+	III +
Vaccinium microphyllum	LM	.	.	2	+	+	.	1	III +/2
Aulacomnium turgidum		1	+	+	+	.	.	.	III +/1
Cladina rangiferina		+	.	+	+	.	1	.	III +/1
Cetraria islandia		+	+	+	.	.	+	.	III +
Cetraria ericetorum		+	+	.	.	+	+	.	III +
Aulacomnium palustre		+	+	.	.	+	.	1	III +/1
Peltigera malacea		.	+	+	+	.	.	+	III +
Bryum spec.		.	+	.	+	+	.	+	III +
Cladonia amaurocraea		.	+	+	+	.	+	.	III +
Psoroma hypnorum		.	+	+	+	.	.	.	III +
Ptilidium ciliare		.	.	1	1	.	2	.	III 1/2
Cladonia coccifera		.	+	.	.	.	+	+	III +
Cetraria nivalis		+	.	.	+	.	+	.	III +
Kiaeria glacialis		5	.	.	1	.	+	.	III +/5
Carex bigelowii	LM	1	.	.	.	+	.	+	III +/1
Phyllodoce coerulea	LO	.	.	1	.	.	.	2	II 1/2
Dicranum elongatum		5	2	.	.	.	.	.	II 2/5
Silene acaulis	AM	.	.	.	.	+	.	+	II +
Cetraria cucullata		+	.	.	r	.	.	.	II r/+
Pohlia cf. longicolla		+	.	+	.	.	.	.	II +
Cladonia crispata		.	.	+	+	.	.	.	II +
Gymnomitrion corallioides		.	+	.	.	.	+	.	II +
Lophozia spec.		.	+	.	+	+	.	.	III +
Rhacomitrium canescens		.	.	+	+	.	.	.	II +
Peltigera spuria		.	.	+	.	.	.	+	II +
Cephaloziella spec.		.	.	.	+	.	.	+	II +
Microlichens div. spec.		.	.	.	.	.	+	+	II +
Peltigera rufescens		.	.	.	.	+	.	+	II +
Lophozia kunzeana		+	.	.	.	+	.	.	II +
Lycopodium dubium	LO	.	.	.	+	.	.	1	II +/1

Occasionally, some slight solifluction occurs. The soils are classified as rankers.

In the district the association is restricted to the interior, where it thrives above 300 m on the famous Cassiopefjeld (loc. 6.1; see also Kruuse 1912, Böcher 1933, Daniëls & Molenaar 1970). It was also found in Ikâsaulaq (loc. 8) above 300 m, on the Qâqarssuaq (loc. 6.3), and in Tasîlaq (loc. 5.5) at a height of 800 m. In the phytosociological area type spectrum, the AC type dominates.

Cassiope tetragona is widely distributed in arctic circumpolar regions (Hultén 1968: 724–725) and common in more continental areas. In Greenland it belongs to the Arctic Widely Distributed Continental Type (AC Type, Böcher 1963). In the southernmost parts of Greenland it is absent, or restricted to continental inland areas such as in the Angmagssalik District. In the western part of the Eurosiberian region it occurs outside the Arctic only in northern Scandinavia, where the species is considered an ice age relict (Nordhagen 1955). According to Nordhagen it is a paradoxal plant that is found on acid and on basic soils (see also Lunde 1962), in the achionophytic, weakly acidophytic to basiphytic "Caricion nardinae" (Nordhagen 1943, 1955, Rønning 1965, Dahl et al. 1971) as well as in the achionophytic Loiseleurio–Diapension (p. 44); Braun–Blanquet et al. 1939, Nordhagen 1955).

In Greenland, *Cassiope tetragona* communities are also found on acid and on basic soils (Gelting 1934, Böcher 1954, 1963, Holmen 1957), but here it is a chionophytic species (Böcher 1963: 190), found on mineral soil, peaty soil, in fen vegetation, and also on solifluction soils (Seidenfaden 1931). As a result of the broad ecological amplitude of the species, *Cassiope tetragona* vegetation as a whole is heterotone and often very rich in species (Böcher 1963). Consequently, many sociation groups can be distinguished. Böcher (1963) proposed to bring all *Cassiope tetragona* heaths into one group with connections in many directions: "what keeps the group together is the ecology of *Cassiope tetragona*, which is an arctic, medium chionophilous species". In my opinion, for floristical and ecological reasons, it is more logical to assign the *Cassiope tetragona* vegetations to different syntaxa.

The communities dominated by *Cassiope tetragona* in the southern arctic regions, at least in Greenland, but also in Canada (Polunin 1948) are often found on acid soils, and they are mainly chionophytic, and they may be assigned to the Phyllodoco–Myrtillion Nordh. 1943.

Some communities with achionophytic lichens, such as the *Cassiope tetragona–Empetrum hermaphroditum* Ass. Br.–Bl., Siss. et Vlg. 1939, the *Cassiope tetragona–Dicranum fuscescens* Ass. Nordh. 1955 (both from Scandinavia), and some other communities from Southwest Greenland (Böcher 1954, tab. 18: 9–10) belong to the Loiseleurio–Diapension (p. 44), in the Rhododendro–Vaccinietalia, Loiseleurio–Vaccinietea.

Other communities are strongly related to the Scheuchzerio–Caricetea (Schwarzenbach 1961, Böcher 1963, tab. 16: 9). Especially towards the north in the Arctic, *Cassiope tetragona* vegetation is common on less acid soils that are rich in calciphytic/basiphytic taxa, such as *Dryas, Rhododendron lapponicum, Saxifraga oppositifolia, Silene acaulis,* several Carices, and others (Hadač 1946, Polunin 1948, Gjaerevoll 1954, Holmen 1957, Rønning 1965). These vegetations belong to the Kobresio–Dryadetalia, Carici–Kobresietea, possibly as a "moist" community group transitional to the Scheuchzerio–Caricetea. The Cassiopetum tetragonae has a lowarctic, possibly circumpolar distribution; it occurs in Greenland, and in North America (Polunin 1948, Knapp 1965). In view of the variation in the association in Greenland, it is proposed to distinguish two subassociations:

Subass. typicum **subass. nov.** found in the Angmagssalik District (NTR: that of the association, p. 43); also found in West Greenland (Böcher 1959, tab. 5: 1–9; Fredskild 1961, tab. 111: 7).

Subass. ledetosum palustris **subass. nov.** (NTR: Böcher 1963, tab. 16: 11). Böcher (1954, tab. 18: 1, 3–7, 11; 1959, tab. 5: 1–9; 1963, tab. 16: 1–4, 7–8, 11). Differential taxa are *Ledum palustre, Betula nana, Rhododendron lapponicum, Stellaria longipes* and *S. monantha,* and *Equisetum arvense.* This subassociation is found on more moist and peaty soils.

Alliance Loiseleurio–Diapension (Br.–Bl., Siss. et Vlg. 1939) **stat. nov.**
(Tab. 26, ref. 22–26, 29, 35).

Syn.: Loiseleurieto–Diapension Br.–Bl., Siss. et Vlg. 1939 pro suball., Arctostaphylo–Cetrarion nivalis Dahl 1957 p.p., Empetro–Cetrarion nivalis Thannheiser 1975.
Lit.: Loiseleurieto–Vaccinion uliginosi Nordh. 1936 (nom. inval.), Loiseleurieto–Arctostaphylion Kalliola 1939 (nom. inval.), Empetrion emyrtilletosum-förband Du Rietz 1942 (nom. inval. et nom. illeg.), *Loiseleuria–Salix uva–ursi* Type (Böcher 1954), Loiseleurieto–Arctostaphylion (Nordhagen) Arctostaphyleto–Cetrarion nivalis (Dahl) (McVean & Ratcliffe 1962) p.min.p.; see further Hedberg et al. (1952), Gjaerevoll & Bringer (1965) and Thannheiser (1975). – Non Loiseleurieto–Vaccinion uliginosi Br.–Bl. in Br.–Bl. et Jenny 1926.

This alliance contains sub- to lowarctic, northern (sub)alpine dwarf shrub communities, which might be characterized as acidophytic, oligotrafent, mainly xerophytic and achionophytic. They are found in places without a continuous snow cover in winter or without snow. The communities are exposed to low temperatures and strong winds.

The vegetation is open and low and is xeromorphic. Dwarf shrubs with small xeromorphic leaves are dominating, but especially in continental areas fruticose lichens are also present. Broad leaved herbs are absent. In areas with a continental climate the alliance can be well distinguished from the chionophytic Phyllodoco–Myrtillion (p. 36), but in areas with oceanic climate the floristical differences between both alliances are less

pronounced, as the higher air humidity causes the chionophytic species to occur in wind exposed, rather snow free places (Dahl 1957). The same can be observed in the Angmagssalik District, where species such as *Salix herbacea, Polygonum viviparum, Harrimanella hypnoides* and others belong to the Loiseleurio–Diapension (see table 26). A differentiation from the achionophytic, neutro/basiphytic Dryadion integrifoliae (Kobresio–Dryadetalia, Carici–Kobresietea) in oceanic regions is often difficult, because of the presence of acidophytic taxa in these syntaxa due to the acidificating action of the soils as a result of the high precipitation (see also Nordhagen 1943: 63–64). Therefore communities with taxa of the Loiseleurio–Diapension and of the Dryadion also occur in the district, e.g., the Gymnomitrio–Loiseleurietum (p. 52) and the *Kobresia myosuroides–Vaccinium microphyllum* community (p. 54).

Faithful taxa of the alliance in Scandinavia are *Loiseleuria procumbens, Diapensia lapponica, Arctostaphylos alpina* and *A. uva-ursi* (Nordhagen 1936, 1943, 1954, Kalliola 1939, Braun–Blanquet et al. 1939, Dahl et al. 1971). The alliance is distinguished from the Phyllodoco–Myrtillion by a great number of achionophytic lichen taxa, such as *Cetraria nivalis, C. cucullata, Thamnolia vermicularis* (incl. *subuliformis*), *Cornicularia, Sphaerophorus, Alectoria nigricans, A. ochroleuca* and bryophytes such as *Rhacomitrium lanuginosum* and *Gymnomitrion corallioides,* which are also considered as faithful/differential taxa (Dahl 1957, Dahl et al. 1971, Nordhagen 1943, 1954, Thannheiser 1975). Mesophytic herbs are absent and pleurocarpous mosses such as *Hylocomium splendens, Drepanocladus uncinatus* and *Pleurozium schreberi* are absent or scarce.

In the Angmagssalik District the alliance is poorly characterized by higher plants. *Arctostaphylos* species are absent; *Loiseleuria procumbens* is a preferential faithful taxon, as it occurs also in the Phyllodoco–Myrtillion; it is rather indifferent to snow cover, just as in some places in West Greenland (Böcher 1963: 193). *Diapensia* is also found in the Dryadion integrifoliae (p. 56) and the Tofieldietalia (p. 24), see Gjaerevoll & Bringer (1965), Thannheiser (1975). Therefore, the alliance can be better characterized by the cryptogams. The following of these are considered as faithful taxa: *Cetraria nivalis, Alectoria nigricans, A. ochroleuca, A. pubescens* (terricolous, also found on rocks, Daniëls 1975), *Parmeliella praetermissa, Rhacomitrium lanuginosum* and *Chadonanthus setiformis* (Tab. 26). Differential taxa as against the Phyllodoco–Myrtillion (p. 36) are *Cladonia amaurocraea, Cornicularia muricata, Thamnolia subuliformis* and *Ochrolechia frigida.*

Some of these faithful and differential cryptogamic taxa are also present in the Dryadion integrifoliae (p. 56), which has a comparable snow cover, but a different soil acidity. This is hardly surprising, as most of these taxa are loosely connected with the substrate and they are as such more dependent on (micro)climatological circumstances than on substrate conditions. However, taxa, such as *Stereocaulon paschale, Cladonia crispata, C. carneola, C. bellidiflora, Dicranum fuscescens, Hieracium alpinum* and *Betula nana* characterize the Loiseleurio–Diapension of the district from the Dryadion integrifoliae.

The alliance is widely distributed in the sub- to low-arctic areas of Greenland (Böcher 1954; this paper). Outside Greenland it is known from Scandinavia, Iceland and Scotland. It probably also occurs in the eastern part of the North American continent (Polunin 1948, Bliss 1963). In the Angmagssalik District three associations and a few communities can be distinguished.

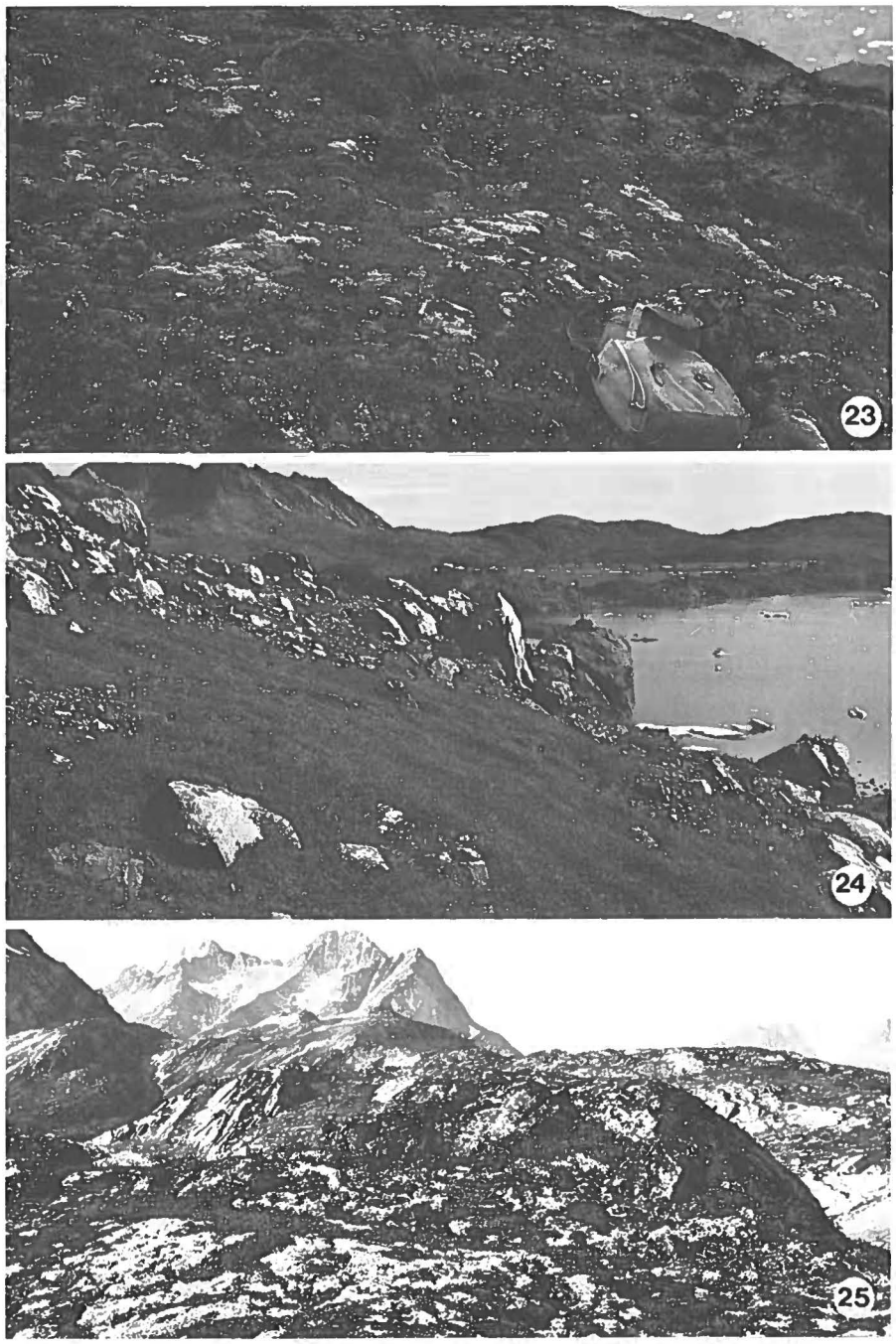
Ass. Sphaerophoro–Vaccinietum microphylli **ass. nov.** (Tab. 11, ref. 1–22; Tab. 26, ref. 22–23; Fig. 23. NTR: Tab. 11, ref. 14).

Lit.: Sociations rich in *Diapensia–Vaccinium microphyllum* (Böcher 1954).

Composition and physiognomy: Regional preferential faithful taxa are *Sphaerophorus globosus* (V +/3) and *Rhacomitrium lanunginosum* (III +/5). Differential taxa as against the Empetro–Betuletum (p. 49) are *Salix herbacea* (IV +/3), *Polygonum viviparum* (IV +/1) and a number of differential taxa of the subassociations, viz., *Solorina crocea* (III +), *Gymnomitrion corallioides* (III +), *Anastrophyllum minutum* (III +), *Lepraria neglecta* (III +), *Aulacomnium turgidum* (II +/2) and *Parmeliella praetermissa* (II +). Differential taxa as against the Gymnomitrio–Loiseleurietum procumbentis (p. 52) are *Cetraria nivalis* (III +/4), *Cornicularia muricata* (IV +/1), *Thamnolia subuliformis* (II +), *Alectoria nigricans* (III +), *Dicranum fuscescens* (IV +/5), *Stereocaulon paschale* (II 1/4), *Cetraria islandica* (III +/1), *Cladina rangiferina* (V +/2) and *Cetraria ericetorum* (IV +/1).

Constant companions are *Vaccinium microphyllum* (V 3/4), *Empetrum hermaphroditum* (V +/5), *Carex bigelowii* (IV +/1), and many cryptogams: *Psoroma hypnorum* (V +/2), *Cladina mitis* (V +/1), *C. rangiferina, Ptilidium ciliare* (V +/2), *Lophozia hatcheri* (V +/2), *Ochrolechia frigida* (V +/2), *Cladonia gracilis* (V +/2), *C. coccifera* (IV +), *Cornicularia muricata* (IV +/1), *Dicranum scoparium* (IV +/5), *Cetraria ericetorum, Stereocaulon alpinum* (IV +/4), *Pohlia nutans* (IV +), *Cladonia amaurocraea* (IV +/1), *C. uncialis* (IV +/2), *Dicranum fuscescens* and *Peltigera malacea* (IV +/1).

The vegetation is low, rich in mosses, poor in flowering plants, and xeromorphic. The aspect is determined by dwarf shrubs, and particularly also by mosses and/or lichens. It is rich in species (over 33 per record). The stratification is not distinct; real undergrowth is absent. Lichens and/or mosses cover more than 50%; the moss layer is 2–5 cm high. Immediately above this layer, but



Figs 23–25: **23.** Sphaerophoro–Vaccinietum microphylli solorinetosum, loc. 1.1, June 1968. **24.** Empetro–Betuletum nanae vaccinietosum, loc. 1.7, August 1968. **25.** Empetro–Betuletum nanae typicum, loc. 4, July 1969.

also intermixed, dwarf shrubs and a few herbs form an open field layer, 3–20 cm high, but generally, not higher than 5 cm.

Habitat and distribution: Synecologically the association may be characterized as moderately acidophytic, oligotrafent, weakly to moderately aerohygrophytic, and slightly achionophytic and psychrophytic. Except for one community found inland at 350 m altitude (loc. 5.2), all communities were found below 150 m in stands

Table 11. Ass. Sphaerophoro–Vaccinietum microphylli and *Salix callicarpaea–Cetraria nivalis* community.

Analysis no.		68 90	68 178	68 8	69 62	68 110	68 91	68 93	69 217	68 187	68 42	68 41	68 62	68 202	68 36	68 94	68 21	68 92	68 179	68 45	68 114	68 119	68 107		68 11
Reference no.		1	2	3	4	5	6	7	8	9	10	11	12	13	(14)	15	16	17	18	19	20	(21)	22		23
Sample plot surface in m^2		9	4	2¼	1½	2	9	6¼	1	4	1	2½	6	4	4	4	4	4	4	4	4	9	4		1
Total cover %		(100	100	90	(100	(90	(100	100	100	90	95	85	(95	95	95	80	80	(100	95	95	60	95	(100		70
Cover % of dwarfshrubs		(60	45	40	(45	(50	50	50	75	45	40	25	(35	50	40	80	60	70	50	60	50	50	30		10
Cover % of herbs		(1	(1	-	(1	(1	(2	(1	(2	-	(3	(5	(1	(1	(1	(1	(2	(1	(5	(2	(2	(¼	10		(5
Cover % mosses/lichens		(40	85	80	(90	(40	(70	(60	80	60	75	85	(85	65	(90	(20	(20	(45	(65	75	12½	(65	75		65
Cover % of mosses		(10	(40	40	(65	(10	(15	(25	(80	50	40	.	60	45	(50	(10	(10	(25	(5	65	(1	(5	(2		(1
Cover % of lichens		(30	(50	40	(45	(40	(55	(35	(10	15	35	.	30	25	(40	(10	(10	(20	(60	10	(12.5	(60	(75		65
Altitude a.s.l. in m		50	40	30	10	60	100	75	350	35	130	130	90	120	30	55	40	80	50	120	35	85	40		60
Direction of exposure		WNW	ENE	NNE	W	NW	-	NW	NNE	NNE	N	N	NE	N	NNW	NW	NE	WNW	N	NNW	S	S	SSE		E
Slope		15	25	30	20	10	-	20	25	15	30	30	5	25	30	20	20	30	10	20	15	10	20		25
pH of rhizosphere		5	4¾	5	4½	5	5	5	5	4½	5	5	5	5	4½	4¾	4¾	5	4¾	5	4¾	5	5		4¾
Locality		2	3	1.2	1.5	2	2	2	5.2	1.1	1.3	1.3	1.1	1.3	1.3	2	1.1	2	3	1.3	2	2	2		1.2
Number of taxa		34	31	27	34	23	28	42	32	35	39	35	40	39	41	41	23	30	33	37	31	30	30		29
Faithful (F) and diff. taxa of the ass. Sphaerophoro–Vaccinietum:																								Presence Range of cover values	
Sphaerophorus globosus (F)		+	+	1	+	+	3	2	.	+/1	+	1	+	1	+	+	.	+	+	+	.	+	+	V +/3	+
Salix herbacea	LO	+		.	.	.	1	1	+	+	+	+	+	+	+	+	3	+	+	+	.	+	1	IV +/3	.
Polygonum viviparum (F)	AM	.	.	.	+	+	+	+	.	+	+	.	+	+	+	+	.	+	.	+	+	+	1	IV +/1	.
Rhacomitrium lanuginosum		+	2	+	4	.	.	+	+	1	2	3	4/5	2/3	4	.	.	.	.	.	.	.	.	IV +/5	.
Diff. taxa of subass.:																									
Solorina crocea		+	.	+	.	.	.	.	.	+	.	.	+	+	+	+	+	.	+	+	.	.	.	III +	+
Gymnomitrion corallioides		.	.	.	.	.	.	+	.	+	+	+	+	+	+	+	+	.	+	.	.	.	.	III +	.
Anastrophyllum minutum		.	.	+	.	.	.	+	.	+	+	1	.	1	1	+	.	.	+	1	.	.	.	IV +/1	.
Lepraria neglecta		+	+	+	+	.	+	.	.	.	.	.	+	.	+	+	+	.	.	.	.	.	.	III +	1
Lophozia ventricosa		+	.	1	.	.	.	+	.	+	+	.	.	+	+	.	.	+	.	+	.	.	.	III +/1	.
Aulacomnium turgidum		.	.	.	+	.	.	+	2	.	.	.	+	+	+	+	.	.	.	+	.	.	.	II +/2	.
Drepanocladus uncinatus		.	.	.	+	.	+	+	.	.	.	.	1	+	.	.	+	.	.	+	.	.	.	II +/1	+
Diapensia lapponica	LM	.	.	.	.	.	.	.	.	.	+	+	+	+	.	.	.	.	1	+	.	.	.	II +/1	.
Microlichens div. spec.		.	.	.	.	.	.	+	+	+	.	+	.	.	.	+	.	.	.	+	.	.	.	II +	.
Cladonia bellidiflora		.	.	+	+	.	.	+	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	II +	.
Parmeliella praetermissa		.	.	.	.	.	+	+	.	.	+	.	.	.	+	+	.	.	.	+	.	.	.	II +	+
Cetraria delisei		.	.	.	+	.	.	2	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	II +/2	.
Peltigera scabrosa		.	.	.	.	.	+	.	+	.	1	.	.	+	.	.	.	.	1	.	.	.	.	II +/1	.
Cladonia carneola		.	+	.	.	.	.	.	.	.	+	.	.	+	.	.	.	+	+	.	.	.	.	II +	.
Pertusaria oculata		2	.	.	.	.	.	+	.	+	.	.	.	.	+	.	1	.	.	.	.	.	.	II +/2	.
Lophozia alpestris		+	+	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	.	.	II +	.
Cladonia phyllophora		.	.	+	+	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I +	.
Tritomaria quinquedentata		.	.	.	.	.	.	+	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	I +	.
Dicranum elongatum		.	.	.	.	.	.	.	.	.	.	1	.	.	4	1	.	.	.	4	.	.	.	I 1/4	.
Cladonia chlorophaea		+	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	I +	.
Lophozia sunzeana		.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	I +	.
Dicranum muehlenbeckii		.	+	.	.	.	.	3	.	.	.	.	.	.	4	.	.	.	.	4	.	.	.	I +/4	+
Gymnomitrion concinnatum		r	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	I +	.
Peltigera canina		.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	I +	.
Oncophorus wahlenbergii		.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	I +	.
Alectoria pubescens		.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	I +	.
Aulacomnium palustre		.	.	.	.	1	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	I +/1	.
Stereocaulon arcticum		.	.	.	1	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	I +/1	.
Lophozia spec.		.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	I +	.
Poa arctica	AM	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	+	II +	.
Cerastium lanatum	LM	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	I +	+
Viscaria alpina	LO	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	I +	.
Other taxa:																									
Ochrolechia frigida		3	+	+	+	+	+	2	+	+	2	1	2	1	+	+	+	+	+	1	+	.	+	V +/2	+
Cladonia gracilis		.	1	.	½	2	1	1	1	+/1	1	+	+	1	+	+	+	+	2	+	+	2	1	V +/2	1
Psoroma hypnorum		+	.	.	+	+	+	+	+	+/1	+	+	+	1	2	+	+	+	+	+	+	+	+	V +/2	+
Cladina mitis		+	+	1	+	1	+	+	+	+	+	.	1	+	+	+	.	+	+	+	+	+	+	V +/1	+
Vaccinium microphyllum	LM	1	2	.	3	4	4	4	4	3	3	3	3	3	3	3	4	.	3/4	4	3	4	4	V 3/4	.
Cladina rangiferina		+	2	.	+	+/1	.	+	+	+	+	1	+	+	+	+	.	1	+	+	+	+	2	V +/2	.
Empetrum hermaphroditum	LM	4	4	4	3	3	.	+	4	3	3	2	3	3	3	5	4	5	3/4	3	4	.	.	V +/5	.
Ptilidium ciliare		+	1	1	+	+	.	.	.	+/1	+	+	+	1	2	+	+	+	+	+	.	+	.	V +/2	+
Cladonia coccifera		+	+	.	+	+	.	+	+	+	+	+	+	.	+	+	+	+	.	+	+	.	+	IV +	+
Cornicularia muricata		+	+	+	+	.	+	+	.	+	+	+	+	.	+	+	.	.	+	.	+	+	1	IV +/1	+
Lophozia hatcheri		+	1	1	+	+	.	.	2	+	.	1	+	+	+	+	+	+	+	.	+	+	.	IV +/2	+
Dicranum scoparium		.	3	4	.	2	+	.	5	4	4	1	1	2	.	.	+	+	+	4	+	1	.	IV +/5	+
Cetraria ericetorum		+	+	.	1	+	.	+	+	+	+	.	.	+	+	+	.	1	+	.	+	+	+	IV +/1	1
Stereocaulon alpinum		+	4	+	1	.	2	1	+	+/1	.	.	1	+	.	+	1	.	2/3	+	.	2	3/4	IV +/4	+
Pohlia nutans		+	+	+	.	.	+	.	+	+	+	+	+	+	.	.	+	.	.	+	+	.	+	IV +	.
Cladonia amaurocraea		+	+	1	1	+	+	1	+	+	1	1	+	+	+	.	.	.	.	+	+	.	+	IV +/1	.
Cladonia uncialis		+	1	2	1	+	+	+	.	.	1	.	2	+	.	+	.	+	+	.	.	+	+	IV +/2	.
Carex bigelowii	LM	+	.	.	.	1	+	1	.	+	+	+	+	+	+	.	+	+	+	.	.	+	1	IV +/1	.
Dicranum fuscescens		2	.	4	2	.	+	.	5	4	4	2	1	.	.	1	+	3	1	.	.	+	.	IV +/5	.
Peltigera malacea		.	.	+	1	+	+	.	+	.	.	.	.	+	+	+	.	+	.	+	+	+	+	IV +/1	.
Cephaloziella spec.		.	+	+	+	+	.	+	+	.	.	.	+	.	+	+	+	+	+	.	+	.	.	III +	.
Cetraria nivalis		1	.	+	.	4	+	+	.	+	1	2	.	.	+	+	.	.	.	.	+	+	3/4	III +/4	5
Polytrichum juniperinum		+	.	.	.	.	+	+	.	+	+	.	.	+	.	.	.	+	+	+	.	+	.	III +	.
Peltigera aphthosa		.	+	.	.	.	.	.	+	+	1	+	+	.	.	.	.	.	+	+	.	.	.	III +	.
Cynodontium strumiferum		.	+	.	+	.	.	.	.	.	.	.	.	1	.	+	1	+	.	.	+	+	+	III +/1	.
Cetraria islandica		.	+	.	+	.	.	.	+	+	.	+	1	+	.	.	.	.	.	+	+	.	.	III +/1	.
Alectoria nigricans		+	.	.	.	+	.	.	.	+	+	+	+	+	.	.	.	.	.	.	.	+	+	III +	+
Cladonia crispata		+	+	.	1	+	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	+	.	II +/1	.
Polytrichum piliferum		.	.	+	.	+	+	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	+	II +	.
Salix callicarpaea	LM	.	.	+	.	.	.	2	.	.	.	.	.	+	+	3	.	.	.	+	3	.	.	II +/3	2
Thamnolia subuliformis		.	.	.	.	.	.	.	+	+	+	.	+	.	.	.	.	.	.	.	.	+	+	II +	+
Luzula spicata	LO	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	.	+	+	+	.	II +	+
Stereocaulon paschale		.	1	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	3/4	II 1/4	.
Cladonia ecmocyna		.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	I +	.
Cladonia pyxidata		.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I +	.
Stereocaulon spec.		.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	2	.	.	I +/2	.

of max. 80 m² in wind exposed sites such as ridges, plateaus or other prominent parts of slopes, always near the sea. The slopes are 15 to 30°. The exposure is mainly northern. Snow cover in winter is probably thin and discontinuous. The habitat is hardly or not influenced by additional water, but due to the location close to the open sea the air is humid.

Soils are moderately acid, well drained and stable, and can be classified as rankers, histosols, or regosols. In many places the soil consists of a thick, very humic to peaty upper surface layer, mainly consisting of decomposing moss material and many roots (rests), directly overlying debris, colluvium or other weathering products. Often a coarse sandy layer of weathering products is found above "parent rock". In the phytosociological area type spectrum the LM-type strongly dominates with 95%.

The combination of much wind (little snow cover) and high air humidity (northern exposure, location at the coast) permits the presence of chionophytic taxa, e.g., *Solorina crocea, Salix herbacea, Polygonum viviparum,* together with achionophytic taxa, e.g., *Alectoria nigricans, Thamnolia subuliformis*; this is unknown in continental areas.

Two subassociations can be distinguished.

Subass. solorinetosum croceae **subass. nov.**
(Tab. 11, ref. 1–19; Tab. 26, ref. 22. NTR: Tab. 11, ref. 14).

Differential taxa are: *Solorina crocea* (III +), *Gymnomitrion corallioides* (III +), *Anastrophyllum minutum* (III +/1), *Lepraria neglecta* (III +), *Lophozia ventricosa* (III +/1), *Aulacomnium turgidum* (III +/2), *Drepanocladus uncinatus* (II +/1), *Diapensia lapponica* (II +/1), *Cladonia bellidiflora* (II +), *Parmeliella praetermissa* (II +), *Cetraria delisei* (II +/2), *Peltigera scabrosa* (II +/1), *Cladonia carneola* (II +), *Pertusaria oculata* (II +/2), *Lophozia alpestris* (II +), *Cladonia phyllophora* (II +), *Tritomaria quinquedentata* (II +), *Dicranum elongatum* (II 1/4), *Cladonia chlorophaea* (II +), *Lophozia kunzeana* (II +), *Dicranum muehlenbeckii* (I +/4), *Gymnomitrion concinnatum* (I r/+), *Peltigera canina* (I +), *Oncophorus wahlenbergii* (I +), *Alectoria pubescens* (I +), *Aulacomnium palustre* (I +/1), *Stereocaulon arcticum* (I +/1) and *Lophozia* sp. (I +).

This subassociation occurs in places with northern exposure, which are probably colder and more humid than the habitats of the next subassociation. Consequently, this subassociation is more aerohygrophytic and psychrophytic than the following one. Soils are very humic to peaty, and can be classified as rankers or histosols.

Subass. viscarietosum alpinae **subass. nov.**
(Tab. 11, ref. 20–22; Tab. 26, ref. 23. NTR: Tab. 11, ref. 21).

Differential taxa are *Poa arctica* (3/3 +), *Cerastium lanatum* (3/3 +) and *Viscaria alpina* (3/3 +). The subassociation is found on dry, less steep slopes (10–20°) with southern exposure, on the island of Kulusuk (loc. 2), very near to the open sea. Soils are rather thick and of uniform texture; they are coarse sandy and slightly humic, and can be classified as rankers and regosols. Lichens are more common than mosses. The subassociation is less psychrophytic and temporarily more "xerophytic" than the subass. solerinetosum.

Remarks on the Sphaerophoro–Vaccinietum

This southeastern Greenlandic association is closely related to many dwarf shrub communities with *Rhacomitrium lanuginosum* (and *Sphaerophorus globosus*) described from Scandinavia (Smith 1920, Resvoll-Holmsen 1920, Du Rietz 1925, Faegri 1933, Böcher 1943, Nordhagen 1943, Dahl 1957), Svalbard (Hadač 1946, Hofmann 1968), northwestern Atlantic areas such as Scotland (Tansley 1939, McVean & Ratcliffe 1962), Ireland (Braun–Blanquet & Tüxen 1952), the Faroes (Böcher 1937), Iceland (Mølholm-Hansen 1930, Steindórsson 1936, 1945, McVean 1955, Hadač 1972), and also from the oceanic areas of southern Greenland (e.g., Gelting 1955, Böcher 1954, 1959, 1963, Knapp 1964). Many of these communities are floristically and synecologically (rather achionophytic) closely related and might be assigned to the Loiseleurio–Diapension. In view of their (northwestern) Atlantic distribution they might be considered together as one separate group (suballiance) within the alliance. These communities together form a rather varied group, but characteristic taxa for one of the vicarious units are practically absent.

The southeastern Greenlandic community, however, has such a deviating and characteristic combination of taxa compared with the most closely related communities from Greenland and other areas, that it is considered as a regional association, with regional faithful taxa and a regional combination of at least two, generally more differential taxa.

Very closely related communities occur in West, Southwest, and South Greenland (Böcher 1954, 1959, 1963, Knapp 1964). The sociations rich in *Diapensia–Vaccinium uliginosum microphyllum* in Southwest Greenland (Böcher 1954, tab. 4: 4–6) belong to the subass. solorinetosum. The most closely related association is the *Vaccinium microphyllum–Rhacomitrium* Ass. from South Greenland (Knapp 1964). The Sphaerophoro–Vaccinietum, however, contains no less than 18 differential taxa, all cryptogams of high presence, compared with Knapp's association, which in turn contains as differential taxa *Thamnolia vermicularis* (V 1, probably *T. subuliformis*), *Carex scirpoidea* (III +), *Scorpidium turgescens* (III 1, probably a misidentification: *Aulacomnium turgidum*?), *Hierochloë orantha* (III +), *Juncus trifidus* (III +),

Table 12. Ass. Empetro–Betuletum nanae.

Analysis no.	Distribution type	69 116	69 131	69 189	69 83	69 71	69 72	68 220	68 230	68 239	68 238	69 57	69 178	69 58	68 229	68 217	69 66	69 67	69 127	69 102	Presence Range of cover values
Reference no.		1	2	3	4	5	6	7	8	(9)	10	11	12	13	14	15	16	17	18	19	
Sample plot surface in m2		2¼	2¼	2¼	2¼	2¼	2¼	4	4	4	4	3	2¼	3	9	9	1	1	1	2¼	
Total cover %		(100	(95	100	100	(100	100	100	75	80	(100	80	(100	(90	(100	90	100	100	100	(100	
Cover % of dwarfshrubs		(40	(50	100	100	70	100	100	70	75	(100	(70	15	50	70	75	20	60	(50	50	
Cover % of herbs		-	(2	(1	(1	(1	-	(1	(2	(1	(1	(3	(1	(3	1	(2	-	(2	(1	5	
Cover % of mosses/lichens		80	75	(5	(1	(35	35	15	15	5	(2	(30	95	(80	40	(35	(95	50	(80	(80	
Cover % of mosses		(5	(3	-	(1	(20	(30	(15	(5	(1	(2	(10	(5	(15	10	(10	(1	-	(1	(5	
Cover % of lichens		(80	(75	(5	(1	(15	(5	(3	(15	(5	(2	(25	(95	(65	30	(25	(95	50	(80	(80	
Altitude a.s.l. in m		20	25	75	20	10	5	45	15	95	90	35	75	25	10	10	250	260	50	20	
Direction of exposure		S	SW	SW	-	NNE	SE	SE	E	SSW	SSW	S	NW	SW	ENE	ESE	NNE	E	NE	SE	
Slope		5/10	10	15	-	5	5	20	5	20	25	5	2	10	10	10	5	5	0/5	0/2	
pH rhizosphere		4	4½	4½	4¾	4	4	4½	5	.	5	5	6	5	4¾	4½	4¼	4½	5½	5	
Number of taxa		21	30	10	13	21	17	16	25	21	16	34	26	34	42	29	11	12	17	39	
Locality		4	6.3	9	6.1	6.1	6.1	1.7	1.7	1.7	1.7	1.5	6.6	1.5	1.7	1.7	6.1	6.1	7	6.1	
Diff. taxa of the ass.:																					
Betula nana (Opulent)	LM	3	4	5	4	5	5	5	5	5/6	6	5	3	5	4	4	3	5	4	4	V3/6
Juncus trifidus	LO	.	+	.	.	.	.	.	+	+	.	+	+	+	+	+	.	1	+	.	III+/1
Festuca brachyphylla	LM	.	+	.	.	.	.	.	.	.	.	+	.	+	+	+	.	.	.	+	II +
Diff. taxa of subass. vaccinietosum:																					
Empetrum hermaphroditum	LM	3	.	3	5	+	4	5	+	+	.	.	+	.	4	4	.	.	.	.	III+/5
Vaccinium microphyllum	LM	.	1	1	4	+	1	+	.	.	.	+	+	+	+	.	.	.	.	.	III+/4
Ochrolechia frigida		.	.	.	.	+	.	.	+	.	.	+	+	+	+	.	.	.	.	.	II+
Luzula spicata	LO	.	+	.	+	.	.	.	.	+	.	+	.	+	+	.	.	.	.	.	II+
Cladonia phyllophora		.	+	.	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	.	II+
Poa glauca	AM	.	.	.	.	.	.	.	.	+	+	+	.	+	.	.	.	.	.	.	II+
Diff. taxa of variant :																					
Sphaerophorus globosus		.	.	.	.	.	.	.	.	.	.	1	+	+	+	+	.	.	.	.	II+/1
Rhacomitrium lanuginosum		.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	.	.	.	.	II+
Psoroma hypnorum		.	.	.	.	.	.	.	.	.	.	+	+	+	+	+	.	.	.	+	II+
Cladonia ecmocyna		.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	.	I+
Saxifraga caespitosa	AM	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	I+
Solorina crocea		.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	I+
Cladonia chlorophaea		.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	I+
Other taxa:																					
Cladina mitis		1	1	+	+	1	+	+	+	+	+	+	.	1	+	+	+	+	+	2	V+/2
Cladina rangiferina		+	2	+	.	+	+	+	+	+	+	+	+	1	+	.	+	+	.	3	V+/3
Cladonia gracilis		1	1	+	.	1	.	+	1	1	+	1	+	3	2	+	+	+	+	2	V+/3
Cetraria ericetorum		1	1	+	.	+	.	.	+	+	+	1	.	2	1	+	.	+	+	1	IV+/2
Ptilidium ciliare		.	.	.	+	1	1	1	+	+	+	+	+	+	1	+	+	.	.	+	IV+/1
Cetraria islandica		.	1	.	.	.	+	+	+	+	+	.	+/1	+	+	+	.	+	+	.	IV+/1
Cladonia amaurocraea		+	+	+	.	+	.	.	+	.	.	.	+	1	+	+	1	+	.	1	IV+/1
Stereocaulon alpinum		1	1	.	+	1	.	.	1	+	.	1	.	3	+	+	.	+	+	2	IV+/3
Cetraria nivalis		5	3	.	.	.	.	.	.	+	.	+	1	+	.	+	1	1	4	4	III+/5
Pohlia nutans		+	.	.	+	+	.	.	+	.	+	+	+	+	+	+	.	.	+	+	IV+
Cladonia coccifera		.	.	.	.	+	.	+	+	+	.	+	+	+	+	+	.	.	+	+	III+
Dicranum scoparium		.	+	.	.	2	3	1	.	+	1	1	.	1	1	1	.	.	.	+	III+/3
Lophozia hatcheri		+	.	.	.	.	+	+	+	.	+	.	+	.	1	+	.	.	.	+	III+/1
Cladonia uncialis		.	1	+	.	.	.	.	.	+	+	1	1	+	+	.	.	.	.	+	III+/1
Salix callicarpaea	LM	.	1	.	.	.	.	+	+	+	.	1	.	.	+	+	.	.	.	2	III+/2
Stereocaulon paschale		+	+	+	.	.	+	.	.	.	+	1	4	+	3	3	.	.	.	2	III+/4
Cladonia crispata		+	+	.	.	+	.	+	.	+	.	+	+	1	+	.	+	.	.	+	III+/1
Cynodontium strumiferum		+	+	.	.	.	+	.	.	+	+	+	+	1	+	+	.	.	.	+	III+/1
Peltigera malacea		.	+	.	.	.	.	.	+	+	+	.	.	+	+	+	.	.	.	+	III+
Polytrichum piliferum		.	.	.	.	+	.	.	+	.	.	+	1	.	+	.	.	.	+	.	II+/1
Dicranum fuscescens		1	+	.	.	.	.	+	1	.	.	.	.	.	1	.	+	.	+	.	II+/1
Cornicularia muricata		.	+	.	.	.	.	.	+	.	.	+	+	+	.	.	.	+	.	+	II+
Alectoria nigricans		+	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	+	+	II+
Alectoria ochroleuca		+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	5	4	4	+	II+
Drepanocladus uncinatus		.	.	.	+	+	.	.	+	.	.	.	.	.	+	+	.	.	.	+	II+
Cetraria delisei		.	.	.	+	1	.	.	1	.	.	.	.	.	+	+	.	.	+	.	II+/1
Cephaloziella spec.		.	+	.	.	+	+	.	.	.	.	.	+	+	.	.	.	.	.	+	II+
Carex bigelowii	LM	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	II+
Cladonia carneola		+	+	.	.	.	.	+	.	.	.	.	.	.	.	+	+	.	+	+	II+
Cladonia pyxidata		.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	I+
Thamnolia subuliformis		+	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	II+

Cetraria cucullata (V 1), *Huperzia arctica* (II +) and *Rhododendron lapponicum* (II +).

The *Rhacomitrium lanuginosum* communities from Iceland (Hadač 1972) are rich in herbs, which differentiates them from the Greenlandic communities with many acidophytic taxa. The *Rhacomitrium*-rich dwarf shrub communities from Scotland lack arctic-alpine species such as *Salix herbacea, Polygonum viviparum, Salix callicarpaea* (McVean & Ratcliffe 1962), just as the Scandinavian communities (Nordhagen 1943, Dahl 1957). The higharctic Rhacomitrietum lanuginosi Spitsbergense Hadač 1946 from Svalbard has among other differential species *Salix polaris* and *Hylocomium splendens* (see also Hofmann 1968) compared to the Sphaerophoro–Vaccinietum, which in turn has many differential species compared to the Svalbard association.

In conclusion, the distribution of the Sphaerophoro–Vaccinietum is restricted to the lowarctic, oceanic parts of Greenland.

Ass. Empetro–Betuletum nanae Nordh. 1943 **em.**
(Tab. 12, ref. 1–19; Tab. 26, ref. 24–26; Figs 24, 25. NTR: Nordhagen 1943, tab. 7, Bestandsnummer XVIII, Rutenummer 35).

Syn.: Cetrarietum nivalis typicum Dahl 1957, Cladonietum alpestris betuletosum Dahl 1957, Empetreto–Betuletum nanae Nordh. 1943.
Lit.: *Betula nana–Empetrum–Cladonia alpestris* Ass. (Du Rietz 1925), *Empetrum–Cetraria nivalis* Soziation and *Betula nana–Empetrum–Cladonia alpestris* Soziation (Kalliola 1939), Birch-Lichen Mat and Cladina Mat (Trapnell 1933), Alectorieto–Betuletum nanae Br.–Bl., Siss. et Vlg. 1939 (nom. inval.), *Betula nana* sociations (Böcher 1954). – Incl. *Betula nana* communities (Böcher 1963, tab. 14: 21–26),? *Empetrum nigrum–Betula nana* Ass. Steindórsson 1946,? Empetreto–Betuletum nanae Böcher 1933 (nom. nud.). – Non Empetreto–Betuletum nanae Nordh. 1943 (*sensu* Hadač, 1971).

Composition and physiognomy: The association is floristically poorly characterized (Braun–Blanquet et al. 1939, Nordhagen 1943). Nordhagen did not give a diagnosis. Braun–Blanquet et al. (1939) gave one, but their Alectorio–Betuletum nanae (which is identical with the Empetro–Betuletum) is invalid. In accordance with Braun–Blanquet et al. (1939), opulent *Betula nana* is considered as differential taxon within the alliance. Physiognomically, however, it is a well recognizable unit by the dominance of *Betula nana,* the scarcity of higher plants, and the predominance of especially yellow fruticose lichens such as *Cetraria nivalis, C. cucullata, Alectoria ochroleuca* and *Cladina alpestris.* The association thrives in the continental areas of the sub- to lowarctic, northern alpine regions and is particularly well developed in Scandinavia, where it often covers the landscape for many hundreds of square metres (Du Rietz 1925, Nordhagen 1943, Dahl 1957).

The southeastern Greenlandic communities of the association represent a separate geographical race (area differential taxon *Salix callicarpaea*). In the Angmagssalik District the Empetro–Betuletum nanae is distinguished from the Sphaerophoro–Vaccinietum (p. 45) by *Betula nana* (V 3/6), *Juncus trifidus* (III +/1) and *Festuca brachyphylla* (II +). Differential taxa as against the Gymnomitrio–Loiseleurietum procumbentis (p. 52) are *Betula nana, Cetraria nivalis* (III +/4), *C. ericetorum* (IV +/2), *C. islandica* (IV +/1), *Dicranum scoparium* (III +/3), *Stereocaulon paschale* (III +/4), *Cladina rangiferina* (V +/3) and *Cladonia crispata* (III +/1). Constant companions are: *Cladina mitis* (V +/2), *Cladonia gracilis* (V +/3), *Ptilidium ciliare* (IV +/1), *Cladonia amaurocraea* (IV +/1) and *Stereocaulon alpinum* (IV +/3).

The vegetation is closed, low, poor in higher plants and rich in cryptogams. The species number per record varies from 11 to 42. The moss layer is generally well developed and occasionally up to 5 cm high. Fruticose lichens determine the aspect. Dwarf shrubs cover 55–100% and herbs 5% at the most. These are generally a little higher than the cryptogams, but the stratification is not always distinct, as *Betula nana* is often found in mosaic with the cryptogams. Herbs may be as high as 40 cm, but the main body of the biomass is nearly always below 10 cm.

The vegetation has a xeromorphic appearance. Pleurocarpous mosses and liverworts are scarcely represented.

Habitat and distribution: synecologically the association might be characterized as strongly to moderately acidophytic, oligotrafent, xerophytic, psychrophytic and moderately to strongly achionophytic. It is found as stands of a few to over hundreds of square metres in rocky, fell-field like, very wind exposed sites, such as ridges, plateaus or moraine ridges, which are barely or not snow covered in winter. The habitats are dry and never affected by additional water. The association does not show any preference for a certain direction of exposure, and the sites are generally flat to moderately steep (slopes from 0 to 25°, average 9°).

Soils are of local, colluvial or fluvioglacial origin; they are thin, heterogenous of texture and rich in coarse particles. The pH ranges from 4 to 6, but generally between 4 and 5. The soils are either slightly humic and classified as lithosols and regosols, or very humic to peaty and classified as shallow histosols and rankers.

The association was found both at the coast, and inland where it is more common and optimally developed. In the phytosociological area type spectrum the LM distribution type dominates (99%). The main distribution of the association covers northern suboceanic-continental, low alpine (sub-) lowarctic areas (Nordhagen 1943, 1954; this paper). In North America and in Southwest Greenland a vicarious community with *Betula glandulosa* is found (Böcher 1954, Hansen 1971).

In the Angmagssalik District two subassociations can be distinguished.

Subass. vaccinietosum microphylli **subass. nov.**
(Tab. 12, ref. 1–15; Tab. 26, ref. 24–25; Fig. 24. NTR: Tab. 12, ref. 9).

Syn.: Cetrarietum nivalis typicum Dahl 1957, Cladonietum alpestris betuletosum Dahl 1957.
Lit.: inc. most of the Scandinavian *Betula nana* communities rich in achionophytic lichens, containing *Empetrum hermaphroditum* and/or *Vaccinium microphyllum* (see a.o. Kalliola 1939, Du Rietz 1925, Nordhagen 1936, 1943).

Differential taxa are *Empetrum hermaphroditum* (IV +/5) and *Vaccinium microphyllum* (IV +/4); in the Angmagssalik District also *Ochrolechia frigida* (II +), *Luzula spicata* (II +), *Cladonia phyllophora* (II +) and *Poa glauca* (II +). The subassociation is found below 100 m a.s.l., and it is especially well developed at the coast. It is found on dry, wind exposed sites, mainly with a southern exposure. In view of the somewhat sheltered conditions towards the north, the vegetation is probably covered with thin but discontinuous snow in winter until early spring.

Compared with the subass. typicum (p. 51) this subassociation is found in less wind exposed places. It might be considered as less psychrophytic and less (moderately) achionophytic. In the Angmagssalik District the subass. vaccinietosum is poor in achionophytic lichens,

Table 13. Ass. Gymnomitrio–Loiseleurietum procumbentis.

Analysis no.	Distribution type	68 150	69 28	68 61	68 60	69 214	68 70	68 135	Presence	Range of cover values
Reference no.		1	2	3	4	5	6	7		
Sample plot surface in m^2		4	1	4	3	2½	3	6		
Total cover %		90	90	85	85	65	90	(80		
Cover % of dwarfshrubs		35	(40	75	55	25	55	25		
Cover % of herbs		(2	(1	(10	20	(2	(2	(5		
Cover % of mosses/lichens		65	80	45	60	50	55	(50		
Cover % of mosses		45	.	.	45	40	(30	(35		
Cover % of lichens		25	.	.	15	10	(25	(15		
Altitude a.s.l. in m		15	115	70	70	230	70	25		
Direction of exposure		-	NNW	NE	NE	NE	NE	N		
Slope		-	10	5/10	0/2	10	25	0/10		
pH rhizosphere		4½	6½	6	6	7	5½	4½		
Number of taxa		38	29	42	33	32	44	28		
Locality		3	1.1	1.1	1.1	5.2	1.1	2		
Faithful taxon of the ass.:										
Gymnomitrion corallioides		4	5	2	2	4	3	4	V	2/5
Diff.taxa against Lois.-Diap.										
Salix herbacea	LO	+	1	+	+	+	+	+	V	+/1
Cladina mitis		+	.	+	+	+	+	+	V	+
Cetraria delisei		1	.	1	+	+	+	.	IV	+/1
Psoroma hypnorum		2	+	+	.	.	1	+	IV	+/2
Pertusaria oculata		+	+	+	.	+	.	+	IV	+
Drepanocladus uncinatus		+	+	2	+	.	+	.	IV	+/2
Polygonum viviparum	LM	.	.	+	+	.	+	.	III	+
Luzula spicata	LO	.	+	.	+	.	+	.	III	+
Salix callicarpaea	LM	.	.	+	.	+	.	.	II	+
Diff. taxa also against the Sph.-Vacc. and the Emp.-Bet.										
Stereocaulon arcticum		+	1	+	+	+	2	+	V	+/2
Harrimanella hypnoides	LO	+	.	+	+	+	+	.	IV	+
Anthelia juratzkana		+	+	2	2	+	.	.	IV	+/2
Oncophorus wahlenbergii		+	+	+	+	.	+	+	V	+
Pinguicula vulgaris	BW	+	.	+	1	+	+	.	IV	+/1
Dicranum muehlenbeckii		.	.	2	3	.	+	.	III	+/3
Lecidea assimilata		+	+	.	.	+	.	.	III	+
Diff. taxa against the Sph.-Vacc. and the Emp.-Bet.										
Diapensia lapponica	LM	1	1	1	2	1	2	1	V	1/2
Loiseleuria procumbens	LO	1	2	1	2	2	2	.	V	1/2
Gymnomitrion concinnatum		1	.	+	.	4	.	.	III	+/4
Tofieldia pusilla	LM	+	.	.	+	+	.	.	III	+
Scapania spec.		.	.	+	.	.	+	+	III	+
Other taxa:										
Ochrolechia frigida		3	1	+	3	2	1	2	V	+/3
Empetrum hermaphroditum	LM	2	2	4	3	+	3	1	V	+/4
Vaccinium microphyllum	LM	3	2	4	3	1	3	3	V	1/4
Carex bigelowii	LM	+	+	+	+	+	+	+	V	+
Pohlia nutans		+	+	+	+	+	+	+	V	+
Cladonia coccifera		.	+	+	+	+	+	+	V	+
Cladonia gracilis		.	+	+	+	+	+	+	V	+
Cephaloziella spec.		+	.	+	.	+	+	+	IV	+
Microlichens div. spec.		+	.	.	+	+	+	+	IV	+
Cladonia uncialis		.	+	+	+	.	+	+	IV	+
Solorina crocea		+	1	+	.	1	+	.	IV	+/1
Stereocaulon alpinum		+	.	1	+	.	2	.	III	+/2
Cladonia amaurocraea		.	+	+	.	.	+	+	III	+
Lophozia ventricosa		+	.	+	.	.	+	.	III	+
Ptilidium ciliare		.	.	1	+	.	+	.	III	+/1
Lophozia alpestris		.	.	.	+	+	+	.	III	+
Juncus trifidus	LO	.	+	.	.	(+)	+	.	III	+
Polytrichum juniperinum		.	+	+	.	.	+	.	III	+
Aulacomnium turgidum		.	.	2	.	.	+	+	III	+/2
Dicranum spec.		+	.	+	.	.	.	+	III	+
Peltigera malacea		.	.	.	+	.	+	.	II	+
Silene acaulis		.	.	.	+	.	+	.	II	+
Cynodontium strumiferum		+	.	+	.	.	.	.	II	+
Cladina rangiferina		.	.	+	.	.	+	.	II	+
Lophozia hatcheri		.	.	+	.	.	1	.	II	+
Cladonia spec.		+	+	.	.	.	.	.	II	+
Polytrichum piliferum		.	+	.	.	.	.	1	II	+/1
Lophozia excisa		.	.	+	.	.	.	+	II	+
Peltigera scabrosa		.	.	.	.	+	.	+	II	+
Conostomum tetragonum		+	.	.	.	.	.	.	I	+
Cephalozia bicuspidata		+	.	.	.	.	.	.	I	+
Stereocaulon paschale		+	.	.	.	.	.	.	I	+
Solonostoma sphaerocarpum		+	.	.	.	.	.	.	I	+
Peltigera spec.		+	.	.	.	.	.	.	I	+
Gymnocolea inflata		+	.	.	.	.	.	.	I	+
Polytrichum cummune		+	.	.	.	.	.	.	I	+
Betula nana	LM	+	.	.	.	.	.	.	I	+
Cladonia crispata		.	+	.	.	.	.	.	I	+
Cornicularia muricata		.	+	.	.	.	.	.	I	+
Sphaerophorus globosus		.	+	.	.	.	.	.	I	+
Lophozia kunzeana		.	.	+	.	.	.	.	I	+
Kiaeria glacialis		.	.	+	.	.	.	.	I	+
Saxifraga oppositifolia	AM	.	.	.	+	.	.	.	I	+
Peltigera aphthosa		.	.	.	+	.	.	.	I	+
Rhacomitrium lanuginosum		.	.	.	+	.	.	.	I	+
Huperzia arctica	BW	.	.	.	.	+	.	.	I	+
Cladonia pyxidata		.	.	.	.	+	.	.	I	+
Stereocaulon spec.		.	.	.	.	+	.	.	I	+
Dicranales indet.		.	.	.	.	+	.	.	I	+
Lycopodium dubium	BW	.	.	.	.	.	+	.	I	+
Peltigera canina		.	.	.	.	.	+	.	I	+
Lepraria neglecta		.	.	.	.	.	+	.	I	+
Peltigera spuria		.	.	.	.	.	+	.	I	+
Cladonia ecmocyna		.	.	.	.	.	+	.	I	+
Cetraria islandica		.	.	.	.	.	.	+	I	+
Luzula confusa	AM	.	.	.	.	.	.	+	I	+
Anastrophyllum minutum		.	.	.	.	.	.	+	I	+

which are very common in all association stands in the continental areas of Scandinavia. The *Betula nana* vegetation described by Böcher (1954, tab. 27: 6–10) from Southwest Greenland may belong to this subassociation, which is well developed and very common in Scandinavia (see syn. and lit.).

In the district two variants can be distinguished:

Typical variant **var. nov.** (Tab. 12, ref. 1–10; Tab. 26, ref. 24). – This variant is found in rather dry habitats. The soil types are lithosols and regosols.

Variant of *Rhacomitrium lanuginosum* **var. nov.** (Tab. 12, ref. 11–15; Tab. 26, ref. 25). – Differential taxa are *Sphaerophorus globosus* (V +/1), *Rhacomitrium lanuginosum* (IV +/1), *Psoroma hypnorum* (V +), *Saxifraga caespitosa* (II +), *Solorina crocea* (II +) and *Cladonia chlorophaea* (II +).

The variant is found in slightly more air humid habitats. Most of the stands are at the coast. The only inland community stand has a northern exposure. The variant is a transition to the Sphaerophoro–Vaccinietum (p. 45), which is found in still more air humid habitats.

Subass. typicum **subass. nov.**
(Tab. 12, ref. 16–19; Tab. 26, ref. 26; Fig. 25. NTR: Nordhagen 1943, tab. 7, Bestandsnummer XVIII, Rutenummer 35).

Lit.: incl. most of the Scandinavian *Betula nana* communities rich in achionophytic lichens, but without *Empetrum hermaphroditum* and/or *Vaccinium microphyllum* (Du Rietz 1925, Kalliola 1939, Nordhagen 1943, 1954), a.o. *Betula nana–Alectoria ochroleuca* sociation Nordhagen (1943, tab. 8).

The subass. typicum in the Angmagssalik District is characterized by *Alectoria ochroleuca* as opulent and differential taxon (4/4+/5), the richly developed moss layer rich in yellow lichens which determine the aspect and the scarcity or absence of herbs. In the district, the subass. typicum must be considered as fragmentarily developed, compared with the Scandinavian stands of this subassociation, which cover large areas and are richer in species, and contain abundant yellow lichen species, e.g., *Cetraria cucullata* and *Cladina alpestris*, species that are practically absent in the district. The subass. typicum in the Angmagssalik District is represented by low community stands with scarce herbs; the aspect is determined by *Betula nana* and yellow fruticose lichens. *Betula nana* covers 20–60%, lichens are dominant and cover 50–90%.

The subassociation is found only inland as small stands on extremely wind exposed, flat (slope 0–5°) places between 20 and 260 m a.s.l., which are snow free in winter. Soils are dry, stony and slightly humic, and can be classified as regosols and rankers. Compared with the subass. vaccinietosum the typical subass. may be characterized as strongly xerophytic, strongly achionophytic, and psychrophytic.

Ass. Gymnomitrio–Loiseleurietum procumbentis **ass. nov.**
(Tab. 13, ref. 1–7; Tab. 26, ref. 29; Fig. 27. NTR: Tab. 13, ref. 5).

Composition and physiognomy: Regional preferential faithful taxon is *Gymnomitrion corallioides* (V 2/5). Differential taxa as against the Sphaerophoro–Vaccinietum (p. 45) and the Empetro–Betuletum (p. 49) are *Loiseleuria procumbens* (V 1/2), *Oncophorus wahlenbergii* (V +), *Pinguicula vulgaris* (IV +/1), *Gymnomitrion concinnatum* (III +/4), *Tofieldia pusilla* (III +), *Anthelia juratzkana* (IV +/2), *Lecidea assimilata* (III +), *Dicranum muehlenbeckii* (III +/3), *Diapensia lapponica* (V 1/2) and *Harrimanella hypnoides* (IV +), *Stereocaulon arcticum* (V +/2), *Scapania* (III +).

Differential taxa as against the related, more achionophytic, xerophytic and acidophytic Loiseleurio–Diapensietum lapponicae Br.–Bl. et Siss. in Br.–Bl., Siss. et Vlg. 1939, from Scandinavia are *Pinguicula vulgaris, Anthelia juratzkana, Salix herbacea* (V +/1), *Stereocaulon arcticum, Harrimanella hypnoides, Cetraria delisei* (IV +/1), *Oncophorus wahlenbergii, Cladina mitis* (V +), *Psoroma hypnorum* (IV +/2), *Pertusaria oculata* (IV +), *Polygonum viviparum* (III +), *Drepanocladus uncinatus* (IV +/2), *Dicranum muehlenbeckii, Lecidea assimilata, Luzula spicata* (III +) and *Salix callicarpaea* (II +) (area differential taxon).

The last association is distinguished from the Gymnomitrio–Loiseleurietum by the differential taxa *Arctostaphylos alpina, Rhacomitrium lanuginosum, Alectoria ochroleuca, A. nigricans, A. divergens, Cetraria ericetorum, C. nivalis, C. cucullata, Cladina sylvatica* (= *C. arbuscula*), *Sphaerophorus globosus, Thamnolia vermicularis, Polytrichum piliferum, Cladonia verticillata* and *Vaccinium vitis-idaea* (Du Rietz 1925, Kalliola 1939, Braun-Blanquet et al. 1939, Nordhagen 1943, Dahl 1957).

Constant companion taxa are *Salix herbacea, Ochrolechia frigida* (V +/3), *Empetrum hermaphroditum* (V +/4), *Vaccinium microphyllum* (V 1/4), *Carex bigelowii* (V +), *Pohlia nutans* (V +), *Cladina mitis* (V +), *Cladonia coccifera* (V +), *C. gracilis* (V +), *C. uncialis* (IV +), *Cetraria delisei, Cephaloziella* sp. (IV +) and *Drepanocladus uncinatus.*

The vegetation is open and low, and rich in species. Total cover varies from 65% to 90%, species number per record from 29 to 44. Stratification is absent. Most of the biomass is lower than 3 cm; herbs may be as high as 8 cm. Dwarf shrubs and liverworts are dominant. Fruticose lichens are distinctly of minor importance. The aspect is determined by pulvinate growth forms of *Diapensia lapponica* and *Gymnomitrion corallioides.*

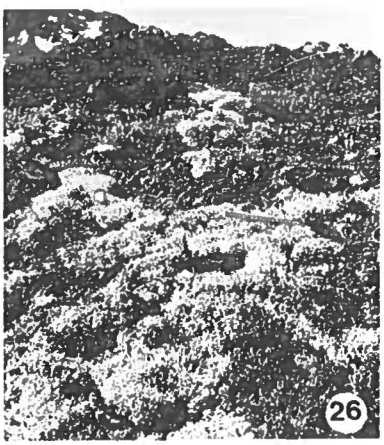
Habitat and distribution: synecologically the association might be characterized as moderately acidophytic to neutrophytic, in general moderately acidophytic, slightly mesotrafent, meso-/xerophytic, weakly psychrophytic, achionophytic, and solifluction-tolerant. It is found in some rather stony, wind open places with sparse vegetation such as plateaus, ridges, terraces, normally on the sloping parts. The slopes vary from 0 to 25°, but most are less than 10°. Exposure is northern, and as a result the snow cover in winter is probably absent or thin and discontinuous. Soils are rather thin, poor in humus, and consist of a heterogenous, coarse-grained layer of weathering products of local or colluvial origin (10–15 cm, 23 cm at the most), overlying solid rock or coarse debris. The pH varies from 4.75 to 7. The soils may be classified as rankers and regosols. Because of the low biomass production, the exposure to the wind that blows away the litter, the frost-action, and the solifluction processes, the pH of the soil remains rather high. The soil is affected to some extent by frost action; in spring when the upper soil becomes moist to wet, solifluction may occur. In summer the soil dries out.

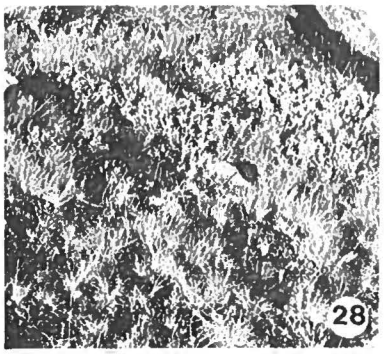
These processes cause a micro-relief with minor depressions. In these comparatively moist places we find the substrate-hygrophytic plants such as *Tofieldia pusilla, Pinguicula vulgaris,* and liverworts. In this respect the habitat strongly resembles that of the Loiseleurio–Diapensietum in Rondane, Norway (Dahl 1957: 91, 281). The association is commonly found in coastal localities, viz., Kulusuk (loc. 2), Elvbakker (loc. 1.1) and Nagtivit (loc. 3), generally lower than 120 m; in one place it was found inland at 230 m (Tasîlaq, loc. 5.2). In the phytosociological area type spectrum the LM distribution type dominates. As yet the association is only found in the Angmagssalik District, but it is probably also present in other lowarctic-(sub)oceanic parts of Southeast Greenland.

Salix callicarpaea–Cetraria nivalis community. (Tab. 11, ref. 23; Fig. 26).

In Blomsterdalen (loc. 1.2) local communities are found in which *Cetraria nivalis* is dominant and *Salix callicarpaea* is present; they cover a few to rarely several tenths of square metres (Tab. 11, ref. 23). The communities are rich in species, and also in lichens, with achionophytic taxa such as *Cetraria nivalis, Thamnolia subuliformis* and *Cornicularia muricata*; they contain also more or less thermophytic herbs such as *Campanula gieseckiana, Chamaenerion angustifolium, Viscaria alpina* and *Luzula spicata.* The communities are acidophytic, oligotrafent, xerophytic, rather euthermic and achionophytic. The habitats are on sloping lithosols with south exposure; they are dry and probably at least temporarily free of snow, due to the location just below the top of wind open plateaus, and warm in the growth season due to the low altitude (below 100 m) and the south exposure.

It is difficult to decide on the syntaxonomic position, because the community contains taxa of different syntaxa (Cladonio–Viscarion alpinae, p. 67, and the Loiseleurio–Diapension, p. 44). It is provisionally as-





Figs 26–30: **26.** *Salix callicarpaea–Cetraria nivalis* community, loc. 1.2, June 1968. **27.** A close view of the Gymnomitrio–Loiseleurietum procumbentis showing *Diapensia lapponica, Loiseleuria procumbens, Empetrum hermaphroditum,* and *Stereocaulon,* loc. 1.1, 28 June 1968. **28.** *Kobresia myosuroides–Vaccinium microphyllum* community, loc. 1.7, 15 Aug. 1968. **29.** Carici–Dryadetum integrifoliae drepanocladetosum, loc. 1.3, June 1969. **30.** *Dryas integrifolia–Salix callicarpaea* community, *Solorina* type, showing a.o. *Salix callicarpaea, Dryas integrifolia* and *Stereocaulon alpinum,* loc. 5.4, August 1969.

signed to the latter alliance, because of the dominance of the achionophytic *Cetraria nivalis,* the presence of a number of faithful/differential taxa of that alliance, and for physiognomical reasons.

The community, to my knowledge, do not occur in other areas of Greenland. Related communities are mentioned from Scandinavia. The Salicetum glaucae lichenosum Nordh. 1943 might be considered as a vicarious Scandinavian vegetation type. Also the "Flechtenreiche Weideröschen Gesellschaft" (Thannheiser 1975, tab. 22, especially no. 2) is closely related to the southeastern Greenlandic *Salix–Cetraria* community.

Kobresia myosuroides–Vaccinium microphyllum community. (Tab. 14, ref. 1–3; Tab. 26, ref. 35; Fig. 28).

Composition and physiognomy: *Kobresia myosuroides, Rinodina* cf. *arctica* and *Arctomia delicatula* may be considered as faithful taxa of this community, which as a consequence is an association. However, as the community is only based upon three records of separate stands close together, it must be considered rather as a community and not as an association.

Taxa with the highest presence are: *Kobresia myosuroides* (3/3 2/3), *Stereocaulon alpinum* (3/3 *2/4*), *Luzula spicata* (3/3 +), *Festuca vivipara* (3/3 +), *Thymus drucei* (3/3 +), *Cladina rangiferina* (3/3 +/1), *Peltigera aphthosa* (3/3 +), *Rhacomitrium lanuginosum* (3/3 +), *Ochrolechia frigida* (3/3 +), *Vaccinium microphyllum* (3/3 +/1), *Cetraria ericetorum* (3/3 +/1), *Juncus trifidus* (3/3 +), *Cladina mitis* (3/3 +/1), *Psoroma hypnorum* (3/3 +/1), *Cephaloziella* sp. (3/3 +), *Silene acaulis* (3/3 +/1), *Empetrum hermaphroditum* (3/3 +/3), *Cornicularia muricata* (3/3 +/1), *Bryum* sp. (3/3 +), *Carex scirpoidea* (3/3 +/1) and *Cetraria islandica* (3/3 +).

The community is very rich in taxa (44–61 species per record). The aspect is determined by graminoid herbs, dwarf shrubs and especially by fruticose lichens. The vertical structure is as follows: the moss layer is low, max. 3 cm high, with mainly cryptogams and dwarf shrubs covering 35–65%. *Stereocaulon* spp. and *Vaccinium microphyllum* are prominent. The covering field layer is open and max. 35 cm high; it contains herbs and the aspect is determined by *Kobresia myosuroides.* The vegetation has a xeromorphic appearance.

Habitat and distribution: This moderately acidophytic, somewhat mesotrafent, xerophytic, thermophytic and to some extent chionophytic to slightly achionophytic community was found in one locality, on the southern slope of the Vega Fjeld massif at the entrance of Sermilikvejen at Kong Oscar Havn (loc. 1.7). The community was found in small, patchy stands of a few tens of square metres each. The altitude is 150 to 220 m. The slope varies from 10 to 20°. The soils are thin (max. 15 cm) with a pH of 5. They consist of coarse weathering material overlying solid rock or debris, and can be classified as rankers.

The location is somewhat sheltered to the north and northwest. Snow cover in winter is probably continuous but thin. In spring the snow disappears rapidly, in summer the soil dries out strongly. In the phytosociological area type spectrum the LM distribution type strongly dominates.

Remarks: *Kobresia myosuroides* (= *Elyna bellardii*) is a widely distributed circumpolar species with mainly (sub)arctic-alpine distribution. It is found on dry, mostly calcareous, neutral to basic soils. In Asia the species is very common (Hultén 1968: 213). It is considered as faithful taxon of the Carici–Kobresietea

Table 14. *Kobresia myosuroides–Vaccinium microphyllum* community.

Analysis no.	Distribution type	68 243	68 244	68 245	
Reference no.		1	2	3	1/3
Sample plot surface in m^2		2½	4	4	
Total cover %		70	(100	85	
Cover % of dwarfshrubs		5	30	25	
Cover % of herbs		30	20	30	
Cover % of mosses/lichens		35	50	35	
Cover % of mosses		(2	(3	(2	
Cover % of lichens		(35	(50	(35	
Altitude a.s.l. in m		220	180	150	
Direction of exposure		SE	S	S	
Slope		10	20	20	
pH rhizosphere		5	5	5	
Number of taxa		44	49	61	
Locality		1.7	1.7	1.7	
					Presence / Range of cover values
Kobresia myosuroides	LM	3	3	3	3 3
Stereocaulon alpinum		2	3/4	2	3 2/3/4
Luzula spicata	LO	+	+	+	3 +
Festuca vivipara	LO	+	+	+	3 +
Thymus drucei	BS	(+)	+	+	3 +
Cladina rangiferina		+	1	+	3 +/1
Peltigera aphthosa		+	+	+	3 +
Rhacomitrium lanuginosum		+	+	+	3 +
Ochrolechia frigida		+	+	+	3 +
Vaccinium microphyllum	LM	+	3	3	3 +/3
Cetraria ericetorum		1	+/1	1	3 +/1
Juncus trifidus	LO	+	+	+	3 +
Cladina mitis		+	1	1	3 +/1
Psoroma hypnorum		1	1	+	3 +/1
Cephaloziella spec.		+	+	+	3 +
Silene acaulis	AM	+	(+)	1	3 +/1
Empetrum hermaphroditum	LM	+	3	+	3 +/3
Cornicularia muricata		+	1	+	3 +/1
Bryum spec.		+	+	+	3 +
Carex scirpoidea	LM	1	+	+	3 +/1
Cetraria islandia		+	+	+	3 +
Cladonia amaurocraea		+	+	.	2 +
Polytrichum piliferum		+	+	.	2 +
Cladonia coccifera		+	+	.	2 +
Loiseleuria procumbens	LO	1	+	.	2 +/1
Cladonia gracilis		1	1	.	2 1
Peltigera malacea		+	+	.	2 +
Lophozia alpestris		+	+	.	2 +
Pohlia nutans		+	+	.	2 +
Peltigera spuria		+	+	.	2 +
Conostomum tetragonum		+	+	.	2 +
Polygonum viviparum	AM	+	+	.	2 +
Dicranum acutifolium		.	+	+	2 +
Trisetum spicatum	AM	.	+	+	2 +
Thalictrum alpinum	LO	.	+	2	2 +/2
Cladonia pyxidata		.	+	2	2 +/2
Peltigera rufescens		.	+	+	2 +
Dicranum fuscescens		.	+	+	2 +
Cladonia uncialis		.	+	+	2 +
Stereocaulon paschale		.	3/4	+	2 +/3/4
Aulacomnium turgidum		.	+	+	2 +
Lophozia hatcheri		+	.	+	2 +
Buellia insignis		+	.	+	2 +
Arctomia delicatula		+	.	+	2 +
Rinodina arctica		+	.	+	2 +
Lophozia spec.		+	.	+	2 +

(Ohba 1974) (see p. 55), which comprises arcto-alpine grass and dwarf shrub heaths on dry, mainly neutral to basic soils (see also Braun–Blanquet 1949b, Oberdorfer 1957, 1978). The species is common in Greenland except in the south. It is reported in heath or steppelike communities on dry soils (Böcher et al. 1966).

The *Kobresia myosuroides–Vaccinium microphyllum* community is not closely related to other Greenlandic communities with *Kobresia myosuroides* as prominent species, known from continental West Greenland (Böcher 1954: 197, 214) and Northeast Greenland (Gelting 1934, Seidenfaden & Sørensen 1937). As they contain taxa such as *Carex supina* ssp. *spaniocarpa, Artemisia borealis, Dryas, Carex nardina, Rhododendron lapponicum* and others, these communities should be assigned to the Carici–Kobresietea (p. 55), which is in agreement with the habitat (dry, high pH).

The community is more closely related to several "Fjell-Fluren und Arktische Steppen" communities described from South Greenland by Knapp (1964), which contain *Silene acaulis, Thymus drucei, Cerastium lanatum, Campanula gieseckiana, Carex scirpoidea, Luzula spicata, Festuca vivipara, Rhacomitrium lanuginosum,* as these are also found in the *Kobresia–Vaccinium* community of the Angmagssalik District. *Carex nardina* is, however, common in these communities in South Greenland. The total floristic composition indicates the close relationship with the more eutrafent communities of Iceland with its vulcanic substrates, where taxa such as *Thymus drucei, Silene acaulis, Festuca vivipara,* and others are often associated with *Kobresia myosuroides* (Mølholm-Hansen 1930, Steindórsson's publications). These vegetation types belong largely to the Carici–Kobresietea, just as do those from Scandinavia with *Kobresia* (Nordhagen 1943, 1954, Ohba 1974).

Although the *Kobresia–Vaccinium* community of the Angmagssalik District contains a number of taxa (*Kobresia myosuroides, Silene acaulis, Carex scirpoidea*) which broadly taken have their optimum presence in the Carici–Kobresietea, it will be assigned to the Loiseleurio–Diapension, Loiseleurio–Vaccinietea, because of the preponderance of faithful/differential taxa of these syntaxa, such as *Stereocaulon paschale, Dicranum fuscescens, Betula nana, Pohlia nutans, Cladina rangiferina, Peltigera aphthosa, Cladonia uncialis, Cynodontium strumiferum, Empetrum hermaphroditum, Cladonia amaurocraea, Loiseleuria procumbens* and *Rhacomitrium lanuginosum* (Tab. 26). The acid soil is also in support of this classification.

The community is restricted to lowarctic oceanic Southeast Greenland, where it is known from the Angmagssalik District only.

Dwarf shrub vegetation on slightly acid to neutral mineral soils

The parent rock in the Angmagssalik District is predominantly crystalline (p. 8). The soils are rather acid. In places with tertiary intrusions of diorite or gabbro, the so-called basic dykes, the soils are slightly acid to neutral. This is true also for the weathering products of metasedimentary schists, which are locally present in the grey gneisses in the interior. Slightly calcareous soils are found inland on fluvio-glacial deltas and alluvial debris cones, and in some moraines. This is probably to be attributed to weathering products of these metasedimentary schists, locally containing calcite. In general, soils with a high pH are not common; they are mainly restricted to the interior, where they cover large areas on recent fluvio-glacial deposits.

The dwarf shrub vegetation of the district on moist to wet soils with high pH are designed to the Tofieldietalia, Scheuchzerio–Caricetea fuscae (p. 20); the dwarf shrub vegetation on dry soils with a high pH to the Carici–Kobresietea Ohba 1974.

Class Carici rupestris–Kobresietea bellardii Ohba 1974 (Tab. 26, ref. 30, 33, 34, 36, 37).

Syn.: Juncetea trifidi Hadač in Klika et Hadač 1944, Elyno–Seslerietea Br.–Bl. 1948 p.p.
Lit.: Kobresio–Elynetea Oberd. 1957 (nom. inval.).

Faithful taxa are *Kobresia bellardii* (= *K. myosuroides,* except in the district, see p. 54), *Silene acaulis, Carex rupestris, Lloydia serotina, Oxytropis lapponica, Astragalus alpinus, Pedicularis oederi, Dryas octopetala* s.l., *Gentiana tenella, Potentilla nivea, P. crantzii* (except in the district), *Tofieldia coccinea, Erigeron uniflorus, Aster alpinus, Androsace chamaejasme* s.l. and others (Ohba 1974). The class contains grass and chamaephytic vegetation on poor, dry, mineral soils with a high pH in arctic and alpine areas. The distribution is circumpolar (Ohba 1974, fig. 13). Ohba (l.c.) distinguished 7 geographical but mutually excluding orders, some of which are provisional (and therefore invalid).

In the Angmagssalik District there is one order with one alliance, and its faithful taxa are also faithful taxa of the class.

Order Kobresio–Dryadetalia Ohba 1974.

Lit.: Elyneto–Seslerietalia Nordh. 1936 (nom. inval., because only one alliance with sociations is mentioned), Elyno–Dryadetalia Br.–Bl. 1948 (nom. inval., no alliances, no associations mentioned), Kobresio–Dryadetalia Br.–Bl. 1948 (see Ohba 1974).

Faithful taxa are *Carex misandra, C. scirpoidea, C. glacialis, C. nardina, Pedicularis kanei* (= *P. lanata), P. capitata, Oxytropis meydelliana.* Differential taxa *Cassiope tetragona* and *Rhododendron lapponicum* (Ohba 1974). The order has a circumpolar distribution and is found in northern North America (including the Sierra Nevada and Rocky Mountains) and northern Eurasia, except Iceland and Scotland, from where Ohba (1974) reported the order Thymo–Kobresietalia Ohba 1974 (by error as Thymo–Kobresietea), Carici–Kobresietea, which was also reported by Ohba from southern Greenland. Contrary to Ohba (1974), the Kobresio–Dryadetalia is found in the whole of Greenland, and thus also in the southern parts, where, according to Ohba, it is replaced by the Thymo–Kobresietalia (see p. 60).

The Kobresio–Dryadetalia contains 4 alliances, 3 of which are provisional, viz., the Oxytropidion nigrescentis (arctic Siberia), the Dryadion integrifoliae (arctic America), and the Carici–Kobresion bellardii (Rocky Mountains, Sierra Nevada). The fourth alliance was named by Ohba Kobresio–Dryadion Nordh. 1936. This name is invalid, however, (no associations mentioned). The valid name of the alliance is Caricion nardinae Hadač 1946. It is found in Scandinavia (incl. Svalbard and Jan Mayen).

The communities of the Angmagssalik District should be assigned to the Dryadion integrifoliae Ohba 1974 ex Daniëls (stat. nov.).

Alliance Dryadion integrifoliae Ohba 1974 ex Daniëls **stat. nov.**
(Tab. 26, ref. 30, 33, 34, 36, 37. Nomenclatoric type association: Carici–Dryadetum integrifoliae, Tab. 16, ref. 1–7).

Lit.: Dryadion integrifoliae Ohba 1974 all. prov.

Faithful taxa are *Dryas integrifolia* and *Pedicularis kanei* ssp. *kanei*; the latter is absent in the Angmagssalik District, but is found along the west coast of Greenland. *Salix callicarpaea* is an area differential taxon as against the Scandinavian Caricion nardinae Hadač 1946. In the district the alliance is well characterized, also by the faithful taxa of the order and class. The following taxa may be considered here as faithful of the alliance, order and class: *Dryas integrifolia, Saxifraga oppositifolia, Silene acaulis, Carex scirpoidea, Carex nardina, Stereocaulon arcticum, Candelariella vitellina, Lecidea wulfeniana, L. lurida, Collema ceraniscum* and other microlichens. The alliance is present in arctic North America and in the whole of Greenland.

Synecologically it may be considered as slightly acido- to basiphytic, mainly oligotrafent, meso- to xerophytic, and weakly chionophytic to achionophytic. In the Angmagssalik District, it contains an open to closed, generally xerophytic, chamaephytic vegetation on dry, weakly acid to neutral mineral soil in wind exposed habitats. Most of the communities are rich in species, particularly microlichens; they are found up to high altitudes.

Two communities and one association can be distinguished in the district.

Silene acaulis–Vaccinium microphyllum community. (Tab. 15, ref. 1–5; Tab. 26, ref. 30).

Composition and physiognomy: Faithful taxa are absent. Constant taxa are *Vaccinium microphyllum* (V 5/6), *Silene acaulis* (V +), *Salix herbacea* (V +/1), *Cetraria delisei*(V +/2), *Polygonum viviparum* (V +), *Drepanocladus uncinatus* (IV +/4), *Cladina mitis* (IV +/3), *Carex bigelowii* (IV +/1) and *Cladonia* sp. (IV +/1), (microlichens are also constant).

This is a "dominance" community, a consociation in the sense of the Scandinavian School. *Vaccinium microphyllum* is dominant. The vegetation is low, rather closed, and stratified as follows: The moss layer is well developed and covers more than 50%. Mosses (*Drepanocladus uncinatus*) or fruticose lichens (*Cladina mitis/Stereocaulon*) determine the aspect. In the overlying field layer dwarf shrubs cover 50–100% and are as high as 4 cm. Herbs cover 2–15% and are up to 10 cm high. The number of species per record varies from 12 to 30.

Table 15. *Silene acaulis–Vaccinium microphyllum* community.

Analysis no.	Distribution type	69 225	69 200	68 246	69 165	69 120	Presence	Range of cover values
Reference no.		1	2	3	4	5		
Sample plot surface in m2		2½	1	5	2½	1		
Total cover %		100	(100	85	(100	(100		
Cover % of dwarfshrubs		(100	60	55	60	50		
Cover % of herbs		5	(10	15	(2	(10		
Cover % of mosses/lichens		50	50	15	65	(70		
Cover % of mosses		(50	(2	(15	35	(3		
Cover % of lichens		(1	(50	(2	25	(70		
Altitude a.s.l. in m		90	800	70	50	360		
Direction of exposure		E	SE	W	NNE	SW		
Slope		5	15	15	15	30		
pH rhizosphere		6	5	5	6½	7		
Number of taxa		12	22	22	30	29		
Locality		1.3	5.5	1.4	7	6.2		
Vaccinium microphyllum	LM	6	5	5	5	5	V	5/6
Silene acaulis	AM	+	+	+	+	+	V	+
Salix herbacea	LO	1	+	+	1	+	V	+/1
Cetraria delisei		+	+	1	1	2	V	+/2
Microlichens div. spec.		+	1	+	+	+	V	+/1
Polygonum viviparum	AM	+	+	+	+	+	V	+
Drepanocladus uncinatus		4	.	2	3	+	IV	+/4
Cladina mitis		.	3	+	+	1	IV	+/3
Carex bigelowii	LM	1	1	.	+	+	IV	+/1
Cladonia spec. (prim.thallus)		+	1	+	.	+	IV	+/1
Cladonia coccifera		.	+	.	+	+	III	+
Ochrolechia frigida		.	+	.	+	+	III	+
Stereocaulon alpinum		.	+	.	1	4	III	+/4
Dicranum scoparium		.	+	.	+	+	III	+
Empetrum hermaphroditum	LM	+	.	.	.	+	II	+
Stereocaulon spec.		+	.	+	.	.	II	+
Polytrichum juniperinum		+	.	.	.	+	II	+
Salix callicarpaea	LM	.	+	.	+	.	II	+
Harrimanella hypnoides	LO	.	+	.	+	.	II	+
Carex scirpoidea	LM	.	.	2	.	+	II	+/2
Juncus trifidus	LO	.	.	+	.	+	II	+
Ptilidium ciliare		.	.	+	.	+	II	+
Psoroma hypnorum		.	.	.	+	+	II	+
Cladonia pyxidata		.	.	.	+	1	II	+/1
Lophozia hatcheri		.	.	.	+	+	II	+

Habitat and distribution: The community may be considered as moderately acidophytic-neutrophytic, weakly mesotrafent, mesophytic and probably weakly chionophytic. It is found as local stands of several tens of square metres on plateaus, terraces or debris cones, most of which are situated in the windshelter of rocks, with a thin, but probably continuous snow cover in winter. The slopes are 5–30° and the exposure is east (NNE, E, SE) or west (W and SW). In the growth season the soil remains moist by meltwater. The soils are generally thin, of heterogenous texture, coarse sandy and slightly humic. The pH ranges from 5 to 7. The soils are classified as rankers and regosols.

The community was found at the coast as well as inland, where it occurs up to 800 m and where it seems to be more common. In the phytosociological area type spectrum the LM distribution type dominates.

Remarks: Many of the faithful taxa of the class, order and alliance are absent in this community. Its syntaxonomic position should be considered as provisional.

The *Silene–Vaccinium* community is to some extent related to the Rhododendro–Vaccinietum (p. 26), which is found on wind exposed and more moist habitats. Several *Vaccinium microphyllum* sociations related to the *Silene–Vaccinium* community have been described from the west coast of Greenland. In the low-arctic oceanic part of Southwest Greenland they are rather scarce because of the strong competition of

Empetrum hermaphroditum (Böcher 1954: 102). In the Angmagssalik District this is less evident, possibly because the climatological differences between coast and inland are not as distinct as in some parts of Southwest Greenland. Floristically and ecologically related *Vaccinium microphyllum* sociations, e.g., with *Cetraria delisei,* were reported by Böcher (1954) from Southwest Greenland, especially from Søndre Strømfjord (Böcher 1954, tab. 11), and should be assigned to the Dryadion integrifoliae.

Ass. Carici–Dryadetum integrifoliae **ass. nov.**
(Tab. 16, ref. 1–7; Tab. 26, ref. 33–34; Fig. 29. NTR: Tab. 16, ref. 3).

Composition and physiognomy: Regional faithful taxa are *Dryas integrifolia* (preferential, V 1/4), *Carex nardina* (V +/2), *Saxifraga oppositifolia* (V +/1), *Caloplaca tetraspora* (III +), *Rinodina* cf. *lecideoides* (IV +), *Candelariella vitellina* (IV +), (terricolous; also on rocks; Daniëls 1975), and *Carex spaniocarpa* (I 1). Differential taxa with regard to all other Greenlandic communities containing *Dryas integrifolia* and *Carex nardina* (Tab. 24) are: *Salix callicarpaea* (IV +/2), *Juncus trifidus* (V +), *Salix herbacea* (III +), *Empetrum hermaphroditum* (III +/2), *Bryum* sp. (III +), *Cornicularia muricata* (V +), *Cetraria delisei* (IV +/1), *Anthelia juratzkana* (IV 1/3), *Oncophorus wahlenbergii* (III +) and *Rhacomitrium canescens* (III +/1).

Other constant taxa are *Drepanocladus uncinatus* (IV +/1), *Lophozia hatcheri* (IV +), *Vaccinium microphyllum* (V +/3), *Cetraria ericetorum* (V +/1), *Stereocaulon arcticum* (V +/2), *Ochrolechia frigida* (V +), *Cladonia coccifera* (V +), *Polygonum viviparum* (V +/1), *Silene acaulis* (V +/1), *Carex bigelowii* (V +/1), *Luzula spicata* (IV +), *Cerastium lanatum* (IV +), *Gymnomitrion corallioides* (IV +/3), and *Cephaloziella* sp. (IV +).

The vegetation is open and rich in taxa. Total cover varies from 60% to 75%, the number of species from 38 to 45 per record. The open places in the vegetation are covered with gravel, cobbles or stones. The aspect of this low vegetation is determined by the pulvinate growth forms of *Dryas integrifolia, Silene acaulis, Diapensia lapponica* and *Saxifraga oppositifolia,* and the abundance of microlichens, particularly on dead plants. The bristlelike *Carex nardina* is conspicuous. The stratification is as follows. The moss layer is well developed and covers 15 to 65%; the height is 1 to 2 cm. The field layer is open and covers 25 to 50%. The dwarf shrubs are max. 5 cm high, the herbs, especially graminoids, max. 15 cm.

Habitat and distribution: Synecologically the association may be characterized as weakly acidophytic to neutrophytic, generally mesotrafent, xerophytic, rather psychrophytic and achionophytic. It is found from 200 m up to more than 800 m in typical fell-field habitats on wind exposed plateaus, ridges and ledges with gravel, cobbles, and stones. Snow cover in winter is absent or thin and discontinuous. The association is mainly found on steep (10° to 40°) slopes. It avoids west and southwest exposures. The soils are formed *in situ* or they are of colluvial origin; they are coarse sandy, rich in gravel and cobbles, but generally poor in humus. The pH varies from 5–6.5. The soils are classified as rankers and regosols. In spring the soils are moist. In some places solifluction can be noticed. The association was found both at the coast and inland. In the phytosociological area type spectrum, the AM distribution type dominates with 55%, the LM type is 33%.

Two subassociations can be distinguished.

Subass. drepanocladetosum uncinati **subass. nov.**
(Tab. 16, ref. 1–5; Tab. 26, ref. 33; Fig. 29. NTR: Tab. 16, ref. 3).

Differential taxa are *Drepanocladus uncinatus* (V +/1), *Lophozia hatcheri* (V +), *Rinodina* cf. *lecideoides* (IV +, also faithful taxon of the association), *Pertusaria oculata* (III +), *Lecidea* cf. *vernalis* (III +), *Caloplaca tetraspora* (III +), *Lecidea assimilata* (III +), *Polytrichum piliferum* (III +/1), *Buellia insignis* (III +), *Rinodina cinnamomea* (III +), *Cetraria nivalis* (III +), *Lophozia* sp. (III +), *Ptilidium ciliare* (II +), *Peltigera malacea* (II +), *Tortula ruralis* (II +), *Solorina crocea* (II +), *Polytrichum alpinum* (II +), *Pohlia cruda* (II +) and *Rhacomitrium heterostichum* (II +).

This subassociation is found on preponderantly steep slopes, above 300 m, with northern exposure. The soils are classified as regosols or rankers. It is probably less achionophytic, more psychrophytic, and less xerophytic than the next subassociation.

Two variants are distinguished:

Variant of *Diapensia lapponica* **var. nov.** (Tab. 16, ref. 1–2). – Differential taxa are *Diapensia lapponica* (2/2 1), *Aulacomnium turgidum* (2/2 +), *Pedicularis flammea* (2/2 +) and *Harrimanella hypnoides* (2/2 +/2). It is found at the coast in rather moist habitats.

Typical variant **var. nov.** . – This variant is found both at the coast and inland.

Subass. thymetosum drucei **subass. nov.**
(Tab. 16, ref. 6–7; Tab. 26, ref. 34. NTR: Tab. 16, ref. 7).

Differential taxa are *Trisetum spicatum* (2/2 +), *Kobresia myosuroides* (2/2 +/1), *Festuca vivipara* (2/2 +), *Thymus drucei* (2/2 +), *Thalictrum alpinum* (2/2 +), *Peltigera rufescens* (2/2 +) and *Loiseleuria procumbens* (2/2 +/1). This subassociation was found only in one locality (1.7) at the coast, on moderately steep to steep southern slopes. The soil type is a regosol or ranker. The soil is slightly thicker than that of the previous subassociation. The habitat is less exposed and not as cold.

Table 16. Ass. Carici–Dryadetum integrifoliae.

Analysis no.	Distribution type	69 30	69 44	69 31	69 99	69 97	69 49	69 51	Presence	Range of cover values
Reference no.		1	2	3	4	5	6	7	I/7	
Sample plot surface in m2		6¼	4	6¼	1	1	4	4		
Total cover %		(60	75	65	(75	(60	70	70		
Cover % of dwarfshrubs		20	40	30	30	30	(30	40		
Cover % of herbs		(10	10	(10	5	(5	(10	15		
Cover % of mosses/lichens		40	(40	(25	(65	(25	35	15		
Cover % of mosses		.	(20	.	.	(10	(25	(1		
Cover % of lichens		.	(20	.	.	(15	(15	(15		
Altitude a.s.l. in m		440	400	420	400	320	240	310		
Direction of exposure		N	NNW	NNW	ENE	E	S	SE		
Slope		25	20	20	20	40	10	25		
pH rhizosphere		6¼	6	5¼	6	6¼	5	6		
Number of taxa		38	48	40	42	44	45	38		
Locality		1.3	1.3	1.3	6.1	6.1	1.7	1.7		
Faithful taxa of the ass.:										
Dryas integrifolia	AM	2	4	3	3	3	1	4	V	1/4
Saxifraga oppositifolia	AM	1	+	1	+	+	+	+	V	+/1
Carex nardina	AC	+	+	1	+	.	+	1/2	V	+/2
Candelariella vitellina		.	+	+	+	+	.	+	IV	+
Rinodina cf. lecideoides		.	+	+	+	+	.	.	III	+
Carex spaniocarpa	LC	.	.	.	.	1	.	.	I	1
Differential taxa within the ass.:										
Drepanocladus uncinatus		+	+	+	+	1	.	.	IV	+/1
Lophozia hatcheri		+	+	+	+	+	.	.	IV	+
Pertusaria oculata		+	+	+	.	.	.	.	III	+
Lecidea cf. vernalis		.	+	.	+	+	.	.	III	+
Caloplaca tetraspora		.	+	+	.	+	.	.	III	+
Lecidea assimilata		+	+	+	.	.	.	.	III	+
Polytrichum piliferum		.	+	.	+	1	.	.	III	+/1
Buellia insignis		.	.	+	+	+	.	.	III	+
Rinodina cinnamomea		.	+	+	.	+	.	.	III	+
Cetraria nivalis		.	+	.	+	+	.	.	III	+
Lophozia spec.		.	+	.	+	+	.	.	III	+
Ptilidium ciliare		.	+	+	.	.	.	.	II	+
Peltigera malacea		.	.	.	+	+	.	.	II	+
Tortula ruralis		.	+	.	.	+	.	.	II	+
Solorina crocea		.	+	.	.	+	.	.	II	+
Polytrichum alpinum		+	.	.	+	.	.	.	II	+
Pohlia cruda		.	.	.	+	+	.	.	II	+
Rhacomitrium heterostichum		.	+	.	.	+	.	.	II	+
Diapensia lapponica	LM	1	1	.	.	.	.	.	II	1
Aulacomnium turgidum		+	+	.	.	.	.	.	II	+
Pedicularis flammea	MA	+	+	.	.	.	.	.	II	+
Harrimanella hypnoides	LO	+	2	.	.	.	.	.	II	+/2
Trisetum spicatum	AM	.	.	.	.	.	+	+	II	+
Kobresia myosuroides	LM	.	.	.	.	.	1	+	II	+/1
Festuca vivipara	LO	.	.	.	.	.	+	+	II	+
Thymus drucei	BS	.	.	.	.	.	+	+	II	+
Thalictrum alpinum	LO	.	.	.	.	.	+	+	II	+
Peltigera rufescens		.	.	.	.	.	+	+	II	+
Loiseleuria procumbens	LO	.	.	.	.	.	1	+	II	+/1
Other taxa:										
Vaccinium microphyllum	LM	+	+	+	3	3	1	1	V	+/3
Cetraria ericetorum		+	+	+	1	+	+	+	V	+/1
Stereocaulon arcticum		1	+	1	+	1	1	.	V	+/1
Ochrolechia frigida		1	2	1	1	+	+	.	V	+/2
Cladonia coccifera		+	+	+	+	+	.	+	V	+
Polygonum viviparum	AM	1	+/1	1	+	.	+	+	V	+/1
Juncus trifidus	LO	+	+	+	+	.	+	+	V	+
Silene acaulis	AM	1	+	+	1	.	+	1	V	+/1
Carex bigelowii	LM	+	1	+	+	.	+	1	V	+/1
Cornicularia muricata		+	+	+	.	+	+	+	V	+
Luzula spicata	LO	+	+	+	.	.	+	+	IV	+
Cerastium lanatum	LM	+	.	+	+	+	.	+	IV	+
Gymnomitrion corallioides		3	.	+	3	+	+	.	IV	+/3
Cephaloziella spec.		.	+	+	.	+	+	+	IV	+
Cetraria delisei		+	+	1	+	.	+	.	IV	+/1
Salix callicarpaea	LM	.	+	2	+	.	(+)	1	IV	+/2
Oncophorus wahlenbergii		+	+	+	.	.	+	.	III	+
Anthelia juratzkana		1	1/2	1	.	.	3	.	III	1/3
Rhacomitrium canescens		+	1	+	.	.	+	.	III	+/1
Dicranum scoparium		1	1	+	.	.	+	.	III	+/1
Psoroma hypnorum		.	.	+	+	+	+	.	III	+
Stereocaulon alpinum		.	+	.	1	1	.	+	III	+/1
Salix herbacea	LO	+	+	+	.	.	+	.	III	+
Cladina mitis		.	.	.	1	+	+	.	III	+/1
Empetrum hermaphroditum	LM	+	.	.	.	.	2	+	III	+/2
Bryum spec.		.	.	.	.	+	+	+	III	+
Carex scirpoidea	LM	.	.	.	+	.	+	+	III	+
Lepraria neglecta		.	.	.	+	+	+	.	III	+
Blue alga		.	.	+	+	.	+	.	III	+
Collema ceraniscum		.	.	+	.	.	.	+	II	+
Cetraria islandica		.	.	+	.	.	.	+	II	+
Cladonia pyxidata		.	.	.	.	1	+	.	II	+/1
Cladonia gracilis		.	.	.	.	+	+	.	II	+
Pinguicula vulgaris	BW	+	.	.	.	.	(+)	.	II	+
Cladonia macrophyllodes		.	+	.	.	.	.	2	II	+/2
Lecidea wulfeniana		.	.	.	.	+	.	+	II	+
Blepharostoma trichophyllum		+	.	.	.	.	.	.	I	+
Ranunculus glacialis	MA	r	.	.	.	.	.	.	I	r
Scapania spec.		+	.	.	.	.	.	.	I	+

▶

Lecidea spec.		+	.	.	.	.	.	.	I	+
Tofieldia pusilla	LM	+	.	.	.	.	.	.	I	+
Cladonia pocillum		.	+	.	.	.	.	.	I	+
Cladonia amaurocraea		.	+	.	.	.	.	.	I	+
Brachythecium spec.		.	+	.	.	.	.	.	I	+
Lophozia alpestris		.	+	.	.	.	.	.	I	+
Pohlia nutans		.	.	+	.	.	.	.	I	+
Cladonia phyllophora		.	.	2	.	.	.	.	I	2
Dicranum spec.		.	.	.	+	.	.	.	I	+
Ochrolechia geminipara		.	.	.	+	.	.	.	I	+
Lophozia ventricosa		.	.	.	+	.	.	.	I	+
Caloplaca tornoensis		.	.	.	+	.	.	.	I	+
Buellia spec.		.	.	.	+	.	.	.	I	+
Cladina rangiferina		.	.	.	1	.	.	.	I	1
Cladonia spec.		.	.	.	+	.	.	.	I	+
Cladonia macrophylla		.	.	.	+	.	.	.	I	+
Thamnolia subuliformis		.	.	.	.	+	.	.	I	+
Dicranum fuscescens		.	.	.	.	1	.	.	I	1
Caloplaca tirolensis		.	.	.	.	+	.	.	I	+
Caloplaca cinnamomea		.	.	.	.	+	.	.	I	+
Desmatodon latifolius		.	.	.	.	+	.	.	I	+
Lecidea lurida		.	.	.	.	+	.	.	I	+
Lecanora vernicosa		.	.	.	.	+	.	.	I	+
Pannaria pezizoides		.	.	.	.	+	.	.	I	+
Campanula gieseckiana	LM	.	.	.	.	.	+	.	I	+
Agrostis borealis	LO	.	.	.	.	.	+	.	I	+
Saxifraga cernua	AM	.	.	.	.	.	+	.	I	+
Pohlia spec.		.	.	.	.	.	+	.	I	+
Carex capillaris	LM	.	.	.	.	.	+	.	I	+
Solonostoma sphaerocarpum		.	.	.	.	.	+	.	I	+
Minuartia rubella	AM	.	.	.	.	.	.	+	I	+
Solorina bispora		.	.	.	.	.	.	+	I	+
Polychidium muscicola		.	.	.	.	.	.	+	I	+
Poa alpina	LO	.	.	.	.	.	.	+	I	+
Parmeliella arctophila		.	.	.	.	.	.	+	I	+
Dermatocarpon cinereum		.	.	.	.	.	.	+	I	+
Cladonia uncialis		.	.	.	.	.	.	+	I	+

Remarks on the Carici–Dryadetum

The Carici–Dryadetum integrifoliae is considered as a southeastern Greenlandic association. Table 24, in which all Greenlandic communities with *Dryas integrifolia* and *Carex nardina* based on published records or synthetic tables have been collected, clearly demonstrates the differences of the Carici–Dryadetum as against all other communities; therefore, it is considered as an independent, regional association ("Gebietsassoziation"). Three community groups can be distinguished:

I. A South Greenland group (Tab. 24, 1–4), consisting of type 1, the *Dryas integrifolia–Campanula uniflora* Ass. Knapp 1964 (Knapp 1964, tab. 6, A) and types 2 and 3, the *Dryas integrifolia–Salix uva–ursi* Ass. Knapp 1964 (Knapp 1964, tab. 6, C and D), and type 4, the *Kobresia myosuroides–Lomatogonium rotatum* Ass. Knapp 1964 (Knapp 1964, tab. 6, E).

Differential taxa of this group are *Salix uva–ursi, Carex capillaris, Campanula gieseckiana, Rhacomitrium lanuginosum, Poa glauca, Rhytidium rugosum, Thuidium abietinum, Ditrichum flexicaule, Ctenidium molluscum, Tortella tortuosa* and *Bartsia alpina.* Its distribution is restricted to the region with the subarctic, (sub)oceanic climate regime (Böcher 1954).

II. A Southwest and West Greenland group (Tab. 24, 6–10), with the following communities: type 6, the vegetation of continental Southwest Greenland (Böcher 1954, tab. 14, 1–9), type 7, the communities of records nos. 1, 4, 6, 9 and 10 in Böcher (1954, tab. 15), type 8, the communities of records nos. 7–12 in Böcher (1963, tab. 18), type 9, the vegetation of records 1–6 in Böcher (1963, tab. 20) from West Greenland, and type 10, stands 1 and II from Disko in Gelting (1955).

Differential taxa are *Thamnolia, Pedicularis lanata* (= *P. kanei* ssp. *kanei*), *Carex rupestris, Luzula confusa, Alectoria lanea, Carex glacialis, Saxifraga tricuspidata, Calamagrostis purpurascens, Alectoria jubata, Cornicularia aculeata, Rhododendron lapponicum* and *Dicranum fuscescens.* This community group is found in the areas with a lowarctic subcontinental and sub- to lowarctic continental climate regime (Böcher 1954).

III. The Carici–Dryadetum integrifoliae from the Angmagssalik District (Tab. 24, type 5). On the one hand this association takes an intermediate position between the two former groups by the presence of many taxa of these groups. On the other hand, it has a number of its own differential taxa, so that it is considered as an association restricted to the area with a lowarctic oceanic climate regime in Southeast Greenland; *Juncus trifidus, Empetrum hermaphroditum* and *Salix herbacea* are typical for this area.

The distribution of the association outside the district along the east coast cannot be traced by lack of records. Probably it is restricted to the Angmagssalik District (Böcher 1938). Closely related communities were described by Polunin (1948) from the North American continent. The Carici–Dryadetum integrifoliae is a vicarious association of the Scandinavian "Nardino–Dryadetum" (Rønning 1965). All communities from Tab. 24 should be assigned to the Kobresio–Dryadetalia, which probably is the only order of the Carici–Kobresietea in Greenland, where it is found everywhere. This is in contrast with Ohba (1974) who

Table 17. *Dryas integrifolia–Salix callicarpaea* community.

Analysis no.	Distribution type	69 210	69 212	69 161	69 159	69 167	Presence	Range of cover values
Reference no.		1	2	3	4	5		
Sample plot surface in m^2		2½	1½	2½	2½	2½		
Total Cover %		80	90	60	75	(90		
Cover % of dwarfshrubs		5	20	(15	25	(30		
Cover % of herbs		-	-	-	-	5		
Cover % of mosses/lichens		75	70	(45	(60	60		
Cover % of mosses		(10	35	(1	(1	(1		
Cover % of lichens		(70	35	(45	(60	(60		
Altitude a.s.l. in m		20	10	45	45	15		
Direction of exposure		WNW	NWE	NE	SE	ESE		
Slope		5	3	10	10	5		
pH rhizosphere		6/7	6/7	7	7½	7½		
Number of taxa		17	21	22	26	24		
Locality		5.4	5.4	7	7	6.5		
Dryas integrifolia	AM	+	2	2/3	3	3	V	+/3
Cephaloziella arctica		2	3	+	+	1	V	+/3
Cladonia coccifera		1	+	+	1	+	V	+/1
Salix callicarpaea	LM	1	1	+	+	1	V	+/1
Cetraria delisei		+	1	1	1	+	V	+/1
Psoroma hypnorum		1	1	+	+	.	IV	+/1
Ochrolechia (cf.) frigida		.	1	1	+	+	IV	+/1
Stereocaulon arcticum		1	1	1	2	.	IV	1/2
Polytrichum piliferum		+	1	+	1	.	IV	+/1
Lepraria neglecta		+	1	1	1	.	IV	+/1
Cladonia pyxidata		+	.	2/3	+	.	III	+/3
Stereocaulon alpinum		4	.	.	.	3/4	II	3/4
Cladina mitis		.	+	.	+	.	II	+
Silene acaulis	AM	.	(+)	.	.	+	II	+
Peltigera spuria		.	.	+	+	.	II	+
Gymnomitrion concinnatum		+	3	+	.	.	III	+/3
Solorina crocea		(+)	2	+	.	.	III	+/2
Lophozia alpestris		+	+	+	.	.	III	+
Cladonia lepidota		2	1	.	.	.	II	1/2
Pohlia nutans		.	1	+	.	.	II	+/1
Cladonia macrophyllodes		.	.	.	+	+	II	+
Candelariella vitellina		.	.	.	+	+	II	+
Bacidea spec.		.	.	.	+	+	II	+
Rinodina cf. lecidoides		.	.	.	+	+	II	+

reported the poorly characterized Thymo–Kobresietalia Ohba 1974 (by error reported as Thymo–Kobresietea), with its main distribution in Scotland and Iceland, from southern Greenland, where it excludes the Kobresio–Dryadetalia (Ohba 1974: 380–385).

The only differential taxa of the Thymo–Dryadetalia are *Thymus drucei* and *Gentiana amarella.* Knapp's tables (1964) on South Greenland (which were not included in Ohba's synoptic table) and Tab. 24 clearly show *Thymus drucei* as poorly represented in the communities from southern Greenland. This applies even more to *Gentiana amarella.* On the other hand, faithful taxa of the Kobresio–Dryadetalia, such as *Carex scirpoidea, C. nardina,* and those of the Dryadion integrifoliae, such as *Dryas integrifolia* and to some extent *Pedicularis kanei,* are common in Knapp's tables and Tab. 24. Consequently, it may be concluded that the Kobresio-Dryadetalia is present in Greenland, and that the Thymo-Kobresietalia is found only in Iceland and Scotland.

Dryas integrifolia–Salix callicarpaea community. (Tab. 17, ref. 1–5; Tab. 26, ref. 36–37).

Composition and physiognomy: The only differential taxon is *Cephaloziella arctica* (V +/3). Other constant taxa are *Dryas integrifolia* (V +/3), *Salix callicarpaea* (V +/1), *Cladonia coccifera* (V +/1), *Cetraria delisei* (V +/1), *Psoroma hypnorum* (IV +/1), *Ochrolechia* (cf. *frigida,* IV +/1), *Stereocaulon arcticum* (IV 1/2), *Polytrichum piliferum* (IV +/1) and *Lepraria neglecta* (IV +/1).

The vegetation is open to closed, and low. Total cover varies from 60 to 90%. The number of species varies from 17 to 26. Stratification is practically absent. The moss layer is max. 4 cm high and covers 45 to 70%; its aspect is determined by lichens, with scattered cushions of *Dryas* in between (50 cm in diametre), and some other phanerogams to max. 12 cm high, covering less than 30%. Herbs are rare. The aspect of the vegetation is determined by the large pulvinate growth form of *Dryas* and the abundance of light coloured fruticose lichens on a gravel and cobble rich substrate.

Habitat and distribution: This neutrophytic – basiphytic – calciphytic, mesotrafent, xerophytic and weakly achionophytic community is found in low altitudes (under 50 m) and covers large areas on stabilized old parts of recent moraines, and on the higher parts of alluvial debris cones. The habitat is wind exposed; snow cover is probably thin and discontinuous. The slope varies from 5 to 10°.

The soils are poor in humus, heterogenous of texture, and contain silt, partly of aeolian origin. The pH varies from 6.75 to 7.5. The soils are classified as regosols; they are temporarily moist in spring due to melting water. In summer the soil dries out. The surface has a certain microrelief by gravel and cobbles. The lower microsites are slightly more moist than the other places, and often contain liverworts.

The community was found in the interior only. In the phytosociological area type spectrum, the AM distribution type strongly dominates.

Remarks: The community should be considered as a typical pioneer vegetation on dry, stabilized, mineral soils, with a high pH. In the course of time, when increasing amounts of humus is formed, and, as a consequence, the soil becomes more acid, the community probably develops into the Carici–Dryadetum (p. 57). Physiognomically and ecologically closely related *Dryas integrifolia* communities in pioneer situations have been reported, e.g., from Sandflugtdalen in continental Southwest Greenland on fluvioglacial deposits (Böcher 1954: 140, fig. 35; see also Polunin 1948).

Two types are distinguished:

Solorina crocea type. (Tab. 17, ref. 1–3; Tab. 26, ref. 36; Fig. 30). – Differential taxa are: *Gymnomitrion concinnatum* (3/3 +/3), *Solorina crocea* (3/3 +/2), *Lophozia alpestris* (3/3 +), *Cladonia lepidota* (2/3 1/2) and *Pohlia nutans* (2/3 +/1). This type is found on slopes with northern exposure. The habitat is probably more moist than that of the next type.

Cladonia macrophyllodes type. (Tab. 17, ref. 4–5; Tab. 26, ref. 37). – Differential taxa are *Cladonia macrophyllodes* (2/2 +), *Candelariella vitellina* (2/2 +), *Bacidea* sp. (2/2 +) and *Rinodina* cf. *lecideoides* (2/2 +). This type is found on slopes with southern exposure. The habitat is rather dry.

Terricolous lichen communities

In addition to the saxicolous lichen communities (Daniëls 1975), terricolous lichen communities are found in the Angmagssalik District, and will be dealt with in this chapter. The aspect is particularly determined by the dominance of lichens. These lichen communities contain herbs, mainly graminoids, and very low dwarf shrubs, e.g., *Harrimanella hypnoides, Salix herbacea* and *S. callicarpaea.* In the coastal area, in Blomsterdalen (loc. 1.2), the lichen communities may cover hundreds of square metres. Inland they are less common, and in particular occur on stabilized substrates close to glaciers. The communities are covered with thick, permanent snow until the end of June; then the soil begins to dry out. The communities are probably covered with snow longer than all previously treated communities, and are therefore (strongly) chionophytic.

Species such as *Stereocaulon alpinum, S. paschale, Cladina mitis, C. rangiferina, Cladonia ecmocyna, Cetraria islandica, C. ericetorum, C. delisei* and *Peltigera malacea* are very common in these communities. Achionophytic lichens are completely absent. Inland, however, they may be prominent in the dwarf shrub vegetation (see p. 51), but they play a minor role in this lowarctic, oceanic district.

The discussed lichen communities belong to very different syntaxa. Except for two communities (see p. 69) they are arranged in two classes, the Salicetea herbaceae and the Juncetea trifidi. Before treating the lichen communities of the Angmagssalik District, a review will be presented on Molenaar's classification of the "snow bed, debris, scree and alluvium, grass heath and xerophytic talus slide and rock vegetation", all of which are chionophytic communities (Molenaar 1976, chapters IV–VII).

In the snow bed vegetation of the Angmagssalik District Molenaar (1976) distinguished the following alliances, belonging to different orders and classes:

1. The Cassiopo–Salicion herbaceae Nordh. 1936 em. Dahl 1957 (should be Cassiopo–Salicion Nordh. 1943 em. Dahl 1957), Salicetalia herbaceae Br.–Bl. 1926 (should be Salicetalia herbaceae Br.–Bl. in Br.–Bl. et Jenny 1926), Salicetea herbaceae Br.–Bl. 1947 (should be Saliceteae herbaceae Br.–Bl., Emb. et Mol. 1947), (see Tab. 25, ref. 1–4, 14).

2. The Ranunculo–Oxyrion digynae Nordh. em. Dahl 1957 (Salicetalia herbaceae, Salicetea herbaceae), (see Tab. 25, ref. 8–10, 15–17, 19–21).

3. The Antitrichio–Rhodiolon (= Sedion) rosea Hadač 1971, Androsacetalia alpinae Br.–Bl. 1926, Thlaspietea rotundifolii Br.–Bl. 1926, 1947, (see Tab. 25, ref. 12–13).

4. The Stellario–Oxyrion Gjaerevoll 1950, Androsacetalia alpinae, Thlaspietea rotundifolii, (see Tab. 25, ref. 7 and 26).

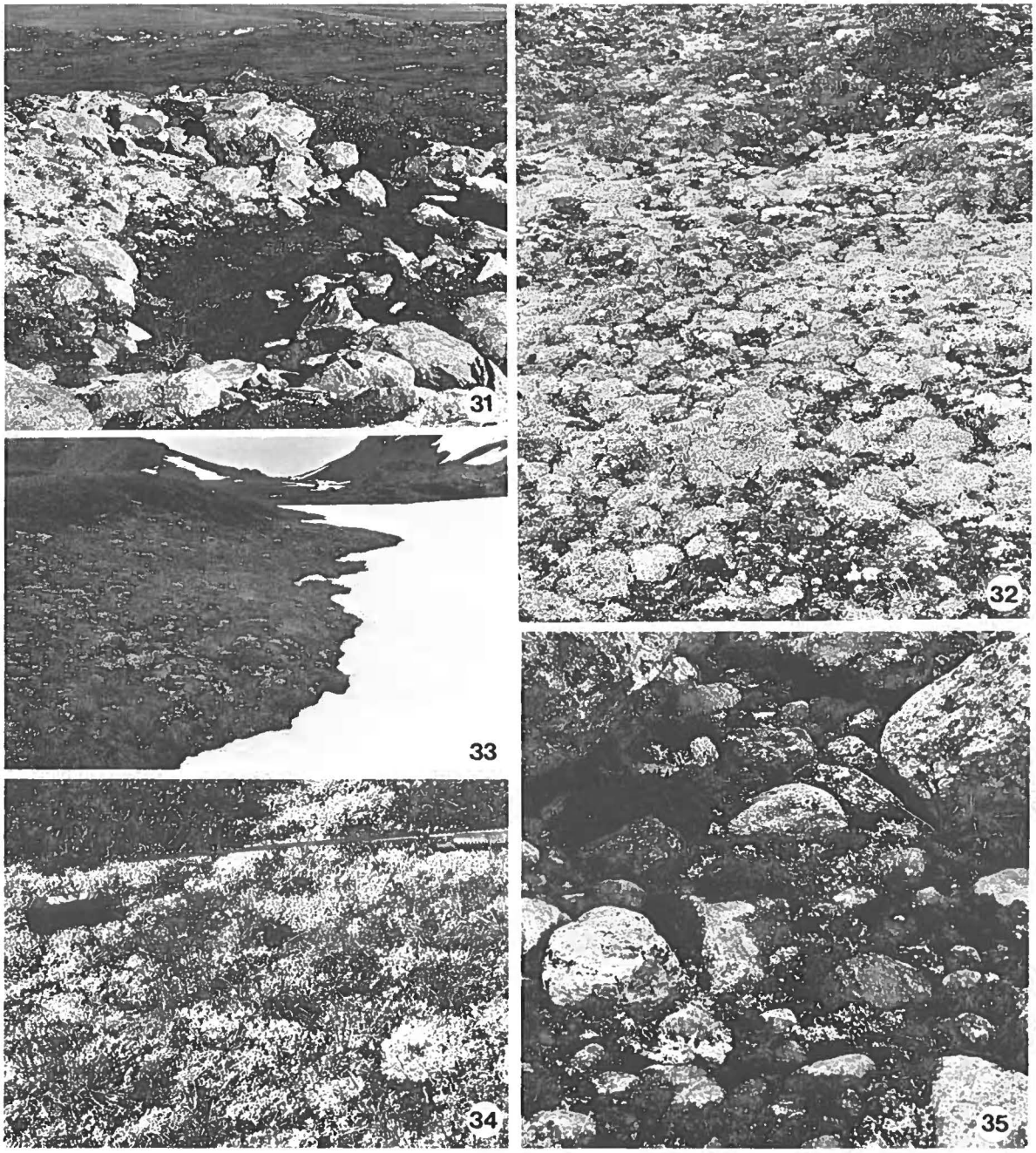
5. The Nardo–Caricion bigelowii Nordh. 1936 (the name is now invalid), Deschampsio–Myrtilletalia Dahl 1957, (see Tab. 25, ref. 18, 23–25 and 27).

The classification presented above differs from the typology in the present paper. The main reason is that Molenaar follows Nordhagen's (1943) association concept that emphasizes the similarities in dominance and to a lesser degree the total floristic composition of the communities, next to structure and ecology.

All terricolous lichen communities of the Angmagssalik District have been collected in Table 25 (ref. 5, 6, 11, 29, 30, 33, 34), together with the communities described by Molenaar (1976), except the littoral, aquatic/amphiphytic, spring and mire communities (incl. Molenaar's Calamagrostion neglectae). Studying the table it becomes clear that these chionophytic communities are indeed floristically related (occasionally very much so), and that gradual transitions may be present between the types. In my opinion, however, there is no reason to subdivide all these vegetation types, at least in the Angmagssalik District, into many floristically poorly characterized syntaxa. I see no reason to distinguish the Antitrichio–Rhodiolon roseae (Tab. 25, ref. 12–13) and the Stellario–Oxyrion (Tab. 25, ref. 7, 26) in the Angmagssalik District as separate alliances, even less in separate classes. The Nardo–Caricion bigelowii (Tab. 25, ref. 18, 23–25, 27) is absent.

The Antitrichio–Rhodiolon roseae, described by Hadač (1971b) from Iceland, contains as "characteristic species": *Rhodiola rosea* (=*Sedum rosea*), *Cystopteris fragilis, Bartsia alpina, Oxyria digyna, Draba incana, Poa glauca, Saxifraga hypnoides, S. oppositifolia, Antitrichia curtipendula, Rhytidiadelphus loreus* and *Peltigera canina.* Most of these taxa are absent in the columns 12 and 13 of Tab. 25, or they are even differential of the Ranunculo–Oxyrion, or they occur in other syntaxa. The Hylocomio–Salicetum herbaceae Hadač 1971 em. De Mol. 1976 (Tab. 25, ref. 13) and the Kiaerio–Salicetum herbaceae De Mol. 1976. ass. prov. (Tab. 25, ref. 12) can therefore better be assigned to the Ranunculo–Oxyrion. In my opinion, also the Taraxaco–Cystopteretum fragilis De Mol. 1976 (Tab. 25, ref. 22), on the basis of its total floristic composition, belongs to this alliance. This association was arranged by Molenaar provisionally in the Androsacetalia.

The alliance Nardo–Caricion bigelowii Nordh. 1936 (nom. inval., should now be Nardo–Caricion bigelowii Nordh. 1943) appears to be absent in the district. This alliance, which is common in Scandinavia and was described by many authors (e.g., Nordhagen 1936, 1943, 1954, Kalliola 1939, Dahl 1957, Gjaerevoll 1956), is characterized by *Nardus stricta, Anthoxanthum odoratum* ssp. *alpinum, Deschampsia atropurpurea, Agrostis borealis, Alchemilla alpina, Carex brunnescens, C. lachenalii, Luzula frigida, Solidago virgaurea, Trientalis europea* and *Deschampsia flexuosa.* The mosses *Drepanocladus uncinatus, Polytrichum alpinum,* and the liverwort *Lophozia lycopodioides* are very common.



Figs 31–35: **31.** *Salix herbacea–Cetraria delisei* community: dark, in the center. Cladonio–Viscarietum alpinae to the left. Loc. 6.1, 16 July 1969. **32.** Polygono–Salicetum herbaceae lophozietosum variant of *Cladonia uncialis*. *Stereocaulon alpinum* is strongly dominant in this stand. Loc. 1.2, July 1968. **33.** Cladonio–Viscarietum alpinae typicum recently free of snow, loc. 1.2, 27 June 1969. **34.** A close view of a stand of the Cladonio–Viscarietum alpinae bordering a stand of the Festuco–Salicetum callicarpaeae chamaenerietosum, loc. 1.7, August 1968. **35.** *Cladonia lepidota–Stereocaulon alpinum* community, loc. 5.4, August 1969.

Here again, these taxa do not at all differentiate the Hieracio–Caricetum bigelowii De Mol. 1976 (Tab. 25, ref. 23), and the Caricetum bigelowii Böcher 1933 em. De Mol. 1976 (Tab. 25, ref. 18, 24, 25, 27) from other communities. The dominance of *Carex bigelowii* alone is insufficient to differentiate a Nardo–Caricion bigelowii. On the strength of the floristic relationship with the Ranunculo–Oxyrion, demonstrated, e.g., by *Polygo-*

num viviparum, Taraxacum croceum, Thalictrum alpinum, Drepanocladus uncinatus, the Hieracio–Caricetum and the Caricetum bigelowii p.maj.p. are assigned to the Ranunculo–Oxyrion and not to the Nardo–Caricion.

The Deschampsietum alpinae *sensu* Molenaar (1976) (Tab. 25, ref. 7), which was assigned to the Stellario–Oxyrion by Molenaar, is intermediate between the Cassiopo–Salicion (*Anthelia juratzkana*) and the Ranunculo–Oxyrion (e.g., *Polygonum viviparum* and *Taraxacum croceum*). In addition, only one stand of this community was found in which three records were made.

Another community, the Oxyrietum triviale *sensu* Molenaar (1976) (Tab. 25, ref. 26), which was also assigned to the Stellario–Oxyrion, lacks all faithful taxa of this alliance (Gjaerevoll 1956), except *Oxyria digyna* which, however, has still higher cover values in the Ranunculo–Oxyrion. Therefore, Dahl (1957), who did not distinguish the alliance in Rondane, Norway, will be followed. The Oxyrietum *sensu* Molenaar (1976) will be provisionally considered as *Oxyria digyna* community, intermediate between the Ranunculo–Oxyrion and the Cladonio–Viscarion all. nov. (see p. 67).

The other communities (see below), assigned by Molenaar to the Stellario–Oxyrion (Molenaar: 195–198), viz., the Caricetum rufinae Nordh. 1943 subass. calliergetosum sarmentosi subass. prov. and the subass. drepanocladetosum exannulati subass. prov. belong to the Scheuchzerio–Caricetea (p. 20). In conclusion, I do not see any reason to recognize the Stellario–Oxyrion in the district.

Concerning the differentiation and the arrangement of the communities in the Cassiopo–Salicion Nordh. 1943 em. Dahl 1957, I largely agree with Molenaar (1976). Only the Gnaphalietum supini from the Angmagssalik District (Tab. 25, ref. 14) might be better placed between the Cassiopo–Salicion and the Ranunculo–Oxyrion on account of floristical arguments.

In summary, the snow bed vegetation of the Angmagssalik District described by Molenaar (1976) will now be classified into two alliances instead of five, viz., the Cassiopo–Salicion and the Ranunculo–Oxyrion, Salicetalia herbaceae, Salicetea herbaceae.

The communities of ref. 27–31 in Tab. 25 are arranged in a new alliance, Cladonio–Viscarion alpinae, which is provisionally assigned to the Caricetalia curvulae, Juncetea trifidi. It comprises lowarctic, lichen rich, meso- to xerophytic, chionophytic herb communities on stable, sandy, slightly humic soils, which dry out strongly in summer (see p. 67).

The following communities are assigned to this alliance: the Caricetum bigelowii *sensu* Molenaar (1976) p.min.p. (Molenaar, tab. 29: 1–6; this paper Tab. 25, ref. 27), the Cladonio–Viscarietum alpinae ass. nov. (Tab. 25, ref. 29–30), the Luzulo–Thymetum De Mol. 1976 (Tab. 25, ref. 28), and the Fimbriario–Sedetum annui De Mol. 1976 (Tab. 25, ref. 31). The last two associations have been assigned, together with the Sedo–Saxifragetum neogaeae De Mol. 1976 (Tab. 25, ref. 32) to the Sedo–Thymion (Böcher 1954) De Mol. 1976 (in the Sedo–Poetalia glaucae De Mol. 1976, Koelerio–Corynephoretea, cf. Molenaar 1976). This alliance is, however, floristically and synecologically rather heterotone and contains scree and rock vegetation (see also Böcher 1954). Therefore, it may be better subdivided into two alliances: the Cladonio–Viscarion alpinae containing communities on dry, rather thick, stable sandy soils, and the Sedo–Thymion De Mol. 1976 **em.**, containing typical rock communities as the Sedo–Saxifragetum and some communities of the *Veronica fruticans–Sedum annuum* Type (Böcher 1954); faithful taxa are *Saxifraga aizoon, S. nivalis, Woodsia ilvensis, Blindia acuta* and *Veronica fruticans.*

The syntaxonomical position of two lichen communities (Tab. 25, ref. 33–34) is difficult to determine at this moment.

Class Salicetea herbaceae Br.–Bl., Emb. et Mol. 1947

This class contains snow bed communities, with snow during 8 to 10 months or longer; they consist mainly of mosses, liverworts, hemicryptophytes and creeping, low chamaephytes. These are found in alpine and arctic regions in the northern hemisphere, on moist, humic, in places stony soils, affected by solifluction and cryoturbation, but not by strong erosion.

Faithful taxa are: *Cerastium cerastioides, Veronica alpina, Sedum alpestre, Soldanella pusilla, Gentiana bavarica, Luzula spadicea, Solorina crocea* (Braun–Blanquet 1948, Molenaar 1976, Oberdorfer 1977, Ellenberg 1978). The class is divided into two orders: the Arabidetalia coeruleae Rübel 1930 on calcareous soils (absent in the Angmagssalik District with its mainly acid substrates) and the Salicetalia herbaceae Br.–Bl. in Br.–Bl. et Jenny 1926, on acid soils. The latter is well developed in the district.

Order Salicetalia herbaceae Br.–Bl. in Br.–Bl. et Jenny 1926

The order contains snow bed communities on acid soils. Faithful taxa are: *Gnaphalium supinum, Kiaeria starkei, Pohlia drummondii, Polytrichum sexangulare, Ranunculus pygmeus, Sibbaldia procumbens, Salix herbacea* (Nordhagen 1936, Braun–Blanquet 1948, Oberdorfer 1977, Molenaar 1976, Ellenberg 1978). In the Angmagssalik District, *Lophozia alpestris* (incl. *L. wenzelii*) is also a faithful taxon (see Tab. 25). Differential taxon as against the Juncetea trifidi (p. 67) is, e.g., *Empetrum hermaphroditum.*

Alliance Cassiopo–Salicion herbaceae Nordh. 1943 em. Dahl 1957
(Tab. 25, ref. 1–6).

Lit.: Cassiopeto–Salicion herbaceae Nordh. 1936 (nom. inval.), Salicion herbaceae Du Rietz 1942 (nom. inval.), Herbaceon Du Rietz 1950 (nom. inval.), Cassiopeto–Salicion herbaceae Nordh. 1936 em. Dahl 1957 (see Molenaar 1976), see further Molenaar (1976). Incl. Polytrichion norvegici Gjaerevoll 1949.

This northern alpine, arctic alliance is vicarious with the middle European alpine Salicion herbaceae Br.–Bl. in Br.–Bl. et Jenny 1926, which is found in similar habitats. It is slightly different from the latter, and after additional research both alliances might possibly be combined.

Differential taxa as against the Salicion herbaceae are the northern *Carex bigelowii* and *Harrimanella hypnoides*. Faithful taxa are *Pohlia commutata, Conostomum tetragonum, Pleuroclada albescens, Polytrichum norvegicum, Cephalozia ambigua* and *Harrimanella hypnoides* (Tab. 25; Dahl 1957 and Molenaar 1976).

The Cassiopo–Salicion herbaceae consists of low snow bed communities on poor soil poor in higher plants, but rich in cryptogams. Most communities must be characterized as "Dauergesellschaften" (Braun–Blanquet 1964: 149, Molenaar 1976). As noticed by many investigators, the differentiation of the alliance as against the phanerogam-rich Ranunculo–Oxyrion (and the Stellario–Oxyrion) is rather difficult and arbitrary. The gradual increase of the phanerogams (and decrease of many cryptogams, especially microlichens and liverworts) coincides with the gradually decreasing thickness and duration of the snow cover.

Just as in Scandinavia (Gjaerevoll 1956), several lichens become dominant in the Cassiopo–Salicion of the Angmagssalik District, and therefore might be considered as (preferential) faithful taxa. This concerns particularly *Ochrolechia, Lepraria neglecta, Solorina crocea* and *Cetraria delisei* which, like the previously mentioned faithful taxa, are absent in the typical Ranunculo–Oxyrion communities (Tab. 25, ref. 15–25). Communities that are floristically intermediate between the Cassiopo–Salicion and the Ranunculo–Oxyrion are common in the district (Tab. 25, ref. 8–13). However, they are assigned to the Ranunculo–Oxyrion because of the presence of diagnostic taxa such as *Polygonum viviparum, Taraxacum croceum, Polytrichum juniperinum* and *Thalictrum alpinum,* according to the concepts of Dahl (1957) and Molenaar (1976).

As communities in extreme snowbed conditions are poor in species, especially in higher plants, it is hardly possible to distinguish associations according to floristic criteria. The following lichen communities belonging to the Cassiopo–Salicion, which are actually dominance communities, will be described as units without lower syntaxonomic status.

Salix herbacea–Lepraria neglecta community. (Tab. 18, ref. 1–5; Tab. 25, ref. 5; Tab. 26, ref. 41).

Composition and physiognomy: Characteristic for this community is the dominance of the grey crustose lichen *Lepraria neglecta* (V 4/5). Differential taxa as against the *Salix herbacea–Cetraria delisei* community (p. 65) are *Kiaeria starkei* (IV +/2), *Solorina crocea* (IV +/1), *Cladonia macrophyllodes* (III +), *C. bellidiflora* (III +/3), *Gymnomitrion concinnatum* (V +), *Pertusaria oculata* (IV +/1), *Stereocaulon arcticum* (III 1/3), *Polytrichum alpinum* (III +), *Cladonia ecmocyna* (IV +/1), *Cladina mitis* (III +/2), *Cladonia gracilis* (III +), *Stereocaulon alpinum* (III +/3). Constant taxa are *Salix herbacea* (IV 1/3), *Lophozia alpestris* (incl. *L. wenzelii*) (IV +/1), *Cetraria delisei* (V +), and *Psoroma hypnorum* (IV +/1). Some species such as *Gymnomitrion concinnatum* and *Pertusaria oculata,* which in Table 26 are restricted to this community, are also found in other communities.

The moss layer including *Salix herbacea* is well developed, but low (cover from 70% to 90%, height max. 2 cm). The field layer is open. Herbs cover max. 10% and are 15 cm high at the most. The aspect of the community is determined by small cushions of grey crustose lichens with a few scattered herbs. The number of species varies from 18 to 26.

Habitat and distribution: Synecologically the community may be characterized as moderately acidophytic, (probably) oligotrafent, meso- to xerophytic, slightly psychrophytic and strongly chionophytic. The stands may be many tens of square metres, in some places as a zone between the lower extreme snow bed communities dominated by *Salix herbacea* (Polygono–Salicetum inops, p. 66) and the higher located communities with many fruticose lichens and graminoids (Polygono–Salicetum lophozietosum, p. 66) or the Cladonio–Viscarietum alpinae (p. 69).

Most of the habitats are below 100 m, on moderately steep to steep (slopes from 10° to 20°) sites, at the foot of (mountain) ridges with mainly northern exposure. The habitat is moderately to very much protected, situated in the wind shelter of adjacent mountain ridges or other topographical features. Snow cover in winter is thick and permanent. The vegetation becomes free of snow medio June. Soils are of colluvial origin, slightly humic, mostly thin, coarse sandy, and occasionally rich in gravel and cobbles. The pH is 4.5 to 5. The soils can be classified as regosols. In spring the soils (and vegetation) remain moist to wet by the melting snow; this may cause solifluction. In summer the upper soil and vegetation dry out strongly; this causes shrinkage cracks (polygons), and the lichen mat changes into small cushions. In autumn, this is probably intensivated by frost and thaw.

The community is more often present at the coast than in the interior. In the phytosociological area type spectrum, the LO distribution type dominates; the AM type, as second, covers 14%.

Remarks: *Lepraria neglecta* is a widely distributed, mainly arctic-alpine species with highest cover values in chionophytic vegetation (Tab. 26; Gjaerevoll 1956,

Table 18. *Salix herbacea–Lepraria neglecta* community.

Analysis no.		69 124	68 136	68 206	69 65	68 140	
Reference no.		1	2	3	4	5	
Sample plot surface in m2		½	1	1	1	1	
Total cover %		80	90	85	90	85	
Cover % of dwarfshrubs		(3	(15	12½	(3	-	
Cover % of herbs		(10	-	1	(5	(5	
Cover % of mosses/lichens		70	(90	75	85	80	
Cover % of mosses		(5	(30	(5	10	10	
Cover % of lichens		(70	(60	(75	80	70	
Altitude a.s.l. in m		130	40	25	20	25	
Direction of exposure		NW	NW	NNW	ESE	NE	
Slope		15	15	20	10	15	
pH rhizosphere		5	4½	5	5	5	
Number of taxa		21	18	22	26	18	
Locality		6.2	2	1.3	1.5	2	
	Distribution type						Presence / Range of cover values
Lepraria neglecta		4/5	4	4	4	4	V 4/5
Salix herbacea	LO	1	3	3	1	.	IV 1/3
Gymnomitrion concinnatum		+	+	+	+	+	V +
Polytrichum piliferum		.	+	1	+	2	IV +/2
Pertusaria oculata		1	1	1	.	+	IV +/1
Cetraria delisei		+	+	+	+	+	V +
Cladonia ecmocyna		.	+	+/1	+	+	IV +/1
Kiaeria starkei		.	1	+	2	+	IV +/2
Stereocaulon alpinum		1	1	.	3	.	III 1/3
Cladina mitis		½	.	+	2	+	III +/2
Cladonia macrophyllodes		+	.	+	+	.	III +
Psoroma hypnorum		+	1	+	+	.	IV +/1
Solorina crocea		.	1	+	+	+	IV +/1
Luzula spicata	LO	+	.	+	+	.	III +
Carex bigelowii	LH	+	.	.	+	.	II +
Cladonia bellidiflora		.	+	.	1	2/3	III +/3
Ochrolechia frigida		+	+	.	+	.	III +
Cladonia gracilis		.	+	.	+	+	III +
Lophozia alpestris		+	+	.	.	+	III +
Lophozia wenzelii		.	+	+	1	.	III +/1
Stereocaulon arcticum		.	.	2	3	1	III 1/3
Polytrichum alpinum		+	.	+	.	+	III +
Cladonia coccifera		.	.	+	.	.	I +
Pohlia nutans		.	+	.	+	.	II +
Minuartia biflora	LH	+	.	.	.	+	II +
Silene acaulis	AM	1	.	+	.	.	II +/1
Pohlia commutata		+	.	.	.	+	II +
Oxyria digyna	AM	.	.	+	.	1	II +/1
Poa spec.		.	.	+	1	.	II +/1
Lecidea caesioatra		+	.	.	+	.	II +

Dahl 1957). Dominance communities of *Lepraria neglecta,* however, have not to my knowledge been mentioned in literature.

Salix herbacea–Cetraria delisei community. (Tab. 19, ref. 1–7; Tab. 25, ref. 6; Tab. 26, ref. 40; Fig. 31).

Composition and physiognomy: The dominant species is *Cetraria delisei* (V 5/6). Differential taxa as against the *Salix herbacea–Lepraria neglecta* community (p. 64) are *Conostomum tetragonum* (III +/2) and *Drepanocladus uncinatus* (III r/+). Other constant taxa are: "*Cladonia* sp." (prim. thallus IV +), *Ochrolechia frigida* (IV +/1) and *Salix herbacea* (IV +/1). It is a heterotone species poor community (6 to 17 taxa per record), the aspect of which is determined by the olive-brown fruticose *Cetraria delisei.* The moss layer is well developed and covers more than 90%; the height is 1 to 3 cm, and it consists of cryptogams including *Salix herbacea.* The field layer is absent or very poorly developed, covering max. 5%; height max. 15 cm.

Table 19. *Salix herbacea–Cetraria delisei* community.

Analysis no.		69 91	69 152	69 153	69 68	69 69	68 167	69 115	
Reference no.		1	2	3	4	5	6	7	
Sample plot surface in m^2		½	½	½	½	½	1	½	
Total cover %		(100	100	100	(100	(100	90	(100	
Cover % of dwarfshrubs		-	-	(5	(1	(1	(5	(10	
Cover % of herbs		-	2	(1	(1	(1	(5	(1	
Cover % of mosses/lichens		(100	(100	(100	(100	(100	90	(100	
Cover % of mosses		(1	10	(10	20	35	(1	(1	
Cover % of lichens		(100	90	(100	80	75	90	(100	
Altitude a.s.l. in m		40	60	5	10	10	30	10	
Direction of exposure		-	-	-	-	-	-	W	
Slope		-	-	-	-	-	-	2	
pH rhizosphere		5½	4½	4½	4½	4½	4½	4½	
Number of taxa		6	10	10	11	17	10	6	
Locality		5.1	7	7	5.1	5.1	3	4	
	Distribution type								Presence / Range of cover values
Cetraria delisei		6	6	6	5	5	6	6	V5/6
Cladonia spec. (prim. thallus)		.	+	+	+	+	+	.	IV +
Ochrolechia frigida		.	.	+	+	+	+/1	+	IV+/1
Salix herbacea	LO	.	.	1	+	+	1	1	IV+/1
Bartramia ithiphylla		+	+	.	+	+	.	.	III +
Drepanocladus uncinatus		+	+	.	.	.	r	+	III r/+
Conostomum tetragonum		.	.	1	1	2	+	.	III +/2
Pohlia (cf.) *commutatum*		+	+	.	.	2	.	.	III +/2
Lophozia alpestris		+	+	+	.	.	.	.	III +
Psoroma hypnorum		.	.	.	+	+	+	.	III +
Cephaloziella spec.		.	.	+	.	+	.	.	II +
Lecidea demissa		.	.	+	.	+	.	.	II +
Oncophorus spec.		.	.	1	.	.	+	.	II +/1
Lepraria neglecta		.	.	.	.	+	+	.	II +
Luzula spicata	LO	.	.	.	+	+	.	.	II +
Cladonia chlorophaea		.	.	.	+	+	.	.	II +
Polytrichum piliferum		.	.	.	1	2	.	.	II 1/2
Lophozia ventricosa		+	.	.	.	.	.	.	I +

Habitat and distribution: Synecologically the community might be characterized as weakly acidophytic, oligo- to mesotrafent, mesophytic, tropohydrophytic and chionophytic. It is always found below 60 m a.s.l., in level places in depressions of a few to 20 cm depth, in dwarf shrub vegetation on plateaus, in old temporarily dry brook beddings, in moraines, and in hollows between hummocks. The communities are found as narrow strips or distributed over tens of square metres.

Soils are generally thin. In most places the bedrock and/or coarse debris are found at less than 20 cm below the mainly coarse sandy soil; in a few places the soil is thicker and loamy. The soils are stable and slightly to moderately humic. The pH is 4.5 to 5.25. The classification is regosols, rankers or gleysols. In spring, during the melting of the snow, the vegetation may be partly or entirely flooded. In summer the upper soil and vegetation dry out strongly. The water collected from the surroundings stagnates in the depressions as a result of the thin soil. In autumn and winter this may lead to ice formation; the ice remains until the next growth season.

The community is found both at the coast and inland. In the phytosociological area type spectrum, the LO distribution type dominates with about 70%.

Remarks: Communities dominated by *Cetraria delisei* have been described in the literature. The species is found in many plant communities, but prefers cold, temporarily wet habitats with ice in winter, such as hollows between hummocks, and snow beds (see also Hansen 1971, Daniëls & Sipman 1976). Mattick (1949) reported square kilometres of "*Cetraria delisei* Gesellschaft" on level, moist places in Svalbard. Unfortunately, the floristic composition of this community was not mentioned.

Klement (1959) described the Cetrarietum delisei Mattick 1949 (nom. inval., might be Cetrarietum delisei Klement 1959) from subarctic Scandinavia, and from similar habitats as the *Salix herbacea–Cetraria delisei* community. Its syntaxonomic position is rather isolated, and on account of the presence of achionophytic taxa as *Cetraria nivalis* and *Alectoria nigricans,* Klement placed the association in the Cetrarion nivalis. On the basis of the total floristic composition, this lichen alliance should probably be incorporated in the Loiseleurio–Diapension (p. 44).

Dahl (1957) also distinguished a Cetrarietum delisei (including phanerogams) in Rondane, Norway, with two facies: a loiseleurietosum and a caricetosum. He stated that this is a clear unit, with a typical synecology ("typical of depressions filled with ice in winter"), but with an isolated, uncertain syntaxonomical position. Because of the relationship with some communities of the Nardo–Caricion bigelowii, Dahl's Cetrarietum delisei is placed in that alliance. Following Dahl's approach, the southeast greenlandic community might be considered as a facies of the Cetrarietum delisei (*sensu* Dahl).

A more distinct relationship, also as regards the soil, can be found with the *Cetraria delisei* community described by Elvin (1975: twelve records in tab. 14) from recent ice free moraines at Finse, Norway. The Angmagssalik community and the Finse community have in common, e.g., *Cetraria delisei, Salix herbacea,* and *Drepanocladus uncinatus.* The latter community undoubtedly belongs to the Salicetalia herbaceae. The *Salix herbacea–Cetraria delisei* community of the Angmagssalik District also belongs to this order, and because of the presence of *Conostomum tetragonum* and *Pohlia commutata* it is provisionally placed in the Cassiopo–Salicion. The community is probably widely distributed in arctic-alpine areas.

Just as in Scandinavia (Dahl 1957), the *Cetraria delisei* communities in Southeast Greenland seem to prefer more continental conditions.

Alliance Ranunculo–Oxyrion digynae Nordh. 1943 em. Dahl 1957
(Tab. 25, ref. 8–13, 15–25).

Lit.: See Molenaar (1976).

As mentioned in the introduction (p. 63), my concept of the alliance in the Angmagssalik District is broader than that of Molenaar (1976). The following phytocoena will be assigned to the alliance (see Tab. 25):

a. All phytocoena of the district assigned by Molenaar to this alliance, viz., the Sibbaldietum procumbentis, the Alchemilletum alpinae, the Ranunculo–Salicetum herbaceae (= Polygono–Salicetum herbaceae), the Chamaenerietum latifolii, the *Alchemilla glomerulans* sociation and the *A. filicaulis* sociation (Tab. 25, ref. 15–16, 8–10, 17, 19–21; Molenaar 1976, tab. XV–XX).

b. The Hylocomio–Salicetum herbaceae and the Kiaerio–Salicetum herbaceae (Tab. 25, ref. 12–13; Molenaar 1976, tab. XXV).

c. The Taraxaco–Cystopteretum fragilis (Tab. 25, ref. 22; Molenaar 1976, tab. XXV).

d. The Hieracio–Caricetum bigelowii and the Caricetum bigelowii p.maj.p. (Tab. 25, ref. 18, 23–25, 27; Molenaar 1976, tab. XXVIII and XXIX, nos 7–22).

Faithful taxa are: *Polygonum viviparum, Phleum commutatum, Alchemilla alpina, Ranunculus acris, Sibbaldia procumbens, Veronica alpina.* Differential taxa as against the Cassiopo–Salicion herbaceae are *Oxyria digyna, Sedum rosea, Thalictrum alpinum, Bartsia alpina, Chamaenerion latifolium, C. angustifolium, Hieracium alpinum, Lophozia hatcheri, Poa alpina.* The alliance has a northern (sub)alpine-(sub)lowarctic distribution and contains meso- to eutrafent, (very) late snow free, preponderantly herb rich communities on temporarily moist to wet, rather stable and well-drained soils. The upper soil layer is humic; the soils are influenced by "dry-wet flushing" (Dahl 1957: 308–309).

Ass. Polygono–Salicetum herbaceae Dahl 1957 **em.**
(Tab. 25, ref. 8–11. NTR: Dahl, 1957: tab. 35, ref. 236).

Syn.: Ranunculo–Salicetum herbaceae Nordh. 1928 em. Mol. 1976 (nom. illeg.) p.maj.p.
Lit.: See Molenaar (1976); non Ranunculetum acris acidophilum Gjaerevoll 1956.
Remarks: Molenaar's proposal (1976) to arrange the northern species-poor *Salix herbacea* vegetations into one association will be followed. The name given by Molenaar to that association, however, should be Polygono–Salicetum herbaceae Dahl 1957, which better defines the association (also according to Molenaar 1976: 170).

The association is common in the district. It is negatively characterized as against other communities of the alliance. *Salix herbacea, Carex bigelowii* and *Polygonum viviparum* are prominent phanerogams. See further Molenaar (1976). The subdivision of the association is according to Molenaar. Two subassociations can be distinguished in the district, viz., a subass. inops De Mol. 1976 and a subass. lophozietosum De Mol. 1976.

Subass. lophozietosum De Mol. 1976.
(Tab. 25, ref. 10–11).

Differential taxa are *Lophozia hatcheri* (incl. *L. lycopodioides*) and *L. wenzelii,* and in the Angmagssalik District also cryptogams such as *Stereocaulon alpinum, Cladonia ecmocyna* and *Cladina rangiferina.* The subassociation is poor in phanerogams, but rich in cryptogams. It is an acidophytic, strongly chionophytic, seasonally wet, mesotrafent and slightly psychrophytic community, with habitats both at the coast and inland. For further details, see Molenaar (1976).

Variant of *Cladonia uncialis* **var. nov.** (Tab. 20, ref. 1–5; Tab. 25, ref. 11; Tab. 26, ref. 42; Fig. 32). – Differential taxa are: *Dicranum fuscescens* (III 1/4), *Cetraria ericetorum* (V +/1), *Cladonia gracilis* (V +/2), *C. crispata* (IV +/3), and *C. uncialis* (V 2/5). Other constant taxa are: *Salix herbacea* (V +/3), *Carex bigelowii* (V +/2), *Cladina rangiferina* (V 2/5), *C. mitis* (V 1/3), *Cladonia ecmocyna* (V +/3), *Psoroma hypnorum* (V +), *Cetraria islandica* (V +/1), *Polygonum viviparum* (IV +), *Drepanocladus uncinatus* (IV +), *Lophozia hatcheri* (IV +) and *Stereocaulon alpinum* (IV 1/4).

Table 20. Ass. Polygono–Salicetum herbaceae subass. lophozietosum variant of *Cladonia uncialis*.

Analysis no.	Distribution type	68	68	68	68	69	Presence	Range of cover values
		49	50	168	38	56		
Reference no.		1	2	3	4	5		
Sample plot surface in m2		¼	¼	1	1	1		
Total cover %		90	100	(100	(100	(100		
Cover % of dwarfshrubs		(1	(1	(1	15	1		
Cover % of herbs		(10	(3	(5	7	(5		
Cover % of mosses/lichens		90	100	95	95	(100		
Cover % of mosses		10	30	(5	40	25		
Cover % of lichens		80	90	(90	55	(90		
Altitude a.s.l. in m.		80	80	30	35	30		
Direction of exposure		NE	NE	–	N	5		
Slope		10	10	–	40	0/5		
pH rhizosphere		5	5	4½	4½	4½		
Number of taxa		24	21	24	24	25		
Locality		1.2	1.2	3	1.3	1.5		
Salix herbacea	LO	+	+	+	3	+	V	+/3
Carex bigelowii	LM	2	1	1	2	+	V	+/2
Cladina rangiferina		2	4	3	3	5	V	2/5
Psoroma hypnorum		+	+	+	+	+	V	+
Cetraria ericetorum		+	+	+	1	+	V	+/1
Cladonia uncialis		2	4	3	3	5	V	2/5
Cladina mitis		3	2	3	3	1	V	1/3
Cladonia ecmocyna		2	3	+	1	2	V	+/3
Cladonia gracilis		1	+	2	+	2	V	+/2
Cetraria islandica		+	1	+	+	1	V	+/1
Polygonum viviparum	AM	+	+	+	.	+	IV	+
Drepanocladus uncinatus		.	+	+	+	+	IV	+
Lophozia hatcheri		+	+	+	.	+	IV	+
Cladonia crispata		+	.	1	3	1	IV	+/3
Stereocaulon alpinum		4	.	1½	1	1	IV	1/4
Ptilidium ciliare		.	2	+	.	+	III	+/2
Dicranum fuscescens		.	1	.	4	2	III	1/4
Pohlia nutans		+	.	.	+	+	III	+
Stereocaulon paschale		2	4	4	.	.	III	2/4
Polytrichum alpinum		+	2	.	+	.	III	+/2
Cladonia bellidiflora		.	.	.	+	+	II	+
Cerastium lanatum	LM	+	.	+	.	.	II	+
Peltigera malacea		+	.	.	.	+	II	+
Cladonia coccifera		+	.	+	.	.	II	+
Cephaloziella spec.		+	.	.	+	.	II	+
Cetraria delisei		+	1	.	.	.	II	+/1
Lophozia alpestris		.	.	.	2	+	II	+/2
Peltigera scabrosa		.	.	+	+	.	II	+

The moss layer is closed and 3 to 10 cm high. It consists mainly of lichens, but mosses and *Salix herbacea* are also present. The field layer is open (covers 3 to 10%) and is 10 cm, in some places max. 20 cm high. The variant is found as stands of 10 to 20 square metres situated in snow bed habitats on stable soil, below 100 m. Slopes vary from 0–40°; exposure is mostly north. Snow cover disappears around June. The vegetation is not influenced by additional water. Soil and vegetation are moist to wet during the snow melting period, but thereafter the upper soil and the vegetation dry out strongly, which causes polygons in the lichen carpet. Soils are of colluvial origin or formed in situ. They are humic, mostly coarse sandy. The pH varies from 4.25 to 5. The soils are well drained, and can be classified as rankers.

Synecologically, the variant may be characterized as moderately acidophytic, meso- to slightly xerophytic and oligotrafent compared with the other communities of the subassociation (Molenaar 1976). In the phytosociological area type spectrum, the LM distribution type and the LO type dominate with 48% and 46% respectively. The variant has only been found at the coast.

Class Juncetea trifidi Hadač in Klika et Hadač 1944 em. Oberd. 1978.

Syn.: Caricetea curvulae Br.–Bl. 1948.
Remarks: Only the Caricetalia curvulae, following Oberdorfer (1978), are assigned to this class, and not the Androsacetalia alpinae, the Salicetalia herbaceae, and the Rhodoreto–Vaccinietalia.

The class comprises grass heaths on acid soils in alpine and northern regions. As faithful taxa were reported: *Botrychium lunularia, Anemone vernalis, Euphrasia minima, Antennaria dioica* (L.) Gärtn. ssp. *borealis* Camus, *Arnica montana* L. var. *alpina* Reichb., *Luzula spicata, Juncus trifidus* and *Viscaria alpina* (Braun–Blanquet 1948, 1949b, Oberdorfer 1978). In the north one order is found, the Caricetalia curvulae; the faithful taxa of the class are also faithful of the order (Nordhagen 1936, 1943, 1954, Kalliola 1939).

Order Caricetalia curvulae Br.–Bl. in Br.–Bl. et Jenny 1926

In Scandinavia this order contains one alliance, the Juncion trifidi (scandinavicum) Nordh. 1936, which is invalid (as no associations are mentioned) and illegitimate. This syntaxon includes achionophytic communities mainly found in the middle alpine mountain belt, "above" the dwarf shrub vegetation, in South and Middle Norway (Nordhagen 1936, 1943, 1954, Gjaerevoll & Bringer 1965), but also in northern Lappland (Kalliola 1939). Dahl (1957) considered the transition of the achionophytic grass heaths to the achionophytic dwarf shrub heaths in Rondane so gradual that he arranged both vegetations into one alliance, the Arctostaphyleto–Cetrarion nivalis.

In the Angmagssalik District, typical achionophytic grass heaths such as in Scandinavia and Southwest Greenland (Böcher 1954, 1963, Knapp 1964, Hansen 1971) have not been found. Consequently, the achionophytic dwarf shrub communities have been arranged in the Loiseleurio–Diapension (p. 44). The chionophytic grass heaths (graminoid and herb vegetations) of the district, which are often rich in lichens, are arranged in a new alliance, the Cladonio–Viscarion alpinae, which together with the achionophytic communities of the 'Juncion trifidi scandinavicum" belong to the Caricetalia curvulae.

Alliance Cladonio–Viscarion alpinae **all. nov.**
(Tab. 25, ref. 27–31).

Syn.: Sedo–Thymion De Mol. 1976 p.p.
Type ass.: Cladonio–Viscarietum alpinae ass. nov. (Tab. 25, ref. 29–30; Tab. 26, ref. 43–44; Figs 33, 34).

The alliance has a lowarctic, mainly oceanic distribution, and contains acidophytic, mainly meso- to eutrafent, weakly meso- to xerophytic, thermophytic and moderately chionophytic communities on thick, coarse sandy, mainly stable, humus-poor, dry soils. The communities are rich in lichens and xerophytic herbs.

Related communities have been described from subarctic South Greenland (Knapp 1964, as *Agrostis borealis–Rumex acetosella*–Verband) and from Southwest Greenland by Böcher (1954, as the *Juncus trifidus–Minuartia groenlandica* Type with lowarctic

Table 21. Ass. Cladonio–Viscarietum alpinae.

Analysis no.		68 215	68 128	68 225	68 126	68 216	68 142	68 147	69 3	69 42	69 101	69 38	68 17	68 226	68 180	68 7	68 193	68 18/19	1/8	9/17	1/17
Reference no.		1	2	3	(4)	5	6	7	8	9	10	(⚠)	12	13	14	15	16	17			
Sample plot surface in m^2		2½	1	2½	1	2½	1	1	1	1	1	1	1	1	1	1	1	1			
Total cover %		(100	85	100	(100	(100	100	100	95	85	(100	90	70	90	90	80	80	90			
Cover % of dwarfshrubs		–	2	8	(10	–	(1	(1	–	(2	–	(1	(10	(8	1	(1	–	(1			
Cover % of herbs		(25	20	12	5	10	(20	10	5	(10	(20	(3	10	(15	15	20	10	15			
Cover % of mosses/lichens		85	70	75	95	90	(95	(100	85	80	(80	85	60	85	(80	80	80	80			
Cover % of mosses		20	(3	15	25	5	2	(2	(5	(5	(2	(25	(1	(5	(1	–	–	(1			
Cover % of lichens		80	(70	75	75	(90	(95	(100	85	(85	(100	75	60	(85	(80	80	(80	80			
Altitude a.s.l. in m		10	60	15	95	5	10	10	100	615	100	100	50	15	70	30	60	60			
Direction of exposure		E	SE	E	SE	E	SSW	WSW	SSE	E	SE	ESE	SE	SSE	S	S	SE	SE			
Slope		15	20	15	10	10	10	0/5	20	15	5	12½	30	15	15	25	15	20			
pH rhizosphere		4½	5	5	4½	4½	5	5	4½	5	5½	4½	5	5	4½	5	43/4	4½			
Number of taxa		34	30	36	26	26	27	20	29	22	19	28	22	41	22	23	23	30			
Locality		1.7	2	1.7	2	1.7	3	3	1.2	1.3	2.1	1.1	1.2	1.7	3	1.2	1.2	1.2			
Faithful (F) and diff. taxa of the ass.:																			Fresence	Range of cover values	
Cladonia phyllophora (F)		.	.	.	+	+	+	1	+	1	+	1	+	+	.	+	.	1	IV	+/1	IV +/1 IV +/1
Stereocaulon alpinum		4	3	5	3	4	1	3	2	5	6	2	3	4/5	4	3	4	+	V	1/5	V 2/6 V 1/6
Cladina rangiferina		+	2	1	+	1	1	2	+	.	1	1/2	+	+	3/4	2	.	1	V	+/2	IV +/4 V +/4
Cladonia crispata		+	+	+	+	+	1	1	.	+	+	+	+	+	+	.	.	.	V	+/1	III + IV +/1
Cladonia uncialis		+	+	+	.	+	.	1	.	.	.	1/2	+	1	.	1	1	1	IV	+/1	IV +/2 IV +/2
Ptilidium ciliare		3	+	1	+	+	+	+	+	.	.	+	.	.	.	.	.	+	V	+/3	II + III +/3
Cladonia macrophyllodes		.	+	+	.	.	+	+	.	+	.	.	+	+	1	.	+	+	III	+	IV +/1 III +/1
Cephaloziella spec.		+	+	+	.	.	.	.	+	.	.	.	.	+	.	.	.	+	III	+	II + II +
Lepraria neglecta		.	+	.	1	.	.	.	.	.	.	.	+	+	.	+	.	+	II	+/1	III + II +/1
Diff. taxa of subass.:																					
Cetraria delisei		+	+	+	1	.	+	1	+	.	.	.	.	.	.	.	.	.	V	+/1	. III +/1
Hieracium alpinum	LO	3	2	+	1	+	+	.	.	.	.	.	.	.	.	.	.	.	IV	+/3	. II +/3
Cladonia bellidiflora		+	+	.	2	.	.	+	.	.	.	.	.	.	.	+	.	.	III	+/2	I + II +/2
Other taxa:																					
Cladina mitis		2	2	2	3	1	4	3	3	+	1	2/3	2	2	1	2	1	1	V	1/4	V 1/3 V +/4
Dicranum scoparium		+	1	2	3	1	+	+	+	.	+	1	.	1	+	.	+	+	V	+/3	IV +/1 V +/3
Cetraria ericetorum		+	1	+	+	+	+	+	+	1	+	1	+	+	1	+	+	1	V	+/1	V +/1 V +/1
Carex bigelowii	LM	+	+	1	+	1	1	.	1	+/1	1	+	+	1	.	1	+	2	V	+/1	V +/2 V +/2
Cladonia ecmocyna		1	+	+	3	+	1	.	1	+	.	1	1	1	+	1	1	2	V	+/3	V +/2 V +/2
Cladonia gracilis		1	3	1	+	+	+	.	1	.	+	1	+	1	1	+	+	+	V	+/3	V +/1 V +/3
Lophozia hatcheri		3	+	+	.	+	+	+	+	1	+	2	.	+	+	.	+	+	V	+/3	IV +/2 V +/3
Stereocaulon paschale		1	.	5	.	4	4	3	2	.	+	1	3	+	4	4	+	5	IV	1/5	V +/5 V +/5
Cetraria islandia		+	+	1	.	1	.	.	1	+	.	1	+	+	+	+	+	+	IV	+/1	V +/1 IV +/1
Cerastium lanatum	LM	+	+	+	+	+	+	+	+	.	1	+	.	+	.	.	+	+	V	+	III +/1 IV +/1
Luzula spicata	LO	+	.	+	.	+	+	.	+	.	2	(+)	+	+	+	+	+	+	IV	+	V +/2 IV +/2
Viscaria alpina	LO	+	1	+	.	(+)	+	.	+	+/1	+	+	.	+	.	+	+	1	IV	+/1	IV +/1 IV +/1
Juncus trifidus	LO	+	.	+	+	.	+	2	.	.	+	+	1	+	+	1	1	+	IV	+/2	V +/ IV +/2
Cladonia coccifera		.	+	.	+	.	+	.	+	+	+	.	+	+	+	.	+	+	III	+	IV + IV +
Campanula gieseckiana	LM	+	1	+	.	.	+	.	+	+/1	.	+	.	+	.	+	+	1	IV	+/1	IV +/1 IV +/1
Peltigera malacea		+	+	.	.	+	.	.	1	+	.	+	.	.	+	+	+	+	III	+/1	IV + III +/1
Chamaenerion angustifolium	BL	.	.	+	.	.	.	.	+	.	.	+	.	+	.	+	+	+	II	+	IV + III +
Salix herbacea	LO	.	1	2	2	.	+	+	.	1/2	.	+	2	+	.	.	.	+	IV	+/2	III +/2 III +/2
Poa arctica	AM	+	+	+	+	+	+	.	.	.	+	.	.	.	.	+	.	.	V	+	II + III +
Thymus drucei	BS	.	.	.	.	.	.	.	.	.	.	.	.	1/2	1	+	.	+	.	.	III +/2 II +/2
Psoroma hypnorum		.	+	.	+	.	.	.	+	.	.	+	.	.	.	.	.	.	II	+	I + II +
Polygonum viviparum	AM	.	.	1	+	.	+	.	.	+	.	.	.	.	.	.	.	.	II	+/1	I + II +/1
Bryum spec.		.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	+	.	.	.	II + I +
Cladonia carneola		.	.	.	+	.	.	+	.	.	.	.	.	.	.	+	.	.	II	+	I + I +
Poa alpina	LO	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	II + I +
Drepanocladus uncinatus		+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	II	+	. I +
Polytrichum piliferum		.	.	.	+	.	.	.	+	.	.	.	+	.	.	.	.	.	II	+	I + I +
Desmatodon latifolius		.	.	+	.	.	.	.	.	.	.	+	.	+	.	.	.	.	I	+	I + I +
Festuca vivipara	LO	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	II	+	I + I +
Caloplaca spec.		.	.	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	II + I +
Dicranum muehlenbeckii		.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	+	.	.	II +/1 I +/1
Rinodina spec.		.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	II + I +
Solorina crocea		.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	I	+	I + I +
Pohlia nutans		.	.	.	.	+	.	+	.	.	.	.	.	.	+	.	.	.	II	+	I + I +

oceanic grass land/herb rich grass land/fell-field communities rich in mosses and lichens). According to Böcher this type corresponds with the achionophytic Scandinavian "Juncion trifidi", but he found also chionophytic taxa, which would be considered as an oceanic characteristic. Böcher's type, however, is rather heterotone and in my opinion should be mainly assigned to the Juncion trifidi because of the dominance of achionophytic (lichen) taxa. The *Agrostis–Rumex*–Verband, (Knapp 1964), contains many habitat – and area differential taxa (over 13). For the present, the Cladonio–Viscarion seems to be restricted to Southeast Greenland.

Faithful taxa are: *Juncus trifidus* (preferential), *Luzula spicata* (preferential) and *Viscaria alpina.* Differential taxa as against the Juncion trifidi are chionophytic taxa such as *Poa alpina, Cladonia ecmocyna, Chamaenerion angustifolium,* and *Thymus drucei.* Furthermore, the alliance is negatively characterized by the absence of achionophytic lichens. Differential taxa as against the *Agrostis–Rumex*–Verband (Knapp 1964) from South Greenland are *Chamaenerion angustifolium, Cetraria ericetorum, Cladonia ecmocyna, C. uncialis, C. coccifera, Salix herbacea, Dicranum scoparium, Cladonia macrophyllodes, Stereocaulon paschale, Peltigera malacea* and *Poa arctica.* Constant companions are *Cladina mitis, Stereocaulon paschale, Cetraria ericetorum, Campanula gieseckiana, Cerastium lanatum, Cetraria islandica, Thymus drucei,* and *Carex bigelowii.*

Ass. Cladonio–Viscarietum alpinae **ass. nov.**
(Tab. 21, ref. 1–17; Tab. 25, ref. 29–30; Tab. 26, ref. 43–44; Figs. 33, 34. NTR: Tab. 21. ref. 11).

Composition and physiognomy: Selective faithful taxon is *Cladonia phyllophora* (IV +/1). Differential taxa as against all other phytocoena of the alliance are *Cladonia crispata* (IV +/1), *C. macrophyllodes* (III +/3), *Cephaloziella* sp. (II +), *Ptilidium ciliare* (III +/3), *Stereocaulon alpinum* (V +/4), *Cladina rangiferina* (V +/4), *Cladonia uncialis* (IV +/2) and *Lepraria neglecta* (II +/1).

Constant companions are *Carex bigelowii* (V +/2), *Cladonia ecmocyna* (V +/3), *C. gracilis* (V +/3), *Lophozia hatcheri* (V +/3), *Viscaria alpina* (IV +/1), *Juncus trifidus* (IV +/2), *Cetraria ericetorum* (V +/1), *Cladina mitis* (V +/4), *Dicranum scoparium* (V +/3), *Stereocaulon paschale* (V +/5), *Cetraria islandica* (IV +/1), *Cerastium lanatum* (IV +/1), *Luzula spicata* (IV +/2) and *Cladonia coccifera* (IV +).

The community is rich in species, very homotone, with a xeromorphic aspect determined by fruticose lichens, graminoids and xeromorphic herbs. Yellow, white, grey and violet are common colours. The phytocoenoses are two-layered. The moss layer, including *Salix herbacea* and *Thymus drucei,* is closed (covering 60% to 100%) and 3 to 5 cm high. Fruticose lichens are dominant in this layer. The field layer is open (covering 5 to 25%) and 10 to 25 cm high. Graminoids are conspicuous.

Habitat and distribution: Synecologically the association may be characterized as acidophytic, oligo- to mesotrafent, xerophytic, thermophytic and chionophytic. The association is nearly always found below 100 m, on wind sheltered places between exposed rigdes and plateaus. The habitat is generally exposed to winds from east to south, but never from the north. The slope is 0–5 to 30° and averages 15°. In winter the vegetation is covered by a thick and permanent snow cover, which disappears in the second half of June.

Soils are acid (pH from 4.25 to 5.25), sandy and slightly humic. They are of colluvial, niveo-aeolian origin or they have originated in situ. They are well drained, thick, and stable, and can be classified as rankers and regosols. The soils are not affected by additional water supply. In summer the upper soil and the vegetation dry out strongly, which causes polygons in the lichen carpet.

The association is found as phytocoenoses in a few to over a hundred square metres. They are situated between communities of the Phyllodoco–Myrtillion (p. 36) or the Festuco–Salicetum callicarpaeae (p. 31), and the communities of the Salicetea herbaceae (p. 63) below. The association should be considered as a "Dauergesellschaft"; it is most common at the coast. In the phytosociological area type spectrum, the LO distribution type dominates with 66%.

Two subassociations are distinguished.

Subass. cetrarietosum delisei **subass. nov.**
(Tab. 21, ref. 1–8; Tab. 25, ref. 29; Tab. 26, ref. 43. NTR: table 21, ref. no. 4).

Differential taxa are: *Ptilidium ciliare* (V +/3), *Cetraria delisei* (V +/1), *Hieracium alpinum* (IV +/3) and *Cladonia bellidiflora* (III +/2). The subassociation is found in places with a longer snow period, which are more moist than those of the subass. typicum (see below).

Subass. typicum **subass. nov.**
(Tab. 21, ref. 9–17; Tab. 25, ref. 30; Tab. 26, ref. 44. NTR: that of the association).

Differential taxa are absent. See further preceding subassociation.

Other lichen communities

Stereocaulon condensatum community. (Tab. 22, ref. 1–3; Tab. 25, ref. 33; Tab. 26, ref. 38).

Composition and physiognomy: Characteristic and dominant species is *Stereocaulon condensatum* (3/3 5). This species was not known from Greenland (Daniëls & Ferwerda 1972). Other common taxa are *Psoroma hypnorum* (3/3 +/3), *Cephaloziella arctica* (2/3 1/2), *Cladonia coccifera* (2/3 +) and *Pohlia drummondii* (2/3 +).

The community is poor in taxa (7–11 per record), but very closed (cover from 85–100%). The aspect is determined by grey crustose lichens. The community is almost single-layered, and very low (< 1 cm); herbs are scarce and cover max. 1%, they are max. 10 cm high.

Table 22. *Stereocaulon condensatum* and *Cladonia lepidota–Stereocaulon alpinum* communities.

Analysis no.	Distribution type	69	69	69	69	69	69	Presence	Range of cover values
		176	206	205	209	164	207		
Reference no.		1	2	3	4	5	6	1/3	4/6
Sample plot surface in m^2		¼	¼	0.64	1	1	1		
Total cover %		(100	85	90	95	(60	80		
Cover % of dwarfshrubs		(1	-	-	-	-	(1		
Cover % of herbs		-	-	(1	-	(1	(3		
Cover % of mosses/lichens		(100	85	(90	95	(60	(80		
Cover % of mosses		(1	5	(2	10	(1	(15		
Cover % of lichens		(100	80	(90	90	(60	(75		
Altitude a.s.l. in m		5	5	5	20	45	5		
Direction of exposure		-	W	S	-	E	W		
Slope		-	0/1	0/1	-	0/1	0/2		
pH rhizosphere		6	7¼	7¼	6¼	7	7¼		
Number of taxa		7	8	11	5	10	18		
Locality		6.5	5.4	5.4	3.4	7	5.4		
Stereocaulon condensatum		5	5	5	.	.	.	3	5 . .
Cladonia lepidota		.	+	.	4	4	4	1 +	3 4
Psoroma hypnorum		3	+	+	.	.	+	3 +/3	1 +
Stereocaulon alpinum		.	+	.	4	1	2/3	1 +	3 1/4
Cetraria delisei		.	.	+	+	1	1	1 +	3 +/1
Cephaloziella arctica		.	2	1	2	.	3	2 1/2	2 2/3
Cladonia coccifera		.	+	+	.	+	+	2 +	2 +
Cladina mitis		.	.	+	.	+	+	1 +	2 +
Ochrolechia frigida		.	.	.	+	+	2	. .	3 +/2
Chamaenerion latifolium	AM	.	.	+	.	+	+	1 +	2 +
Pohlia drummondii		+	+	.	.	.	.	2 +	. .
Lophozia alpestris		.	.	+	.	.	+	1 +	1 +
Salix callicarpaea	LM	+	.	.	.	.	+	1 +	1 +
Oxyria digyna	AM	.	.	+	.	.	+	1 +	1 +
Cladonia ecmocyna		.	.	+	.	+	.	1 +	1 +
Ditrichum spec.		+	.	.	.	.	+	1 +	1 +

Table 23. Survey of Scheuchzerio–Caricetea communities of the Angmagssalik District with enumeration of faithful and differential species only.

Reference no.	1	2	3	4	5	6	7	8	9	10	11	12	1
Scheuchzerio-Caricetea communities of the Angmagssalik District													
DM '76 = de Molenaar (1976)													
regional faithful and differential taxa	Rhododendro-Vaccinietum		Pohlio-Caricetum rufinae DM '76 XXVI: 1–4	Pohlio-Caricetum rufinae DM '76 XXVI: 5–11	J. Cast.-J.bigl. comm. DM '76 V: 1–3	Junco-Caricetum bicoloris DM '76 V: 4–8	Caricetum microglochinis Nh '28 '43 DM '76 V: 9–11	Equiseto-Caricetum rariflorae DM '76 VI: 1–5	Drepanocladus-Campylietum DM '76 VI: 6–7	Sphagno-Salicetum call.	Pedicolari-Vaccinietum	Carex rariflora-Philon.-Paludella comm. DM '76 VII: 1–2	
Number of records	3	4	4	7	3	5	3	5	2	6	4	6	2
Faithful/diff. taxa of the Scheuchzerio-Caricetea:													
Carex rariflora	.	.	.	.	.	.	.	V3/4	I3	I2	.	.	2
Eriophorum scheuchzeri	.	.	2+/1	II+	.	I+	.	.	24	.	.	.	.
Calamagrostis neglecta	.	.	.	VI/3	.	I+	.	III+/2	23/4	.	.	.	.
Faithful taxa of the Tofieldietalia:													
Equisetum variegatum	.	.	I+	III+	2+	V+/4	22/4	V+/1	11	II+	.	.	I
Campylium stellatum	2+	2+	.	.	.	II+	I+	VI/6	22/5	.	.	.	2
Carex capillaris	2+	I+	.	.	.	.	.	.	.	.	.	.	.
Tofieldia pusilla	3+/1	3+/1	.	.	.	.	.	.	.	.	.	.	.
Faithful/diff. taxa of the Caricion bicolori-atrofuscae:													
Juncus castaneus	.	.	22	IV1/3	3+/2	V+/2	2+	I+	.	.	.	.	.
Juncus arcticus	.	.	13	IV+/2	I+	III2/5	21	.	.	.	.	.	.
Juncus biglumis	.	.	2+	.	2+/1	II+	I+	.	.	.	.	.	.
Bryum pseudotriquetrum	.	.	.	.	.	II+/2	2+	IV+/2	13	.	.	.	I
Catascopium nigritum	.	.	.	.	.	V+/5	32/4	VI/6	.	.	.	.	.
Distichium capillacium/inclinatum	.	.	.	.	.	IV+/1	2+	III+	.	.	.	.	.
Angstroemia longipes	.	.	4+/1	III+	.	IV+	.	.	.	.	.	.	.
Carex bicolor	.	.	.	.	.	V+/2	I+	.	.	.	.	.	.
Carex microglochin	.	.	.	.	.	I+	35/6	.	.	.	.	.	.
Leptobryum pyriforme	.	.	.	.	.	II+	.	II+/1	.	.	.	.	.
Carex rufina	.	.	4+/3	V+/2	.	.	.	.	.	.	.	.	.
Drepanocladus revolvens	.	.	.	.	.	.	I+	.	23/6	.	.	.	.
Faithful/diff. taxa of the Sphagno-Tomenthypnion:	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum warnstorfii	.	.	.	.	.	.	.	.	.	VI/6	I+	I+	.
Tomenthypnum nitens			.	.	.	.	.	.	.	V+/1	I+	II2/4	.
Faithful/diff. taxa of the Caricetalia fuscae/Caricion fuscae													
Drepanocladus exannulatus	.	.	3+/2	.	.	.	.	.	.	.	.	.	.
Calliergon sarmentosum	.	.	.	.	.	.	.	.	.	.	.	.	.
Calliergon stramineum	.	.	.	.	.	.	.	.	.	.	I+	II+	I
Paludella squarrosa	.	.	.	.	.	.	.	II+	.	.	.	.	2
Sphagnum teres	.	.	.	.	.	.	.	.	.	I4/5	2+/1	.	.
Oncophorus wahlenbergii	.	.	.	.	.	.	.	.	.	.	.	.	.
Comarum palustre	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex saxatilis	.	.	.	.	.	.	.	.	.	.	.	.	.
Scirpus austriacus	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum riparium	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum lindbergii	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum fuscum	.	.	.	.	.	.	.	.	.	.	.	.	.
Faithful/diff. taxa of ass.:													
Rhodiodendron lapponicum	3+/2	4+/3	.	.	.	.	.	.	.	.	.	.	.
Bartsia alpina	.	.	.	.	.	.	.	.	.	V+	.	.	.
Pedicularis hirsuta	.	.	.	.	.	.	.	.	.	.	4+	IV+	.

4	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	Drepanocladus exann. soc. DM '76 VIII: 1-4	Drep. ex.-Er. scheuchz. soc. DM '76 VIII: 5-7	Drep. ex.-Cal. negl. soc. DM '76 VIII: 8-12	Drep. ex.-Carex sax. soc. DM '76 VIII: 13-14	Calliergon sarmentosum soc. DM '76 IX: 1-4	Call. sarm.-Erioph. scheuchz. soc. DM '76 IX: 5	Call. sarm.-Carex big. soc. DM '76 IX: 6	Call. sarm.-Carex rarifl. soc. DM '76 IX: 7-8	Call. sarm.-Carex sax. soc. DM '76 IX: 9	Paludella squarrosa-Carex rar. soc. DM '76 X: 1-9	Sph. rip.-Scirp. caesp. soc. DM '76 XI: 5-6	Sph. lindb.-Carex rar. soc. DM '76 XI: 7-9	Comarum pal.-Salix call. comm.	Comarum pal.-Salix call. comm.	Vacc. micr.-Carex rar.-Eq. arv. comm.	Vacc. micr.-Car. rar.-Sal. call. comm.	Vacc. micr.-Car. rar.-Dicranum comm.	Vacc. micr.-Car. rar.-Sph. warnst. comm.	Calamagrosto-Ditrichetum DM '76 XXVI: 1-7	Sphagnum rip.-Car. rar. soc. DM '76: 1-4	Vacc. micr.-Car. rar.-Sph. fuscum comm.
	4	3	5	2	4	1	1	2	1	9	2	3	3	2	2	1	1	4	7	4	2
3	.	.	.	.	.	.	.	23/4	.	V2/4	22	33/4	.	.	23/4	1+	12	4+/3	II+	41/3	21/2
	.	33/4	III1/4	.	.	13	.	.	.	I+	1+	.	.	.	.	.	.	.	.	12	.
	.	.	V3/5	.	.	.	.	.	.	.	.	.	2+	.	.	.	.	1+	VI/3	.	.
	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I+	.	.
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	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	46	36	VI/6	2+/3	11	.	1+	21/2	.	I+	.	3+/3	.	.	.	.	.	.	V+/6	.	.
	11	2+/1	.	.	45/6	16	16	26	15	II+/1	.	21/2	.	.	.	.	.	.	I+	.	.
	.	.	I2	.	.	.	.	.	.	V2/5	21/2	31/3	.	.	2+	1+	1+	4+	.	11	1+
	.	.	.	.	.	.	.	.	.	V3/6	24	13	.	.	.	.	.	2+	.	.	.
	.	.	.	.	.	.	.	.	1+	IV1/4	.	.	.	21/3	2+	11	1+	43/4	.	.	.
	.	.	.	.	.	.	.	.	.	III+/2	22/3	3+/5	.	.	1+	1+	.	4+	.	.	.
	.	.	I3	.	.	.	.	.	.	.	.	.	3/13	21/3	.	.	.	1+	.	1+	.
	.	.	.	25/6	.	.	.	.	14	.	.	.	.	.	.	.	.	2+	.	.	.
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Table 24. Survey of Dryadion integrifoliae communities of Greenland. Taxa with presence I or less have been omitted. For further explanation see the text.

Type	1	2	3	4	5	6	7	8	9	10
Carex nardina	V1	V1	V+	V1	V+/2	IV+/2	III+/2	V2	III+/1	2.1
Dryas integrifolia	V1	V3	V1	III1	V1/4	V+/4	V+/5	V3/5	V1/4	2.3
Silene acaulis	V1	V1	V1	V1	V+/1	III+/1	.	.	II+	1.1
Cetraria nivalis	IV1	V1	V1	V1	III+	III+/1	V+/2	V1/3	V+/3	2.2
Polygonum viviparum	II+	V1	V+	II+	V+/1	III+/1	.	.	V+/1	2.1
Cetraria ericetorum	III+	V2	V1	V1	V+/1	.	.	.	V+/2	2.1
Ochrolechia	V1	V1	V1	III1	V+/2	II+	.	.	V+/3	2.1
Cetraria cucullata	III+	V1	V1	V1	.	II+	IV+/3	.	II+	2.1
Stereocaulon alpinum	IV+	V1	V1	V1	III+/1	.	IV+/3	II+	.	2.1
Alectoria ochroleuca	III+	.	IV1	.	.	IV+/1	IV+/2	V1/3	IV+/1	2.2
Drepanocladus uncinatus	I+	V1	IV+	.	IV+/1	.	.	.	II+	.
Alectoria nigricans	III+	.	II+	.	.	.	.	.	II+	1.1
Kobresia myosuroides	III1	V1	V+	V3	II+/1	II1/2	II1/2	.	.	.
Tortula ruralis	.	.	.	IV+	II+	II+	.	.	.	.
Cladina mitis	.	.	.	V1	III+/1	III/4	.	.	.	.
Carex supina spaniocarpa	.	.	.	II+	.	III+/1	II+	.	.	.
Sphaerophorus globosus	.	.	.	III1	.	.	.	.	II+	.
Salix uva-ursi	III1	II1	V1/2	III1	.	.	.	.	.	.
Carex capillaris	V+	V1	III+	IV+	.	.	.	.	.	.
Campanula gieseckiana	.	II+	I+	V+	.	.	.	.	.	.
Rhacomitrium lanuginosum	V+	V1	V1	.	.	.	.	.	.	.
Poa glauca	III+	.	.	IV+/1	.	.	.	.	.	.
Rhytidium rugosum	.	V2	V1	V3	.	.	.	.	.	.
Thuidium abietinum	.	V2	III1	V2	.	.	.	.	.	.
Ditrichum flexicaule	.	V1	III+	IV+	.	.	.	.	.	.
Ctenidium molluscum	.	V1	.	II+	.	.	.	.	.	.
Tortella tortuosa	.	V1	.	II+	.	.	.	.	.	.
Chamaenerion latifolium	.	V+	.	I+	.	.	.	.	.	.
Bartsia alpina	.	III+	.	II+	.	.	.	.	.	.
Lomatogonium rotundata	.	I+	.	IV+	.	.	.	.	.	.
Campanula uniflora	III+	.	.	.	.	.	.	.	.	.
Oxyria digyna	II+	.	.	.	.	.	.	.	.	.
Calliergon turgescens	.	V2	.	.	.	.	.	.	.	.
Euphrasia	.	V1	.	.	.	.	.	.	.	.
Saxifraga aizoon	.	V+	.	.	.	.	.	.	.	.
Camptothecium lutescens	.	V1	.	.	.	.	.	.	.	.
Psora decipiens	.	III+	.	.	.	.	.	.	.	.
Gentiana detonsa	.	.	.	II+	.	.	.	.	.	.
Polentilla crantzii	.	.	.	V+	.	.	.	.	.	.
Festuca rubra	.	.	.	IV+	.	.	.	.	.	.
Botrychium lunularia	.	.	.	IV+	.	.	.	.	.	.
Cladonia chlorophaea	.	.	.	V1	.	.	.	.	.	.
Rhinanthus borealis	.	.	.	III+	.	.	.	.	.	.
Selaginella selaginoides	.	.	.	III+	.	.	.	.	.	.
Peltigera rufescens	.	.	.	III+	II+	.	.	.	.	.
Cerastium lanatum	III+	II+	III+	V1	IV+	.	.	.	.	.
Carex bigelowii	IV+	V1	V+	V1	V+/1	.	.	.	.	.
Saxifraga oppositifolia	V1	V2	V1	IV+	V+/1	.	.	.	.	1.1
Carex scirpoidea	V1	V1	V+	V1	III+	.	.	.	.	.
Thymus drucei	.	II+	I+	III+	II+	.	.	.	.	.
Pedicularis flammea	III1	V+	.	.	II+	.	.	.	.	.
Pinguicula vulgaris	.	V+	.	III+	II+	.	.	.	.	.
Luzula spicata	III+	.	.	.	IV+	.	.	.	.	.
Thalictrum alpinum	.	.	.	V1	II+	.	.	.	.	.
Festuca vivipara	.	.	.	IV1	II+	.	.	.	.	.
Trisetum spicatum	.	.	.	V+	II+	.	.	.	.	.
Salix callicarpaea	.	.	.	.	IV+/2	.	.	.	.	22.1
Juncus trifidus	.	.	.	.	V+	.	.	.	.	.
Salix herbacea	.	.	.	.	III+	.	.	.	.	.
Empetrum hermaphroditum	.	.	.	.	III+/2	.	.	.	.	.
Bryum	.	.	.	.	III+	.	.	.	.	.
Lepraria neglecta	.	.	.	.	III+	.	.	.	.	.
Cetraria islandica	.	.	.	.	II+	.	.	.	.	.
Cladonia macrophyllodes	.	.	.	.	II+/2	.	.	.	.	.
Solorina crocea	.	.	.	.	II+	.	.	.	.	.
Polytrichum alpinum	.	.	.	.	II+	.	.	.	.	.
Rhacomitrium heterostichum	.	.	.	.	II+	.	.	.	.	.
Harrimanella hypnoides	.	.	.	.	II+/2	.	.	.	.	.
Loiseleuria procumbens	.	.	.	.	II+/1	.	.	.	.	.
Cornicularia muricata	.	.	.	.	V+	.	.	.	.	.
Cephaloziella	.	.	.	.	IV+	.	.	.	.	.
Cetraria delisei	.	.	.	.	IV+/1	.	.	.	.	.
Oncophorus wahlenbergii	.	.	.	.	III+	.	.	.	.	.
Anthelia juratzkana	.	.	.	.	III1/3	.	.	.	.	.
Rhacomitrium canescens	.	.	.	.	III+/1	.	.	.	.	.
Vaccinium microphyllum	.	.	.	.	V+/3	II1/2	IV2/5	.	V1/2	2.2
Cladonia pyxidata	.	.	.	.	II+/1	III+	.	V1/2	.	2.1
Stereocaulon arcticum/denund.	.	.	.	.	V+/1	V1/4	II1/2	.	.	.
Microlichens div. spec.	.	.	.	.	V+	.	.	V1/2	.	2.1
Cladonia gracilis	.	.	.	.	II+	II+/1	.	.	.	1.1
Aulacomnium turgidum	.	.	.	.	II+	.	II+	.	II+	.
Polytrichum piliferum	.	.	.	.	III+/1	III+/1	.	.	.	1.1
Psoroma hypnorum	.	.	.	.	III+	II+	.	.	.	1.1
Candelariella	.	.	.	.	IV+	II+	.	.	.	.
Cladonia coccifera	.	.	.	.	V+	III+	.	.	.	.
Peltigera malacea	.	.	.	.	II+	II1	.	.	.	.
Lophozia hatcheri	.	.	.	.	IV+	.	II+	.	.	.
Gymnomitrion corallioides	.	.	.	.	IV+/3	II+	.	.	.	.
Ptilidium ciliare	.	.	.	.	II+	.	.	.	II+	.
Dicranum scoparium	.	.	.	.	III+/1	.	.	.	V+	.
Collema ceraniscum	.	.	.	.	II+	.	.	.	.	1.1
Diapensia lapponica	.	.	.	.	II1	.	.	.	V1/2	.

▶

Type	1	2	3	4	5	6	7	8	9	10
Thamnolia	.	.	.	.	.	IV+	II+/1	IV+/1	.	2.1
Pedicularis lanata	.	.	.	.	.	II1/2	.	.	IV+	2.1
Carex rupestris	.	.	.	.	.	II2/4	.	.	V2/3	2.2
Luzula confusa	.	.	.	.	.	.	II+	.	III+/1	2.1
Alectoria lanea	.	.	.	.	.	III+/2	II+/1	V1/2	.	.
Carex glacialis	.	.	.	.	.	.	III+/1	.	.	1.1
Alectoria jubata	.	.	.	.	.	III+/1	II1/2	.	.	.
Cornicularia aculeata	.	.	.	.	.	II+	.	.	III+	
Rhododendron lapponicum	.	.	.	.	.	.	III+/2	.	III+/1	.
Dicranum fuscescens	.	.	.	.	.	II+/1	II+	.	.	.
Calamagrostis purpurascens	.	.	.	.	.	II+/1	.	III+/1	.	.
Saxifraga tricuspidata	.	.	.	.	.	.	.	IV+/1	.	1.1
Festuca brachyphylla	.	.	.	.	.	II+/1	.	.	.	.
Polentilla nivea	.	.	.	.	.	III+/1	.	.	.	.
Ceratodon purpureus	.	.	.	.	.	II+	.	.	.	.
Poa arctica	.	.	.	.	.	.	II+	.	.	.
Polytrichum juniperinum	.	.	.	.	.	.	II+	.	.	.
Artemisia borealis	.	.	.	.	.	.	.	II+	.	.
Cerastium arcticum	.	.	.	.	.	.	.	III+	.	.
Polentilla chamissonis	.	.	.	.	.	.	.	IV+	.	.
Distichium capillaceum	.	.	.	.	.	.	.	III+	.	.
Encalypta rhabdocarpa	.	.	.	.	.	.	.	IV+	.	.
Hypnum revolutum	.	.	.	.	.	.	.	III+	.	.
Stereocaulon paschale	.	.	.	.	.	.	.	II+	.	.
Carex misandra	.	.	.	.	.	.	.	.	V+/1	.
Tofieldia pusilla	.	.	.	.	.	.	.	.	V+/1	.
Huperzia arctica	.	.	.	.	.	.	.	.	II+	.
Tomenthypnum nitens	.	.	.	.	.	.	.	.	II+	.
Draba lactea	.	.	.	.	.	.	.	.	.	1.1
Draba nivalis	.	.	.	.	.	.	.	.	.	2.1
Melandrium affine	.	.	.	.	.	.	.	.	.	1.1
Pyrola grandiflora	.	.	.	.	.	.	.	.	.	1.1
Dactylina ramulosa	.	.	.	.	.	.	.	.	.	1.1
Alectoria nitidula	.	.	.	.	.	.	.	.	.	2.3
Dermatocarpon cinereum	.	.	.	.	.	.	.	.	.	1.1
Dicranum spec.	.	.	.	.	.	.	.	.	.	2.1
Cornicularia divergens	.	.	.	.	.	.	.	.	.	1.3

Habitat and distribution: Synecologically the community may be characterized as weakly acidophytic to neutrophytic, meso- to eutrafent, mesophytic and strongly chionophytic. It is restricted to fluvio-glacial deposits not affected by strong erosion or soil displacement, and situated within or bordering moraine complexes at the front of glaciers in the interior (loc. 5.4, 6.5).

The community is actually found on level silt deposits, a few cm thick, overlying gravel and debris, and in depressions and gullies in sandurs, where a thin sand layer overlies coarse material. The altitude is 5 m or less; the sites are rather sheltered. In winter the habitat is covered with thick permanent snow.

The soils are not humic; the pH is 6 to 7.25. The soils are classified as regosols. In spring the upper soil and the vegetation are moist to wet due to abundant melt water. Later in the season the vegetation and upper soil dry out strongly, which causes polygons in the lichen carpet. The subsoil remains moist.

Related communities are not known. In Klement's system of lichen communities (1955), the lichen synusium of the *Stereocaulon condensatum* community belongs to the Stereocauletum condensati (Langerfeldt 1939) Klement 1955.

Cladonia lepidota–Stereocaulon alpinum community. (Tab. 22, ref. 4–6; Tab. 25, ref. 34; Tab. 26, ref. 39; Fig. 35).

Composition and physiognomy: Dominant and characteristic taxon is *Cladonia lepidota* (3/3 4). Other common taxa are *Stereocaulon alpinum* (3/3 1/4), *Cetraria delisei* (3/3 +/1), *Cephaloziella arctica* (2/3 2/3), *Cladonia coccifera* (2/3 +), *Cladina mitis* (2/3 +), *Ochrolechia frigida* (3/3 +/2) and *Chamaenerion latifolium* (2/3 +). The vegetation is open; the uncovered places are covered with gravel and cobbles. The aspect is determined by light coloured (grey-white) fruticose lichens. Herbs are sparse, covering max. 3%, the height is max. 20 cm. The moss layer is 2 cm high and covers 60 to 95%. The community is a strictly local one, on some tens of square metres.

Habitat and distribution: The community may be synecologically characterized as neutrophytic, mesotrafent, mesophytic, slightly aerohygrophytic, to some extent tropohydrophytic, possibly slightly rheophytic, and chionophytic. The community was found on or at the foot of moraines. It mainly occurs in shallow depressions, where in some places coarse sandy material is deposited over (fluvio-) glacial debris, or directly on coarse textured, gravel –, cobble –, or stone rich deposites (Fig. 35) at the foot of end moraines. Snow cover in winter is thick and permanent. In spring melt water causes the vegetation to be flooded and inundated.

The pH of the soil is 6.5 to 7.5. Soils are not humic and are classified as regosols. The habitat is located in relatively humid air due to the sheltered locations, the moist subsoil and the loose, coarse textured soil. The lichen carpet dries out in summer.

Remarks: Communities with dominance of *Cladonia lepidota* were also observed in several places in the coastal areas, always in depressions between hummocks

in "mire environments"; in some places they were temporarily inundated (see also Dahl 1957, Hansen 1971). The community may also be found elsewhere in Greenland. Hansen (1971) reported *Cladonia lepidota* from moist places between stones on talus screes, together with *Cladonia ecmocyna.*

In the system of Klement (1955) the lichen synusium of the community belongs to the Stereocauletum alpini Frey 1923, of which *Cladonia lepidota* is a faithful taxon. The habitat, "Schwemmböden nährstoffarmer, grobsandiger Kiesbänke und kalkfreier Moränenrucken" corresponds rather well with the present habitat of the community.

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Postscript

1. Just after completing the manuscript, a paper was published by Eric Steen Hansen: Notes on occurrence and distribution of lichens in Southeast Greenland (Meddr Grønland 204 (4); 1978). In that paper 83 records of one square metre are presented of various types of vegetation in several localities on the southeast coast of Greenland, 40 of which are in the Angmagssalik District. These records were not intended for vegetation typology, but only as illustration of lichen habitats.

2. The name Tofieldietalia used in this paper appears to be invalid. This name was first published in 1949 in Oberdorfer (1949; Pflanzensoziologische Exkursionsflora für Südwestdeutschland und die angrenzenden Gebiete. Ulmer, Stuttgart), but invalidly as the only alliance mentioned, the Eriophorion latifoliae Br.–Bl. et Tx. 1943, is a *nomen nudum* (see Braun-Blanquet, J. & Tüxen, R., 1943. Übersicht der höheren Vegetationseinheiten Mitteleuropas (Unter Ausschluss der Hochgebirge). SIGMA Comm. 84).

The Tofielddietalia are validly published in 1950, although incorrectly as Tofieldietalia Prsg. apud Oberd. 1949 (see Oberdorfer, E., 1950. Eine Bemerkung zur "Pflanzensoziologischen Exkursionsflora von Südwestdeutschland". Mitt. Flor. u. Soz. Arbeitsgem. N.F. 2: 27–32).

The name should now be Tofieldietalia Prsg. in Oberd. 1950, as used in this paper. But, because Braun-Blanquet in 1949 already published the Caricetalia davallianae, which is the oldest validly published synonym of the Tofieldietalia, this name has priority. The Tofieldietalia Prsg. in Oberd. 1950 consequently should be rejected in favour of the Caricetalia davallianae Br.-Bl. 1949 (see Braun-Blanquet, J., 1949. Übersicht der Pflanzengesellschaften Rätiens. 111. Vegetatio 1: 285–316).

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Appendix

List of taxa occurring in the nomenclatoric type records (NTR) of the newly described syntaxa, but which were left out of the tables. The complete species lists of all records can be obtained on request from the author:

Table **4;** ref. 4: *Pohlia* spec. +, *Preissia* spec. +. *Oncophorus* (cf. *virens*) +, *Dicranum majus* 1, *Peltigera scabrosa* +, *Sphagnum* spec. +. Table **5;** ref. 2: *Carex microglochin* (LC) +, *Lophozia* spec. +, ref. 7: *Sphag-*

num warnstorfii +, *Philonotis fontana* +, *Meesia uliginosa* +, *Peltigera aphthosa* 1. Table **6;** ref. 3: *Betula nana* 1, ref. 9: *Lophozia alpestris* +, *Cladonia crispata* +. Table **7;** ref. 5: *Brachythecium* +, *Equisetum arvense* (BW) +, ref. 13: *Arabis alpina* (LO) +. Table **11;** ref. 14: *Nephroma arcticum* 2, *Huperzia arctica* +, *Kiaeria glacialis* +, ref. 21: *Juncus trifidus* (LO) +, *Cladonia macrophyllodes* +, *Cephalozia* spec. +. Table **12;** ref. 9: *Pohlia* spec. +. Table **21;** ref. 4: *Lophozia* spec. +, *Ochrolechia frigida* +, ref. 11: *Lophozia* spec. +.

1981

6. Ole G. Norden Andersen:
»The annual cycle of phytoplankton primary production and hydrography in the Disko Bugt area, West Greenland«. 65 pp.

The distribution and size of phytoplankton production and biomass in relation to physical and chemical parameters in the upper 50 m at Godhavn and in Kangikerdlak in the inner part of Disko Fjord was investigated through 2½ years (1973–75). Some data from other parts of Disko Bugt are presented.

In both locations the hydrography alternates between an unstable winter situation with isothermal (÷1.75°C) and isohaline (33.5–34.0‰) conditions throughout, and a highly stable summer situation when dilution and heating, especially of the upper 20–30 m, raise the temperature at the surface to 9.9°C and at 50 m to 3.8°C at Godhavn, and to 12°C and 3.5°C respectively in Kangikerdlak. Salinities drop correspondingly to 30.6‰ in Kangikerdlak.

The 1% depth for green light is greatly reduced beneath ice and snow. During the ice free period at Godhavn it varies from 12 m during the spring phytoplankton bloom to more than 60 m from Oct. through the winter. In Kangikerdlak the 1% depth reaches only 40 m in winter, and outflowing turbid fresh water creates 1% depths of as little as 4–5 m in June–Aug.

At Godhavn NO_3-N reaches highs of 10.05 µgat/liter and 10.15 µgat/liter at 0 and 50 m respectively in winter, whereas during the summer, depletion to less than 0.01 µgat/liter occurs in the upper 40 m and to 1.0 µgat/liter at 50 m. PO_4-P is similarly reduced from 0.8 µgat/liter and 1.1 µgat/liter to less than 0.01 µgat/liter in the upper 20 m and to 0.21 µgat/liter at 50 m. The N:P ratio drops from 13 to less than 0.01 in the upper 30 m and to 1.0 at 50 m. In Kangikerdlak depletion of NO_3-N is similar to conditions at Godhavn, whereas PO_4-P reaches a low of 0.1 µgat/liter only, while in mid summer it reaches 1.88 µgat/liter at the surface, giving an N:P ratio which is below 0.1 in the upper 5 m only.

At Godhavn primary production is about 90 $gC \cdot m^{-2} \cdot yr^{-1}$ (75–104 g) with a maximum of about 5.5 $gC \cdot m^{-3} \cdot yr^{-1}$ at 5–10 m, whereas in Kangikerdlak production was concentrated near the surface with about 6.0 $gC \cdot m^{-3} \cdot yr^{-1}$ and a total of 35 $gC \cdot m^{-2} \cdot yr^{-1}$ at most. Production at Jacobshavn off the glacier fjord is probably greater than at Godhavn, whereas at Christianshåb and Egedesminde it is definitely lower.

Phytoplankters larger than 56 µ contribute about 50% of annual and up to 90% of daily production.

Due to the great stability, production usually extends no deeper than compensation depth, and most of the chlorophyll is usually in the nutrient rich water below this depth, where it sinks, is consumed, or degrades into phaeopigment. P/B is highest where there is least chlorophyll. Light reduces production in the upper 5–10 m, and inhibition may extend to 30 m. Correlations between production, P/B, or P/B/light and nutrients reveal possible saturation values of 0.08–0.78 µgat NO_3-N/liter and 0.17–0.22 µgat PO_4-P/liter. PO_4-P seems to be the limiting nutrient in some cases, although NO_3-N is most quickly and thoroughly depleted.

Dark fixation at Godhavn is about 24 $gC \cdot m^{-2} \cdot yr^{-1}$, and at Kangikerdlak about 15 $gC \cdot m^{-2} \cdot yr^{-1}$. 55–60% of dark fixation is presumed to be biotic and 16–64% is associated with particulate matter larger than 56 µ.

Although oxygen is never at a minimum in Disko Bugt, saturation as well as absolute O_2 values and pH show profiles in the bay that clearly reflect the high degree of stratification compared to waters south of the bay.

1981

7. J. de Korte, C. A. W. Bosman & H. Meltofte:
»Observations on waders (Charadriidae) at Scoresby Sund, East Greenland«. 21 pp.

Populations of waders in three census areas at Scoresby Sund, central East Greenland, were studied during the three breeding seasons of 1973, 1974 and 1975. Ringed Plover (*Charadrius hiaticula*), Golden Plover (*Pluvialis apricaria*), Turnstone (*Arenaria interpres*), Knot (*Calidris canutus*), Dunlin (*Calidris alpina*) and Sanderling (*Calidris alba*) bred in the census areas, while Purple Sandpiper (*Calidris maritima*) and Red-necked Phalarope (*Phalaropus lobatus*) bred elsewhere in the region. Po-

pulation densities were very low, compared to other areas further north in high arctic Greenland. Extensive, deep and late-thawing snow cover prevents waders from utilizing large areas in June. Time of breeding showed a high correlation with the snow melting conditions in the respective areas and years. Breeding success was generally low; only Ringed Plover had more than 50% nest and egg survival. Nest failures were probably mostly due to predation by Arctic Foxes (*Alopex lagopus*). Observation and examination of individuals from post-breeding flocks in the second half of July indicated that these flocks contained mainly non-breeders, but failed and successful breeders were also present. Measurements on eggs, pulli and adults are presented.

1982

8. Helge Abildhauge Thomsen:
»Planktonic choanoflagellates from Disko Bugt, West Greenland, with a survey of the marine nanoplankton of the area«. 35 pp.

Light and electron microscopy of whole mounts prepared from water samples collected in July and August 1977 at thirteen stations in the vicinity of Godhavn (Disko Bugt, West Greenland), has led to the enumeration of approximately 100 nanoplanktonic taxa. A full account is given of field and laboratory methods. The most conspicuous algal class was the Prymnesiophyceae with more than 38 species. Among the heterotrophic organisms listed the Choanoflagellida was the most important single group, comprising 28 species. Two new choanoflagellate taxa are described on the basis of West Greenland material: *Conion groenlandicum* gen. et sp.nov. and *Diaphanoeca undulata* sp.nov.

In order to facilitate immediate comparison of closely related taxa *Diaphanoeca sphaerica* sp.nov. is described on the basis of Danish material.

Thirteen of the loricate choanoflagellate species listed are new recordings for West Greenland. A summary of previous findings of the choanoflagellate species encountered in the Disko Bugt samples show that three species *(Conion groenlandicum, Pleurasiga caudata* and *Parvicorbicula serratula)* are so far known from arctic and subarctic localities only. A pronounced vertical distribution pattern of choanoflagellate species was observed at one station southeast of Godhavn. Three distinct species associations occurred in this particular water column (0–300 m).

1982

9. Eric Steen Hansen:
»Lichens from Central East Greenland«. 33 pp.

A total of 600 samples of 167 species of macro- and microlichens were collected mainly by Pauline Topham and Geoffrey Halliday on botanical expeditions to Central East Greenland in the years 1961, 1962, 1968, 1971, 1974 and 1980. Three of the species, viz., *Caloplaca tornoensis* Magnusson, *Rhizocarpon pusillum* Runem, and *Verrucaria thalassina* (Zahlbr.) Zsch. are additions to the known lichen flora of Greenland. The following eleven species have not previously been reported from East Greenland: *Catillaria philippea* (Mont.) Massal., *Cladonia luteoalba* A. Wilson & Wheldon, *C. macroceras* (Delise) Ahti, *Coelocaulon divergens* (Ach.) R. H. Howe, *Diploschistes muscorum* (Scop.) R. Sant., *Leprocaulon subalbicans* (Lamb) Lamb & Ward, *Peltigera kristinssonii* Vitik., *Pertusaria octomela* (Norman) Erichsen, *Rhizocarpon intermediellum* Räsänen, *Solorina saccata* (L.) Ach. and *Thelidium papulare* (Fr.) Arnold.

Information is provided on climatic conditions at two meteorological stations situated in the area investigated. Thirtyeight collecting localities are listed, together with brief notes on their geology. The localities are situated between the southernmost part of Liverpool Land and Jameson Land, c. 70°N, and the middle of Lyell Land and Traill Ø, c. 73°N.

A survey is given of some important ecological, phytosociological and distributional characteristics for the lichen species, together with information on the presence of perithecia or apothecia.

Lichens of particular interest are discussed in the special part of the paper.

A number of commonly used synonyms are listed in the Appendix.

Table 25. Survey of snow bed communities, communities rich in herbs, and terricolous lichen communities in the Angmagssalik District. Taxa with presence 1 or less have been omitted.

Reference no.	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
Class	Salicetea herbaceae																										Juncetea trifidi					As pl.	?	
Order	Salicetalia herbaceae																										Caricetalia c.							
Alliance	Cassiopo-Salicion CS						CS RO	Ranunculo-Oxyrion RO						CS RO	Ranunculo-Oxyrion RO											RO CV	Cladonio-Viscarion CV					Sedo-Thymion		
Association/sociation/community	Cassiopo-Anthelietum typicum	Cassiopo-Anthelietum conostometosum	Pleuroclado-Polytrichetum typicum	Cassiopetum hypnoidis	Salix herb. – Lepraria neglecta	Salix herb. – Cetraria delisei	Deschampsietum alpinae	Polygono – Salicetum herb. inops	Polygono – Salicetum herb. inops	Polygono – Salicetum herb. lophozietosum	Polygono – Salicetum herb. loph. var. Clad. unc.	Kiaerio-Salicetum herb.	Hylocomio-Salicetum herb. ptilidietosum	Gnaphalietum supini	Sibbaldietum procumbentis	Alchemilletum alpinae	Chamaenerietum latifolii	Caricetum bigelowii salicetosum herb.	Alchemilla glomerulans soc.	Alchemilla glomerulans soc.	Alchemilla filicaulis soc.	Taraxaco-Cystopteretum fragilis	Hieracio-Caricetum bigelowii	Caricetum big. chamaenerietosum p.p.	Caricetum big. s.a. inops	Oxyrietum triviale s.a. inops	Caricetum big. chamaenerietosum p.p.	Luzulo-Thymetum drucei	Cladonio – Viscarietum cetrarietosum	Cladonio – Viscarietum typicum	Fimbriario – Sedetum annui	Sedo – Saxifragetum neogaeae	Stereocaulon condensatum	Cladonia lepidota – Stereocaulon alpinum
Table, ref. no.	1 – 8	1 – 12	13 – 16		1 – 6	1 – 7	1 – 3	1 – 5	6 – 11		1 – 5							14 – 18	1 – 5	6 – 10	11 – 16			9 – 13	19 – 22		1 – 6		1 – 8	9 – 17			1 – 3	4 – 6
Author; dM = de Molenaar (1976), Da = Daniëls (1982)	dM 12;	dM 12;	dM 12;	dM 13	Da 18;	Da 19;	dM 24;	dM 17;	dM 17;	dM 18	Da 20;	dM 22	dM 21	dM 14	dM 15	dM 16	dM 19	dM 29;	dM 20;	dM 20;	dM 20;	dM 25	dM 28	dM 29;	dM 29;	dM 23	dM 29;	dM 30	Da 21;	Da 21;	dM 31	dM 32	Da 22;	Da 22;
Number of records	8	4	4	10	5	7	3	5	6	9	5	4	9	10	12	13	5	5	5	5	5	5	6	5	4	5	6	9	8	9	10	9	3	3
Salix herbacea	5	4	2	5	4	4	1	5	5	5	5	4	5	4	5	4	5	5	2	3	3	2	5	2	3	.	.	3	4	3	.	.	.	1
Lophozia alpestris incl.wenzelii	.	3	1	4	4	3	.	.	2	3	2	3	.	2	.	.	3	.	2	2	.	.	.	2	.	.	.	.	.	.	.	.	1	1
Empetrum hermaphroditum	.	.	.	2	.	.	.	.	2	2	.	.	2	3	2	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Pohlia commutata	4	1	3	2	2	3	1	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Conostomum tetragonum	4	4	.	2	.	3	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pleuroclada albescens	2	1	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Marsupella condensata	.	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anthelia juratzkana	5	3	.	3	.	.	3	.	.	.	.	1	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Marsupella varians	2	.	.	3	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cetraria delisei	.	2	.	3	5	5	.	.	.	3	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	1	3
Ochrolechia spec.	.	1	1	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Polytrichum norvegicum	.	2	4	.	.	.	3	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calliergon stramineum	.	2	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Harrimanella hypnoides	3	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oncophorus wahlenbergii	.	4	.	.	.	.	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Psoroma hypnorum	.	.	.	3	4	3	.	.	.	3	5	3	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	3	1
Kiaeria starkei	.	.	.	2	4	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Solorina crocea	.	.	.	2	4	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.
Dicranum fuscescens	.	.	1	.	.	.	.	.	.	.	3	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aulacomnium turgidum	.	1	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Loiseleuria procumbens	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scapania subalpina	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nardia geoscyphus	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gymnocolea inflata	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cephalozia ambigua	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polytrichum commune	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calliergon sarmentosum	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arctoa fulvella	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cladonia macrophyllodes	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	4	.	.	.	.
Cladonia bellidiflora	.	.	.	.	3	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.
Lepraria neglecta	.	.	.	.	5	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	.	1
Gymnomitrion concinnatum	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pertusaria oculata	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stereocaulon arcticum	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Minuartia biflora	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa spec.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lecidea caesioatra	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lecidea demissa	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oncophorus spec.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cladonia chlorophaea	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Cerastium cerastioides	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Deschampsia alpina	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scapania irrigua	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Drepanocladus exannulatus	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saxifraga stellaris	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pohlia spec.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rhacomitrium fasciculare	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Drepanocladus uncinatus	.	2	.	4	.	3	.	.	5	5	4	4	5	2	.	.	3	.	.	.	.	.	5	3	.	.	.	.	2	.	.	.	.	.
Polytrichum alpinum	.	1	.	.	3	.	.	.	.	3	3	1	4	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	3	.	.
Cladonia ecmocyna	.	.	.	2	4	.	.	.	.	4	5	3	.	.	.	.	.	.	.	.	.	.	5	.	.	.	4	3	5	5	2	.	1	1
Cladina mitis	.	.	.	4	3	.	.	.	.	5	5	3	3	.	.	3	.	.	.	.	.	.	5	.	.	.	5	4	5	5	3	3	1	2
Stereocaulon paschale	.	.	.	4	.	.	.	.	.	.	3	3	3	.	.	.	.	.	.	.	.	.	5	.	.	.	5	4	4	5	3	4	.	.
Cetraria ericetorum	.	.	.	2	.	.	.	.	.	2	5	2	3	.	.	.	.	.	.	.	.	.	4	.	.	.	2	2	5	5	4	2	.	.
Cladina rangiferina	.	.	.	.	.	.	.	.	.	3	5	.	3	.	.	.	.	.	.	.	.	.	5	.	.	.	.	3	5	4	.	.	.	.
Cladonia coccifera	.	.	.	.	.	.	.	.	.	2	2	1	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	2	3	4	.	2	2	2
Cladonia gracilis	.	.	.	.	3	.	.	.	.	2	5	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	5	5	.	.	.	.
Lophozia hatcheri	.	.	.	.	.	.	.	.	.	4	4	.	4	.	2	.	.	.	.	.	.	.	5	.	.	.	5	.	5	4	.	.	.	.
Dicranum scoparium	.	.	.	.	.	.	.	.	4	3	.	.	2	.	.	.	.	.	.	.	.	.	4	3	.	.	3	.	5	4	.	2	.	.
Stereocaulon alpinum	.	.	.	.	3	.	.	.	.	5	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	5	5	.	.	1	3
Ptilidium ciliare	.	.	.	.	.	.	.	.	.	2	3	1	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	2	.	.	.	.
Comarum palustre	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aulacomnium palustre	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Rhacomitrium canescens	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Polytrichum juniperinum strictum	.	.	.	.	.	.	.	.	.	2	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Kiaeria glacialis	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum teres	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus pygmaeus	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Peltigera scabrosa	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hylocomium splendens	.	.	.	.	.	.	.	.	.	2	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pleurozium schreberi	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tortula ruralis	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Luzula confusa	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Timmia austriaca	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Climacium dendroides	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lophozia cf. ventricosa	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum viviparum	.	.	.	4	.	.	1	5	5	5	4	2	3	3	5	2	5	5	5	5	5	.	5	3	.	.	.	.	2	.	.	3	.	.
Oxyria digyna	.	.	2	.	2	.	.	.	.	.	.	.	3	.	.	.	.	2	2	2	2	3	.	2	.	5	.	.	.	.	.	.	1	1
Polytrichum juniperinum	.	.	1	2	.	.	.	2	.	3	.	.	.	2	4	.	4	5	.	2	.	.	2	2	1	.	.	.	.	.	.	2	.	.
Taraxacum croceum	.	.	.	.	.	.	1	.	3	2	.	.	.	.	5	4	2	3	5	5	5	5	2	5	.	.	5	2	2	.	.	.	.	.
Sibbaldia procumbens	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	.	2	3	.	2	.	4	.	.	1	.	.	.	.	.	.	.	.	.
Veronica alpina	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	.	3	.	2	2	4	.	.	.	.	.	.	.	.	.	.	2	.	.
Phleum commutatum	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	2	.	.	4	4	2	.	.	2	.	.	.	.	.	.	.	.	.	.
Sedum rosea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	3	5	3	2	.	.	.	.	.	.	.	.	.	5	.	.
Thalictrum alpinum	.	.	.	.	.	.	.	.	.	2	.	.	.	.	2	2	.	.	2	3	5	.	2	3	2	.	.	.	.	.	.	3	.	.
Bartsia alpina	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.	.	.	2	5	2	.	.	.	.	.	.	.	.	.	2	.	.
Viola palustris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Chamaenerion latifolium	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	5	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
Cystopteris fragilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	5	.	5	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus acris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Gnaphalium supinum	.	.	.	.	.	.	.	.	.	.	.	.	.	5	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pyrola minor	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.
Stellaria calycantha	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla alpina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla glomerulans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plagiothecium denticulatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gnaphalium norvegicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Philonotis tomentella	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Polystichum longitis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa glauca	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium hornemannii	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dicranum elongatum	.	.	.	.	.	.	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Brachythecium reflexum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gentiana nivalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phyllodoce coerulea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Brachythecium spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Marchantia alpestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium anagallidifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium lactiflorum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica alpestris australis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla filicaulis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.
Coptis trifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.
Selaginella selaginoides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Angelica norvegica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Tortula norvegica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Poa alpina	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	3	.	.	3	4	.	4	3	2	4	.	3	.	2	4	3	.	1
Hieracium alpinum	.	.	.	.	.	.	.	.	.	2	.	.	.	3	3	.	.	.	.	.	.	2	5	.	.	.	3	.	4	.	.	.	.	.
Chamaenerion angustifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	2	3	3	2	4	3	5	.	.	4	3	2	4	4	.	.	.
Campanula gieseckiana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	2	3	2	2	3	3	.	.	5	2	4	4	.	5	.	.
Bryum spec.	.	.	.	.	.	.	2	.	.	2	.	.	.	.	.	.	2	3	2	4	4	.	.	3	.	.	5	3	.	2	5	3	.	.
Luzula spicata	.	.	.	.	3	2	.	.	.	.	.	.	3	.	.	2	.	.	.	2	.	.	5	3	1	5	5	5	4	5	5	5	.	.
Cerastium lanatum	.	.	.	.	.	.	.	.	.	3	2	.	3	.	.	.	.	2	.	.	.	.	5	5	.	2	5	4	5	3	4	5	.	.
Thymus drucei	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	3	5	.	3	4	5	.	.
Viscaria alpina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	4	4	4	4	.	.	.
Juncus trifidus	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	3	4	5	.	3	.	.
Peltigera malacea	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	4	5	.	.	.
Ceratodon purpureus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	5	.	.	.
Festuca brachyphylla	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	2	.	.	.
Cetraria islandica	.	.	.	.	.	.	.	.	.	3	5	.	.	.	.	.	.	.	.	.	.	.	5	3	.	.	5	5	4	5	5	.	.	.
Cladonia crispata	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	3	.	.	.	.
Cladonia phyllophora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	.	.	.	.
Cephaloziella spec.	.	.	.	.	.	2	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.	.	.
Cladonia carneola	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Caloplaca spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
Dicranum muehlenbeckii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
Rinodina spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
Peltigera rufescens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
Rhacomitrium lanuginosum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Cladonia uncialis	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	4	.	2	.	.
Cladonia pyxidata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	2	3	.	.
Saxifraga caespitosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	2	.	.
Sedum annuum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	2	.	.
Fimbriaria ludwigii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	2	.	.
Saxifraga nivalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.
Saxifraga cernua	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
Cladonia fimbriata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
Euphrasia frigida	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
Saxifraga oppositifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	1
Antennaria canescens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Pohlia cruda	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Vaccinium microphyllum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Tortella fragilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Saxifraga aizoon	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.
Woodsia ilvensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Blindia acuta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Cladonia lepidota	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3
Cephaloziella arctica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Ditrichum spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Stereocaulon condensatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
Pohlia drummondii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.
Solonostoma sphaerocarpa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Scapania lapponica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Carex bigelowii	4	4	.	5	2	.	.	5	5	4	5	2	4	5	5	4	5	5	2	4	5	3	5	5	4	.	5	4	5	5	.	.	.	1
Pohlia nutans	.	1	1	2	2	.	.	.	.	2	3	.	.	.	2	.	2	.	.	.	.	.	.	.	.	.	.	.	2	.	2	2	.	.
Peltigera canina	.	.	.	2	.	.	.	.	.	2	.	.	5	.	.	2	.	.	.	.	.	.	2	.	.	.	4	.	.	.	.	2	.	.
Desmatodon latifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	2	.	.	.	5	3	.	.	.	.	.	.	3	.	.	5	2	.	.
Peltigera aphthosa	.	.	.	.	.	.	.	.	.	3	.	.	2	2	.	.	2	.	.	.	.	.	3	.	.	.	.	.	.	.	.	4	.	.
Polytrichum piliferum	.	.	.	.	4	2	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	2	.	.
Agrostis borealis	.	.	.	.	.	.	.	.	2	.	.	.	.	2	2	.	.	.	.	2	.	.	.	.	.	2	.	2	.	.	.	2	.	.
Trisetum spicatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	2	1	.	.	3	.	.	2	3	.	.
Poa arctica	.	.	.	.	.	.	.	.	.	2	.	1	.	.	3	2	.	3	.	.	.	.	.	.	2	.	.	3	5	2	.	.	.	.
Bartramia ithyphylla	.	.	.	.	.	3	1	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Potentilla crantzii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	2	.	.	.	.	.	.	.	.	4	.	.
Carex scirpoidea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	5	.	.
Festuca vivipara	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	4	.	.	.	.	3	2	.	.	3	.	.
Silene acaulis	.	.	.	.	2	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	3	.	.
Tortula norvegica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	2	.	.	.
Peltigera spec.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Lophozia kunzeana	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Marsupella boeckii	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
Cladonia spec.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
Erigeron uniflorus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	3	.	.	.	.	2	.	.
Salix callicarpaea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	3	.	1	1
Lophozia spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
Stereocaulon spec.	2	1	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 26. Survey table of shrub, dwarf shrub and lichen communities in the Angmagssalik District, except communities with dominance of *Harrimanella hypnoides* and/or *Salix herbacea*.

Reference no.	1	2	3	4	5	6	7	8	9	27	28	31	32	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	29	35	30	33	34	36	37	38	39	40	41	42	43	44
Class	Oxycocco - Sphagnetea Scheuchzerio - Caricetea													Betulo-Adenostyletea			Loiseleurio - Vaccinietea																Carici-Kobresietea					?		Salicetea herbaceae			Juncetea trifidi	
Vegetation	Mire vegetation													Shrub vegetation			Dwarf shrub vegetation																					Lichen vegetation						
Association/Community	Sphagnum rubellum - Vaccinium comm.	Vaccinium - Carex rariflora - Sphagnum fuscum comm.	Vaccinium - Carex rariflora - Sphagnum warnstorfii comm.	Vaccinium - Carex rariflora - Dicranum comm.	Vaccinium - Carex rariflora - Salix callicarpaea comm.	Vaccinium - Carex rariflora - Equisetum arvense comm.	Comarum palustre - Salix callicarpaea comm.	Comarum palustre - Salix callicarpaea comm.	Sphagno - Salicetum callicarpaeae	Pediculari - Vaccinietum typicum	Pediculari - Vaccinietum cladonietosum	Rhododendro - Vaccinietum anthelietosum	Rhododendron - Vaccinietum alectorietosum	Festuco - Salicetum callicarpaeae typicum	Festuco - Salicetum callicarpaeae chamaenerietosum typ. var.	Festuco - Salicetum callicarpaeae chamaenerietosum var. Cystopteris	Phyllodoco - Salicetum callicarpaeae sedetosum var. Viola	Phyllodoco - Salicetum callicarpaeae sedetosum typ. var.	Phyllodoco - Salicetum callicarpaeae transition	Phyllodoco - Salicetum callicarpaeae cladonietosum var. Aulacomnium	Phyllodoco - Salicetum callicarpaeae cladonietosum var. Gymnomitrion	Phyllodoco - Salicetum callicarpaeae cladonietosum typical var.	Empetrum - Vaccinium comm. typical type	Empetrum - Vaccinium comm. Drepranocladus type	Cassiopetum tetragonae	Sphaerophoro - Vaccinietum solorinetosum	Sphaerophoro - Vaccinietum viscarietosum	Empetro - Betuletum nanae vaccinietosum typ. var.	Empetro - Betuletum nanae vaccinietosum var. Rhacomitrium	Empetro - Betuletum nanae typicum var. inops	Gymnomitrio - Loiseleurietum procumbentis	Kobresia - Vaccinium comm.	Silene - Vaccinium comm.	Carici - Dryadetum drepanocladetosum	Carici - Dryadetum thymetosum	Dryas - Salix callicarpaea comm. Solorina type	Dryas - Salix callicarpaea comm. Cladonia type	Stereocaulon condensatum comm.	Cladonia lepidota - Stereocaulon alpinum comm.	Salix herbacea - Cetraria delisei comm.	Salix herbacea - Lepraria neglecta comm.	Polygono - Salicetum lophozietosum var. Cladonia	Cladonio - Viscarietum alpinae cetrarietosum	Cladonio - Viscarietum alpinae typicum
Number of records	3	2	4	1	1	2	3	2	6	4	6	3	4	5	12	18	5	11	4	16	4	23	15	10	7	19	3	10	5	4	7	3	5	5	2	3	2	3	3	7	5	5	8	9
Sphagnum rubellum Wils.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calypogeia sphagnicola (Arn. & Perss..) Warnst & Loeske	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum fuscum (Schimp.) Klinggr.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mylia anomala (Hook.) S. F. Gray	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calliergon stramineum (Brid.) Kindb.	2	1	4	1	1	2	.	.	.	1	2	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex rariflora (Wbg.) Sm.	.	2	4	1	1	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum teres (Schimp.) Angstr.	.	.	4	1	1	2	.	2	1	2	.	.	.	.	.	.	2	.	1	2	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sphagnum warnstorfii Russ.	.	1	4	.	.	.	.	2	5	1	1	.	1	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aulacomnium palustre (Hedw.) Schwaegr.	3	.	4	.	.	.	.	2	4	3	5	1	.	.	.	1	.	+	.	4	.	.	.	+	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aulacomnium turgidum (Wg.) Schwaegr.	1	.	.	.	.	.	.	.	.	3	5	2	3	.	.	.	.	.	.	+	.	.	.	1	3	3	.	1	.	.	3	2	.	2	.	.	.	.	.	.	.	.	.	.
Equisetum arvense L.	.	.	.	.	.	2	1	.	5	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pleuroclada albescens (Hook.) Spruce	.	.	2	1	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Comarum palustre L.	.	.	1	.	.	.	3	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex lachenalii Schkuhr.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calamagrostis neglecta (Ehrh.) G., M. & S	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mnium cinclidioides Hüb.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Helodium blandowii (Web. & Mohr) Warnst.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mnium rugicum Laur.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex saxatilis L.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Paludella squarrosa (Hedw.) Brid.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tomenthypnum nitens (Hedw.) Loeske	.	.	.	.	.	.	.	.	5	1	2	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pedicularis hirsuta L.	.	.	.	.	.	.	.	.	.	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyrtomnium Kjeld Holmen	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ditrichum flexicaule (Schleich.) Hampe	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pedicularis flammea L.	.	.	.	.	.	.	.	.	.	2	3	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.
Tofieldia pusilla (Michx.) Pers.	1	.	1	.	.	.	.	.	.	.	.	3	3	.	.	.	1	1	.	2	1	r	.	.	1	.	.	.	.	.	3	.	.	1	.	.	.	.	.	.	.	.	.	.
Rhododendron lapponicum (L.) Wbg.	.	.	.	.	.	.	.	.	.	.	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fissidens osmundioides Hedw.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Campylium stellatum (Hedw.) C. Jens	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Drepanocladus badius (Hartm.) Roth.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex capillaris L. coll.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Tortella Limpr. spec.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cerastium alpinum L. ssp. lanatum (Lam.) Asch. & Graebn.	.	.	.	.	.	.	.	.	.	1	2	.	.	3	4	2	.	1	.	1	.	2	.	.	1	.	3	+	.	1	.	1	.	3	1	.	.	.	.	.	1	2	5	3
Chamaenerion angustifolium (L.) Scop.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	5	5	1	2	.	+	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4
Festuca rubra L. coll.	.	.	.	.	.	.	1	.	.	.	.	.	.	2	4	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stellaria calycantha (Led.) Bong.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Campanula gieseckiana Vest.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	5	2	+	.	+	.	+	.	.	.	.	1	.	.	1	.	1	.	.	1	.	.	.	.	.	.	.	4	4
Cystopteris fragilis (L.) Bernh.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hieracium hyparcticum Almq.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juniperus communis L. ssp. nana Syme	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bartsia alpina L.	.	.	.	.	.	.	.	.	5	.	.	.	2	.	.	2	5	5	1	4	.	2	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Diphasium alpinum (L.) Rothm.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	2	4	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis borealis Hartm.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	+	.	+	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.
Phleum commutatum Gaud.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sibbaldia procumbens L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica alpina L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	2	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gnaphalium supinum L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gentiana nivalis L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Platanthera hyperborea (L.) Lindl.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola palustris L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla glomerulans Bus.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium anagallidifolium Lam.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cassiope tetragona (L.) D. Don	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anastrophyllum minutum (Schreb. ex Cranz) Schust.	.	.	.	.	.	.	.	.	.	1	3	3	3	.	.	.	.	.	.	.	.	.	.	1	4	3	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
Hylocomium splendens (Hedw.)Br. Eur.	.	.	.	.	.	.	.	.	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	5	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dicranum majus Turn.	.	1	.	.	.	.	.	.	1	4	5	.	.	.	.	.	.	.	.	+	.	.	.	.	3	+	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Timmia austriaca Hedw.	.	.	.	.	.	.	1	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	3	+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Oxyria digyna (L.) Hill.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	2	.	.	.
Pohlia cf. longicolla (Hedw.) Lindb.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pyrola minor L.	.	.	.	.	.	.	.	.	1	.	.	.	.	3	3	1	3	4	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Coptis trifolia (L.) Salisb.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	2	4	5	3	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sedum rosea (L.) Scop.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	2	4	4	4	1	1	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Taraxacum croceum Dahlst.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4	2	4	5	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.
Poa alpina L.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	+	2	2	2	1	1	.	1	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	1	.	.	1	.	2
Thalictrum alpinum L.	.	.	.	.	.	.	.	.	1	.	1	1	.	.	3	2	3	1	.	1	.	r	.	.	.	.	.	.	.	.	.	2	.	.	2	.	.	.	.	.	.	.	.	.
Trisetum spicatum (L.) Richt.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	2	.	1	.	+	.	.	1	.	.	.	.	.	.	2	.	.	2	.	1	.	.	.	.	.	1	1
Peltigera spuria (Ach.) DC.	.	.	.	.	.	.	.	.	.	1	2	.	1	.	+	.	1	+	.	1	2	+	.	2	2	.	.	.	.	.	1	2	.	.	.	1	1	.	.	.	.	.	.	.
Harrimanella hypnoides (L.) Coville	.	.	.	.	.	.	.	.	.	1	.	2	1	.	.	.	1	.	.	1	2	1	+	+	3	.	.	.	.	.	4	.	2	2	.	.	.	.	.	.	.	.	.	.
Cladonia ecmocyna (Ach.) Nyl.	.	.	1	1	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	2	4	3	4	3	.	1	1	+	2	.	1	.	.	.	.	.	.	1	1	.	4	5	5	5
Phyllodoce coerulea (L.) Bab.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	5	4	.	2	3	2	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Peltigera polydactyla (Neck.) Hoffm./horizontalis Huds.) Baumg.	.	.	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	2	.	r	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Kiaeria glacialis (Berggr.) Hag.	.	.	.	1	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	2	3	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	1
Pleurozium schreberi (Brid.) Mitt.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bryum Hedw.	.	.	1	.	.	.	.	1	.	1	1	2	3	2	2	1	1	+	.	2	.	1	.	.	3	.	.	.	1	.	.	3	1	1	2	.	1	.	.	.	.	.	.	2
Lycopodium dubium Zoega	.	.	.	.	.	.	.	.	1	.	.	.	.	2	+	.	.	+	.	.	1	1	.	.	2	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Ochrolechia frigida (Sw.) Lynge	.	.	.	.	.	.	.	.	.	.	5	3	4	.	.	1	.	.	.	+	.	r	1	2	.	5	2	1	4	.	5	3	3	5	1	2	2	.	3	4	3	.	1	.
Cladonia amaurocraea (Flörke) Schaer.	.	.	.	.	.	.	.	.	.	1	1	1	3	.	.	.	.	.	.	.	.	r	2	1	3	4	2	3	4	3	3	2	.	1	.	.	.	.	.	.	.	1	1	.
Cetraria nivalis (L.) Ach.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	3	3	3	2	4	4	.	1	1	3	.	.	.	.	.	.	.	.	.	1
Cornicularia muricata (Ach.) Ach.	.	.	.	.	.	.	.	.	.	.	2	.	2	.	.	.	.	.	.	+	.	.	.	.	.	4	3	1	3	2	1	3	.	4	2	.	.	.	.	.	.	.	.	.
Thamnolia subuliformis (Ehrh.) W. Culb.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	1	2	2	1	1	1	.	1	.	1	.	.	.	.	.	.	.	.	.	.
Alectoria nigricans (Ach.) Nyl.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	2	2	1	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Diapensia lapponica L. ssp. lapponica	.	.	.	.	.	.	.	.	.	1	.	3	3	.	.	.	.	.	.	.	.	.	.	1	1	2	.	.	.	.	5	.	.	2	.	.	.	.	.	.	.	.	.	.
Gymnomitrion corallioides Nees.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	.	.	5	1	.	4	1	1	.	.	.	.	.	.	.	.
Sphaerophorus globosus (Huds.) Vain.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	5	2	.	5	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Rhacomitrium lanuginosum (Hedw.) Brid.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1	4	.	.	4	.	1	3	.	.	.	.	.	.	.	.	.	1	2	.
Alectoria pubescens (L.) R., H. Howe	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Parmeliella praetermissa (Nyl.) P. James	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Chadonanthus setiformis (Ehrh.) Lindb.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Festuca brachyphylla Schultes	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	4	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polytrichum hyperboreum R. Br.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alectoria ochroleuca (Hoffm.) Mass.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Loiseleuria procumbens (L.) Desv.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	1	+	.	2	3	1	+	+	.	+	.	.	.	.	5	2	.	.	2	.	.	.	.	.	.	.	.	.
Lophozia ventricosa (Dicks.) Dumort s.l.	1	1	2	.	.	.	.	.	.	3	4	.	.	.	.	.	2	+	.	1	1	+	1	3	4	3	.	+	.	.	3	.	.	1	.	1	.	.	.	1	1	1	.	.
Stereocaulon paschale (L.) Hoffm.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	2	1	.	2	1	3	5	1	1	2	.	.	.	.	.	.	.	.	1	3	4	5
Pohlia nutans (Hedw.) Lindb.	1	.	3	1	.	.	.	.	.	2	5	.	.	.	.	2	.	+	.	3	1	1	3	3	5	4	1	3	5	2	5	2	1	1	.	2	.	.	.	1	2	3	2	1
Cetraria islandica (L.) Ach.	.	.	1	.	.	.	.	.	.	2	4	.	.	.	3	2	1	.	3	3	4	2	3	3	3	3	1	3	4	2	1	3	1	1	1	.	.	.	.	.	.	5	4	5
Cladina rangiferina (L.) Harm.	1	.	1	1	.	.	.	.	.	2	3	.	2	.	+	.	.	.	.	2	1	1	3	3	3	5	3	5	4	3	2	3	.	1	.	1	.	.	.	.	.	5	5	4
Peltigera aphthosa (L.) Willd.	1	.	3	.	.	.	.	.	.	3	5	.	1	.	.	.	2	1	1	3	.	r	.	.	5	3	1	.	1	.	1	3	1	.	.	.	.	.	.	.	.	.	.	.
Cladonia uncialis (L.) Wigg.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	1	1	+	2	2	.	4	2	2	4	1	4	2	.	.	1	.	.	.	.	.	.	5	4	4
Peltigera scabrosa Th. Fr.	1	1	2	1	.	.	.	.	1	1	4	.	.	.	.	1	.	.	.	2	.	+	+	4	1	2	.	+	.	.	2	.	.	.	.	.	.	.	.	.	.	2	.	.
Cynodontium strumiferum (Hedw.) D. Not.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	r	2	1	.	2	3	3	5	1	2	1	1	.	.	.	.	.	.	.	.	1	1	1
Cladonia crispata (Ach.) Flot.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	+	.	1	2	3	2	2	1	3	4	2	1	.	.	.	.	.	.	.	.	.	.	4	5	3
Cladonia carneola (Fr.) Fr.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	1	1	1	2	.	2	1	3	.	.	.	.	.	1	.	.	.	.	.	.	2	1
Dicranum fuscescens Turn.	.	1	1	1	.	.	.	.	.	.	.	1	2	.	+	.	.	.	.	.	.	1	3	3	4	4	1	2	1	2	.	2	.	1	.	.	.	.	.	.	.	3	.	1
Hieracium alpinum (L.) Backh.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	5	3	3	1	.	1	.	.	.	+	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	4	.
Betula nana L.	1	1	3	.	.	.	.	.	.	1	.	.	2	2	.	1	1	.	.	1	1	1	.	1	.	.	.	5	5	4	1	1	.	.	.	.	.	.	.	.	.	.	.	.
Cladonia bellidiflora (Ach.) Schaer.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	1	.	2	.	+	.	.	.	.	.	.	.	.	.	.	.	.	3	2	3	1
Cetraria cucullata (Bell.) Ach.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Huperzia selago (L.) Bernh. ex Schrank & Mart. ssp. arctica (Grossh.) Löve & Löve	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	3	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Silene acaulis (L.) Jacq.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	+	2	+	.	.	.	.	2	3	5	4	2	1	1	.	.	.	2	.	1	.
Oncophorus wahlenbergii Brid.	.	.	4	.	1	1	.	.	.	.	1	3	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	5	.	.	3	1	.	1	.	.	.	.	.	.	.
Stereocaulon arcticum Lynge	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	+	1	1	1	1	.	.	.	.	5	1	.	5	1	3	1	.	1	.	3	1	.	.
Buellia insignis Th. Fr.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	3	.	.	1	.	.	.	1	.	1	1
Caloplaca tirolensis Zahlbr.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	1	.	.	.	.	.	.	.
Polychidium muscicola (Sw.) S. Gray	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.
Lecidea assimilata Nyl.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	3	.	.	.	.	.	.	.	.	.	.
Rinodina cinnamomea (Th. Fr.) Räs.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	3	.	.	.	.	.	.	.	.	.	.
Kobresia myosuroides (Vill.) Fiori & Paol.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	2	.	.	.	.	.	.	.	.	.
Arctomia delicatula Th. Fr.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Rinodina cf. arctica H. Magn.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Saxifraga oppositifolia L.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	5	2	.	1	.	1	.	.	.	.	.
Dryas integrifolia M. Vahl	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	2	3	2	.	.	.	.	.	.	.
Carex nardina Fr.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	2	.	1	.	.	.	.	.	.	.
Candelariella vitellina (Ehrh.) Müll. Arg.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4	1	.	2	.	.	.	.	.	.	.
Lecidella wulfenii (Hepp.) Körb.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	1	.	1	.	.	.	.	.	.	1
Collema ceraniscum Nyl.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.
Lecidea lurida (Dill.) Ach.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.
Ochrolechia geminipara (Th. Fr.) Vain.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.
Rinodina cf. lecideoides (Nyl.) Vain.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	2	.	.	.	.	.	.	.
Lecidea vernalis (L.) Ach.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	1	.	.	.	.	.	.	.
Caloplaca tetraspora (Nyl.) Oliv.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	1	.	.	.	.	.	.	.
Rhacomitrium heterostichum (Hedw.) Brid.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.
Bacidea De Not. spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.
Chamaenerion latifolium (L.) Sweet	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	.	.	.	.	.
Cephaloziella arctica Bryhn. & Douin	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	2	2	.	.	.	.	.
Cladonia lepidota Nyl.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	.	.	2	.	1	3	.	.	.	1	1
Stereocaulon condensatum Hoffm.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Pohlia drummondii (C. Müll.) Adrews	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Scapania lapponica (Arn. & Jens.) Steph.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Pohlia commutata Lindb.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.	.
Lophozia wenzelii (Nees.) Steph.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	1	.	.
Conostomum tetragonum (Hedw.) Lind.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r	1	+	1	.	.	.	.	.	1	2	.	.	.	.	.	.	.	3	.	.	.	.
Gymnomitrion concinnatum (Lightf.) Corda	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	3	.	.	1	1	2	.	.	.	.	3	.	.	.	.	3	.	.	.	.	5	.	.	.
Kiaeria starkei (Web. & Mohr) Hag.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.
Minuartia biflora (L.) Sch. & Th.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
Lecidea caesioatra Schaer.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
Cladonia phyllophora Hoffm.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	1	+	2	+	.	2	.	1	2	.	.	1	.	1	.	.	.	.	.	.	.	1	4	4
Viscaria alpina (L.) G. Don	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	+	.	.	.	.	3	.	1	.	.	1	.	.	.	.	.	.	.	1	.	.	4	4
Antennaria canescens (Lge.) Malte	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Lecanora hageni (Ach.) Ach.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Vaccinium uliginosum L. ssp. microphyllum Lge.	3	2	4	1	1	2	1	1	5	4	5	3	4	4	2	2	5	5	4	5	1	4	2	5	3	5	3	3	4	.	5	3	5	5	2	1	.	.	.	1	.	.	.	.
Empetrum nigrum L. ssp. hermaphroditum (Hag.) Böch.	3	2	4	1	1	.	1	1	5	4	5	3	3	3	3	4	5	5	4	5	4	5	5	5	4	5	1	4	3	.	5	3	2	1	2	.	.	.	.	.	.	.	.	.
Salix glauca L. ssp. callicarpaea (Trautv.) Böch.	1	.	.	.	1	.	3	2	5	3	4	.	2	5	5	5	3	4	2	5	1	3	1	2	1	1	1	2	3	1	2	1	2	3	2	3	2	1	1	.	.	.	.	.
Carex bigelowii Torr.	1	2	3	1	1	1	2	.	5	4	5	2	3	3	5	2	4	5	3	4	3	4	4	5	3	4	2	+	2	1	5	1	4	4	2	.	.	.	1	1	2	5	5	5
Salix herbacea L.	1	2	4	1	1	2	1	.	.	2	5	1	2	1	2	.	5	5	4	5	4	5	4	4	5	5	2	.	1	.	5	1	5	3	1	1	.	.	1	4	4	5	4	3
Polygonum viviparum L.	2	1	3	1	1	.	2	.	5	4	5	3	4	2	4	3	5	5	3	5	2	5	3	4	4	3	3	.	.	.	3	2	5	4	2	.	.	.	.	1	1	4	2	1
Cladina mitis (Sandst.) Hale & W. Culb.	.	1	1	1	.	.	.	.	.	4	4	2	4	.	1	.	.	.	.	2	4	4	4	5	5	5	3	5	4	4	5	3	4	2	1	1	1	1	2	.	3	5	5	5
Drepanocladus uncinatus (Hedw.) Warnst.	1	.	2	1	1	2	.	2	.	4	5	1	2	1	+	1	2	1	2	3	.	2	1	5	5	2	.	2	2	1	4	1	4	5	.	.	.	.	.	3	.	4	2	.
Stereocaulon alpinum Laur.	.	.	.	.	.	.	.	.	.	3	4	2	3	.	.	.	1	+	2	2	3	2	4	4	5	4	2	3	4	3	3	3	3	3	1	1	1	1	3	1	3	4	5	5
Cetraria delisei (Bory ex Schaer.) Th. Fr.	.	.	.	.	.	.	.	1	.	1	2	1	1	1	.	.	.	.	.	1	2	.	3	3	.	2	.	2	2	1	4	.	5	4	1	3	2	1	3	5	5	2	5	.
Cephaloziella (Spr.) Schiffn. spec.	1	.	1	1	.	.	.	.	.	2	4	1	1	.	.	.	.	.	.	+	.	1	1	3	2	4	1	2	2	1	4	3	2	4	2	.	.	.	.	2	1	2	3	2
Cladonia coccifera (L.) Willd.	.	.	.	.	.	.	.	.	.	.	5	2	2	.	.	.	.	.	.	1	2	r	2	2	3	4	2	2	5	2	5	2	3	5	1	3	2	2	2	.	1	2	3	4
Psoroma hypnorum (Vahl) S. Gray	.	.	.	.	.	.	.	.	.	2	5	2	3	.	+	.	.	.	.	1	.	.	5	4	3	5	3	.	5	1	4	3	2	3	1	3	1	3	1	3	4	5	2	1
Peltigera malacea (Ach.) Funck	.	.	.	.	.	.	.	.	.	.	2	1	2	.	+	.	.	.	.	+	2	2	2	2	3	3	3	2	3	1	2	2	1	2	.	.	1	.	.	.	.	2	3	4
Dicranum scoparium Hedw.	.	.	2	.	1	.	.	1	.	2	1	1	.	1	1	.	2	1	.	3	3	4	3	3	4	3	2	3	4	1	.	.	3	3	1	.	.	.	.	.	.	.	5	4
Polytrichum juniperinum Hedw.	1	2	2	1	.	.	.	.	.	4	4	1	2	.	.	.	2	+	1	4	.	.	1	3	4	3	1	+	1	.	3	.	2	.	.	.	.	.	.	.	.	1	.	.
Poa arctica R. Br.	.	.	.	.	.	.	1	1	4	.	2	.	.	3	3	.	3	4	2	1	4	.	.	1	1	3	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	1	5	2
Luzula spicata (L.) DC.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	1	1	.	.	+	1	+	.	.	1	2	2	2	3	.	3	3	1	3	2	.	.	.	.	2	3	.	4	5
Polytrichum piliferum Hedw.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	r	2	.	1	2	1	1	3	1	2	2	1	3	.	3	1	.	.	2	4	.	2	1
Ptilidium ciliare (L.) Nees.	.	.	.	.	.	.	.	.	.	2	1	.	.	1	.	.	.	.	.	.	.	1	4	5	3	5	1	4	5	2	3	1	2	2	.	.	.	.	.	.	.	3	5	2
Lophozia hatcheri (Evans) Steph.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	+	2	1	.	.	2	2	3	2	5	5	4	2	3	3	1	2	2	2	5	.	.	.	.	.	.	.	4	5	4
Cetraria ericetorum Opiz.	.	.	.	1	.	.	.	.	.	1	2	1	4	.	+	.	.	.	.	1	.	2	2	3	3	4	3	4	4	1	.	3	1	5	2	.	.	.	.	.	.	5	5	5
Cladonia gracilis (L.) Willd.	.	.	.	.	.	.	.	.	.	2	5	1	2	.	.	.	.	.	.	1	.	1	3	4	5	5	3	4	5	4	5	2	1	1	1	.	.	.	.	.	3	5	5	5
Juncus trifidus L.	.	.	.	.	.	.	.	.	.	.	1	2	3	.	+	.	3	+	.	2	2	2	1	.	.	+	1	1	5	2	3	3	2	4	2	.	.	.	.	.	1	.	4	5
Festuca vivipara L.	.	.	.	.	.	.	.	.	.	1	3	.	.	.	+	.	2	+	.	1	1	.	.	.	.	.	.	.	.	.	.	3	.	.	2	.	.	.	.	.	.	1	2	1
Peltigera rufescens (Weis.) Humb	.	.	.	.	.	.	.	.	1	.	.	2	2	.	.	1	1	.	.	2	.	2	1	.	2	.	1	.	.	.	.	2	.	.	2	1	.	.	.	.	.	.	.	2
Lophozia alpestris (Schleich. ex Web.) Evans	1	.	2	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	2	1	+	2	1	2	.	.	.	.	3	2	.	1	.	3	.	1	1	3	3	2	.	.
Cladonia chlorophaea (Flörke ex Somm.) Spreng.	.	.	.	.	.	.	.	.	.	1	1	2	3	.	2	.	.	.	.	2	1	2	2	1	3	2	.	.	2	.	.	.	1	.	.	.	.	1	.	2	.	.	.	1
Rhacomitrium canescens (Hedw.) Brid.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	+	.	r	.	+	2	.	.	+	.	.	.	.	1	3	1	.	.	.	.	.	.	.	1	1
Anthelia juratzkana (Limpr.) Trev.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	4	.	1	3	1	.	.	1	.	.	1	.	.	.
Solorina crocea (L.) Ach.	.	.	1	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	+	3	.	.	+	1	3	.	.	2	.	4	1	.	2	.	3	.	.	.	.	4	1	1	1
Desmatodon latifolius (Hedw.) Brid.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	1	.	1	.	.	1	.	1	.	.	1	.	.	1	1	.	1	.	.	.	.	.	1	1	1
Lepraria neglecta (Nyl.) Lett.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	r	1	.	.	3	.	.	.	.	1	.	.	2	1	3	1	.	1	2	5	.	2	3
Polytrichum alpinum Hedw.	.	.	.	.	1	.	2	.	.	1	1	.	1	.	.	.	.	.	.	.	2	+	+	.	.	.	.	.	.	1	.	.	1	2	.	.	.	.	.	1	3	3	.	.
Cladonia pyxidata (L.) Hoffm.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	2	1	1	2	2	1	1	2	1	.	.	.	.	.	.	.
Cephalozia (bicuspidata (L.) Dumort. p. maj. p.)	1	.	.	.	.	.	.	.	.	1	2	3	1	.	.	.	1	.	.	+	.	r	.	.	1	+	1	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
Lophozia Dumort. spec.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	2	1	2	2	1	3	1	.	.	.	.	.	2	.	3	.	.	1	.	.	.	.	.	1	2
Microlichens div. spec.	.	.	.	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	+	+	1	2	2	.	.	.	1	4	.	5	.	.	.	.	.	.	.	.	.	.	.
Peltigera canina (L.) Willd.	.	.	.	.	.	.	.	.	.	1	5	.	.	.	.	.	1	.	.	1	1	r	.	+	1	1	.	+	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Lophozia kunzeana (Huebn.) Evans	.	.	.	.	.	.	.	.	.	2	3	.	.	.	.	.	.	.	.	1	.	.	.	1	2	2	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	1	2	.
Cladonia Wigg. spec.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	+	+	.	.	.	.	.	.	2	.	4	1	.	.	.	.	.	4	.	.	.	.
Cladonia macrophyllodes Nyl.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	r	1	.	.	.	1	.	.	.	.	.	.	1	1	.	2	.	.	.	3	.	3	4
Pertusaria oculata (Dicks.) Th. Fr.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	+	+	1	2	.	.	.	.	4	.	.	3	.	.	.	.	.	.	4	.	.	.
Scapania (curta(Mart.) Dumort.)	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	1	+	.	.	.	+	.	.	.	+	.	.	.	.	3	.	1	1	.	.	.	.	.	1	.	.	.	.
Stereocaulon Hoffm. spec.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	3	4	.	.	.	.	.	.	.	.	.	1	1	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.	.
Brachythecium Br. Eur. spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	+	1	.	.	.	1	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	1	1
Oncophorus Brid. spec.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	1	.	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
Pohlia Hedw. spec.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	2	.	1	.	+	.	+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Tortula ruralis (Hedw.) Crone	.	.	.	.	.	.	.	.	.	.	2	.	1	.	2	.	.	.	.	.	.	r	.	.	.	+	.	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.
Pohlia cruda (Hedw.) Lindb.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	2	.	1	.	.	.	.	1	.	1	.
Cladonia macrophylla (Schaer.) Stenham.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	r	+	.	.	+	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.
Luzula confusa Lindeb.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	+	1	+	.	.	.	1	1	.	.	.	.	.	.	.	.	.	1	.	.	.
Lophozia excisa (Dicks.) Dumort.	.	.	.	.	.	.	.	.	.	1	4	.	.	.	.	.	.	.	.	+	.	.	.	1	.	+	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Bartramia ithyphylla Brid.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	r	.	.	1	.	.	.	.	1	.	.	.	.	.	1	.	.	.	3	.	.	.	.
Euphrasia frigida Pugsl.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	1	2	.	.	.	.	r	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Poa glauca M. Vahl	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	1	.	.	.	.	.	.	.	.	.	.	1	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Thymus drucei Ronn. emend. Jalas	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	1	.	.	.	.	r	.	.	.	.	.	.	.	.	.	3	.	.	2	.	.	.	.	.	.	.	.	3
Dicranum Hedw. spec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	+	.	.	1	.	.	.	.	3	.	.	1	.	.	.	.	.	.	.	.	.	.
Sphagnum girgensohnii Russ.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	1	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polytrichum commune Hedw.	.	.	1	.	.	1	.	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Dicranum elongatum Schleich.	.	.	.	1	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	+	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lophozia longidens (Lindb.) Macoun	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	+	.	.	.	.	2	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Tritomaria quinquedentata (Huds.) Buch.	.	.	.	1	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pinguicula vulgaris L.	.	.	3	.	.	.	.	.	.	.	.	3	2	.	.	.	2	+	.	+	.	r	.	.	.	.	.	.	.	.	4	.	.	1	1	.	.	.	.	.	.	.	.	.
Blepharostoma trichophyllum (L.) Dumort.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Solonostoma sphaerocarpum (Hook.) Steph.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	.	1	.	1	.	.	1	.	.	.	.	.	.
Dicranum muehlenbeckii Br. Eur.	.	.	.	.	.	.	.	.	.	.	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	3	1	1	.	.	.	.	.	.	.	.	.	.	2
Dicranum acutifolium C. Jens.	.	.	.	.	.	.	.	.	.	1	1	1	4	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.
Carex scirpoidea Michx.	.	.	.	.	.	.	.	.	1	.	.	1	3	.	+	.	1	+	.	+	.	r	.	.	1	.	.	.	.	.	.	3	2	1	2	.	.	.	.	.	.	.	.	1
Peltigera Willd. spec.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla tridentata Ait.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Listera cordata (L.) R. Br.	1	.	.	.	.	.	.	.	5	.	.	.	.	.	.	1	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla alpina L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla filicaulis Bus.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gymnocarpium dryopteris (L.) Newman	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Climacium dendroides (Hedw.) Web. & Mohr	.	.	.	.	.	.	.	1	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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