

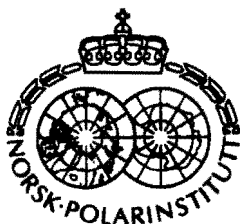
ARVE ELVEBAKK and PÅL PRESTRUD

# A CATALOGUE OF SVALBARD PLANTS, FUNGI, ALGAE AND CYANOBACTERIA



SKRIFTER NR. 198  
OSLO 1996





SKRIFTER NR. 198

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# A catalogue of Svalbard plants, fungi, algae and cyanobacteria

Edited by

ARVE ELVEBAKK and PÅL PRESTRUD

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NORSK POLARINSTITUTT  
OSLO 1996

*Cover:* Arctic dandelion (*Taraxacum arcticum*), Sveagruva, Svalbard. The arctic dandelion can be found as scattered occurrences throughout most parts of Svalbard. Photograph: Arve Elvebakk.

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# Introduction

ARVE ELVEBAKK and PÅL PRESTRUD, EDITORS

This is the first attempt to present a survey of all Svalbard species of plants, algae and fungi (including lichens), and cyanobacteria since the presentation by Lindblom (1840) who listed 223 accepted species in addition to some taxa that were considered critical. This catalogue now includes 2885 species, which must be considered a high number for a relatively small area situated in the northern part of the Arctic.

The compilation of this catalogue was initiated by the Norwegian Polar Institute in 1987 as part of the Institute's environmental impact studies on Svalbard (MUPS, Miljøundersøkelser på Svalbard). Much more time was needed and many more systematic problems were encountered than first anticipated. Much literature that is not easily available had to be reviewed, and many reports of Svalbard species are found in studies primarily dealing with other geographical areas or in monographs or revisions. Because of the widely scattered reports of Svalbard species, there are certainly a number of records that are missing from this catalogue. Notes on supplements or corrections from readers to the authors or editors will be appreciated.

The aim of this catalogue has been to critically review the present literature. A large number of systematic or identification problems have been encountered that cannot be solved without revision of herbarium material. This is normally outside the scope of this publication, but quite a large number of herbarium collections have been revised, especially for the parts on vascular plants, bryophytes and basidiomycetes. However, a large number of critical reports have been evaluated without the study of herbarium collections. Many such reports have been treated as excluded taxa, and the lists of excluded taxa include several hundred species. These evaluations have been based on the authors' knowledge of arctic flora, and some of the parts have been more critical than others.

Many of the collaborating authors have also included own unpublished information or information supplied by colleagues. In this catalogue 131 species are reported as new to Svalbard, the majority among basidiomycetes and marine algae. A large number of new localities are also referred to and one new moss (*Plagiothecium svalbardensis* Frisv.) is described.

Even at the highest taxonomic level among groups previously treated as botany, there is no consensus as to definitions and nomenclature. For definitions of the kingdoms and divisions we have chosen to follow the system used in the textbook *Biology of Plants* by Raven et al. (1992, Worth Publ.), with the exception that we treat bryophytes as one division. In this system only vascular plants and bryophytes are considered as plants. The name *algae* is used collectively for a number of unrelated divisions within the kingdom Protista. The group of bacteria now called Cyanobacteria have previously been called *blue-green algae*; these are still often informally referred to as *algae* but have been treated here as cyanobacteria. Lichens are systematically treated as fungi. Four species of basidiolichens within the genus *Omphalina* have been treated both in Part 6 with lichens and in Part 3 with basidiomycetes. The heterotrophic protists Myxomycota, Oomycota and Chytridiomycota have informally been included among Fungi II in the title of Part 4.

The catalogue consists of nine parts:

Part 1 Elven, R. & Elvebakk, A.: Vascular Plants

Part 2 Frisvoll, A.A. & Elvebakk, A.: Bryophytes

Part 3 Gulden, G. & Torkelsen, A.-E.: Fungi I. Basidiomycota: Agaricales, Gasteromycetales, Aphyllophorales, Exobasidiales, and Tremellales

Part 4 Elvebakk, A., Gjerum, H. & Sivertsen, S.: Fungi II. Myxomycota, Oomycota, Chytridiomycota, Zygomycota, Ascomycota, Deutromycota and Basidiomycota: Uredinales and Ustilaginales

Part 5 Alstrup, V. & Elvebakk, A.: Fungi III. Lichenicolous fungi

Part 6 Elvebakk, A. & Hertel, H.: Lichens

Part 7 Hansen, J.R. & Jenneborg, L.H.: Benthic marine algae and cyanobacteria

Part 8 Hasle, G.R. & Hellum von Quillfeldt, C.: Marine microalgae

Part 9 Skulberg, O.M.: Terrestrial and limnic algae and cyanobacteria

Parts 5 and 7-9 have been defined ecologically whereas the others have been defined systematically. Systematically the lichenicolous fungi belong to part 4. Many divisions of algae and fungi have been included in several parts of the catalogue. We therefore present the table below showing the number of taxa determined to species level in each division that each part of the catalogue has accepted, and also the total number of species in all divisions.

Division	Part									Sum
	1	2	3	4	5	6	7	8	9	
Anthophyta	165									165
Pterophyta	4									4
Sphenophyta	3									3
Lycophyta	1									1
Bryophyta		373								373
Basidiomycota			175	25		(4)				200
Ascomycota				226	50	593				869
Deuteromycota				102	10					112
Zygomycota				28						28
Chytridiomycota				3						3
Oomycota				2						2
Myxomycota				3						3
Chrysophyta							1	118	430	549
Phaeophyta							60			60
Rhodophyta							59		1	60
Cryptophyta								3	4	7
Dinophyta								58	8	66
Euglenophyta								2	4	6
Chlorophyta							38	8	250	296
Charophyta									1	1
Zoomastigophora								4		4
Cyanobacteria							5		68	73
Total:	173	373	175	389	60	593	163	193	766	2885
New to Svalbard:	—	6	46	8	5	5	29	27	5	131

Because of the high number of species there is a need for a synopsis. All parts except 5, 7, 8 and 9 start with a list of species that includes *Ecosystem Component Values* (see below). The Ecosystem Component Values list attempts to give a broad impression of the occurrence and ecology of the species. It also indicates which species have been commented and which have not. The values are very tentative in many cases; many will certainly deserve a different value after increased exploration of Svalbard, and many values are still lacking. It is hoped that these summaries in general will prove useful, in spite of the uncertainty of a large number of the value assignments. Some contributions only use some of the Ecosystem Component Values. The values of rarity are defined slightly differently for the vascular plants than for the other groups because of a much more intense collection activity. For the other parts it is practically impossible to use Ecosystem component values.

The values of phytogeography refer to total distribution patterns and/or Svalbard patterns. A very rare species on Svalbard is phytogeographically interesting and has a high value although it may otherwise be a widespread species elsewhere. A Svalbard endemic has a high value although it may be widespread on Svalbard. No values are indicated in cases where no information exists or in cases where the information is too scarce or uncertain.

Biodiversity is a keystone in the structure and function of our ecosystems. The importance of biodiversity in ecological management has been gaining increasing attention both at national and international levels. In this context it is essential that the present knowledge be reviewed and further studies be initiated. Although this

catalogue is primarily a response to the former task; it is hoped that the major gaps revealed here in the state-of-the-art of Svalbard biodiversity will prove valuable in stimulating further studies.

Definition of Ecosystem Component Values:

**R** *Rarity (on Svalbard)*

3 = Very rare

2 = Rare

1 = Scattered or common, at least locally

**P** *Phytogeographical importance*

3 = Strongly disjunct or described from Svalbard and not yet known elsewhere

2 = Belonging to a phytogeographical element of special interest on Svalbard

1 = More or less widespread

**E** *Ecological indicator value*

3 = Very high (specialised, stenoic)

2 = Intermediate

1 = Low (euryoic)

**A** *Local abundance*

3 = Dominant, in places more than 50% cover in its habitats

2 = Subdominant, 20–50% cover

1 = Sparse

**I** *Importance to vertebrate animals*

3 = Important as a highly preferred fodder plant

2 = Of secondary importance

1 = Of no importance

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A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae, and cyanobacteria

## Part 1. Vascular plants

REIDAR ELVEN and ARVE ELVEBAKK



Elven, R. & Elvebakk, A. 1996: Part 1. Vascular plants. Pp. 9–55 in Elvebakk, A. & Prestrud, P. (eds.): A catalogue of Svalbard plants, fungi, algae, and cyanobacteria. *Norsk Polarinstitutt Skrifter* 198.

An annotated list of vascular plants from Svalbard is presented, including 173 species. Of these, six species are stable aliens and two species are seashore plants only with ephemeral occurrences. Six of the species are represented by two subspecies on Svalbard. In addition, 13 hybrids are accepted and separate lists include 21 taxa of frequently introduced plants and 41 excluded taxa. A table includes information on rarity, local abundance, ecological indicator value, and importance in phytogeography and as food source for higher animals. The comments concentrate on taxonomical and nomenclatural problems and on recently discovered taxa.

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## Introduction

The present catalogue of Svalbard vascular plants is based on field experiences by the authors and others, on a survey of the Svalbard collections in the herbaria of the Botanical Museum, the University of Oslo (O), the Royal Norwegian Society of Sciences, the University of Trondheim (TRH), Tromsø Museum (TROM), on a study of a few type specimens (of *Draba* spp.) in London (BM, K), Stockholm (S), and Uppsala (UPS), and on published records. Important collections from Svalbard are deposited in various herbaria outside Norway. Examination of these and of the type collections of several species is needed for a complete enumeration, but this was outside the scope of the present work. The names of herbaria are abbreviated according to Holmgren et al. (1990).

There is a mounting floristic literature from Svalbard, comprehensively cited by Kleppa (1973, 1979, 1989) and Elvebakk (1989). Many important references to and evaluations of Svalbard plants have, however, been made in taxonomical studies not included in the Norwegian bibliographies.

Floras of Svalbard vascular plants have been published by Rønning (1964, 1979, 1996). Other comprehensive sources are Tutin et al. (1964–1980, 1993) and Hultén & Fries (1986). Floristic surveys of other arctic areas are given i.a. by Tolmachev (1960–1987), Hultén (1968), Böcher et al. (1978) and Porsild & Cody (1980). All are important sources on taxonomy, nomenclature and distribution.

Although the Svalbard taxa of vascular plants are comparatively well known, there are only a few modern biosystematic studies. Taxonomic problems remain in several genera, especially in *Cerastium*, *Draba*, *Eriophorum*, *Festuca*, *Poa*, *Potentilla*, *Puccinellia*, *Saxifraga*, and *Ranunculus*. Critical taxonomic studies have been outside the scope of the present work. In cases of taxonomic controversy, the present survey indicates problems rather than aiming to solve them.

There is also a lack of consensus as to nomenclature. Some discrepancies exist between species concepts applied by European and North American botanists. More serious, however, are the

divergencies between 'western' and 'eastern' European taxonomy. For some time Soviet botanists applied a very narrow, often geographically based, species concept (see i.a. Komarov 1934-1964). This resulted in a description of species which was based on local variation only and did not merit specific rank in other areas. Political boundaries made it difficult to study type collections fundamental to the application of names of many arctic plants. In some genera, therefore, the same species has been described under different names in various parts of the Arctic (and sometimes under several names in the Russian parts). A comparative study of type material deposited in herbaria throughout the northern hemisphere is needed before a consistent nomenclature and species concept can be attained. The cooperation within the planned Pan-Arctic Flora Project will hopefully contribute much to solving such problems.

We have followed the species concept of recent studies where these agree with our observations from Svalbard. Sources on nomenclature have been cited in cases where there is no consensus, and recent synonyms, comprising all names used by Rønning (1979, 1996) and Tutin et al. (1964-1980, 1993), have been included in a separate list of synonyms (see section "Synonyms" below). The nomenclature used in the Norwegian national standard flora (Lid & Lid 1994, also including the arctic areas) is, with few exceptions, the same as adopted here. Slightly different use of author citations and spelling has not been recorded.

The main list includes all species known to have stable occurrences on Svalbard. Most are native, and all native species published from Svalbard since the publishing year of the first comprehensive Svalbard flora by Resvoll-Holmsen (1927) have been considered. A separate annotated list of excluded taxa is included (see section "Excluded taxa" below).

A considerable number of introduced species have been recorded from the settlements of Longyearbyen and Ny-Ålesund by Høeg & Lid (1929), Hadač (1941) and Sunding (1961, 1966), from Moskushavn by Hadač (1944), and from Pyramiden by Schweitzer (1966). Seven of these were included by Rønning (1979). Presumably based on these sources, a number of records have been included in the maps of Hultén & Fries (1986), mostly without any indication of anthropochory and ephemeral occurrence.

From the Russian settlements of Barentsburg

and Pyramiden, Tishkov (1985) reported on the establishment of introduced plants but did not give a list of species. A list of introduced species at Barentsburg recorded during the last decade has kindly been made available to us by A.A. Tishkov. This list mainly includes species that had also been formerly found in the Norwegian settlements on Spitsbergen. A visit to Barentsburg in 1993 confirmed the presence of numerous introduced species (Elven unpubl.) and added several to the list of Tishkov.

Introduced species which are able to persist, and/or reproduce regularly, are included in the main list and are commented upon in the notes. A separate list is included of species which are frequently introduced but seem dependent upon regular introduction (see section "Ephemeral (introduced) taxa" below). In the main Norwegian settlement, Longyearbyen, only 1-3 anthropochores are known to be persisting. The situation is different in the Russian settlements of Barentsburg and Pyramiden, where the use of livestock is comparable to the situation at Longyearbyen and Ny-Ålesund many years ago, and land reclamation is different from that in the Norwegian settlements. Many anthropochorous species are reported to produce seeds in the Russian settlements (Tishkov pers. comm., own observations 1993). Their persistence is, however, not known. The situation at Bjørnøya is also different from that at Longyearbyen and Ny-Ålesund. Here Engelskjøn (1986a) reported the presence of a few more or less stable anthropochores in 1983.

Readers are referred to the Svalbard flora (Rønning 1996) and the rich literature on distribution and ecology. Pteridophytes and monocotyledons were mapped by Rønning (1972), and 14 selected species by Engelskjøn (1986b). About 80 more or less thermophilous and rare species were mapped by Elvebakk (1989). There are also some local floristical studies. The most important of these cover Bjørnøya (Engelskjøn & Schweitzer 1970; Engelskjøn 1986a), Sørkapp Land (Dubiel 1985, 1990; Kuc & Dubiel 1995 including the entire Hornsund area), the Van Mijenfjorden area (Engelskjøn et al. 1972), the area east and north of Longyearbyen (Hadač 1944), Gipsdalen in the Isfjorden area (Elven et al. 1990), Edgeøya (Neilson 1970), parts of Barentsøya (Hofmann 1968), and Nordaustlandet (Scholander 1934; Neilson 1968). Accordingly, detailed information on distribution and ecology is generally not

included here. The notes concentrate on taxonomical and nomenclatural problems and comments on recently discovered taxa.

The present enumeration of native Svalbard vascular plants and stable aliens includes 173 species, six among them with two subspecies. Of these taxa six are considered to be established aliens, and two are seashore plants only with ephemeral occurrences. Thirteen hybrids are accepted. In addition 21 taxa of frequently introduced plants are listed (see section "Ephemeral (introduced) taxa" below).

This study of the Svalbard vascular flora took several years and was prepared parallel to the Norwegian standard flora (Lid & Lid 1994) of which one of the authors, R. Elven, was editor. The results of these studies were first published by Elven in Lid & Lid (1994), but the documentation is partly included in the present survey. A few name changes have been made here as compared to Lid & Lid (1994): *Cakile maritima* subsp. *islandica* instead of *C. maritima* subsp. *arctica*, *Carex marina* subsp. *pseudolagopina* instead of *C. amblyrhyncha*, *Dupontia fisheri* instead of *D. pelligera*, and *Carex misandra* instead of *C. fuliginosa* subsp. *misandra*. Compared with the until recently most complete surveys, Rønning (1979) and Tutin et al. (1964–1980), the additions are nine species/subspecies: *Botrychium boreale* and *Puccinellia angustata* subsp. *palibinii* (also published by Elvebakk et al. 1994), and *Atriplex* cf. *prostrata* (Bjørnøya), *Carex glacialis* (NW Spitsbergen), *Carex krausei* (W. Spitsbergen, Elven et al. in press), *Equisetum arvense* subsp. *arvense* (introduced, West Spitsbergen), *Festuca edlundiae* (see Aiken et al. 1995), *Festuca rubra* subsp. *rubra* (as probably native, West Spitsbergen), and *P. capillaris* (Bjørnøya), and the following hybrids: *Draba arctica* × *corymbosa*, *D. corymbosa* × *micropetala*, *Festuca hyperborea* × *rubra* subsp. *arctica*, *Ranunculus affinis* × *sulphureus*, *R. nivalis* × *pygmaeus*, *R. pygmaeus* × *sulphureus*, and *Saxifraga hyperborea* × *rivularis*. The re-evaluation of previous reports resulted in the following revisions: the Spitsbergen material of *Ranunculus hyperboreus* is identified as subsp. *arnelli*, the Bjørnøya material as subsp. *hyperboreus* (revision made by Nilsson, Flora Nordica in prep.), *Carex aquatilis* subsp. *stans* × *subspatheacea* (instead of parts of *C. bigelowii*), *Deschampsia borealis* (instead of *D. brevifolia*), *Juncus triglumis* subsp. *albescens* (instead of *J.*

*triglumis* s.str.), *Potentilla* × *insularis* (instead of *P. rubricaulis* and *P. pedersenii*), *Salix arctica* (instead of *S. glauca* subsp. *callicarpaea*), and *Silene uralensis* (instead of *S. wahlbergella*/ *Melandrium apetalum*).

## Ecosystem Component Values

As a synopsis we have arranged a list of species indicating their status in the Svalbard ecosystem by so-called Ecosystem Component Values. The choice of one value over another has been quite tentative in many cases, but still we hope that this table will be of use to our readers. The following values are used:

### Definitions

#### R Rarity

- 3 = Very rare, 1–4 localities known at present
- 2 = Rare, 5–25 localities known at present
- 1 = Scattered or common (at least locally)

#### P Phytogeographical importance

- 3 = Endemic or highly disjunct
- 2 = Belonging to a phytogeographical element of special interest in Svalbard
- 1 = More or less widespread

#### E Ecological indicator value

- 3 = Very high (specialised, stenotic)
- 2 = Intermediate
- 1 = Low (eurytic)

#### A Local abundance

- 3 = Dominant, > 50% cover
- 2 = Subdominant, 20–50% cover
- 1 = Sparse

#### I<sub>9</sub> Importance to animals (vertebrates)

- 3 = Highly preferred fodder plant
- 2 = Of secondary importance
- 1 = Of no importance

Comments to the following species list: A dash is written where no or only uncertain information exists. As the vascular flora is very different on Bjørnøya from that of the main archipelago, presence on one and/or the other is indicated by B/S (occurring on both Bjørnøya and the Spitsbergen islands), B (occurring on Bjørnøya alone), or S (occurring on Spitsbergen and the neighbouring islands). The numbers in brackets refer to notes to the species in question.



## Accepted taxa of stable (native and introduced) plants

Scientific and Norwegian names	Ecosystem Component Values						
	R	P	E	A	I	B/S	Notes
<i>Achillea millefolium</i> L. – Ryllik	3	1	–	1	1	S	(1)
<i>Alchemilla glomerulans</i> Bus. – Kjeldemarikåpe	3	2	–	1	1	B	(2)
<i>Alopecurus borealis</i> Trin. – Polarreverumpe	1	2	2	3	3	B S	
<i>Arabis alpina</i> L. – Fjellskrinneblom	2	2	2	1	1	B S	
<i>Arctagrostis latifolia</i> (R. Br.) Griseb. – Russegras	2	2	2	1	1	S	(3)
<i>Arctophila fulva</i> (Trin.) N.J. Anderss. – Hengjegras	1	2	3	3	2	B S	
<i>Arenaria humifusa</i> Wahlenb. – Dvergarve	2	3	3	1	1	S	
<i>A. pseudofrigida</i> (Ostenf. & Dahl) Juz. – Kalkarve	1	2	3	1	1	S	
<i>Arnica angustifolia</i> M. Vahl – Fjellsolblom	2	2	3	1	1	S	(4)
<i>Atriplex</i> cf. <i>prostrata</i> Bouch. ex DC. – Tangmelde	3	2	3	1	1	B	(5)
<i>Barbarea vulgaris</i> R. Br. – Vinterkarse	3	1	–	1	1	S	(6)
<i>Betula nana</i> L. coll. – Dvergbjørk	2	2	3	3	2	S	(7)
<i>Bistorta vivipara</i> (L.) S.F. Gray – Harerug	1	1	1	2	3	B S	
<i>Botrychium boreale</i> Milde – Fjellmarinøkkel	3	3	3	1	1	S	(8)
<i>B. lunaria</i> (L.) Sw. – Marinøkkel	3	3	3	1	1	S	
<i>Braya purpurascens</i> (R. Br.) Bunge – Purpurkarse	1	2	3	1	1	S	
<i>Cakile maritima</i> Scop. subsp. <i>islandica</i> (Gand.) Elven – Ishavsreddik	3	2	3	1	1	S	(9)
<i>Calamagrostis stricta</i> (Timm.) Koeler – Smårøykvein	2	2	2	2	3	B S	
<i>Campanula rotundifolia</i> L. subsp. <i>giesekiana</i> (Vest) Witasek – Arktisk blåklomme	3	3	3	1	1	S	(10)
<i>C. uniflora</i> L. – Høgfjellsklokke	2	2	2	1	1	S	
<i>Cardamine bellidifolia</i> L. – Høgfjellskarse	1	1	2	1	1	S	
<i>C. pratensis</i> L. subsp. <i>polemonioides</i> Rouy – Polarkarse	1	1	2	1	2	B S	
<i>Carex aquatilis</i> Wahlenb. subsp. <i>stans</i> (Drejer) Hult. – Tundrastorr	3	2	3	–	–	S	(11)
<i>C. aquatilis</i> subsp. <i>stans</i> × <i>subspathacea</i>	3	2	–	–	–	S	(12)
<i>C. capillaris</i> L. s. str. – Hårstorr	3	3	3	1	1	S	(13)
<i>C. glacialis</i> Mack. – Rabbestorr	3	2	3	1	1	S	(14)
<i>C. glareosa</i> Wahlenb. – Grusstorr	2	2	3	1	–	S	(15)
<i>C. krausei</i> Boeck. – Islandsstorr	3	3	2	1	1	S	(15a)
<i>C. lachenalii</i> Schkuhr – Rypestorr	1	2	2	2	2	B S	
<i>C. lidii</i> Hadač	2	2	2	2	1	S	(16)
<i>C. marina</i> Dewey subsp. <i>pseudolagopina</i> (Th. Sør.) Böcher – Buttstorr	3	3	3	2	2?	S	(15)
<i>C. maritima</i> Gunn. coll. – Bogestorr	1	2	2	1	1	S	(17)
<i>C. misandra</i> R. Br. – Dubbestorr	1	2	2	2	2	S	
<i>C. nardina</i> Fr. – Skjeggstorr	1	2	3	2	2	S	
<i>C. parallela</i> (Læst.) Sommerf. – Smalstorr	1	2	3	3	2?	S	
<i>C. rupestris</i> All. – Bergstorr	1	1	2	3	3	S	
<i>C. saxatilis</i> L. – Blankstorr	1	1	2	2	2	S	
<i>C. subspathacea</i> Wormskj. – Ishavsstorr	1	1	2	3	2	B S	
<i>C. ursina</i> Dewey – Isbjønnstorr	1	2	3	3	–	S	
<i>Cassiope hypnoides</i> (L.) D. Don – Moselyng	2	2	3	2	1	S	
<i>C. tetragona</i> (L.) D. Don – Kantlyng	1	2	2	3	1	S	
<i>Cerastium alpinum</i> L. coll. – Fjellarve	3	2	2	1	1	S	(21)
<i>C. arcticum</i> Lange coll. – Snørave	1	1	1	3	3	B S	(20)
<i>C. arcticum</i> × <i>regelii</i>	2	2	1	1	1	S	(19)
<i>C. cerastoides</i> (L.) Britton – Brearve	2	2	2	–	1	B	(22)
<i>C. regelii</i> Ostenf. – Polararve	1	2	2	2	–	B S	(18)
<i>Chrysosplenium tetrandrum</i> (N. Lund) Th. Fr. – Dvergmaigull	1	2	2	2	–	B S	
<i>Cochlearia groenlandica</i> L. coll. – Polarskjørbuksurt	1	2	2	3	3	B S	(23)

Scientific and Norwegian names	Ecosystem Component Values						
	R	P	E	A	I	B/S	Notes
<i>Cystopteris fragilis</i> (L.) Bernh. var. <i>dickieana</i> (R. Sim) Moore – Berglok	1	2	2	1	1	S	(24)
<i>Deschampsia alpina</i> (L.) Roem. & Schultes – Fjellbunke	1	1	2	3	3	B S	(26)
<i>D. borealis</i> (Trautv.) Roshev. – Tundrabunke	1	2	2	2	2?	S	(27)
<i>D. cespitosa</i> (L.) Beauv. – Sølvbunke	3	1	–	1	1	B S	(25)
<i>Draba alpina</i> L. – Gullrublom	1	1	2	1	2	B S	(28)
<i>D. alpina</i> × <i>subcapitata</i>	3	2	–	1	1	S	(33)
<i>D. arctica</i> J. Vahl – Mjølrublom	1	2	2	1	–	S	(30)
<i>D. arctica</i> × <i>corymbosa</i>	3	1	–	1	1	S	(33)
<i>D. corymbosa</i> R. Br. ex DC. – Puterublom	1	2	2	1	2	S	(28)
<i>D. corymbosa</i> × <i>micropetala</i>	3	2	–	1	1	S	(33)
<i>D. daurica</i> DC. – Skredrublom	1	1	2	1	1	S	(31)
<i>D. fladnizensis</i> Wulf. – Alperublom	2	2	2	1	1	S	
<i>D. lactea</i> Adams – Lapprublom	1	2	1	1	1	S	(32)
<i>D. lactea</i> × <i>oxycarpa</i>	3	2	–	1	1	S	(33)
<i>D. micropetala</i> Hook. – Polarrublom	1	2	2	1	1	S	(29)
<i>D. nivalis</i> Liljebl. – Snørublom	1	1	3	1	1	S	
<i>D. norvegica</i> Gunn. – Bergrublom	2	2	2	1	1	B S	
<i>D. oxycarpa</i> Sommerf. – Bleikrublom	1	2	1	1	2	B S	(28)
<i>D. pauciflora</i> R. Br. – Tundrabrublom	1	2	3	1	1	S	(29)
<i>D. subcapitata</i> Simm. – Halvkulerublom	1	2	2	1	1	S	
<i>Dryas octopetala</i> L. – Reinrose	1	1	2	3	3	S	(34)
<i>Dupontia fisheri</i> R. Br. – Tundragras	1	2	2	3	3	S	(35)
<i>D. psilosantha</i> (Rupr.) Griseb. – Sprikjetundragras	1	2	2	3	2	B S	(35)
<i>Empetrum nigrum</i> L. subsp. <i>hermaphroditum</i> (Hagerup) Böcher – Fjellkrekling	1	2	3	2	2	S	
<i>Equisetum arvense</i> L. subsp. <i>arvense</i> – Vanleg åkersnelle	3	1	–	1	1	S	(36)
<i>E. arvense</i> L. subsp. <i>boreale</i> (Bong.) Á. Löve – Polarsnelle	1	1	1	3	3	B S	(36)
<i>E. scirpoides</i> Michx. – Dvergsnelle	1	1	2	1	1	B S	
<i>E. variegatum</i> Schleich. ex Web. & Mohr – Fjellsnelle	1	1	2	1	1	B S	
<i>Erigeron humilis</i> R.C. Graham – Svartbakkestjerne	1	2	2	1	1	S	
<i>E. uniflorus</i> L. subsp. <i>eriocephalus</i> (J. Vahl) Cronq. – Ullbakkestjerne	3	3	–	1	1	S	
<i>Eriophorum angustifolium</i> Honck. subsp. <i>triste</i> (Th. Fr.) Hult. – Svartull	1	2	2	2	2	S	
<i>E. angustifolium</i> subsp. <i>triste</i> × <i>scheuchzeri</i>	3	3	2	2	1	S	(37)
<i>E. scheuchzeri</i> Hoppe – Snøull	1	1	2	3	2	S	
<i>Euphrasia frigida</i> Pugsley – Fjellaugnetrøst	3	3	3	1	1	S	
<i>Eutrema edwardsii</i> R. Br. – Polarreddik	1	2	2	1	1	S	
<i>Festuca baffinensis</i> Polunin – Hårsvingel	1	2	3	2	1	S	(38)
<i>F. brachyphylla</i> Schultes – Bergsvingel	3	3	–	1	–	S	(39)
<i>F. edlundiae</i> S. Aiken, Consaul & Lefkovitch	–	2	–	–	–	S	(39)
<i>F. hyperborea</i> Holmen – Polarsvingel	1	2	2	2	1	S	(39)
<i>F. hyperborea</i> × <i>rubra</i> subsp. <i>arctica</i>	3	2	–	–	–	S	(40)
<i>F. rubra</i> L. subsp. <i>arctica</i> (Hack.) Govor. – Arktisk raudsvingel	1	2	1	3	3	B S	(41)
<i>F. rubra</i> L. subsp. <i>rubra</i> – Vanleg raudsvingel	3	3	3?	2	1	S	(41)
<i>F. vivipara</i> (L.) Sm. – Geitsvingel	1	1	2	1	2	B S	(42)
<i>Gentianella tenella</i> (Rottb.) Börner – Småsåte	3	3	3	1	1	S	
<i>Hierochloë alpina</i> (Willd.) Roem. & Schultes – Fjellmarigras	1	2	3	2	2	S	
<i>Hippuris vulgaris</i> L. – Hesterumpe	2	3	3	2	2	B	
<i>Honkenya peploides</i> (L.) Ehrh. subsp. <i>diffusa</i> (Hornem.) Á. Löve – Strandarve	2	2	3	2	1	S	(43)
<i>Huperzia selago</i> (L.) Bernh. ex Schrank & Mart. subsp. <i>arctica</i> (Grossh.) Á. & D. Löve – Polarusegras	1	1	2	1	1	S	(44)
<i>Juncus arcticus</i> Willd. – Finnmarkssiv	3	2	3	1	1	S	
<i>J. biglumis</i> L. – Tvillingsiv	1	1	2	2	1	B S	

Scientific and Norwegian names	Ecosystem Component Values						
	R	P	E	A	I	B/S	Notes
<i>J. castaneus</i> Sm. – Kastanjesiv	3	3	3	1	1	S	
<i>J. triglumis</i> L. subsp. <i>albescens</i> (Lange) Hult. – Tundrasiv	2	2	2	1	1	S	(45)
<i>Kobresia simpliciuscula</i> (Wahlenb.) Mack. – Myrtust	3	3	3	1	1	S	
<i>Koenigia islandica</i> L. – Dvergsyre	1	1	2	1	1	B S	(46)
<i>Luzula arctica</i> Blytt – Snøfrytle	1	1	2	3	2	S	
<i>L. arcuata</i> Sw. subsp. <i>arcuata</i> – Bogefrytle	2	2	2	2	3	B S?	(47)
<i>L. arcuata</i> Sw. subsp. <i>confusa</i> (Lindeb.) Blytt – Vardefrytle	1	1	2	3	3	B? S	(47)
<i>L. wahlenbergii</i> Rupr. – Reinfrytle	2	2	3	1	1	S	
<i>Mertensia maritima</i> (L.) S.F. Gray – Østersurt	2	1	3	2	–	S	(48)
<i>Minuartia biflora</i> (L.) Schinz & Thell. – Tuvearve	1	1	2	2	1	S	
<i>M. rossii</i> (R. Br. ex Richardson) Graebn. – Putearve	1	2	3	1	1	S	(49)
<i>M. rubella</i> (Wahlenb.) Hiern – Nålearve	1	1	2	1	1	S	(50)
<i>M. stricta</i> (Sw.) Hiern – Grannarve	3?	2	2	1	1	S	
<i>Oxyria digyna</i> (L.) Hill – Fjellsyre	1	1	2	3	3	B S	
<i>Papaver dahlianum</i> Nordh. – Svalbardvalmue	1	2	2	3	3	B S	(51)
<i>Pedicularis hirsuta</i> L. – Lodnemyrklegg	1	2	1	1	2	S	
<i>P. lanata</i> Cham. & Schlecht. subsp. <i>dasycantha</i> (Trautv.) Hult. – Ullmyrklegg	1	3	3	1	2	S	
<i>Petasites frigidus</i> (L.) Fr. – Fjellpestrot	1	1	2	1	1	S	
<i>Phippsia algida</i> (Sol.) R. Br. – Snøgras	1	1	1	2	2	B S	
<i>P. concinna</i> (Th. Fr.) Lindeb. – Sprikjesnøgras	1	1	2	2	2	B S	
<i>Pleuropogon sabinii</i> R. Br. – Sabinegras	2	2	3	1	–	S	
<i>Poa abbreviata</i> R. Br. – Puterapp	1	2	3	1	2	S	
<i>P. alpina</i> L. var. <i>alpina</i> – Fjellrapp, seminiferous type	3	2	3	1	1	B S	(52)
<i>P. alpina</i> L. var. <i>vivipara</i> L. – Fjellrapp, viviparous type	1	1	2	3	3	B S	(52)
<i>P. arctica</i> R. Br. – Jervrapp, seminiferous type	1	1	1	2	3	S	(53)
<i>P. arctica</i> R. Br. – Jervrapp, viviparous type	1	1	1	3	3	S	(53)
<i>P. arctica</i> R. Br. subsp. <i>cespitans</i> (Simm.) Nannf. – Tuvrapp	1	2	2	2	3	S	(53)
<i>P. glauca</i> J. Vahl – Blårapp	1	2	2	1	1	S	(54)
<i>P. hartzii</i> Gand. – Strirapp	2	3	3	2	1	S	(55)
<i>P. pratensis</i> L. subsp. <i>alpigena</i> (Fr.) Hiit. – Seterrapp, seminiferous type	1	1	2	2	3	B S	(56)
<i>P. pratensis</i> L. subsp. <i>alpigena</i> (Fr.) Hiit. – Seterrapp, viviparous type	1	1	2	2	3	S	(56)
<i>Polemonium boreale</i> Adams – Polarflukk	1	2	2	2	1	S	
<i>Potentilla chamissonis</i> Hult. – Flogmure	2	2	3	2	1	S	(58)
<i>P. crantzii</i> (Cr.) G. Beck ex Fritsch – Flekkmure	1	2	2	2	1	S	(60)
<i>P. hyperctica</i> Malte – Raggmure	1	2	2	2	1	S	
<i>P. × insularis</i> Soják – Svalbardmure	2	3	3	1	1	S	(59)
<i>P. nivea</i> L. subsp. <i>subquinata</i> (Lange) Hult. – Svalbardsnøemure	2	3	3	2	1	S	(57)
<i>P. pulchella</i> R. Br. – Tuvemure	1	2	3	3	2	S	(61)
<i>Puccinellia angustata</i> (R. Br.) Rand & Redf. subsp. <i>angustata</i> – Polarsaltgras	1	2	2	3	3	S	(62)
<i>P. angustata</i> (R. Br.) Rand & Redf. subsp. <i>palibinii</i> (Th. Sør.) Tzvelev – Kjeldesaltgras	3	3	3	1	–	S	(62)
<i>P. capillaris</i> (Liljeb.) Jansen – Taresaltgras	3	2	3	1	1	B	(63)
<i>P. phryganodes</i> (Trin.) Scribn. & Merr. coll. – Teppesaltgras	1	1	3	3	2?	B S	(64)
<i>P. svalbardensis</i> Rønning – Svalbardsaltgras	3	3	3	–	1	S	(65)
<i>P. vahlana</i> (Liebm.) Scribn. & Merr. – Fimbulgras	1	2	2	1	2	S	
<i>X Puccinhippsia vacillans</i> (Th. Fr.) Tzvelev – Svalbardgras	1	3	2	2	1	S	(66)
<i>Ranunculus affinis</i> R. Br. – Fliksoleie	2	2	3	1	1	S	(67)
<i>R. affinis</i> × <i>sulphureus</i>	3	2	–	1	1	S	(71)
<i>R. glacialis</i> L. – Issoleie	2	3	–	–	–	S	
<i>R. hyperboreus</i> Rottb. subsp. <i>arnellii</i> Scheutz – Tundrasoleie	1	2	2	2	1	S	(69)
<i>R. hyperboreus</i> Rottb. subsp. <i>hyperboreus</i> – Setersoleie	2	2	2	2	1	B	(69)

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<i>R. lapponicus</i> L. – Lappsoleie	1	2	2	2	1	S	
<i>R. nivalis</i> L. – Snøsoleie	1	1	2	2	1	S	
<i>R. nivalis</i> × <i>pygmaeus</i>	3	1	–	1	1	S	(71)
<i>R. pallasii</i> Schlecht. – Glinsesoleie	2	2	3	2	1	S	
<i>R. pygmaeus</i> Wahlenb. – Dvergssoleie	1	1	2	2	1	B S	
<i>R. pygmaeus</i> × <i>sulphureus</i>	3	1	2	1	–	S	(71)
<i>R. × spetsbergensis</i> (Nath.) Hadač – Svalbardsoleie	1	3	3	2	1	S	(70)
<i>R. sulphureus</i> Sol. – Polarsoleie	1	2	1	2	2	B S	
<i>R. wilanderi</i> (Nath.) Á. & D. Löve – Wilandersoleie	3	3	2	1	1	S	(68)
<i>Rhodiola rosea</i> L. subsp. <i>arctica</i> (A. Boriss.) Á. & D. Löve – Arktisrosenrot	2	3	3	2	2	B S	
<i>Rubus chamaemorus</i> L. – Molte	2	2	2	1	1	S	
<i>Rumex acetosa</i> L. coll. – Engsyre	3	1	3	–	–	B S?	(72)
<i>Sagina cespitosa</i> (J. Vahl) Lange – Stuttarve	3	3	–	1	1	S	
<i>S. nivalis</i> (Lindbl.) Fr. – Jøkularve	1	1	1	2	1	B S	
<i>Salix arctica</i> Pallas – Tundravier	3	2	2	1	1	S	(73)
<i>S. herbacea</i> L. – Musøyre	2	3	2	2	2	B S	
<i>S. herbacea</i> × <i>polaris</i>	2	2	2	1	2	B S	(74)
<i>S. polaris</i> Wahlenb. – Polarvier	1	1	1	3	3	B S	
<i>S. reticulata</i> L. – Rynkevier	1	1	2	2	1	B S	
<i>Saussurea alpina</i> (L.) DC. – Fjelltistel	3	3	–	1	1	S	(75)
<i>Saxifraga aizoides</i> L. coll. – Gulsildre	1	1	3	2	1	B S	(76)
<i>S. cernua</i> L. – Knoppsildre	1	1	1	3	3	B S	
<i>S. cespitosa</i> L. coll. – Tuvesildre	1	1	1	3	2	B S	(77)
<i>S. flagellaris</i> Sternb. & Willd. subsp. <i>platysepala</i> (Trautv.) A.E. Porsild – Trådsildre	1	2	2	1	1	S	(78)
<i>S. foliolosa</i> R. Br. – Grynsildre	1	1	2	1	1	B S	
<i>S. hieracifolia</i> Waldst. & Kit. – Stivsildre	1	2	2	2	2	S	
<i>S. hirculus</i> L. coll. – Myrsildre	1	2	2	2	2	B S	(79)
<i>S. hyperborea</i> R. Br. – Polarsildre	1	2	2	2	1	S	(80)
<i>S. hyperborea</i> × <i>rivularis</i>	3	2	–	1	1	S	(80)
<i>S. nivalis</i> L. – Snøildre	1	1	1	2	2	B S	
<i>S. oppositifolia</i> L. coll. – Raudsildre	1	1	1	3	3	B S	(81)
<i>S. rivularis</i> L. – Bekkesildre	1	1	2	1	1	B S	(80)
<i>S. svalbardensis</i> Øvstedal – Svalbardsildre	1	3	3	1	1	S	(82)
<i>S. tenuis</i> (Wahlenb.) H. Sm. – Grannsildre	1	1	1	2	1	B S	
<i>Sibbaldia procumbens</i> L. – Trefingerurt	3	3	3	1	1	S	
<i>Silene acaulis</i> (L.) Jacq. – Fjellsmelle	1	1	2	2	1	B S	
<i>S. furcata</i> Rafn. subsp. <i>furcata</i> – Polarjonsokblom	1	2	2	1	1	S	
<i>S. uralensis</i> (Rupr.) Bocq. – Polarblindurt	1	1	2	1	2	S	(83)
<i>Stellaria humifusa</i> Rottb. – Ishavstjerneblom	1	2	3	3	1	B S	
<i>S. longipes</i> Goldie coll. – Snøstjerneblom	1	1	1	2	2	S	(84)
<i>Taraxacum arcticum</i> (Trautv.) Dahlst. – Arktisløvetann	1	2	2	1	1	S	
<i>T. brachyceras</i> Dahlst. – Polarløvetann	2	2	3	1	1	S	
<i>T. cymbifolium</i> H. Lindb. ex Dahlst. – Bjørnløvetann	3	3	3	2	1	B	
<i>Tofieldia pusilla</i> (Michx.) Pers. – Bjønnbrodd	2	3	2	1	1	S	
<i>Trisetum spicatum</i> (L.) K. Richter – Svartaks	1	1	3	3	–	S	
<i>Vaccinium uliginosum</i> L. subsp. <i>microphyllum</i> Lange – Polarblokkebær	3	3	–	1	1	S	(85)
<i>Woodsia glabella</i> R. Br. – Dverglodnebegne	3	2	3	1	1	S	



## Notes

(1) *Achillea millefolium* L.

Introduced, established at Barentsburg (Tishkov pers. comm.), seen as late as 1993 and 1996 and possibly reproducing by seed (Elven unpubl.).

(2) *Alchemilla glomerulans* Bus.

*Alchemilla vulgaris* L. coll., as applied by Rønning (1979), includes several introduced agamospecies. The only species of the genus presumed to be stable today is *A. glomerulans*, reported from Bjørnøya by Engelskjøn (1986a), but several years old individuals of *A. subcrenata* Bus. were seen at Barentsburg in 1993 (Elven unpubl.) and 1996 (Brosø unpubl.).

(3) *Arctagrostis latifolia* (R. Br.) Griseb.

Dahl & Hadač (1946) described var. *hirta* from Kapp Wijk, Isfjorden area, probably of small taxonomic importance.

(4) *Arnica angustifolia* M. Vahl

Both Svalbard and northern Scandinavian plants belong to the widely distributed subsp. *angustifolia* (Downie 1988). Previously reported as *A. alpina* (an invalid name for this taxon, see Downie 1988) and considered to be endemic to the North Atlantic area.

(5) *Atriplex* cf. *prostrata* Bouch. ex DC.

Found by Lundberg in 1991 as a single, sterile specimen on Bjørnøya (UME). The determination is uncertain, since bracteoles and mature fruits are needed for a safe identification; the plant may also belong to *A. longipes* Drej. (subsp. *praecox* (Hülph.) Turess.). Both taxa are obviously unable to reproduce in the Arctic proper. The northernmost reproducing populations are found on the coasts of Finnmark, northern Norway and the Rybachi Peninsula, Russia. The plant has probably reached Bjørnøya by ocean currents.

(6) *Barbarea vulgaris* R. Br.

Introduced, but occurring in Barentsburg in large amounts in 1993 and 1996, well established and evidently reproducing by seeds (Elven unpubl.). It is not known to which of the two subspecies, subsp. *vulgaris* or subsp. *arcuata* (Opiz ex J. & C. Presl) Simonk., the Svalbard plants belong.

(7) *Betula nana* L. coll.

The Svalbard material differs from alpine Scandinavian material in occurrence of glands on young twigs and in more rhomboid and deeply dentate leaves. Plants with rhomboid leaves have previously been reported from Svalbard as f. *flabellifolia* Hook by Asplund (1918). These features, and especially the presence of glands, may indicate that the Svalbard plants belong to the widespread arctic-subarctic hybrid complex between *B. nana* and the American *B. glandulosa* Michx. In Russia this complex is treated as a separate species, *B. tundrarum* Perf. (see Tolmachev 1966), distributed north of *B. nana* s. str. in the Russian Arctic. However, some Russian botanists (B. A. Yurtsev, pers. comm.) consider the glands to be of little taxonomic importance.

(8) *Botrychium boreale* Milde

Found in 1981 at the warm springs of Bockfjorden, as one specimen intermingled in a population of *B. lunaria* that was discovered there a few years before. It was also collected in 1990 in Andrée Land between Wijdefjorden and Woodfjorden. See Elvebakk et al. (1994).

(9) *Cakile maritima* Scop. subsp. *islandica* (Gand.) Elven

Collected once in 1939 at Deltaneset in the Isfjorden area (Hadač 1942, 1944) as *C. maritima*. The diaspore has probably reached the area by ocean currents. This annual plant is not able to reproduce in the Arctic (Elven & Gjelsås 1981). The northernmost reproducing populations are found in the transition zone between boreal areas and the Arctic at Varangerhalvøya Peninsula, northern Norway. The material was reported as *C. arctica* Pobed. by Elven & Gjelsås (1981), but this taxon is closely related to and not reproductively

isolated from *C. maritima* and is probably best considered as a subspecies.

(10) *Campanula rotundifolia* L. subsp. *giesekiana* (Vest) Witasæk

The single known Svalbard population, at Colesdalen in the Isfjorden area, is large and probably native, occurring in intact vegetation (Engelskjøn & Spjelkavik pers. comm.). It is, however, situated in an area heavily influenced by human activities during a long time. The diploid chromosome number ( $2n = 34$ , Flovik 1940) separates it from *C. rotundifolia* s. str. (subsp. *rotundifolia*), cf. also Laane (1968) and Croffin Engelskjøn (1979).

(11) *Carex aquatilis* Wahlenb. subsp. *stans* (Drejer) Hult.

The only confirmed Svalbard population is situated at Forkdalen, Wijdefjorden. Most reports of *C. aquatilis* coll. from Svalbard, and all reports of the related *C. bigelowii*, refer as far as herbarium specimens are available to large-grown specimens of *C. subspathacea* (cf. the preliminary determination by Engelskjøn et al. 1972, Engelskjøn unpubl., and Elven unpubl.). A recent collection from southern Spitsbergen (Dubiel 1985) has also been redetermined as *C. subspathacea* (Dubiel 1990).

(12) *Carex aquatilis* Wahlenb. subsp. *stans* (Drejer) Hult.  $\times$  *subspathacea* Wörmskj.

Collections referred to as *C. bigelowii* from Forkdalen have been redetermined as this hybrid (Engelskjøn in O).

(13) *Carex capillaris* L. s. str.

Only known from the warm springs area at Bockfjorden (Rønning 1961). A report from Forlandssundet (Gugnacka-Fiedor & Noryskiewicz 1982) is erroneous (Gugnacka pers. comm.).

(14) *Carex glacialis* Mack.

Recently found at several localities in the Kongsfjorden–Engelsbukta area (Elvebakk 1989).

(15) *Carex glareosa* Wahlenb. and *Carex marina* Dewey subsp. *pseudolagopina* (Th. Sør.) Böcher

Three names have been in use in this group in a Svalbard context: *C. amblyrhyncha* V. Krecz. (described in 1935, based on material from the Sayan Mountains in C Asia), *C. glareosa* Wahlenb. (described in 1803, based on material from Finnmark, northern Norway and the Bothnian Bay, northern Sweden), and *C. marina* Dewey (described in 1836, based on material from the “Arctic Coast”, i.e. the Canadian Arctic), see Halliday & Chater (1969a; 1969b). Only two taxa (species) are present in Svalbard.

The confusion has its main origin in misapplications of the name *C. marina*. Halliday & Chater (1969b) have convincingly shown that the type of *C. marina* belongs to the same species as the type of *C. amblyrhyncha* (or “*amblyorhyncha*”), and that this traditionally accepted name for one of the Svalbard taxa therefore is predated by *C. marina*. *Carex marina* is only known from a few places in mires in the climatically favourable areas of inner Isfjorden and has recently also been reported from Germaniahelvøya at Liefdefjorden (Thannheiser 1992). The Svalbard material belongs to the northern subsp. *pseudolagopina*, as demonstrated by Böcher (1952) in his revision of the group. The recombination under *C. marina* was made by Böcher in Halliday & Chater (1969b).

The name *C. marina* has, however, for a long time been applied for parts of the seashore species *C. glareosa*, e.g. by Hadač (1942, 1944) which reported *Carex marina* from Svalbard and thought that this species replaced *C. glareosa* here. Rønning (1972) considered *C. glareosa* var. *amphigena* (see below), a name used for some Svalbard plants, to be a synonym of *C. marina*. However, in the herbarium materials from Svalbard the name *C. marina* has been applied mainly to the clearly different *C. lachenalii*.

The material referred to by Wahlenberg (1803) in the original description of *C. glareosa* differs in shape of utriculus from both the more southern, the western and the arctic materials, as shown by Halliday & Chater (1986a). The major parts of the material, including the Svalbard plants, have therefore been placed in a var. *amphigena* Fernald (described in 1906 on material from Quebec), either under *C. glareosa* or more often under *C. marina*. Halliday & Chater (1969a) demonstrated

that there is a continuous transition from the narrow-“fruited” type of *C. glareosa* found in the Baltic, in northernmost Norway and in the White Sea area to the more broad-“fruited” type found in western Scandinavia, the Arctic proper, Greenland and eastern North America. They also chose to select an illustration of a more broad-“fruited” type, referred to by Wahlenberg (1803), as lectotype, as the description of Wahlenberg does not agree with the herbarium specimens he referred to. There seems to be no reason for separating *C. glareosa* into two species (or subspecies), and in any case, the name *C. marina* does not apply to any of the types.

The correct names for the two Svalbard species are therefore *C. glareosa* Wahlenb. for the sea-shore plant and *C. marina* Dewey subsp. *pseudolagopina* (Th. Sør.) Böcher for the rare mire plant.

#### (15a) *Carex krausei* Boeck.

Recently (1996) found in a single locality in the Isfjorden area (Elven et al. in press). The occurrence in Spitsbergen is very isolated; the species is otherwise found north to the Scoresbysund area in E. Greenland and the northernmost Ural mountains. The Svalbard plants belong to subsp. *porcildiana* (Polunin) Á. & D. Löve.

#### (16) *Carex lidii* Hadač

Described as *C. lidii* by Hadač (1942, 1944) from Vindodden in the Isfjorden area, and later reported (Neilson 1970) and collected from several other localities. *Carex lidii* has previously been considered as the hybrid *C. maritima paralela*. It forms large stands, sometimes in absence of one or both the putative parental species. Seeds have not been found. Øvstedal & Haaland (1996) argue convincingly against the proposed hybrid origin and tentatively accept *C. lidii* either as a separate species, closely related to *C. maritima*, or as an old hybrid between *C. maritima* and a now extinct (or undiscovered) species in Svalbard.

#### (17) *Carex maritima* Gunn. coll.

Arctic plants have been treated as subsp. *setina* (Christ) Egorova or as *C. setina* (Christ) V. Krecz. The Svalbard plants belong to this type. They differ from the majority of Scandinavian plants in

quantitative features only (being smaller in all parts), but may deserve a subspecific status.

#### The *Cerastium alpinum*–*arcticum* complex (notes 18–21)

The polymorphic *Cerastium alpinum*–*arcticum* complex consists of numerous taxa inhabiting the Arctic and mid-latitude mountain ranges. It has a center of variation around the North Atlantic. At least six taxa are published from Svalbard (Tolmachev 1930, Hultén 1956, Böcher 1977): *C. alpinum* L. subsp. *lanatum* (Lam.) Aschers. & Graebn., *C. arcticum* Lange var. *vestitum* Hult., var. *procerum* Hult. and var. *sordidum* Hult., *C. hyperboreum* Tolm., and *C. regelii* Ostenf. The delimitation of species, and the degree and cause of subspecific variation, is disputed, as seen from the divergent treatments by Hultén (1956), Böcher (1977), and Jonsell (in prep., Flora Nordica). Hultén treated the complex as a case of ongoing circumpolar hybridisation and introgression, with several varieties interpreted to be of a fairly recent hybridogenous origin. Böcher treated it as an old polyploid complex, and Jonsell tends to agree with Böcher.

In our opinion, three taxa at level of species can be recognised in Svalbard. Each of these is variable, to some degree, but probably not deserving a subspecific division within Svalbard. In addition, some hybridisation occurs.

A summary of the ongoing studies of the North Atlantic variation in the complex is presented by Hagen et al. (1995).

#### (18) *Cerastium regelii* Ostenf.

*Cerastium regelii* is a distinct species, differing from the other *Cerastium* species in e.g. a more contracted growth, round and glabrescent leaves, and by producing bulbils in the shoot apices. The main way of propagation is by these bulbils. Flowering commences in late summer, but mature seeds have never been found in northern arctic populations (Heide et al. 1990), probably due to the late flowering. Recently, *C. regelii* has been found to be conspecific with *C. jenisejense* Hult., a more southern plant without bulbils, flowering early in the season and reproducing by seed. The shift between production of bulbils and flowering was shown to be governed by day length and

spectral characteristics (Heide et al. 1990). The name *C. regelii* has priority. The species is octoploid ( $2n = 72$ ) both in Svalbard (Engelskjøn 1979) and elsewhere (Löve & Löve 1975). The amphi-Atlantic parts of the species are often considered as a separate subspecies, subsp. *cespitosum* (Malmgr.) Tolm.

(19) *Cerastium arcticum* Lange  $\times$  *regelii* Ostenf.

There is good morphological evidence for the existence of the hybrid *C. arcticum*  $\times$  *regelii* in Svalbard. The hybrid was not recognised by Rønning (1979), but has been reported by Høeg (1968) and Kuc & Dubiel (1995) from Hornsund, by Engelskjøn (1986a) from Bjørnøya, by Dubiel (1990) from Sørkapp Land, and we have identified it as frequent in several parts of Svalbard, often mixed with one or both of the putative parent species (Elven & Elvebakk unpubl.). The report of the hybrid *C. alpinum*  $\times$  *regelii* by Tolmachev (1930) may well refer to the same combination, possibly also the var. *sordidum* of *C. arcticum* described by Hultén (1956). The hybrid differs from *C. regelii* in more elongated and pubescent leaves and in a profuse flowering from early in the season. In view of the late and infrequent flowering of *C. regelii*, the occurrence of this hybrid is remarkable and an experimental study of Svalbard populations would be interesting.

(20) *Cerastium arcticum* Lange coll.

What traditionally has been named *C. arcticum* Lange probably represents the most problematic group of taxa in the *C. alpinum*—*arcticum* complex (see references above). *Cerastium arcticum* coll. is amphi-Atlantic, distributed in the northern parts of the British Isles, the Fennoscandian mountain range, Iceland, the eastern Canadian Arctic, Greenland, the Norwegian arctic islands, and the northwestern Russian arctic islands. Three species have been described within *C. arcticum* coll.: *C. arcticum* Lange s. str., typified by material from Upernavik in western Greenland (Hultén 1956), *C. nigrescens* (H.C. Watson) Edmondst. ex H.C. Watson (*C. edmondstonii* (H.C. Watson) Murb. & Ostenf.), a serpentinicolous plant from Shetland, and *C. hyperboreum* Tolm., typified by material from Svalbard (Tolmachev 1930). However, Tolmachev (1971)

later regarded *C. hyperboreum* Tolm. as a synonym of *C. arcticum* Lange. Their specific delimitation is disputed, as is the nomenclature. In the most recent survey, Jonsell (in prep., Flora Nordica) argues for a broad species concept.

Chromosome counts of *C. arcticum* from the North Atlantic area (Iceland, Bjørnøya, Scandinavia) resulted in the dodecaploid number  $2n = 108$  (Brett 1953, 1955, Löve & Löve 1956, Jørgensen et al. 1958, Engelskjøn 1979, Hagen & Sæther 1993). No counts have been made, as far as we know, on material from Spitsbergen and the eastern Svalbard islands. From neighbouring arctic areas both the dodecaploid number (northern Greenland, Holmen 1952 and Jørgensen et al. 1958), and the hexaploid number  $2n = 54$  (Greenland, Böcher & Larsen 1950; the Russian Arctic, Sokolovskaya & Strelkova 1960) have been reported. Löve & Löve (1975) referred the hexaploid plants to *C. hyperboreum* Tolm., without further documentation.

The diagnostic characters are combined in a different way in North Atlantic and arctic populations of *C. arcticum* (Hagen & Sæther 1993; Schjöll 1995). The Icelandic and Scandinavian plants are characterised by densely tufted growth, short and broad leaves, a scattered indumentum of fairly short, few-celled hairs, bracteoles without a scarious border, a rounded calyx, and a rugose seed surface. They are mainly plants of late snowbeds (Scandinavia) and lava fields (Iceland), on circumneutral to alkaline soils. The Spitsbergen and Greenland plants are characterised by more open growth, larger and more narrow leaves, a usually dense indumentum of long but few-celled hairs, bracteoles often with a scarious border, a less rounded calyx, and an acutely tuberculate seed surface. They are mainly plants of open habitats, but not of late snowbeds (where they are replaced by *C. regelii*), on both acidic and alkaline soils. The deviating morphological features of the Greenland and Spitsbergen plants (except for the number of cells in the hairs), as well as the habitat preferences, are shared with Scandinavian *C. alpinum* and partly with Greenland *C. alpinum*. This probably explains the numerous (and mostly erroneous) reports of *C. alpinum* from Svalbard, see note (21). Preliminary genetic investigations by iso-enzyme electrophoresis (Hagen & Sæther 1993, Schjöll 1995) showed Greenland and Spitsbergen populations of *C. arcticum* to be widely different from



southern Scandinavian and Icelandic populations both of *C. alpinum* and of *C. arcticum*.

The southern (southern Scandinavia, Iceland) and the northern plants (Greenland, Spitsbergen) obviously belong to different taxa, at level of subspecies or species. The material selected by Hultén (1956) as a type of *C. arcticum* Lange (from Upernavik in western Greenland, UPS, selected by Hultén 1956), belongs to the northern type (Schjöll 1995), and the later name *C. hyperboreum* Tolm. is therefore superfluous in any case. The southern type, including the Scandinavian material, must be compared (morphologically and genetically) with British material before final naming, because both the available names at level of species (*C. nigrescens* and *C. edmonstonei*) are based on the British serpentine plants.

Another model may be that the entire complex, including *C. arcticum* s. lat. and both Scandinavian and arctic *C. alpinum* (see note 21), has a complicated polyphyletic origin involving several ploidy levels. They may be considered as several entities (subsp.) within a very widely defined *C. alpinum*. In view of these unsolved problems, a division of the Svalbard material of *C. arcticum* into several subspecific taxa (as done by Hultén 1956 and partly by Böcher 1977) is premature.

Based on morphological evidence alone extensive hybridisation has been postulated between *C. alpinum* and *C. arcticum* (see e.g. Hultén 1956). This has not yet been clarified by chromosomal evidence. There is one intermediate chromosome number of  $2n = 90$  from southern Norway (Engelskjøn 1979), and also combined morphological and iso-enzyme electrophoretic evidence for hybridisation (Hagen & Sæther 1993). Hybrid strains are to be expected in West Spitsbergen, but have not yet been confirmed.

#### (21) *Cerastium alpinum* L. coll.

The presence of *C. alpinum* in Svalbard has been disputed. The characters used for separating the arctic strains of *C. alpinum* and *C. arcticum* in the floras are ambiguous, and most examined specimens from Svalbard labelled as *C. alpinum* clearly belong to *C. arcticum* as defined above (note 20). Most or all published reports of *C. alpinum* probably refer to *C. arcticum* (i.a. Środoń 1960; Sunding 1962; Hofmann & Thannheiser 1972; Tishkov 1985; Godzik &

Wójcicki 1987; Świąż 1988; van der Knaap 1985, 1988). The distribution reported by Rønning (1964, 1979) is also too wide.

An octoploid chromosome number ( $2n = 72$ ) is reported in *C. alpinum* from all parts of its distribution range (Brett 1950, 1952; Böcher & Larsen 1950; Löve & Löve 1956; Hedberg 1967; Engelskjøn 1979; Hagen & Sæther 1993), until recently not including Svalbard. A single dodecaploid count ( $2n = 108$ ) was recently made from a morphologically well-defined *C. alpinum* from southern Norway (Hagen & Sæther 1993).

Dubiel (1990) reported *C. alpinum* (as subsp. *lanatum*) from Sørkapp Land. The material (seen by us) corresponds morphologically to *C. alpinum* as recognised elsewhere in the Arctic, and the identification is supported by the chromosome count of  $2n = 72$  (Dubiel 1990). Kuc & Dubiel (1995) report the species (as subsp. *lanata*) as locally frequent in a small area south of Hornsund. Morphologically similar plants were found in a few places along the western coast of Spitsbergen northwards to Magdalenefjorden, and in the Isfjorden area (Elven unpubl.).

Three subspecies of *C. alpinum* have been recognised from the North Atlantic area (Hultén 1956). Hultén and subsequent authors have referred the arctic plants to a subsp. *lanatum* (Lam.) Aschers. & Graebn. This subspecies was, however, described from C Europe and has a relatively thermophilous, montane to low alpine distribution in C Europe and in Fennoscandia. Similar biotypes also occur in Iceland and in southernmost Greenland. They differ from the truly arctic representatives named as subsp. *lanatum* in several features: a dense indumentum of soft, white hairs, short and ovate to broadly lanceolate, subobtus leaves, and comparatively small flowers. The northern arctic plants are coarser, have a coarse indumentum of stiff, greyish hairs, long and narrowly lanceolate, acute leaves, and comparatively large flowers. This northern arctic representative replaces subsp. *lanatum* s. str. in northern Greenland as it does on Jan Mayen and in Svalbard (Elven unpubl.). In a morphological analysis northern arctic *C. alpinum* (from several sites in western Greenland) was as distinct from Scandinavian *C. alpinum* as it was from southern and northern *C. arcticum* (Schjöll 1995). The superficial similarity of the southern and northern representatives may represent parallel evolution of the 'lanate' feature, and the subspecific name should be avoided for arctic

populations. The arctic type probably deserves rank of subspecies, "*C. alpinum* L. (ssp.)", but as far as we know no published name is available.

(22) *Cerastium cerastoides* (L.) Britton

Only known from Bjørnøya (Engelskjøn & Schweitzer 1970, Engelskjøn 1986a). A report from Forlandssundet, West Spitsbergen (Gugnacka-Fiedor & Noryskiewicz 1982) has proved to be erroneous (rev. Elvebakk).

(23) *Cochlearia groenlandica* L. coll.

In the Arctic only diploid chromosome numbers are known in *Cochlearia*,  $2n = 14$  (base number 7) on Bjørnøya, in Svalbard, Iceland, Greenland, in the American Arctic and in northeastern Asia, and  $2n = 12$  (base number 6) in Iceland (Nordal & Laane 1990). These diploids ( $x = 6, 7$ ) are now placed in *C. groenlandica* L. (including *C. fenestrata* R. Br.). Taxa with base number  $x = 7$  were placed by Löve & Löve (1975, 1976) in a separate genus, *Cochleariopsis* Á. & D. Löve. No morphological or physiological characters are found to separate the  $2n = 14$  and  $2n = 12$  biotypes in Iceland (Nordal & Laane 1990), and there is evidence indicating that the base number of  $x = 7$  has originated by primary tetrasomy in the  $2n = 12$  plants (see Gill 1973). There is therefore no reason to separate these taxa in two genera. In accordance with Nordal et al. (1986) the diploid arctic plants are recorded here as *C. groenlandica*.

All previous reports from Svalbard of *C. officinalis* L., *C. arctica* Schlecht., *C. fenestrata* R. Br., and *C. anglica* L., i.e. by Rønning (1964, 1979), probably refer to *C. groenlandica*. In modern opinion (see Nordal et al. 1986, Nordal & Stabbetorp 1990), *C. officinalis* s. lat. includes only tetraploid biotypes ( $2n = 24$ ) with base chromosome number  $x = 6$ , and is distributed in northwestern Europe north to northern Norway and northern mainland Russia. *Cochlearia anglica* has proved to be octoploid ( $2n = 48$ ) with the same base number and is (as far as known) restricted to western Europe northwards to Denmark and the British Isles.

A large eco-geographical variation exists in *C. officinalis*, now divided into several subspecies (Nordal & Stabbetorp 1990). A similar variation is observed in *C. groenlandica* (Nordal & Laane

1990, Galteland et al. 1995, own experiences), but no subspecific division has yet been attempted.

(24) *Cystopteris fragilis* (L.) Bernh. var. *dickieana* (R. Sim) Moore

The Svalbard plants of *C. fragilis* have rugose spores (as opposite to echinate), a partly distinct leaf morphology, and they have usually been referred to subsp. *dickieana* (R. Sim) Hyl. (or *C. dickieana* R. Sim). The spore ornamentation is the only distinctive feature in common between the plants from different areas placed in *C. dickieana*. It is not consistently associated with any other morphological features, and similar leaf types as found in the Svalbard plants are found in Icelandic specimens with echinate spores. The spore ornamentation may be a more or less spurious feature determined by a single or a few genes, and it is questionable if the plants with rugose spores deserve any taxonomic rank (see e.g. Haufler et al. 1993). At present, however, we follow Berg (1992) in describing them at variety level.

The *Deschampsia cespitosa* complex (notes 25–27)

The *D. cespitosa* complex is taxonomically intricate within its circumpolar area. From the northern parts of the Russian Arctic Tzvelev in Tolmachev (1964) recorded three indigenous species: *D. alpina* (L.) Roem. & Schultes north to Zemlja Frantsa-Josifa and *D. borealis* (Trautv.) Roshev. and *D. brevifolia* R. Br. north to northern Novaja Zemlja. The latter taxon was not accepted for the European Arctic by Tzvelev (1984). From the northeastern parts of the Canadian Arctic and in Greenland, Porsild (1957) and Porsild & Cody (1980) reported three indigenous species: *D. alpina* in southern Greenland and Labrador, *D. brevifolia* in the northern parts, and *D. pumila* (Trin.) Ostenf. in central and northern parts, but not in northernmost Greenland. In addition *D. cespitosa* (L.) Beauv. s. str. occurs as an introduction in most arctic areas.

Tzvelev (1984) treated the variation within the former U.S.S.R. area as 17 subspecies of a polymorphic *D. cespitosa*, among them subsp. *alpina* (L.) Tzvelev, subsp. *borealis* (Trautv.) Á. & D.

Löve, subsp. *brevifolia* (R. Br.) Tzvelev, subsp. *cespitosa*, subsp. *glauca* (Hartm.) Hartm., and subsp. *paramushirensis* (Honda) Tzvelev (= *D. paramushirensis* Honda and *D. pumila* (Trin.) Ostenf.).

The Svalbard material belongs to three recognizable taxa, only one of which is problematic with respect to nomenclature, viz. *D. borealis* below. The taxa are well separated, morphologically and ecologically, and are here regarded as species.

(25) *Deschampsia cespitosa* (L.) Beauv.

The seminiferous *D. cespitosa* is introduced and persists at least in Barentsburg (Tishkov pers. comm., Elven unpubl.) and probably also on Bjørnøya (Engelskjøn & Schweitzer 1970, Engelskjøn 1986a). From other areas it is known to be mostly diploid ( $2n = 26$ , Engelskjøn 1979).

(26) *Deschampsia alpina* (L.) Roemer & Schultes

The pseudoviviparous *D. alpina* is common all over the islands and is morphologically fairly uniform and well separated from *D. cespitosa*. *Deschampsia alpina* is amphi-Atlantic, may have arisen from *D. cespitosa* or from hybrid(s) between *D. cespitosa* and other arctic taxa, and may therefore have a polyphyletic origin. The Svalbard plants are polyploid ( $2n = 39-50$ , Flovik 1938, Engelskjøn 1979).

(27) *Deschampsia borealis* (Trautv.) Roshev.

This seminiferous species is morphologically distinct in Svalbard, but has partly been overlooked in the field and to a large extent confused with the pseudoviviparous *D. alpina* in the herbarium. *Deschampsia borealis* is a tussock grass of shallow mires and wet, silty sedimentation flats, mainly on calcareous substrates. The plants are loosely tufted, composed of stiff but very narrow (convolute) leaves, 1/4–1/2 the length of mature culms. The stems are slender, carrying an open panicle with whitish to pale yellow spikelets. It flowers too late in the season to produce fruits regularly. A diploid chromosome number ( $2n = 26$ , Engelskjøn unpubl.) is known from Svalbard material.

In the beginning of this century the taxon was considered as *D. cespitosa* (as opposed to *D. alpina*). Hadač (1942) interpreted it as *D. brevifolia* (*D. cespitosa* subsp. *brevifolia*, described from Melville Island in the Canadian Arctic), a view accepted e.g. by Rønning (1964, 1979) and by Clarke (1980). Tzvelev (1984) treated *D. arctica* (Spreng.) Merr. as a synonym. However, as demonstrated by Porsild (1957), Porsild & Cody (1980), and McLachlan et al. (1989) *D. brevifolia* is quite different from the Svalbard taxon, being densely tufted with short, stout leaves, short and stiffly erect culms, and a contracted, short-branched panicle with distinctly bronze or purple coloured spikelets. Porsild & Cody (1980) reported the habitats as "hummocky and frost-heaved rather wet soils, and occasionally in turfy places in tundra".

Another species to consider is *D. pumila*. It was originally described from Kamtchatka, and the name was treated by Tzvelev (1984) and McLachlan et al. (1989) as a synonym of *D. paramushirensis* (*D. cespitosa* subsp. *paramushirensis*), originally described from the Kuril Islands. It was reported by Porsild (1957) as endemic in the eastern American Arctic (in spite of it originally being described from Asia!), by Tzvelev (1984) as an endemic of northeastern Asia, and by Porsild & Cody (1980) as high-arctic circumpolar. The Canadian plant was also described as a stoloniferous seashore plant. Moreover, a tetraploid chromosome number ( $2n = 42$ ) was reported in *D. pumila* from northeastern Asia (Zhukova et al. 1973). We leave this confusion out of consideration as the Svalbard material does not match either of the very different descriptions by Tzvelev (1984), McLachlan et al (1989), and Porsild & Cody (1980).

Tzvelev (1984) treated *D. cespitosa* subsp. *glauca* (*D. glauca* Hartm.) as an arctic taxon and as a mainly European Russian parallel to the mainly Siberian *D. cespitosa* subsp. *borealis*. As *D. glauca* originally was described from forest river valleys of Scandinavia, is a distinctly boreal taxon, and is widely different from anything seen in arctic materials in numerous morphological features, it is here left out of consideration. In our opinion, Tzvelev's "subsp. *glauca*" belongs within a more widely defined *D. borealis*.

The last candidate to be considered in Svalbard is *D. borealis*, originally described from the Taimyr Peninsula and reported from the entire Russian Arctic and from North America by

Tzvelev (1984), but not accepted by American authors. It was characterised by Tzvelev as a plant of "mossy, sandy and stony tundras, riverside sand and pebbles". The Svalbard plants match the description, and *D. borealis* was reported as diploid (Tzvelev 1984). We tentatively accept this name for the native, seminiferous Svalbard taxon.

### *Draba* (notes 28–33)

The genus *Draba* is one of the most species-rich vascular plant genera in the Arctic. There is an excess of names in use because many studies are based on geographically limited material, on environmentally modified or otherwise dubious characters, and partly on herbarium specimens in poor or juvenile conditions. Moreover, a narrower species concept was previously more often applied than what is usually done today.

The morphological and genetical pattern of variation is very complicated in the circumpolar area, evidently due to local differentiation and species evolution, different ploidy levels, some hybridisation, and inferred multiple origins of several polyploids (Brochmann et al. 1992a, 1992b, 1992c, 1993).

In recent years an extensive genetic and cytological study of Scandinavian and Svalbard *Draba* (Brochmann 1993, Brochmann & Elven 1992, and Brochmann et al. 1992a, 1992b, 1992c, 1993), combined with limited morphological studies (Brochmann 1992), has clarified the limitation of many species in these areas. The nomenclature is, however, still confused at a circumpolar scale. There is little correspondence in the application of names among the treatments of the western European, American and the Russian arctic materials. Compare our survey with Mulligan (1976) and Rollins (1993). We are generally more in agreement with Russian authors (e.g. Tolmachev 1975).

The species concept used here is the same as in Lid & Lid (1994) and followed by Rønning (1996), but differs from Rønning (1979) and the Flora Europaea treatments (Walters 1964, Walters & Akeroyd 1993) in several aspects. Our new treatment will be explained below for all species and complexes of related species, but first summarised in the following points (A–F):

(A) *Draba kjellmannii* Lid ex E. Ekm., accepted by Walters (1964) and Walters &

Akeroyd (1993), is a superfluous name as the available material, including the type specimens, refers to other yellow-flowered species (mainly *D. corymbosa* R. Br. ex DC.), and the original description fits within the limits of the polymorphic *D. corymbosa* as understood today.

(B) *Draba glacialis* Adams, accepted for Svalbard by Walters (1964), probably represents a distinct taxon of the *D. alpina* complex in the Russian Arctic westwards to Kolguev and the Kanin Peninsula. In Svalbard the name has only been applied to other yellow-flowered taxa (especially to *D. corymbosa*).

(C) *Draba gredinii* E. Ekm., accepted by Walters (1964) and Walters & Akeroyd (1993), is conspecific with *D. oxycarpa* Sommerf.

(D) The name *Draba oblongata* R. Br. ex DC., accepted as applicable to a yellow-flowered species by Walters (1964), Tolmachev (1975), and by Rønning (1964, 1979), was found by Mulligan (1974) to refer to the quite different, white-flowered *D. arctica* subsp. *groenlandica* (E. Ekm.) Böcher, in the *D. arctica*–*cinerea* complex.

(E) Both species of the *D. micropetala* complex have to change their names as compared to Rønning (1979). The valid names of *D. micropetala* and *D. adamsii* as used by Rønning are *D. pauciflora* R. Br., and *D. micropetala* Hook., respectively, following the treatment by Tolmachev (1975). It is symptomatic of the lack of correspondence between American and Russian authors that these two names, both applicable also to American plants, are left entirely out of consideration in the latest survey of North American crucifers (Rollins 1993).

(F) The Svalbard material of *D. cinerea* Adams, as accepted by Walters (1964), Walters & Akeroyd (1993), and by Rønning (1964, 1979), has proved to belong to another, morphologically and chromosomally more or less uniform species, *D. arctica* J. Vahl, a conclusion reached already by Böcher (1966), and followed by Engelskjøn (1979).

### (28) The *Draba alpina* complex

The *D. alpina* complex consists of yellow-flowered species with broad, bright or pale yellow petals, subacute to acute leaves with a mixed, mostly short indument of simple, forked and short-stalked stellate hairs, and ovate to broadly

elliptic, glabrous or hairy siliculae. The complex has a circumpolar distribution and includes several taxa at the level of species. Three distinct species are present in Svalbard: *D. alpina*, *D. corymbosa*, and *D. oxycarpa*.

*Draba alpina* is decaploid ( $2n = 80$ , Brochmann et al. 1993) with comparatively small, half-open flowers, narrowly obovate and non-overlapping petals, more narrowly elliptic siliculae than the other two, and comparatively small, brown seeds. The siliculae are glabrous in mainland Scandinavia and most often in Svalbard, but elsewhere in the Arctic there are populations with siliculae carrying scattered hairs both marginally and on the valves. Much of the Bjørnøya material is of this type. The variation in silicula indumentum has caused confusion in the determination of Svalbard collections and is responsible for at least one superfluous name in the complex. *Draba alpina* is probably mainly autogamous.

*Draba oxycarpa* is octoploid ( $2n = 64$ , Brochmann et al. 1993) with larger, open flowers, broadly obovate and overlapping petals, ovate to elliptic siliculae, and comparatively large, blackish seeds. The siliculae are usually glabrous on the valves, but with small marginal cilia. The species is probably partly allogamous (i.e. a "mixed mater" in the sense of Brochmann 1993).

Other characters commonly used to discriminate between *D. alpina* and *D. oxycarpa*, e.g. petal colour and indumentum of scapes and pedicels, vary within both species. Brochmann et al. (1993) demonstrated that *D. oxycarpa* and *D. alpina*, in spite of being morphologically similar, are genetically very different and probably have different polyploid origins.

Until recently, *D. gredinii* E. Ekm. has been accepted as name on the arctic part of the complex, following its description by Ekman (1933). Bretten (1973) found *D. gredinii* to be conspecific with *D. oxycarpa* Sommerf., described from Svalbard a century earlier (Sommerfelt 1833), and also reported from southern Norwegian mountains in the original description. This name clearly predates *D. gredinii* (and also predates *D. oxycarpa* Boiss., first used in 1849 for a Syrian species of a quite different part of the genus). Brochmann et al. (1992a, 1993) have compared southern Norwegian and Svalbard populations of *D. oxycarpa* genetically and place them unambiguously within the same species. Ekman (1933) described *D. gredinii* from eastern Greenland, but she also referred to some Svalbard

specimens in her original description. The presence of the species in Svalbard was, however, not unambiguously recognised until the 1960's (Rønning 1961 and Svedberg 1961). Rønning (1961) found it to be widely distributed on Spitsbergen and neighbouring islands. Later, a review of the herbarium material has proved that *D. oxycarpa* is the most widespread species of the *D. alpina* complex in Spitsbergen and neighbouring islands.

Engelskjøn & Schweitzer (1970) reported only *D. alpina* from Bjørnøya, but at that time they used this name in its previous wide sense, including *D. oxycarpa*. Most of the material from Bjørnøya clearly belongs to *D. alpina*. However, a few specimens differ in larger petals and in siliculae which are hairy on the seam (see Engelskjøn & Schweitzer 1970, figs. 5c, d, 6f, g). These belong to *D. oxycarpa*, and the species is hereby confirmed from Bjørnøya.

The applications of the name *D. alpina* in other arctic areas are ambiguous. Löve & Löve (1975) referred all octoploid chromosome numbers (otherwise characteristic of *D. oxycarpa*) to *D. alpina* L. Most of these counts originate from within the known distribution of *D. oxycarpa* (eastern Greenland, Svalbard, Scandinavia and probably Novaja Zemlja) and presumably refer to that species. A few octoploid numbers originate from the Russian and American Arctic (Mulligan 1976). These may refer to other octoploid species (yellow- or white-flowered) or to *D. oxycarpa*, which may have a wider distribution than recognised today. Decaploid chromosome numbers (otherwise characteristic of *D. alpina*) were referred by Löve & Löve (1975) to *D. micropetala*, as they seem to have used this name for what is considered *D. alpina* by almost all other authors (and in contradiction with the types). These counts originate from Scandinavia, Svalbard and Alaska, i.e. confirmed areas of *D. alpina* as used by other authors. As both *D. alpina* and *D. oxycarpa* are typified on Scandinavian and Svalbard material, the Scandinavian applications have priority, i.e. *D. alpina* for the decaploid, *D. oxycarpa* for the octoploid. *Draba alpina* is not yet formally lectotypified, but the most relevant Linnaean material (LINN 823.5) is confirmed as belonging to the species as accepted today (Elven unpubl.). Material for unambiguous lectotypification of *D. oxycarpa* is available in O (Elven unpubl.).

*Draba corymbosa* R. Br. ex DC. is 16–18-ploid

( $2n = 128$  in Svalbard, Böcher 1966, Brochmann et al. 1993;  $2n = 144$  in the American Arctic, Mulligan 1974, 1976). The species is highly variable and probably polyphyletic, with *D. alpina* and several white-flowered species at lower ploidy levels in its parentage (Brochmann et al. 1992a, 1992b).

The species is usually characterised by a coarse indumentum of long cilia, forked and stellate hairs on leaves, scapes and pedicels, large, open flowers with sepals distinctly saccate at base, bright yellow and broadly obovate petals, and large siliculae with a coarse indumentum, distinct styles, and comparatively large, brown seeds. However, Brochmann (pers. comm.) has found 16-ploid plants lacking most of the distinctive characters separating *D. corymbosa* from *D. alpina*. A varied parentage may be responsible for the large variation found, and partly for the multitude of names in use in different parts of the Arctic.

*Draba corymbosa* was described 1819/1821 on American material (type in BM, confirmed as *D. corymbosa* in the present sense by Elven unpubl.). The following other names are here considered as synonyms of this polymorphic species: *D. macrocarpa* Adams (described 1834), *D. bellii* Holm (described 1907), and partly *D. kjellmannii* Lid ex E. Ekm. (described 1931). The synonymy between *D. corymbosa*, *D. bellii* and *D. macrocarpa* is also accepted by Rollins (1993).

The valid name of the taxon has been uncertain until recently, as seen from the treatment by Walters (1964), where the two most recent names, *D. bellii* and *D. kjellmannii*, were applied for two different Svalbard species, and where no reference was given to the two older names. Besides, the name *D. corymbosa* is consistently in use in America (see e.g. Mulligan 1974, 1976), and *D. macrocarpa* more or less consistently in Russia (see e.g. Tolmachev 1975). Walters & Akeroyd (1993), however, accepted *D. corymbosa* as replacing *D. bellii*, but still considered *D. kjellmannii* as a separate species. Two major problems exist in species concepts and nomenclature: (1) should the material from different parts of the Arctic be treated within one polymorphic species or separated into several species, and (2) what names are validly published?

As to the first problem, no thorough study has been made of the entire arctic material. However, in our opinion (based on field experiences in Svalbard, Greenland and the Canadian Arctic

and on an investigation of herbarium specimens from these areas and from arctic Russia) the polymorphic pattern of variation is best treated as one species with a circumpolar distribution. This also corresponds with the results of Brochmann et al. (1992a, 1992b, 1993) as to a probably complex polyphyletic origin of the 16–18-ploids.

As to the nomenclature, the uncertainties may be ascribed to Ekman's (1931) treatment of the variability of the species, especially within Greenland, but also with reference to Svalbard plants. Ekman (1931) indicated that the type collection of *D. corymbosa* (BM) was a *Cochlearia* and the same as the type of *C. fenestrata* R. Br. Her rejection of this name is no longer mandatory under the Code, and it is also irrelevant as there are two unambiguous collections of *D. corymbosa* annotated by R. Brown and available in BM, one obviously mislabelled as *Cochlearia fenestrata*, and another labelled *D. corymbosa* and chosen by Mulligan as lectotype. She also doubted the validity of the name *D. macrocarpa*, as no type material was available. Ekman (1931), when treating the Svalbard plants, described them partly as *D. bellii* var. *svalbardensis* E. Ekm., more compact than the type variety, and partly as a new species, *D. kjellmannii*. The treatment by Ekman (1931), accepting *D. kjellmannii* at species level, was followed by Walters (1964), Löve & Löve (1975), Tolmachev (1975), and Walters & Akeroyd (1993).

The treatment by Ekman (1931) was not discussed by Mulligan (1974) who rightly accepted the name *D. corymbosa* for the American material as it is unambiguous and predates all other available names.

The name *D. kjellmannii* should, in any case, be rejected as superfluous. The type material (S), from Novaja Zemlja, is heterogeneous and no single element is yet selected as a lectotype. The major parts belong to *D. corymbosa* in the present sense, some specimens belong to *D. oxycarpa*, and some may belong to *D. alpina* and/or *D. glacialis* (Elven unpubl.).

Walters (1964) reported *D. glacialis* Adams (described in 1817 on Russian arctic material) from Svalbard, northern Norway and the Russian Arctic. In Svalbard the name *D. glacialis* Adams has been applied mainly to material of *D. corymbosa*. One exception is the material referred to by Godzik & Wójcicki (1987), belonging to *D. oxycarpa* in the present opinion (det. R. Elven, O). The abundant Novaja Zemlja

material named as *D. glacialis*, and corresponding with the diagnosis, is distinctive and probably belongs to another representative (species) of the group. This conclusion was also reached by Tolmachev (1975) who found that the Novaja Zemlja type was widely distributed in the Russian and Siberian Arctic, but not yet detected in Svalbard. The inconsistent treatment of the Svalbard material has been maintained by a confusion between the names *D. glacialis* Adams and *D. alpina* L. var. *glacialis* Ostenf., the latter based on a different (American) type and referring to *D. corymbosa* (see Ekman 1931). The conclusion is that both *D. glacialis* and *D. alpina* var. *glacialis* are superfluous names for Svalbard plants.

### (29) The *Draba micropetala* complex

The *D. micropetala* complex is a distinct, well delimited species-group containing yellow-flowered taxa with short and narrow petals (and probably predominantly autogamous flowers), leaves with an obtuse to rounded apex, a coarse indument of simple, forked and/or long-stalked stellate (or "cruciform") hairs, and elliptic to obovate, more or less hairy siliculae with a very short or undeveloped style. The complex has an arctic circumpolar distribution and probably contains at least three taxa at species level, two of them widely distributed in Svalbard.

Our *D. micropetala*, i.e. the taxon named "*D. adamsii*" by Rønning (1979), is characterised by obtuse to rounded leaves with a coarse indument, marginally of long-stalked stellate or cruciform hairs, pale yellow petals, a distinctly elongating infrutescence, and elliptic siliculae with a distinct indument. It is mainly a plant of open, unstable, gravelly habitats (Brochmann & Elven 1992), and is hexaploid ( $2n = 48$ , Brochmann et al. 1993). Our *D. pauciflora*, i.e. the taxon named "*D. micropetala*" by Rønning (1979), is characterised by more acute leaves with a similarly coarse indument, but marginally mainly with long cilia and/or forked hairs, by dark yellow petals, a frutescence that does not elongate, obovate, glabrous or subglabrous siliculae, and a distinct reddish or brownish colour of sepals and siliculae and partly of leaves. It is a plant usually growing in dense moss carpets (moss tundra) and on the rim of soil polygons (Brochmann & Elven 1992). *Draba pauciflora* has a tetraploid chromosome number ( $2n = 32$ , Brochmann et al. 1993). The

chromosome numbers  $2n = 48$  and  $32$  represent the lowest ploidy levels known in northern European yellow-flowered *Draba* and separate these two species from the 8–16(–18)-ploid species of the *D. alpina* complex.

*Draba micropetala* and *D. pauciflora* are concentrated to the coldest parts of the Arctic, and both are frequent on Spitsbergen and surrounding islands. The prevailing confusion both between these two taxa and between the *D. micropetala* and *D. alpina* groups (in Svalbard and elsewhere) is at least partly due to the absence of some of the distinctive characters in much of the available herbarium collections. However, the characteristic indument, much coarser than in any other Nordic *Draba* and also separating the two species well, is present in all collections, but has largely been overlooked. As the nomenclature is equally confused, a survey and tentative evaluation of the alternatives is given below.

The earliest name applied in the group is *D. oblongata* R. Br. ex DC. (described in 1819/1821, based on North American material). It was still applied for the collective group by Walters (1964) and for our *D. micropetala* by Rønning (1964) and Tolmachev (1975). This is erroneous according to Mulligan (1974), as the type material of *D. oblongata* belongs to a taxon in the white-flowered and very distantly related *D. arctica*—*cinerea* complex. Mulligan's conclusion was confirmed by a renewed study of the type (K, Elven unpubl.).

*Draba micropetala* Hook. was described in 1825, based on North American material. Mulligan (1974) concluded that "*D. micropetala* is a later synonym of *D. alpina* L.", without further documentation. This conclusion is in disagreement with most earlier and later investigations of the arctic *Drabas* and with the available type material. Most authors, including Rønning (1979), have followed Ekman (1931) in applying this name to our *D. pauciflora*, but this is also erroneous. Tolmachev (1975) argued that Ekman had misinterpreted Hooker's original diagnosis of *D. micropetala*. Tolmachev (1975) still accepted the name *D. oblongata* for the species in question and listed *D. micropetala* as a synonym. When the name *D. oblongata* now has to be abandoned, *D. micropetala* Hook. remains as probably the oldest valid name for this species. Available type material (K, from the Canadian Arctic) corresponds exactly with our usage (Elven unpubl.) and Mulligan has also selected a lectotype. Even if this species is originally described from America,



and probably is widespread there, both it and its name have been neglected by the latest American authors (see Rollins 1993).

*Draba adamsii* Ledeb. was described in 1842 on Russian material. The name, long forgotten, was reintroduced by Tolmachev (1932), as applicable to plants corresponding to our *D. pauciflora*. Mulligan (1974) accepted it as the valid name of what earlier had been named *D. oblongata* in North America, and it has since been applied to all North American plants, as Mulligan (1976) accepted only one American species of the *D. micropetala* complex. The name has, by some kind of "diffusion", later been applied to our *D. micropetala*, both in North America/Greenland and Svalbard, as Ekman's use of "*D. micropetala*" for the other species of the group has prevailed.

There are at least four reasons for believing that this traditional North American–Greenland and Norwegian application of the name *D. adamsii* is erroneous: (1) the probable identity of Ledebour's *D. adamsii* with our *D. pauciflora* (demonstrated by Tolmachev 1975); (2) the correspondence of Mulligan's (1974) illustration of *D. adamsii* with our *D. pauciflora*; (3) the reports of American plants named as *D. adamsii* as being tetraploid ( $2n = 32$ , Mulligan 1974, 1976, Rollins 1993), which corresponds with our *D. pauciflora*, but not with our *D. micropetala*; and (4) the presence of not only one, but three species (*D. micropetala*, *D. pauciflora* and a probably undescribed species) in the complex in the Canadian Arctic (Hansen & Elvebakk in prep.).

Furthermore, the name *D. adamsii* is predated by *D. pauciflora* R. Br., described in 1824 on material from the Canadian Arctic. A type collection is deposited in K, but was not available for study in 1995. The name was considered a nomen obscurum by Ekman (1931), partly due to lack of a type material for study then, but mostly due to her presumed misinterpretation of *D. micropetala* Hook. Mulligan (1974) did not consider this name in his acceptance of *D. adamsii*. Tolmachev (1975) accepted the name *D. pauciflora* for plants corresponding to our *D. pauciflora* in the treatment of the Russian Arctic *Draba*, and we follow his treatment here.

The final evaluation of the taxa has to await a renewed study of a large, circumpolar material.

### (30) *Draba arctica* J. Vahl

Four taxa of the *Draba cinerea* complex have

been reported from Svalbard: *D. arctica* J. Vahl, *D. cana* Rydberg, *D. cinerea* Adams, and *D. groenlandica* E. Ekm. Walters (1964), Rønning (1964, 1979), and Walters & Akeroyd (1993) included only *D. cinerea* from the islands, but indicated *D. arctica* as a possible synonym.

In her revision of the Greenland material of the *D. cinerea* complex, Ekman recognised five taxa (Ekman 1929), but at that time not yet *D. arctica*. As suggested by her identifications, her concepts of the taxa within the group changed during her study period. In her early years she applied a wide concept of *D. cinerea*, later she separated the northern parts of the material and divided it into (at least) five taxa, *D. arctica*, *D. groenlandica* s. str., *D. groenlandica* var. *arctogena* E. Ekm., *D. ostensfeldii* E. Ekm. s. str., and *D. ostensfeldii* var. *ovibovina* E. Ekm., based on a more narrow species concept than applied by later authors.

In a thorough morphological and cytological survey of the Greenland (and partly the Svalbard) taxa of the group, Böcher (1966) separated the hexaploid ( $2n = 48$ ) *D. cinerea* from *D. arctica* and found *D. arctica* to contain three subspecific taxa, the octoploid ( $2n = 64$ ) subsp. *groenlandica* (E. Ekm.) Böcher and the decaploids ( $2n = 80$ ) subsp. *arctica* and subsp. *ostensfeldii* (E. Ekm.) Böcher. He accepted *ovibovina* as a variety of subsp. *ostensfeldii*, and he discussed the octoploid ( $2n = 64$ ) *D. arctogena* E. Ekm. (*D. groenlandica* var. *arctogena*) as a northern arctic counterpart of the mostly North Atlantic and southern to middle arctic *D. norvegica*. We agree with the views of Böcher (1966), with one small exception.

The Svalbard material is fairly homogeneous, even if varying in leaf indumentum (with only stellate or a mixture of stellate and simple hairs). This variation remains to be studied. It differs considerably from *D. cinerea* as seen in Fennoscandia and in southern Greenland, both in morphology (see Böcher 1966) and in being decaploid (several Svalbard counts referred to by Böcher 1966 and Engelskjøn 1979). Brochmann et al. (1992a) found *D. arctica* and *D. cinerea* to be genetically related, but clearly different, and they indicated that *D. arctica* could have arisen by hybridisation and polyploidisation from *D. cinerea* and a diploid species. The original description of *Draba arctica* is based on material from Bellsund in Svalbard (in S. lectotypified by Böcher 1966) and this species is at present accepted by us as the only representative of the

*D. cinerea* complex in Svalbard. Böcher (1966) also reported *D. arctica* subsp. *ostenfeldii* from Svalbard, but in our opinion, the depauperate specimens determined as this subspecies should be considered within the wide and modificative range of variation of *D. arctica* subsp. *arctica*. From the variation found in indumentum in *D. arctica* s.l., the octoploid might also occur in Svalbard. Its oldest name would then be *D. oblongata* R. Br. ex DC., syn.: *D. groenlandica* E. Ekm.

### (31) *Draba daurica* DC.

The Svalbard material of *D. daurica* is distinct from *D. arctica* and *D. norvegica*. It is octoploid ( $2n = 64$ ), vs. decaploid ( $2n = 80$ ) in *D. arctica* and hexaploid ( $2n = 48$ ) in *D. norvegica*. Clear genetical differences between the three species were demonstrated by Brochmann et al. (1992a). Morphologically, it differs from *D. norvegica* e.g. in an indumentum mainly of short, stellate hairs in all vegetative parts, from *D. arctica* e.g. in glabrous or subglabrous siliculæ. A certain variation is observed in petal colour. A variety with pale yellow flowers is found in the Pyramiden area and possibly elsewhere.

The valid name of the taxon is disputed. *Draba daurica* (described 1825) is based on material from Asia, and this name is prevalent in Norwegian and Russian literature. Another alternative is the earlier name *D. glabella* Pursh (described 1814), based on American material, and uniformly used for North American and Greenland plants. A study of numerous Asian collections named as *D. daurica* and American ones named as *D. glabella* (in K) revealed no differences of significance and the two names most probably refer to a single species. A third alternative, *D. magellanica* Lam. (described 1786), is less relevant, even if this name has been used extensively for northern plants. It was described from southernmost South America, and this is a species related to *D. daurica*, but distinct from all northern plants in e.g. indumentum (Elven unpubl.). The Linnaean name *D. hirta* has priority over both *D. daurica* and *D. glabella* (and the more "distant" *D. magellanica* Lam.), and it may be valid if it is based partly or entirely on material now placed within *D. daurica*. The Linnaean material may contain elements (LINN 823.12) suitable for an unambiguous typification (Elven

unpubl.). A clarification of this issue must, however, await the ongoing lectotypification of Linnaean names (see Jonsell & Jarvis 1994). Until this is done, we apply the name currently in use on European Arctic material.

### (32) *Draba lactea* Adams

*Draba lactea* is a hexaploid ( $2n = 48$ , Knaben 1966, Brochmann et al. 1993), but is closely related to and has probably originated phylogenetically from combinations of the diploids *D. fladnizensis* Wulf., *D. nivalis* Liljebl. and *D. subcapitata* Simm. (Brochmann et al. 1992b). *Draba lactea* is usually reported with glabrous scapes (Knaben 1966). Scapes with some hairs are frequent in arctic strains and also in northern Norwegian middle- and high-alpine sites (Engelskjøn pers. comm.). Such plants have very often been interpreted as hybrids. A variability is, however, to be expected if the proposed heterogenous parentage is correct. Reports of tetraploid chromosome numbers within the closely related *D. fladnizensis* and of diploid numbers within *D. lactea* (see e.g. Rollins 1993) may indicate problems in a consistent separation of these taxa on a circumpolar scale.

### (33) *Draba* hybrids

Brochmann et al. (1992c, 1993) proved by experimental hybridisation that most Nordic *Draba* species are able to cross and that hybridisation may result in partly fertile progeny in spite of differences in ploidy level. In the Arctic, hybridisation in *Draba* is generally hampered by lack of pollinators (insects) and by the prevailing autogamy in many small-flowered species (Brochmann & Elven 1992). The main candidates for hybridisation are therefore large-flowered species, e.g. *D. arctica*, *D. corymbosa*, *D. lactea*, and *D. oxycarpa*, while small-flowered ones may function as male parents.

Many *Draba* hybrid combinations are reported from Svalbard. An initial study of the herbarium material proved that most hybrid reports are based on juvenile and/or badly preserved material which is difficult or impossible to interpret. All published hybrid reports need confirmation, especially the reports by Asplund (1918) of *D. alpina*  $\times$  *oblongata* from Templet and of *D. alpina*  $\times$  *lactea* from Colesbukta and Longyear dalen.

Only hybrid combinations based on a few field specimens investigated experimentally, on specimens seen by ourselves in the field, or on well-developed, determinable herbarium material, are included in the list.

Several hybrids involving species of the *D. alpina* complex have been identified. The combinations *D. alpina* × *subcapitata*, *D. lactea* × *oxycarpa*, and *D. arctica* × *corymbosa* are based on available collections in good condition, and are plausible. *Draba alpina* × *subcapitata* was reported from Gipsvika by Asplund (1918), determined by E. Ekman, and was refound in the area in 1986 (TROM). *Draba lactea* × *oxycarpa* has been collected at several sites and may also be the basis of reports of *D. alpina* × *lactea* (see Excluded taxa, Chap. 4). A sterile, natural F1 hybrid of *D. lactea* × *oxycarpa*, originating from Gipsdalen in the Isfjorden area, was cultivated and shown to be identical to experimental hybrids of this combination (Brochmann et al. 1992c, 1993). *Draba arctica* × *corymbosa*, see below.

The minute flowers of the species of the *D. micropetala* group are supposed to favour autogamy and partly prevent hybridisation, both between these two and with other species. However, a plant intermediate between *D. micropetala* and *D. corymbosa*, probably with aborting siliculae, has been collected in the Isfjorden area, and a very probable, intermediate hybrid *D. micropetala* × *pauciflora* with aborting siliculae has been seen from northeastern Greenland (O).

*Draba arctica* does not seem to hybridise frequently with other species, in spite of its large flowers. Hybrids with *D. corymbosa* have, however, been found in a mixed population in Gipsdalen (Brochmann et al. 1992c, 1993) and in the Sassendalen area, and they probably also occur elsewhere. Natural hybrids from Gipsdalen corresponded morphologically and genetically with experimentally produced ones (Brochmann et al. 1992c); they were 14-ploid, fertile, interpreted as later generation hybrids, and back-crossing with *D. corymbosa* was indicated at the site (Brochmann et al. 1992c).

#### (34) *Dryas octopetala* L.

This is one of the most widely distributed species on the islands, with the notable exception of Bjørnøya, southernmost Spitsbergen and the polar desert areas. It is also morphologically vari-

able, e.g. with respect to leaf form and dimensions, leaf indumentum, and flower size and colour. Several taxa at the level of variety, subspecies, and sometimes species, have been proposed. Rønning (1996) accepted two subspecies, subsp. *octopetala* and subsp. *punctata* (Juz.) Hult. (*D. punctata* Juz.), the latter characterised mostly by large upper leaf surface glands.

No thorough morphological or genetical study of Svalbard material have yet been undertaken. A very preliminary study of herbarium specimens (O) did not reveal any certain material of the *punctata* type, but the distinguishing features are mainly lost in preservation. Dr. B.A. Yurtsev (pers. comm.), however, claims from field studies in Svalbard in 1995 that the variation spans from *D. octopetala* to *D. punctata* as these species are understood by Russian botanists.

#### (35) *Dupontia fisheri* R. Br. and *D. psilosantha* (Rupr.) Griseb.

Tzvelev (1984) treated this genus as monotypic, i.e. as consisting of one species, *D. fisheri* R. Br., with three subspecies at different levels of polyploidy, all of them widely distributed in the Eurasian and American Arctic: subsp. *fisheri* (probably dodecaploid,  $2n = c. 132$ ), subsp. *pelligera* (Rupr.) Tzvelev (octoploid,  $2n = c. 88$ ), and subsp. *psilosantha* (Rupr.) Hult. (tetraploid,  $2n = c. 44$ ).

Lipkin (1983), however, identified *D. fisheri* R. Br. with the octoploid cytotype, and Tzvelev's subsp. *pelligera* therefore has to be replaced by subsp. *fisheri*. The dodecaploid cytotype (Tzvelev's subsp. *fisheri*) is, according to Dr. D.F. Murray (pers. comm.), unnamed and will most likely remain so.

Tzvelev reported his "subsp. *fisheri*" (the unnamed dodecaploid) from Zemlja Frantsa-Josifa and Novaja Zemlja, but as far as we know it does not occur in Svalbard. The two others are both widely distributed in Svalbard. Both chromosome numbers are documented from Svalbard (Engelskjøn 1979), based on plants clearly belonging to the two taxa.

Intermediates have been reported (McLachlan et al. 1989), but Dahl (1937) was of the opinion that the taxa are easily separated late in the growing season. We share this opinion; in Svalbard the taxa are distinct with respect to morphology and ecological preferences. Based on the Svalbard

pattern of variation they should be treated as separate species. *Dupontia fisheri* (sensu Lipkin, not Tzvelev) is a plant of shallow, firm marshes and sedimentation areas; *D. psilosantha* is a plant of wet, deep marshes and salt marshes. Both taxa are widely distributed on the Spitsbergen islands, *D. psilosantha* also on Bjørnøya.

The descriptions and illustrations of *D. fisheri* and *D. psilosantha* were interchanged by Rønning (1964, 1979).

(36) *Equisetum arvense* L. coll.

Previously reported from Svalbard as *E. arvense* var. *boreale* by Hadač (1944) and recognised as a subspecies by Löve & Löve (1975). The taxon was not recognised by Tutin (1964a, 1993) and not included by Rønning (1979) from Svalbard. Øllgaard (in prep., Flora Nordica) recognised it as a subspecies and reported it from Svalbard. It is a comparatively distinct arctic-alpine race and in our opinion the only race of *E. arvense* indigenous to the archipelago. Rønning (1996) divided the indigenous material in a subsp. *alpestre* (Wahlenb.) Rønning and a subsp. *riparium* (Fr.) Rønning. Both types are within our concept of subsp. *boreale*, but the assignment of parts of the Svalbard material to Fries' *riparium* is uncertain (subsp. *alpestre* is recognised as a synonym of subsp. *boreale*). The introduced subsp. *arvense* was found as established in Longyearbyen in 1992 (Elven unpubl.).

(37) *Eriophorum angustifolium* Honck.  
subsp. *triste* (Th. Fr.) Hult. × *scheuchzeri*  
Hoppe

First described from Greenland by Sørensen (1933), who also reported it from Spitsbergen, but without any locality information. It was reported from lower Sassendalen by Hadač (1944), and several populations have later been found in the Dickson Land area in 1990 and in the Kongsfjorden area in 1993 (Elven unpubl.).

The plants occur in distinct, often extensive stands in shallow marshes on calcareous substrates, sometimes together with the proposed parents, but more often alone. The Dickson Land and Kongsfjorden specimens had well-developed anthers with morphologically good pollen, and a further study is needed of this tentative (and for taxonomic reasons less probable) hybrid.

The *Festuca brachyphylla* complex (notes 38–39)

Until 1934 all the tussock-forming, seminiferous *Festuca* plants in Svalbard were considered as belonging to a broadly defined *F. ovina* L. The material has later been referred to four species (e.g. by Scholander 1934, Holmen 1957, Rønning 1961, 1979, Frederiksen 1977, and Aikens et al. 1995), none of them corresponding to *F. ovina* L. s. str., and here referred to as the *F. brachyphylla* complex.

(38) *Festuca baffinensis* Polunin

A distinct species with erect, pubescent culms, dark violet spikelets, and  $2n = 28$  chromosomes (Engelskjøn 1979). It has proved uniform and easily recognizable in Svalbard, after it was recognised there by Rønning (1961), and is confined to calcareous substrates.

(39) *Festuca brachyphylla* Schultes, *F. hyperborea* Holmen and *F. edlundiae* Aiken et al.

Based on the studies by Holmen (1952, 1957), Rønning (1961) divided the remaining material of the group almost equally between *F. brachyphylla* and *F. hyperborea*. Rønning (1972) mapped the distribution of the two species in Svalbard.

In a revision of the Greenland material, Frederiksen (1977) maintained Holmen's division and emended the description of *F. hyperborea*. In the opinion of e.g. Frederiksen (1977) and Böcher et al. (1978), *F. brachyphylla* is a species of dry heath-like vegetation whereas *F. hyperborea* is more typical of snowbeds and damp soil polygons. Whereas *F. brachyphylla* is widely distributed from northern mountains into the Arctic, *F. hyperborea* is mainly a species of the northern Arctic.

*Festuca brachyphylla* has been reported as hexaploid ( $2n = 42$ , Holmen 1952 and Frederiksen 1977), and *F. hyperborea* as tetraploid ( $2n = 28$ , see Rønning 1961, Frederiksen 1977). Only the tetraploid number has been recorded in Svalbard material (three counts only, Flovik 1938, Holmen in Rønning 1961, and Engelskjøn 1979). In a revision of the material in O and TROM Engelskjøn (unpubl.) found it to be homogeneous

and to correspond with *F. hyperborea*, as expected from the chromosome counts.

Our preliminary survey of the material and field observations indicate that a renewed study should be made. Three morphological types seem to be present.

A collection from Adventdalen, originally described as *F. supina* Schur (Hadač 1944), was classified as *F. brachyphylla* by Rønning (1961). It corresponds very well with the southern, tall-growing type of *F. brachyphylla* as recognised by Greenland authors and is accepted here. Similar plants were collected in 1992 and 1996 in the Longbyen area (Elven unpubl.), but have not yet been studied further.

The low-growing material can be separated in two morphological and ecological types: (1) A distinctly glaucous type with stiff and curved leaves, short and diverging to prostrate stems, and panicles of a few pale spikelets, growing on dry gravel ridges and shore terraces; and (2) A less or not glaucous type with more slender, erect leaves and stems and more numerous, dark-coloured spikelets, growing in snowbeds and damp hummocky tundra. The types do not differ appreciably in length of glumes, lemmas, nor awns, i.e. characters separating *F. brachyphylla* and *F. hyperborea* according to Holmen (1952) and Frederiksen (1977). The voucher specimens that were the basis for the tetraploid chromosome numbers reported by Flovik (1938) and Engelskjøn (1979) resemble type (1) and originate from gravelly habitats (Engelskjøn pers. comm.).

Aiken et al. (1995) separated Holmen's *F. hyperborea* into two species, *F. hyperborea* s. str. and *F. edlundiae*. The two species are separated both morphologically and genetically. *Festuca hyperborea*, in the sense of Aiken et al., seems to correspond to our type (2) while their *F. edlundiae* seems to correspond to our type (1). They also mapped both *F. edlundiae* and *F. hyperborea* for Spitsbergen. We therefore accept the new species for Svalbard. Its distribution and ecology is unknown until further investigations are made, but if the correspondence between the Aiken species and our types holds it is widespread.

(40) *Festuca hyperborea* Holmen  $\times$  *rubra* L. subsp. *arctica* (Hack.) Govor.

A large collection from Ytre Norskøya (O, TRH, collected in 1928 by O.A. Høeg) combines the

tufted growth and partly intravaginal shoots, the short and obtuse leaves, and the dark violet and glaucous lemmas of *F. hyperborea* s.l. with the subterranean runners and white-hirsute lemmas of *F. rubra* subsp. *arctica*. Over the years this material has variously been named and renamed as *F. brevifolia*, *F. arenaria*, and *F. rubra* var. *mutica*. This is the first report of the hybrid from Svalbard. It is uncertain which of the two species, *F. edlundiae* or *F. hyperborea* s. str., participate in this hybrid, but its morphology suggests the first one.

(41) *Festuca rubra* L. coll.

The indigenous and common Svalbard *Festuca rubra* is characterised by densely white-hirsute and short-awned or awnless lemmas. It has variously been treated as *F. rubra* var. *mutica* Hartm., *F. rubra* var. *arenaria* (Osbeck) Fr., *F. richardsonii* Hook., *F. cryophila* V. Krecz. & Bobr., and *F. rubra* L. subsp. *cryophila* (V. Krecz. & Bobr.) Hult. Tzvelev (1984) listed most of these as synonyms of *F. rubra* L. subsp. *arctica* (Hack.) Govor. Rønning (1996) accepted it at rank of species (as *F. cryophila*). In view of the almost continuous transition towards *F. rubra* s. str. in the Scandinavian mountains, we choose to accept it at rank of subspecies. For *Festuca rubra* var. *arenaria*, see Excluded taxa, Chap. 4.

The more southern and tall-growing *F. rubra* subsp. *rubra*, with awned and glabrous or sparsely grey-hirsute lemmas, has been introduced at some settlements and trapper's cabins and is persistent, at least in Longyearbyen and Barentsburg. Recently this type has also been found in two sites comparatively far from settlements: on a southfacing, rocky slope in Grønfjorden (O, collected in 1965), and in a bird cliff meadow in Kongsfjorden (O, collected in 1993). The subspecies might be indigenous in favourable local habitats along the west coast of Spitsbergen. In other arctic areas the subspecies is indigenous at least north to southern Greenland (O).

(42) *Festuca vivipara* (L.) Sm.

The Scandinavian and Bjørnøya plants of this pseudoviviparous taxon are tri- and tetraploid ( $2n = 21$  and  $28$ , Engelskjøn 1979 and Salvesen 1986), whereas a material from Spitsbergen is heptaploid ( $2n = 49$ , Flovik 1938). On the mainland and elsewhere different types with glabrous

(var. "*glabra*") and hirsute lemmas (var. "*hirsuta*") are found, cf. Frederiksen (1981) and Salvesen (1986). In Spitsbergen the type with glabrous lemmas predominates while the hirsute type prevails on Bjørnøya (and e.g. on Jan Mayen).

An origin from the seminiferous *F. ovina* s. str. is proposed for the mainland plants (see Salvesen 1986), while arctic plants are proposed to have a different origin from some other seminiferous arctic species of the *F. ovina*—*brachyphylla* groups. The Svalbard material is different from all taxa of the *F. brachyphylla* group occurring on the islands and, with one exception, morphologically homogeneous.

The exception is a type with hirsute lemmas found in the Pyramiden area in Isfjorden and also differing from the other material in less tufted growth and taller culms. They have tentatively been named as *F. vivipara* var. "*hirsuta*", but might possibly represent the hybrid *F. rubra* subsp. *arctica* × *vivipara*. This pseudoviviparous hybrid, which seem to be identical with what has previously been called *F. rubra* f. *prolifera* (Piper) Hyl. or *F. prolifera* (Piper) Fern., has chromosome numbers intermediate between *F. rubra* and *F. vivipara* (see Salvesen 1986).

(43) *Honkenya peploides* (L.) Ehrh.

The Svalbard material has been referred to the northern subsp. *diffusa* (Hornem.) Å. Löve.

(44) *Huperzia selago* (L.) Bernh.

● occurs only as subsp. *arctica* (Grossh.) Å. & D. Löve in Svalbard.

(45) *Juncus triglumis* L. subsp. *albescens* (Lange) Hult.

Rønning (1972) was of the opinion that the Svalbard material belongs to the Eurasiatic subsp. *triglumis*. In our opinion the Svalbard plants differ consistently from mainland European material and correspond to subsp. *albescens* (Lange) Hult., an arctic taxon known from Greenland and North America and often considered as a separate species, *J. albescens* (Lange) Fern. Mapped by Rønning (1972) and Elvebakk (1989) and confined to the warmest, central parts of Spitsbergen.

(46) *Koenigia islandica* L.

Slightly deviating morphology has been reported in arctic populations (Hadač 1942, 1944), and they have been described as var. *arctica* Hadač. The taxon was given rank as a species, *K. hadacii*, by Löve & Löve (1976), but the only diagnostic features given were smaller flowers and fruits. The European material is tetraploid ( $2n = 28$ ). A diploid number ( $2n = 14$ ) of very uncertain origin is reported for *K. hadacii* (Löve & Löve 1975).

(47) *Luzula arcuata* Sw. coll.

Intermediates between subsp. *arcuata* and subsp. *confusa* (Lindb.) Blytt are common in many areas within their range and justify the separation of these taxa at subspecific rather than specific level. Subsp. *arcuata* is apparently the only taxon present on Bjørnøya (Engelskjøn 1986a) and is dominant on Jan Mayen (Lid 1964), whereas subsp. *confusa* is dominant on Spitsbergen and neighbouring islands. Intermediates have been found in several places on the west coast of Spitsbergen from Sørkapp Land (Dubiel 1990) north to Krossfjorden. Recently Kuc & Dubiel (1995) reported subsp. *arcuata* from one site in Hornsund.

(48) *Mertensia maritima* (L.) S.F. Gray

Reported from Svalbard as the weakly differentiated var. *tenella* Th. Fr.

(49) *Minuartia rossii* (R. Br.) Graebn.

An often overlooked species which is related to the more southern *M. stricta* (Sw.) Hiern, but differs e.g. in its main reproduction by bulbils, a much more tufted growth, shorter, curved leaves, and much shorter pedicels. In the type area (by the Bering Strait) and in the Canadian Arctic *M. rossii* is normally found flowering whereas most of the material from the North Atlantic area reproduces by bulbils alone. The species has recently been observed flowering and setting seed in the Kongsfjorden and Isfjorden areas (Elven unpubl.).

(50) *Minuartia rubella* (Wahlenb.) Hiern

The nominal type is characterised by glandular

hairs on pedicels and sepals and is common in Svalbard. A glabrous type has been described as *M. propinqua* (Richards.) House and is found scattered in Svalbard. It probably represents only a minor variation as intermediates with a few glandular hairs are frequent.

### (51) *Papaver dahlianum* Nordh.

Northern *Papaver* species of the Scapiflora group have been found to be very polymorphic, and are recognised as many subspecific or sometimes specific taxa, cf. the treatment of the *P. radiculatum* group by Knaben (1959). A similar polymorphism was suggested in *P. dahlianum* (Knaben 1959), but no thorough investigation has been undertaken. There is an evident variability among plants from the major parts of the Spitsbergen islands, from southwestern Spitsbergen and Bjørnøya, and from mainland Norway (Nilsson in prep., Flora Nordica). Löve (1955) divided the Spitsbergen plants in two separate varieties (var. *spitzbergensis* Å. Löve and var. *hadacianum* Å. Löve), as separate from the plants of mainland Norway (var. *dahlianum*). The morphological criteria for this treatment have not been clarified.

The relations between *P. dahlianum* and the North Atlantic *P. radiculatum* have been disputed. Knaben (1959) kept them well apart (at species level) while Rändel (1974) reduced *P. dahlianum* to a subspecies, *P. radiculatum* subsp. *dahlianum* (Nordh.) Rändel. Ongoing genetical investigations (Solstad in prep.) indicate that *P. dahlianum* is very distinct from a more closely related group of the species *P. alpinum* (C Europe), *P. radiculatum* Rottb., and *P. lapponicum*.

*Papaver dahlianum* is different from *P. polare* Tolm. (Löve & Löve 1975, Tolmachev 1975, Rändel 1974, Engelskjøn 1990). The type of *P. polare* from Vaigatch (LE) belongs within *P. lapponicum* coll. (according to Engelskjøn pers. comm.). These taxa have, however, been much confused. Tolmachev (1975) mapped all *Papaver* on Zemlja Frantsa-Josifa as *P. polare*, but a comparison with a large material collected in these islands in 1991 by A.-M. Odasz showed them to be identical with Svalbard *P. dahlianum*. According to Rändel (1974), the species is distributed in northern Canada, Greenland and the Taimyr peninsula, Siberia in addition to Svalbard and northernmost mainland Norway. The taxonomy

of *Papaver* in the Arctic is, however, still very insufficiently known.

### *Poa* (notes 52–56)

The Svalbard species of *Poa* belong to three main groups: the rhizomatous *P. arctica-pratensis* group, the tussock-forming *P. abbreviata-glauca* group, and to *P. alpina*. All three are characterised by proved or inferred occurrence of agamospermy (asexual seed production). In the *P. arctica-pratensis* group and in *P. alpina* both seminiferous and pseudoviviparous types are found within each species. Hybridisation may play a certain role in the observed variation, and especially in the origin of the agamospermous and pseudoviviparous taxa.

### (52) *Poa alpina* L.

The pseudoviviparous type is usually named var. *vivipara* L., but as demonstrated in several studies (Schwarzenbach 1956, Bachmann 1980, Heide 1989, Iversen 1992) pseudovivipary may be climatically induced and is of only slight taxonomic importance. The pseudoviviparous type is common all over Svalbard. The seminiferous type has been found in a warm site at Sassendalen (TROM) and near the warm springs at Bockfjorden (Rønning 1961, 1972). It has also been introduced, e.g. to Bjørnøya (Engelskjøn 1986a).

### (53) *Poa arctica* R. Br.

The *P. arctica* complex is polymorphic and mainly, or perhaps entirely, apomictic. Several taxa have been reported from Svalbard. The revision by Nannfeldt (1940) demonstrated that the variability in southern Norway allowed the distinction of three subspecies, and that at least three other subspecies could be recognised within the heterogeneous northern Scandinavian material. One morphological subspecies has also been recognised in the Svalbard material (subsp. *cespitans*), discussed by Flovik (1938). Apart from this contribution, the Svalbard material has not been thoroughly studied.

The Svalbard material may provisionally be separated in two broad groups: extensively rhizomatous plants with open panicles and small

spikelets (*P. arctica* "s. str."), occurring almost equally frequent as seminiferous and pseudoviviparous (var. *vivipara* (Malmg.) Schol.), and tufted, coarser plants with more contracted panicles and larger spikelets (*P. arctica* subsp. *cespitans*), occurring mainly or entirely as seminiferous (see below). *Poa arctica* was originally described from the Canadian Arctic (in 1824), and it is unknown to which part of the variation the type material (probably in BM or K) belongs.

Tzvelev (1984) treated subsp. *cespitans* as a separate species, *P. tolmachewii* Roshev., and considered it to be of a hybridogenous origin (*P. arctica* × *glauc*). He also suggested that the name *P. filipes* Lange might have priority. Subsp. *cespitans* is separated from the main parts of the *P. arctica* complex by a lower chromosome number ( $2n = 56$ , see Flovik 1938). Some pseudoviviparous plants, earlier considered hybrids, are very similar to subsp. *cespitans* in other respects and also similar to the pseudoviviparous *P. arctica* subsp. *stricta* (Lindeb.) Nannf. (*P. lindebergii* Tzvelev). The latter is, however, considered by Nordic authors as endemic of southern Norwegian mountains. Such pseudoviviparous plants of a subsp. *cespitans* affinity may be the origin of the surprising report of the supposed Norwegian endemic *P. lindebergii* from northeastern Siberia (Tzvelev 1984).

The problems in this complex is further complicated by reported hybridisation between *P. arctica* s. lat. and *P. pratensis* s. lat. Several Svalbard collections have been tentatively determined to such hybrids in the herbaria, but our revision did not reveal any convincing specimens.

#### (54) *Poa glauca* J. Vahl

Frequent in central parts of Spitsbergen. The Svalbard material has been reported as belonging to the poorly understood subsp. *conferta* (Blytt) Holmb. (Hadač 1944). The chromosome numbers of mainland plants are  $2n = 44-56$  (based on more than 20 collections, Synnøstvedt in Engelskjøn 1979), whereas the numbers  $2n = 70-72$  are known from Svalbard (Flovik 1938). The infraspecific variation of the species is poorly known, but Pálsson (1986) has demonstrated an even transition, both in morphological features and from low to high chromosome numbers, from Scandinavian *P. nemoralis* L. through Scandinavian *P. glauca* to Icelandic and arctic *P. glauca*.

*Poa glauca* subsp. *conferta* may be the end-point of this continuous variation.

#### (55) *Poa hartzii* Gand.

Treated as *P. × hartzii* by Edmondson (1980) and McLachlan et al. (1989), and presumed to be the hybrid *P. abbreviata* × *glauc*, or *P. arctica* × *glauc* as indicated by other authors. The plant is, however, seminiferous, occurs independently of the proposed parents (especially *P. glauca*), and is best treated as a species. It may be an apomict, and if it has a hybridogenous origin, the combination *P. abbreviata* × *glauc* is the most plausible for morphological reasons.

#### (56) *Poa pratensis* L. subsp. *alpigena* (Fr.) Hiit.

The *Poa pratensis* complex is largely apomictic and morphologically very variable. The main entities are now often treated as subspecies. Subsp. *pratensis* may have been introduced in Svalbard, but no convincing material has been seen. The numerous collections referred to this subspecies belong to subsp. *alpigena* which obviously occurs both as indigenous and introduced. The tall-grown introduced types found in and around settlements are seminiferous, whereas both seminiferous and pseudoviviparous types are common among the indigenous types. The race described as var. *colpodea* Th. Fr., by Tzvelev (1984) considered as subsp. *colpodea* (Th. Fr.) Tzvelev, is weakly differentiated and probably represents only a more or less accidentally described part of the total variation. Some pseudoviviparous forms of *P. pratensis* may be difficult to separate from *P. arctica* and may be of hybridogenous origin.

#### The *Potentilla nivea* complex (notes 57–59)

The complex is circumpolar, temperate to arctic, possibly with partially apomictic seed production, and in need of a world-wide biosystematic revision. In a series of papers Soják (1985, 1986, 1987, 1989) clarified some taxa, but applied a very narrow species concept. This resulted in descriptions of a large number of 'new' species and in renaming of most of the species traditionally recognised from Svalbard. His revision



of the Svalbard *Potentilla* material in O is not convincing to us. We have therefore decided mainly to follow the traditional application of names, but with references to the alternatives proposed by Soják.

Rønning (1964, 1979, 1996) recognised 3–4 taxa of the *P. nivea* complex in Svalbard: *P. chamissonis* Hult., *P. nivea* L. subsp. *subquinata* (Lange) Hult., and *P. rubricaulis* Lehm., including the poorly defined *P. pedersenii* (Rydb.) Ostenf. It is also necessary to take into account the recently described *P. lyngei* Jurtz. & Soják, the less closely related *P. crantzii* (Cr.) G. Beck ex Fritsch, *P. multifida* L. (see section *Excluded taxa*), *P. pulchella* R. Br., and *P. hyparctica* Malte, and some other taxa described by Soják, as there are indications of evolution of hybridogenous, possibly agamospermic taxa throughout large parts of the genus.

All Svalbard *Potentillas* are found in south-facing cliffs, scree and manured bird cliff meadows, even if two of them (*P. hyparctica* and *P. pulchella*) have their major occurrences in other habitats. Very often several taxa are found growing together in mixed populations. In facultative apomicts this would favour hybridisation, especially as all taxa are large-flowered and probably insect-pollinated.

The majority of the Svalbard material of the *P. nivea* complex can be separated in two closely related species: *P. nivea* and *P. chamissonis*. *Potentilla nivea* is mainly characterised by petioles covered by short, floccose hairs, while *P. chamissonis* is characterised by long, straight hairs on the petiole (but often mixed with some short, floccose hairs).

#### (57) *Potentilla nivea* L. subsp. *subquinata* (Lange) Hult.

The Svalbard material of *P. nivea* is alleged (e.g. Rønning 1996) to belong to subsp. *subquinata* with digitate leaves as compared with regularly ternate leaves in the mainland subsp. *nivea*. However, ternate leaves are also common in Svalbard plants. It was recognised at species level, as *P. subquinata* (Lange) Rydb., by Soják (1986) who considered it to have its origin in the hybrid *P. nivea* subsp. *nivea* × *pulchella* (or rather *P. prostrata* Rottb. subsp. *floccosa* Soják × *pulchella* in the nomenclature of Soják 1989). This hypothesis of origin is strongly doubted by us. An equally

improbable origin is as a stabilised progeny from the hybrid *P. crantzii* × *nivea* subsp. *nivea*. It was typified on Greenland material and is elsewhere known only from Svalbard, northeasternmost Norway and the Kola Peninsula. In spite of a possible hybridogenous origin, we choose to regard it as a distinct taxon as it has a distribution quite separate from at least one of the tentative parents (*P. nivea* subsp. *nivea*).

#### (58) *Potentilla chamissonis* Hult.

The Svalbard material of *P. chamissonis* corresponds well with the northern Fennoscandian material, in indumentum and in the more or less regularly ternate leaves. In the species concept of Soják (1989) the name *P. chamissonis* should be restricted to such plants with ternate leaves, and the plant should be renamed as *P. prostrata* subsp. *chamissonis* (Hult.) Soják. Plants with digitate leaves, earlier placed in *P. chamissonis*, are placed in other species by Soják. Other authors (e.g. Rønning 1996) indicate an affinity with the North American *P. hookeriana* Lehm.

#### (59) *Potentilla* × *insularis* Soják (*Potentilla chamissonis* × *pulchella*)

Plants generally resembling *P. chamissonis* and *P. nivea*, but with regularly digitate or pinnate leaves (i.e. with a short distance between the 1–2 lowermost leaflets and the three others), and a denser, more silky indumentum, were placed by Soják (1986) in other species and interpreted to have their origin in hybrids between species with ternate (section *Niveae*) and pinnate leaves (section *Multifidae*). Soják (1986) mentioned or described 20–30 species of such presumed hybridogenous origins on a worldwide base.

Rønning (1961) reported the occurrence in Svalbard of such plants with the general appearance of *P. chamissonis*, but with digitate or slightly pinnate leaves and with long, soft indumentum on the lower leaf surface. He identified them with *P. rubricaulis* Lehm., at that time considered to be widely distributed in Greenland and the Canadian Arctic. He also mentioned *P. pedersenii* (Rydb.) Ostenf. from Svalbard, as most probably a northern arctic variety (var. *arctica* Simm.) of *P. rubricaulis*. Thus *P. rubricaulis* was recognised from Svalbard and included in the

standard floras, like Rønning (1964, 1979, 1996) and Ball et al. (1968).

The collections cited by Rønning (1961) in his original report of *P. rubricaulis* from Svalbard have been re-examined by Soják and by us. We found them to be heterogeneous, including specimens of tall-growing *P. pulchella*, some specimens of *P. chamissonis*, and specimens differing from both. The descriptions of Rønning (1961 and later) are based on this mixture. His illustration of "*P. rubricaulis*" (Rønning 1964, 1979, 1996) is obviously based on a tall-growing *P. pulchella* with distinctly pinnate leaves, while his illustration of "*P. chamissonis*" is based on a plant clearly intermediate between *P. chamissonis* and *P. pulchella* (i.e. corresponding to his "*P. rubricaulis*"). This has not facilitated morphotype identification within one of the difficult vascular plant genera in Svalbard.

As in several other Svalbard taxa, the problem is two-fold: the morphological evaluation of the material and the application of names. In the opinion of more recent American authors (e.g. Porsild & Cody 1980) and of Soják (1986), *P. rubricaulis* is an American species, ranging from Alaska eastwards to eastern Greenland, but not reaching Svalbard. Soják (1986) interpreted *P. rubricaulis* as originating from hybrid(s) between *P. arenosa* (Turcz.) Juz. (*P. hookeriana* auct. non Lehm.), a species widely distributed from northeastern Russia through Siberia and North America, but lacking in the North Atlantic area, and the American and northeast Asian *P. bimundorum* Soják. Both parents and the hybrid have, according to Soják (1986), boreal to southern arctic distributions. According to these studies *P. rubricaulis* should be excluded from the flora of Svalbard. The same is the case with *P. hookeriana* Lehm. s. str., considered by Soják (1989) and North American authors to be a species of western North America.

North American authors, such as Porsild & Cody (1980), include *P. pedersenii* as arctic forms of *P. rubricaulis*. It is thus distributed through the American Arctic east to Greenland. Soják (1986) considered it as a distinct species of a hybridogenous origin, from *P. pulchella* s. lat. on one side and either *P. chamissonis* or the American northern arctic *P. vahliana* Lehm. on the other. He described its distribution as ranging from the Canadian Arctic eastwards to western and northern Greenland. Consequently, this species should also be excluded from the flora of Svalbard.

Soják (1986) described a new species, *P. insularis* Soják, to include those parts of the Svalbard material previously placed in *P. rubricaulis* and *P. pedersenii*, and which did not belong to *P. chamissonis* or *P. pulchella* s. lat. It was typified on material from "Sassenbay", Hyperithatten (28/8 1908, leg. H. Resvoll-Dieset, O), in the inner Isfjorden area. The material combines characters from *P. chamissonis* and *P. pulchella* and can be interpreted as representing a possibly apomictic, seed-producing taxon arisen by hybridisation. Soják (1986) proposed an origin of his *P. insularis* from the hybrid *P. chamissonis*  $\times$  *lyngei*.

*Potentilla lyngei* Jurtz. & Soják was described in 1984 on material from Novaja Zemlja (Yurtsev & Soják in Yurtsev 1984). It was reported from Svalbard by Yurtsev (1984), "according to written communication by J. Soják" (Yurtsev in lit.), and reported to have a disjunct amph-Atlantic distribution from Novaja Zemlja through Svalbard to northeast Greenland, in Greenland as a subsp. *spissum* Soják (Yurtsev in lit.). The single known Svalbard specimen is one of four on a sheet, collected in a known mixed population of *P. chamissonis*, *P. pulchella*, and *P. \times insularis*, at "Sassenbay", Gipsbukken (19/7 1908, leg. H. Resvoll-Dieset, O) in the Isfjorden area. Resvoll-Dieset made the following note on the label (our translation): "Probably an intermediate form between *P. pulchella* and *nivea* f. *subquinata*". The three other specimens were determined by Soják to *P. \times insularis*, and we agree with this determination (i.e. rather a hybrid with *P. chamissonis* than with *P. nivea*). The fourth specimen does not, in our opinion, differ much from the three others and is in addition composed of rearranged, loose leaves and stems that may belong to different plants. Until a comprehensive study of the variation within *P. pulchella* and *P. \times insularis* is undertaken, we hesitate to accept *P. lyngei* as a distinct taxonomic entity in a Svalbard context. The Greenland material of *P. lyngei* subsp. *spissum* (in O) is also of the same general type.

Nilsson (pers. comm.) studied parts of the material in 1993 and found it to consist of several morphologically distinct types, all more or less intermediate between *P. chamissonis* and *P. pulchella*. Engelskjøn (pers. comm.) also noted a considerable phenotypic plasticity in specimens growing in stabilised screes below the mountain Templet in the "Sassenbay" area.

An investigation in 1996 (Elven et al. unpubl.)

of the majority of known localities of *P. insularis* in Svalbard revealed a large morphological variation, always with clear features in common with *P. pulchella* but with variation in the direction of either *P. chamissonis* or *P. nivea*. It was also usually found in company with one of these species. In the type locality, Hyperitthatten, it occurs together with *P. chamissonis* and *P. pulchella*, but in the absence of *P. nivea*. In the locality reported for *P. lyngei*, Gipshuken, *P. insularis* is also found with *P. chamissonis* and *P. pulchella*, but without *P. nivea*. Morphologically varying hybrid swarms were observed in some localities.

The conclusion reached here is that smaller parts of the Svalbard material which previously has been determined as *P. rubricaulis* and *P. pedersenii* belong to *P. pulchella* and *P. chamissonis*, whereas the remaining majority represents a series of intermediates between *P. chamissonis* and *P. pulchella*. These plants occur in cliffs and scree slopes, often as obviously seed-reproducing populations, but mostly in company with both *P. chamissonis* and *P. pulchella*. The plants vary from site to site, sometimes being closer to *P. chamissonis* with ternate and digitate leaves and a sparse indumentum, sometimes closer to *P. pulchella* with slightly pinnate leaves and a denser indumentum. The plants approaching *P. chamissonis* were assigned to *P. × insularis* by Soják (1986), those approaching *P. pulchella* were assigned to *P. lyngei* by Soják (in herb.) and Yurtsev & Soják (in Yurtsev 1984). They are at present best interpreted as a possibly apomictically reproducing and locally arisen (polytopic) hybridogenous species swarm. Its distribution is at present uncertain; it occurs scattered in warmer fjord areas of Spitsbergen. However, a northeastern Greenland sheet accidentally placed among the Svalbard plants (in ●) was by Soják determined as *P. × insularis*. If *P. lyngei* is included, the "species" has an ampho-Atlantic, arctic distribution (and the name *P. lyngei* will have priority before *P. × insularis*).

#### (60) *Potentilla crantzii* (Cr.) G. Beck ex Fritsch

The Svalbard and Jan Mayen material of *P. crantzii* is homogeneous, except for some variation in the number of leaflets. Soják (1985), however, recognised only the plants with digitate

leaves as *P. crantzii* s. str., while those with ternate leaves were considered to belong to *P. gelida* C.A. Meyer and those with variation in the number of leaflets to be hybrids between the two (*P. × scandica* Soják) or between *P. crantzii* and *P. hyparctica* (*P. × protea* Soják). The last hybrid was reported by Soják (1985) in the scanty material of *P. crantzii* from Jan Mayen, in spite of the lack of records of the other tentative parent (*P. hyparctica*) from that island.

In our opinion all the Svalbard and Jan Mayen material belongs to *P. crantzii* s. str., irrespective of some variation in number of leaflets. Hybrids with *P. hyparctica* may occur in Svalbard, but no convincing specimens have yet been found.

#### (61) *Potentilla pulchella* R. Br.

Whereas the taxa within the *P. nivea* complex and *P. crantzii* are regularly associated with warm slopes, cliffs, scree and bird cliff meadows, *P. pulchella* also often grows as the only *Potentilla* on dry ridges and deposits of silty alkaline soils, associated with *Puccinellia angustata* and *Poa abbreviata*. In such sites only a small amount of variation is found. Most plants are villous, whereas some populations on dry shore terraces in the Isfjorden area consist of very distinctive, small and glabrescent plants. These have tentatively been considered as a "Sassen morphotype", but have not yet been sufficiently studied or taxonomically recognised. The deviating "morphotypes", both the glabrescent gravel shore terrace type and a distinct dwarfish silt terrace type, keep their morphological features in comparative cultivation (Elven et al. unpubl.). The genetical base of the variation is yet unknown.

The scree and bird cliff populations, where *P. pulchella* usually grows together with other species of *Potentilla*, are also varied. Tall-growing plants have been mistaken for "*P. rubricaulis*", see note (59), and some back-crossing from hybrids is suggested.

#### (62) *Puccinellia angustata* (R. Br.) Rand & Redf. coll.

Tzvelev (1984) included several taxa previously described at specific level in a widely defined *P. angustata*. Three taxa are found in Svalbard, two of them previously recognised at species level. The major part of the herbarium material belongs

to subsp. *angustata*, which is growing in a wide range of open, often base- and nutrient-rich habitats. A decumbent and lax plant described as var. *decumbens* E. Jørgensen is sometimes found on silty shore terraces and river-banks. It is known only from eastern Greenland and Spitsbergen.

A deviating plant was found on two separate occasions on dry calcareous soil near the warm springs in Bockfjorden, by Elvebakk and by Thannheiser (Elvebakk et al. 1994). Similar plants were found in 1996 in the Pyramiden area (Thannheiser pers. comm.). They correspond fairly well with *P. angustata* subsp. *palibinii* (Th. Sør.) Tzvelev (*P. palibinii* Th. Sør.). The plants differ from subsp. *angustata* e.g. in almost smooth panicle branches, lemmas almost without apical ciliae and fringes, and an open and much more lax panicle. The taxon is elsewhere only known from Zemlja Frantsa-Josifa and Novaja Zemlja.

(63) *Puccinellia capillaris* (Liljeb.) Jansen

Engelskjøn & Schweitzer (1970) and Engelskjøn (1986a) recognised only one species of the genus, *P. phryganodes*, on Bjørnøya. Among the collections made by Engelskjøn in 1967 and 1983 some contain a mixture of *P. capillaris* with culms and *P. phryganodes* only with stolons, and two are entirely *P. capillaris*, with well-developed pollen. The collections were made on the shore terrace on the north coast of the island (Nordkapp and Kobbekbukta) and landwards from the south-eastern coast at Røedvika, up to 30 m a.s.l. The material belongs to the northern type previously recognised as *P. coarctata* Fern. & Weath. Its status on Bjørnøya is presently being studied by Engelskjøn & Elven (in prep.).

(64) *Puccinellia phryganodes* (Trin.) Scribn. & Merr. coll.

A polyploid complex in which the Svalbard and Novaja Zemlja plants are tetraploid ( $2n = 28$ ) and plants from northern Fennoscandia and Greenland triploid ( $2n = 21$ ). The cytotypes are also separated by morphological and anatomical features (Sørensen 1953). Flowering is rare in Fennoscandian plants, frequent in Svalbard plants, but development of seeds has not been proved. The plants reproduce by fragmented stolons dispersed by ocean currents and possibly by birds.

Löve & Löve (1975) treated the entities on different ploidy levels as separate species (within the genus *Phippsia*) and reserved the name *Phippsia phryganodes* (Trin.) Á. & D. Löve (*Puccinellia phryganodes*) for the diploid Beringian plant. The triploid was named *Phippsia neoarctica* Á. & D. Löve), while the common tetraploid Svalbard plant was named *Phippsia vilfoidea* (Anderss.) Á. & D. Löve (*Puccinellia vilfoidea* (Anderss.) Á. & D. Löve). However, one population of the morphological/anatomical "Greenland type" (i.e. corresponding to the triploid level) has been found at Biscayerhuken, northern Spitsbergen (revised in the herbarium by Sørensen in 1952, reported by Rønning 1962). Although no cytological data are available, this population may belong to *P. neoarctica*. At present we prefer to treat the material as *P. phryganodes* in a wide sense, possibly with several subspecies, as the correspondence between ploidy levels and morphological and anatomical features at a circumpolar scale is still tentative. This treatment is in accordance with Tzvelev (1984).

(65) *Puccinellia svalbardensis* Rønning

First reported as *P. tenella* (Lange) Holmberg by Dahl & Hadač (1946) based on collections from the Dicksonfjorden and Kongsfjorden areas. Later Rønning (1962) revised the former collection as *P. angustata* and described the latter as *P. svalbardensis* Rønning (Rønning 1962, 1971). Rønning (1972) added one locality of *P. svalbardensis* from the Wijdefjorden area. The material differs from other Svalbard *Puccinellia* species, but was considered by Hughes & Halliday (1980) to be doubtfully distinct from the almost circumpolar *P. tenella* s. lat. The Svalbard plant is, however, hexaploid ( $2n = 42$ , Rønning 1961), whereas *P. tenella* has variously been reported as diploid ( $2n = 14$ , Löve & Löve 1975) or to belong to the otherwise hexaploid *P. capillaris* group (Tzvelev 1984) from which the Svalbard plant is clearly different. Pending further investigations we accept the species. A report of *P. svalbardensis* from Forlandssundet (Gugnacka-Fiedor & Noryskiewicz 1982) proved to be *XPucciphippsia vacillans* (rev. A. Elvebakk). At present the species is only known from Spitsbergen.

(66) *XPucciphippsia vacillans* (Th. Fr.) Tzvelev

This probably hybridogenous taxon is reported

from Svalbard and from both the Canadian and Russian Arctic. It occurs scattered over most of the Spitsbergen archipelago. Hedberg (1962) discussed several alternatives as to the origin of Canadian plants and regarded them finally as a hybrid between *Phippsia algida* and *Puccinellia vahliana*. He concluded that the Svalbard material was of the same origin. This interpretation was accepted by Tzvelev (1984). Scholander (1934) discussed several possible hybridogenous origins of the Svalbard plants and found *Phippsia concinna*  $\times$  *Puccinellia vahliana* to be the most probable.

After comparing Svalbard material with material collected by Elvebakk in Canada in 1989 (TROM), we agree with Scholander that the Svalbard material resembles the hybrid *Phippsia concinna*  $\times$  *Puccinellia vahliana*, whereas the Canadian material inspected by us most probably has a *Phippsia algida*  $\times$  *Puccinellia vahliana* origin. *Catabrosa concinna* Th. Fr. subsp. *vacillans* Th. Fr. was described from Svalbard (Fries 1869a), and the name therefore belongs to the Svalbard plant, whereas the Canadian plant probably is unnamed.

A triploid chromosome number ( $2n = 21$ ) is reported from Canada (Hedberg 1962), and the Canadian hybrid is considered to be sterile. The Svalbard plants form large populations and often occur in absence of one or both of the proposed parents. Investigated plants have shrunken anthers and no mature seeds have been found. It is difficult to understand how this plant, lacking means of vegetative propagation, is able to form populations, and further studies are needed.

#### The *Ranunculus affinis*–*auricomus* complex (notes 67–68)

J. Lid (unpublished notes, Bot. Mus., Univ. Oslo) studied the material of the *R. affinis*–*R. auricomus* complex in Svalbard in the 1930's. He stated that there are two species present, a rather widespread *R. affinis* (later usually called *R. pedatifidus* Sm. in Svalbard contexts) in western and central parts of Spitsbergen, and a second, local species, *R. wilanderi*. The former is a comparatively tall-growing plant of cliff and bird cliff meadows, has long (c. 1.0 mm) and soft marginal hairs on the leaves and long, distinctly curved beaks on the nutlets. The Svalbard material is fairly homo-

geneous. The latter, *R. wilanderi*, is found in damp moss tundra and is separated by a different leaf form, short (c. 0.2 mm) marginal hairs and different fruits. These morphological differences are also in accordance with Andersson & Hesselman (1900) who discussed and illustrated these two taxa.

Tutin (1964b) treated *R. affinis* (with *R. auricomus* var. *glabratus* Lynge as a synonym) and *R. pedatifidus* as fairly well-separated taxa, including the former in the *R. auricomus* group but not the latter. Tolmachev (1971) listed both *R. pedatifidus* and *R. wilanderi* as synonyms of *R. affinis*. Böcher et al. (1978) treated *R. pedatifidus* and *R. affinis* as synonyms, and *R. wilanderi* as possibly one of three agamospecies within the complex. Jalas & Suominen (1989) included *R. pedatifidus* in a widely defined *R. affinis*, but excluded *R. wilanderi*. Rønning (1979) listed *R. pedatifidus* from several localities in Svalbard, and in addition listed *R. auricomus* var. *glabratus* and/or *R. pedatifidus* var. *wilanderi* as uncertain in Svalbard. Tutin & Akeroyd (1993) included the Svalbard plants in *R. affinis*, and excluded *R. pedatifidus* Sm. from the European flora.

#### (67) *Ranunculus affinis* Sm.

We agree with Lid in placing the majority of the Svalbard plants in the arctic *R. affinis* R. Br. complex rather than in the *R. auricomus* L. complex, widespread in mainland Fennoscandia. The *R. auricomus* complex is almost entirely apomictic with differentiation into an abundance of local agamospecies. The reproductive systems in the *R. affinis* complex are unknown. There are no modern studies of the complex, and as seen from the citations above, there is an abundance of synonyms in the literature. The name *R. affinis* is used collectively for the complex in most arctic areas, and this approach is also followed here, especially as the name *R. pedatifidus* may be based on material from Central Asia and is ambiguous in an arctic context. *Ranunculus affinis* may have to be replaced by an earlier synonym, *R. arcticus* Richards. (S. Ericsson, pers. comm.).

A tetraploid chromosome number ( $2n = 32$ ) has recently been counted on Svalbard material of *R. affinis* (Engelskjøn pers. comm.). This number has been reported repeatedly in both the *R. affinis* and *R. auricomus* complexes.

The valid name of the species may be *R. arcticus* Richards. (Nilsson in prep., Flora Nordica).

(68) *Ranunculus wilanderi* (Nath.) Á. & D. Löve

The plant has only been found at Kapp Thordsen in the Isfjorden area and was described by Nathorst (1883) as *R. affinis* f. *wilanderi*.

The fairly extensive discussion about this taxon has been based on the small original collection by Nathorst. The locality was revisited and thoroughly investigated in 1992, and a single, but fairly extensive stand was found in a damp, deep moss tundra beneath a dry bird cliff meadow where typical *R. affinis* was growing (Elven unpubl.). The evaluation here is therefore based on a more extensive material than previously available, and also on comparison of live plants of both *R. affinis* and *R. wilanderi* (Botanical Garden, Oslo).

In view of its location, close to a large population of *R. affinis*, but in a different habitat, the plant might be considered to be a local (ecotypic) race. However, the morphological differences are considered (by Nilsson in prep., Flora Nordica, and S. Ericsson pers. comm.) to be of an order deserving separation at the rank of species. A few plants growing mixed with *R. affinis* also proved consistently different from this (Elven pers. observ. 1996). Both Nilsson and Ericsson also considered *R. wilanderi* to be more closely related to the *R. auricomus* complex than to the *R. affinis* complex. *Ranunculus wilanderi* is therefore here accepted as the only native "species" of the *R. auricomus* complex known in Svalbard.

(69) *Ranunculus hyperboreus* Rottb. coll.

According to Nilsson (in prep., Flora Nordica) the Spitsbergen and Bjørnøya materials differ. The material from Spitsbergen and neighbouring islands belongs to the mainly arctic subsp. *arnellii* Scheutz (subsp. *samojedorum* (Rupr.) Hult.) together with the Jan Mayen material, whereas the Bjørnøya material and at least the majority of the mainland Fennoscandian material belongs to the mainly boreal subsp. *hyperboreus*.

(70) *Ranunculus* × *spetsbergensis* (Nath.) Hadač

The taxon is considered to have its origin in the hybrid *R. lapponicus* × *pallasii* and is known only with vegetative propagation. In Svalbard it is morphologically and ecologically distinct. In general its biology is that of an autonomous species, and its distribution is distinctly different from one of its proposed parents (*R. pallasii*), which is very rare. Rønning (1971) considered it as a Svalbard endemic, but it is now recorded from several localities in Siberia and Canada (Tolmachev 1971, Cody et al. 1988). It was first described as *R. pallasii* var. *minimus* Rupr. from Kolgujev in 1846 (see Tolmachev 1971) and later as *R. pallasii* var. *spetsbergensis* by Nathorst (1883). The occurrence in Svalbard has been described by Hadač (1942, 1944).

(71) *Ranunculus* hybrids

The hybrid *R. nivalis* L. × *pygmaeus* Wahlenb. has been found with certainty at one site in the Van Mijenfjorden area (O). It is seed-sterile and well known from the Fennoscandian mountains. A fairly certain hybrid, morphologically intermediate between *R. pygmaeus* Wahlenb. and *R. sulphureus* Sol., has been found at Bjondalen in the Isfjorden area (in 1985 by Engelskjøn & Brochmann, O and TROM).

A single stand of a plant identified by Nilsson (in prep., Flora Nordica) as the hybrid *R. affinis* Sm. × *sulphureus* Sol. was found in 1992 below a heavily manured bird cliff on Kapp Thordsen in the Isfjord area (Elven, O). It was growing with the putative parents. The hybrid has, as far as we know, not been reported previously, except by Lid & Lid (1994). It is, however, only tentatively included by us as a better understanding of the reproductive system of the proposed parents should be achieved before such an improbable hybrid is fully accepted.

(72) *Rumex acetosa* L. coll.

An introduction, at present only known from two localities on Bjørnøya (Engelskjøn 1986a), but reported as stable. The available material is sterile and difficult to determine to subspecies.

(73) *Salix arctica* Pallas

The species is only known from two very small populations in Svalbard. A single individual near the airstrip at Ny-Ålesund in the Kongsfjorden area has become extinct, probably due to grazing by the recently introduced reindeer, whereas a few plants are located in the upper middle part of Adventdalen east of Longyearbyen. At the latter locality the plants are threatened by fluvial erosion and human traffic. Their extreme rarity has prevented collection, and only a few twigs have been available for study. Only male plants are known from Svalbard, and no flowering material has been collected.

The shrubs were reported by Hultén (1964) as *S. glauca* L. subsp. *callicarpaea* (Trautv.) Böcher (*S. callicarpaea* Trautv.) and accepted as such by Rønning (1979). A revision of the North Atlantic taxa of the *S. glauca* complex (Pálsson & Elven in prep., Flora Nordica) indicates that *S. callicarpaea* is a boreal American taxon reaching north and east to southern Greenland only, and that the plants on the Faeroes, in Iceland and Spitsbergen previously named as *S. callicarpaea* belong to the widespread and polymorphic *S. arctica*, common e.g. in Greenland.

For phytogeographical reasons *S. arctica* is a more probable identification of the Svalbard plants than either *S. glauca* or *S. callicarpaea*. Their final identity will, however, remain unconfirmed until a better material is available for study. The origin of the Svalbard plants is problematic. The persisting clones may be relicts from a time with more favourable climate. In favor of this hypothesis is the occurrence of material from Bellsund (O) of a possible hybrid between *S. polaris* and a species of the *S. arctica*-*glauca* group. The plant differs from *S. arctica* in more rounded, smaller, thinner and less hairy leaves, from *S. polaris* in oblong, hairy leaves and much thicker branches. However, the plant must be refound and more material collected before this hybrid can be accepted from Svalbard.

(74) *Salix herbacea* L. × *polaris* Wahlenb.

Intermediate in leaf margin (basally dentate) and fruit indumentum. Known from several sites on Bjørnøya (Engelskjøn 1986a, map 21). Reported from Sørkapp Land by Lid (1925) and later found at several sites along the western coast of Spitsbergen north to Danskeøya and in the Isfjorden

and Wijdefjorden areas, although Rønning (1979) only indicated Bjørnøya. Dubiel (1990) and Kuc & Dubiel (1995) considered the majority of *Salix* collections from Sørkapp Land as belonging to *S. herbacea* × *polaris*. A Fennoscandian population of the hybrid was found to be tetraploid ( $2n = 76$ , Borgen & Elven 1983). Tentative hybrids produce well-formed seeds. The hybrids may reproduce independently of the diploid and hexaploid parents and behave as a separate species.

(75) *Saussurea alpina* (L.) DC.

Only found near a trapper's cabin at Storvika between Bellsund and Hornsund, southwestern Spitsbergen (Rønning 1961). The plant may have been introduced, but has been observed during the last decade and seems to be established.

(76) *Saxifraga aizoides* L.

The Svalbard plants differ consistently from the Fennoscandian ones with a more compact growth, shorter petals, and more glaucous leaves. Colour variability, common in Fennoscandian mountains, does not seem to be present in Svalbard. According to Nilsson (pers. comm.) they correspond more to the Alpine than to the Fennoscandian type. A further study is needed before any taxonomic conclusion can be reached.

(77) *Saxifraga cespitosa* L.

A very polymorphic species. Hadač (1944) described six varieties and forms from Svalbard and reported on intermediates between the varieties *alba*, (with three forms, possible ecormorphs), *aurea* and *apetala*. Rønning (1996) separated the material in two species, *S. cespitosa* and a new species proposed to cover Hadač's var. *aurea*, and he recognised a var. *apetala* within his new species.

The position of these specific and subspecific taxa, also including a var. *uniflora* (R. Br.) Simm. (*S. uniflora* R. Br.) is dubious. Morphotypes with small flowers and narrow, erect yellow petals (Hadač's var. *aurea*, Rønning's new species) and types with large flowers and broad, spreading white petals have been found mixed in several populations, and the variation may have a quite simple genetical explanation. The variation has also been found to be continuous in many

populations. The same morphological variation has also been found in other areas, i.e. local stands of yellow-flowered, narrow-petalled plants within normal white-flowered populations (see e.g. Elven et al. 1980).

A formal taxonomic treatment should include material from a larger geographical area and should be based on experimental studies, especially on crossing experiments. We therefore do not accept the separation proposed by Rønning (1996). Ongoing genetic studies (see Tollefsrud et al. 1995) indicate that the variation in flower shape and colour is taxonomically entirely insignificant.

(78) *Saxifraga flagellaris* Sternb. subsp. *platysepala* (Trautv.) A.E. Porsild

The arctic taxon present in Svalbard is tetraploid ( $2n = 32$ ), as opposed to the more southern and diploid subsp. *flagellaris* ( $2n = 16$ ). It may merit rank as a separate species, *S. platysepala* (Trautv.) Tolm. (see e.g. Rønning 1996).

(79) *Saxifraga hirculus* L. coll.

The arctic type found in Svalbard is small-growing, forming dense cushions and usually with only one flower per stem. It differs considerably from the lowland European type and has sometimes been distinguished, together with the Icelandic and Alpine plants, as subsp. *alpina* (Engler) Å. Löve.

(80) *Saxifraga hyperborea* R. Br. and *S. rivularis* L.

The two species are separated cytologically (*S. hyperborea* diploid with  $2n = 26$ , *S. rivularis* tetraploid with  $2n = 52$ , both counted on Svalbard material). The morphological differences are, however, small, and *S. hyperborea* is at least one of the parents of the polyploid *S. rivularis* (Brochmann pers. comm.). *Saxifraga hyperborea* differs mainly in lacking subterranean runners and in having petals nearly double the length of the sepals. Pigmentation is often used in separating them, but both may have a distinctly purplish pigmentation.

Hybridisation between the two species has been documented. The expected intermediate chromosome number of  $2n = 39$  was found in a ten-

tative hybrid growing with both parents (also counted) in Ny-Ålesund in the Kongsfjorden area (Borgen & Elven 1983). Other morphological intermediates have been found, together with *S. hyperborea*, at one locality in Krossfjorden. The hybrid may be widespread.

(81) *Saxifraga oppositifolia* L. coll.

Two distinct morphotypes with deviant ecological preferences have been reported (see i.a. Crawford et al. 1993). In less exposed, damp habitats a prostrate type is found with long, slender branches and distant leaves usually with marginal cilia. This type probably corresponds with the majority of Scandinavian mountain plants. On dry, wind-exposed ridges there is a compact, cushion-forming type with dense, overlapping leaves entirely or mostly without cilia. This type is also reported from the northern Scandinavian mountains (Nilsson 1986). It may correspond with what is recognised as a separate, closely related taxon, *S. pulvinata* Small (*S. oppositifolia* subsp. *smaliana* (Engler & Irmscher) Hult.), in the American Arctic including Greenland. The name *pulvinata* was published at species level in 1901. The types also differ in floral morphology. Rønning (1996) accepted the types at subspecific level, first described in a Svalbard context as forms by Andersson & Hesselman (1900). The prostrate type was named as subsp. *reptans* (Anderss. & Hesselm.) Rønning, probably corresponding with what should be named subsp. *oppositifolia*, and the pulvinate type as subsp. *pulvinata* (Anderss. & Hesselm./Small) Rønning. Both the priority of the names (Small's or Andersson & Hesselman's) and the relation between the Svalbard and arctic American types are still unsolved questions.

A recent local investigation in the Ny Ålesund area, Svalbard (Brysting et al. 1996) revealed that no other morphological feature was correlated with growth form, that the pollen grains were of one size (differences often indicative of differences in ploidy level), and that intermediates had well-developed pollen not indicative of hybridization. Their conclusion was that the variation in growth form was clinal and not worthy of taxonomic recognition.

From mainland northern Europe only the diploid chromosome number ( $2n = 26$ ) is known, corresponding with *S. oppositifolia* s. str. A single count of a Svalbard plant revealed a tetraploid



number ( $2n = 52$ , Flovik 1940). It is not known from which of the two morphotypes the count originates. Tetraploid numbers are elsewhere reported from the American Arctic including Greenland (Löve & Löve 1975) and are associated with *S. pulvinata*.

(82) *Saxifraga svalbardensis* D.O. Øvstedal

This comparatively recently described taxon (Øvstedal 1975) is found to be common in Svalbard. It may be an endemic as no similar plants are found in the extensive collections from other arctic areas in O, TRH and TROM. The plants are morphologically homogeneous, characterised by half-open flowers with irregular numbers, positions and development stages of petals and sepals, by petals with a purplish pigmentation, and by subterranean runners. Seeds are produced only rarely (Brochmann pers. comm.), and *S. svalbardensis* mostly reproduces by bulbils and locally by runners. The plants are confined to deep, wet moss tundra.

*Saxifraga svalbardensis* has been interpreted as originating from a hybrid between *S. cernua* and either *S. hyperborea* or *S. rivularis*. In the latter case it may have the same parentage as *S. × opdalensis* Blytt, described from mountains in southern Norway, but differing from *S. svalbardensis* in being low-growing, with white, open, and regular flowers, in lacking runners, and in being an ecological specialist of irrigated gravel-flats. One chromosome count in *S. svalbardensis* (Borgen & Elven 1983) also resulted in a slightly higher number ( $2n = ca\ 64$ ) than usually found in *S. × opdalensis* ( $2n = 48-50$ , Engelskjøn 1979). The *S. cf. svalbardensis* tentatively reported by Rune (1988) from a serpentine bedrock area in northern Scandinavia is probably another *S. cernua × rivularis* hybrid, as the illustration shows it to differ considerably from Svalbard *S. svalbardensis*. Such putative hybrids are known from several parts of southern and northern Scandinavia.

Recent genetic studies by Brochmann (unpubl.) confirm a probable origin from *S. cernua* and *S. rivularis*. The morphological features combine runners characteristic of *S. rivularis* and purplish pigmentation. Its homogeneous appearance over large areas, and its ability to reproduce by seed (at least as well as one of its putative parents, *S. cernua*), indicates that rank of species

is appropriate, even if it may originally have appeared as a hybrid.

(83) *Silene uralensis* (Rupr.) Bocq.

A complex which until recently was treated as one species in Fennoscandia and Svalbard (*Melandrium apetalum* Fenzl or *Silene wahlbergella* Chowdh.) and another in the Urals (*S. uralensis*). Bocquet (1969) found a continuity in the variation between *S. uralensis* and *S. wahlbergella* that justified a treatment at subspecific level. At species level the name *S. uralensis* has priority, and Bocquet (1969) recognised three subspecies in the European area: subsp. *uralensis* in the Urals, subsp. *apetala* (L.) Bocq. in Fennoscandia, and subsp. *arctica* (Th. Fr.) Bocq. in the Arctic including Svalbard. Kurtto (in prep., Flora Nordica) found the differences between the plants in the Urals and the Arctic too insignificant to merit separation even at level of subspecies, whereas the differences between these and the Scandinavian plants were of an order corresponding to separation as distinct species. This treatment is followed here. The arctic-boreal species group of *S. uralensis*, *S. wahlbergella*, *S. furcata* and allies is very distinct and may well deserve separation in a distinct genus, *Gastrolychnis*.

(84) *Stellaria longipes* Goldie coll.

A very complicated arctic/boreal aggregate, urgently in need of a world-wide revision. According to Hultén (1943) and Chater & Heywood (1964) there are three species in Svalbard: *S. ciliatiseipala* Trautv., *S. crassipes* Hult., and *S. longipes* Goldie s. str. Rønning (1979) recognised only *S. crassipes*, whereas Chater & Heywood (1993) excluded *S. ciliatiseipala*, but reported *S. crassipes* and *S. longipes* s. str. from the islands. According to studies in Canada, Norway (including Svalbard) and Russia (Chinnappa 1985, Öften 1989) there are no reliable morphological characters separating these species, and they are at present best treated as parts of a polymorphic *S. longipes* Goldie. Further studies may, however, reveal several taxa in Svalbard.

(85) *Vaccinium uliginosum* L. subsp. *microphyllum* Lange

The Svalbard material is probably diploid (one

count of  $2n = 24$  from the Isfjorden area, Flovik 1940), as most investigated materials from the Arctic and from northern alpine areas. The diploid is usually separated from the tetraploid southern taxon as subspecies or species (*V. gaultherioides* Bigel.). The Fennoscandian alpine plants resemble the same taxon, as proposed by Nilsson (1986), but the few chromosome counts from Fennoscandian mountains have yielded tetraploid numbers (Engelskjøn 1979; Borgen & Elven 1983). The taxon has only been found a few times in central parts of Spitsbergen (Elvebakk 1989).

### Ephemeral (introduced) taxa

A large number of taxa have been found introduced in the settlements and near trappers' cabins (see references in the *Introduction*). Taxa listed below have been found several times and may still be introduced regularly or be more or less permanent in the vicinity of the Russian settlements (R, according to information from Barentsburg by Tishkov pers. comm., and from a visit in 1993), more infrequently in Longyearbyen (L') or on Bjørnøya (B, according to Engelskjøn 1986a), and very rarely and not recently in Ny-Ålesund (N):

- Alchemilla subcrenata* Bus.—Engmarikåpe (B)  
*Agrostis capillaris* L.—Engkvein (B)  
*Capsella bursa-pastoris* (L.) Medic.—Gjetartaske (R)  
*Chamomilla suaveolens* (Pursh) Rydb.—Tunbalderbrå (N)  
*Chenopodium album* L. coll.—Meldestokk (R)  
*Fallopia convolvulus* (L.) Á. Löve—Vindeslirekne (R)  
*Galeopsis* cf. *tetrahit* L.—Kvassdå (R)  
*Matricaria maritima* L. coll. (LNR, fertile specimens determined to subsp. *subpolaris* (Pobed.) Rauschert – Nordleg strandbalderbrå – and subsp. *phaeocephala* (Rupr.) Rauschert—Finnmarksbalderbrå)  
*Poa annua* L.—Tunrapp (R)  
*Polygonum aviculare* L. (mostly var. *boreale* Lange)—Tungras (L)  
*Ranunculus acris* L. coll.—Engsoleie (R)  
*R. auricomus* L. coll.—Nyresoleie (R)  
*R. repens* L.—Krypssoleie (R)  
*Raphanus raphanistrum* L.—Åkerreddik (R)

- Rumex acetosella* L. subsp. ~~*acetosella*~~—Småsyre (LR)  
*R. longifolius* DC.—Høymol (LR)  
*Sinapis arvensis* L.—Åkersennep (R)  
*Stellaria media* (L.) Vill.—Vassarve (NR)  
*Taraxacum* spp.—Ugrasløvetann (R)  
*Thlaspi arvense* L.—Pengeurt (R)  
*Trifolium repens* L.—Kvitkløver (R).

### Excluded taxa

#### *Alchemilla vulgaris* L.

Used by Rønning (1979) and other authors to indicate several introduced *Alchemilla* taxa. See note (2).

#### *Braya alpina* Sternb. & Hoppe

Previously considered, i.e. by Triloff (1943), to include also *B. purpurascens* and other species. Svalbard records refer to *B. purpurascens*.

#### *Carex bigelowii* Torr.

Reported from a few localities by several authors and mapped by Rønning (1972). Some reports were revised by Asplund (1918) who only recognised it from Adventpynten. The available herbarium specimens have later proved to be non-littoral forms of *C. subspathacea*, and we have not seen any proper *C. bigelowii* collections from Svalbard. See also notes (11) and (12).

#### *Carex bigelowii* Torr. × *subspathacea* Wormskj.

Hjelmqvist & Nyholm (1947) reported this hybrid from the area near Longyearbyen Airport. The collection (probably in a Swedish herbarium) has not been reexamined but is tentatively included in *C. subspathacea* based on the erroneous reports of other *C. bigelowii* collections from Svalbard.

#### *Carex hepburnii* Boott

Much of the Svalbard material of *C. nardina* Fr. in the herbaria has been named *C. hepburnii*. This is a more tall-growing and poorly defined

taxon from western North America, which is not recognised by most arctic floras.

*Cerastium alpinum* L.  $\times$  *regelii* Østenf.

Reported from Svalbard by Tolmachev (1930), and cited by e.g. Triloff (1943), but the material probably belongs to *C. arcticum*  $\times$  *regelii*. See note (19).

*Cerastium hyperboreum* Tolm.

Described from Svalbard by Tolmachev (1930), but by us at present included in *C. arcticum* s. str. See note (20).

*Cochlearia anglica* L.

Reported e.g. by Rønning (1979) as *C. officinalis* var. *anglica* (L.) Alef. This is a southern plant not found in the Arctic, and the material belongs to *C. groenlandica*. See note (23).

*Cochlearia officinalis* L.

Frequently reported in a collective sense, but all Svalbard material is at present regarded as *C. groenlandica*. See note (23).

*Deschampsia brevifolia* R. Br.

Confused with *D. borealis*. See note (27).

*Deschampsia glauca* Hartm.

Indicated by Hadač (1989) as the correct identification of the Svalbard plants previously named *D. brevifolia* and here treated as *D. borealis*, see note (27). However, Hartman's *D. glauca* is a quite distinct and different plant from boreal river-banks in Fennoscandia (described in 1820 from Jämtland) and possibly in northern Russia. However, also Tzvelev (1984) seemed to identify this plant as a northern Russian and Siberian mountain and tundra taxon.

*Draba alpina* L.  $\times$  *lactea* Adams

The reports by e.g. Asplund (1918) from Colesbukta (determined by E. Ekman) and by Dahl &

Hadač (1946) from Longyeardalen are probably referable to *D. lactea*  $\times$  *oxycarpa*, as these authors used the name *D. alpina* collectively. The hybrids *D. alpina*  $\times$  *lactea* and *D. lactea*  $\times$  *oxycarpa*, produced by experimental crossings (Brochmann et al. 1993), are difficult to separate morphologically, and both combinations probably occur on Svalbard. The specimens inspected, however, have marginal hairs on the siliculae, suggesting *D. oxycarpa* as the other parent (Elven unpubl.). See note (33).

*Draba arctica* J. Vahl subsp. *ostenfeldii* (E. Ekm.) Böcher

One collection from Longyearbyen was referred to this subspecies by Böcher (1966). The subspecies differs from subsp. *arctica* in quantitative characters only, easily modified by the environment, and only one taxon of the group is here accepted from Svalbard. See note (30).

*Draba cana* Rydberg

Listed from Svalbard by Mulligan (1971). He treated this species as a close relative of *D. arctica*, not of *D. daurica/norvegica*. He was also of the opinion that *D. arctica*, described from Bellsund, differed from *D. cinerea*, but he did not present further opinions on the identity of *D. arctica* as he did not recognise it from Canada. His report probably refers to *D. arctica*. See note (30).

*Draba cinerea* Adams

Reported by numerous authors (e.g. Rønning 1979). All reports refer to *D. arctica*, see note (30).

*Draba glacialis* Adams

*Draba glacialis* has been recognised as a Svalbard species during most of this century, most recently by Walters (1964), Löve & Löve (1975), Godzik & Wójcicki (1987), and Walters & Akeroyd (1993). The name has been in use for several Svalbard taxa, none of them corresponding with Adams' *D. glacialis*. See note (28).

*Draba groenlandica* E. Ekm.

This taxon has been reported from Svalbard by

Ekman (1929), Neilson (1968 - as *D. arctica* subsp. *groenlandica* (E. Ekm.) Böcher), and by E. Ekman in O. As indicated in note (30) the earlier species concept in this group was very narrow, resulting both in a confusion concerning the separation of *D. cinerea* Adams from *D. arctica* J. Vahl, and a description of several species closely related to or now included in *D. arctica*. Böcher (1966) accepted *D. groenlandica* as a subspecies of *D. arctica*, but did not report this subspecies from Svalbard. Reports from Svalbard are, waiting for further investigations, referred to *D. arctica* subsp. *arctica* in the present concept, but see note 30.

*Draba kjellmanii* Lid ex E. Ekm.

Of the Svalbard material originally determined as *D. kjellmannii* in O, about 75% belongs to *D. corymbosa* in the present concept, about 20% to a leiocarp type of *D. alpina* on Bjørnøya and Novaja Zemlja, and the remaining 5% to a leiocarp type of the white-flowered *D. norvegica* from Bjørnøya. The name is probably to be referred (mainly) to *D. corymbosa* and is superfluous. See note (28).

*Draba magellanica* Lam.

The name should be restricted to South American plants (see note 31) but has frequently been used for Svalbard plants, e.g. by Triloff (1943) who refers both to *D. hirta* L. and *D. magellanica*. In the herbarium the name has been used for material of both *D. arctica* and *D. daurica* in the present concept and it is usually impossible to decide to which of the two species a literary record refers.

*Draba oblongata* R. Br. ex DC.

There are many references to *D. oblongata* in the Svalbard literature (e.g. Rønning 1964). Most reports refer to *D. micropetala* in our concept, some probably also to *D. pauciflora*. As shown by Mulligan (1974) the type collection of *D. oblongata* does not represent a yellow-flowered species, but corresponds to what later has been named *D. groenlandica* E. Ekm. (*D. arctica* subsp. *groenlandica*). The priorities of the names applied to species in the *D. cinerea*—*arctica* group are still uncertain. However, the name *D.*

*oblongata* may in any case have to be rejected as it during a long period has been applied to taxa in the *D. micropetala* group, quite different from the *D. cinerea*—*arctica* group where the type material belongs.

*Equisetum arvense* L. *riparium* (Fr.) Rønning

Described by Rønning (1996) based on *E. arvense* var. *riparium* Fr. In our concept this plant is included in *E. arvense* subsp. *boreale* (which Rønning (1996) renames as *E. arvense* subsp. *alpestre* (Wahlenb.) Rønning).

*Festuca ovina* L.

The name was previously used (e.g. by Resvoll-Holmsen 1927) in a collective sense for all small-grown, tufted fescues on Svalbard (*F. baffinensis*, *F. brachyphylla*, *F. edlundiae* and *F. hyperborea*). see notes 38–39. *Festuca ovina* was excluded from the Svalbard flora by Scholander (1934) and by Hadač (1944). However, it was recently erroneously indicated from Svalbard by Hultén & Fries (1986).

*Festuca rubra* L. var. *arenaria* (Osbeck) Fr.

In the early parts of this century this name was applied for what now is considered as *F. rubra* subsp. *arctica* (Hack.) Govor. in Svalbard. At present var. *arenaria* is variously considered a more or less distinct variety, subspecies (subsp. *arenaria* (Osbeck) Syme), or species (*F. arenaria* Osbeck), but distributed on northwestern European sand dunes, not reaching the Arctic. Kjellqvist (1964) gives the taxon specific rank because of its octoploid chromosome number,  $2n = 56$ . See note (41).

*Festuca supina* Schur

Reported from Svalbard by Hadač (1942, 1944). The species is central European (Tzvelev 1984), and the material collected by Hadač (O) belongs to *F. brachyphylla*, see note (39).

*Kobresia myosuroides* (Vill.) Fiori

Erroneously reported from Svalbard by Hultén & Fries (1986).

*Papaver nudicaule* L.

Listed by several authors, even as late as Triloff (1943), in spite of Nordhagen's (1931) clarification as to the differences between the diploid *P. nudicaule* (now considered restricted to Siberia) and the polyploids in N European mountains and the Arctic. All Svalbard records of *P. nudicaule* refer to *P. dahlianum*.

*Papaver radicum* Rottb.

Listed by Resvoll-Holmsen (1927), Scholander (1934), and Dahl (1937), but later authors considered all Svalbard material as belonging to *P. dahlianum* in the sense of Nordhagen (1931).

*Parrya nudicaulis* (L.) Regel

This species has been reported twice from Svalbard, first from Sorgfjorden by Hooker (1828) and later from Krossfjorden by Mathey-Dupraz (1912). The species was included for Svalbard by Resvoll-Holmsen (1927). No herbarium specimens have been preserved. The report from Krossfjorden probably refers to *Arabis alpina* as *Parrya* also often is white-flowered. The Sorgfjorden record is enigmatic. The plant has been searched for in vain as shown by Scholander (1934) who did not exclude the report. However, in accordance with Rønning (1979) we think the *Parrya* report is best considered as erroneous.

*Phippsia algida* × *concinna*

Reported by Polunin (1945). As young specimens of *P. concinna* easily are mistaken for hybrids this report is rejected. Tzvelev (1984) indicated that the hybrid "in some Arctic regions . . . is found more commonly than the parental forms". This is, however, not our experience from Svalbard or from a study of the arctic herbarium material. We have found no indication of hybridisation in mature, well-developed material (but have seen a lot of immature material difficult to determine).

*Poa* × *herjedalica* H. Sm.

Numerous collections from Svalbard have been determined as this polymorphic taxon, believed to be of hybrid origin (*P. alpina* L. × *pratensis* L. coll., see Nannfeldt 1937). The material seems mainly to belong to tall-grown (possibly manured) *P. alpina*. Occurrence of this hybrid is, however, to be expected.

*Potentilla keilhau* Sommerf.

Described from Svalbard (Vestspitsbergen, Sommerfelt 1833), but conspecific with *P. pulchella* R.Br.

*Potentilla lyngei* Jurtz. & Soják

Pending further investigations, this recently described taxon (Yurtsev & Soják in Yurtsev 1984) is included in *P. × insularis* Soják. See note (61).

*Potentilla multifida* L.

Recognised from Svalbard by Resvoll-Holmsen (1927), Hadač (1944), and Hultén & Fries (1986), based on a material collected by Nathorst at Kapp Thorsden in the Isfjorden area. The specimens (S and UPS) were studied by J. Lid in the 1930's and by Elven in 1995. Lid (unpubl.) found them to agree well with *P. multifida* from other areas and to differ significantly from all other Svalbard *Potentilla*. Rønning (1961) considered the Kapp Thorsden plants as a form of *P. pulchella*, and the species was excluded from the Svalbard flora by Rønning (1964, 1979, 1996). Elven (unpubl.) found the collected plants to correspond well with tall-grown bird cliff *P. pulchella*.

*Potentilla pedersenii* (Rydb.) Ostenf.

Indicated for Svalbard by Rønning (1964, 1979) as an obscure taxon included in *P. rubricaulis*. Other authors have either followed Rønning and included the plant in *P. rubricaulis* (Porsild & Cody 1980) or restricted the name to an arctic American taxon (Soják 1986). The Svalbard material is included in *P. × insularis*. See note (59).

*Potentilla rubricaulis* Lehm.

Reported from Svalbard by Rønning (1961) and included by Rønning (1964, 1979, 1996) and by Ball et al. (1968). The name was restricted to an American taxon by Porsild & Cody (1980), and the Svalbard material is here interpreted as *P. × insularis*. See note (59).

*Puccinellia tenella* (Lange) Holmberg

First published from the Kongsfjord and Isfjorden areas by Dahl & Hadač (1946). This record was accepted by Hughes & Halliday (1980) although the material was described by Rønning (1962) as a new and endemic species, *P. svalbardensis*, a treatment which is followed here. See note (65).

*Ranunculus acris* L. subsp. *borealis* (Trautv.) Nyman

Reported from Forlandssundet by Gugnacka-Fiedor & Noryskiewicz (1982). This study includes many species later found to be misidentified, and the report must be confirmed before it can be accepted.

*Ranunculus sabinii* R. Br.

Mapped from northern Svalbard by Hultén & Fries (1986). In view of the considerable variability of the widely distributed *R. sulphureus*, the lack of material available for study, and the lack of confirmed reports from the area between Greenland and Taimyr (Tolmachev 1971), the report is rejected here.

*Rhododendron lapponicum* Wahlenb.

Indicated from Bjørnøya by Fries (1869b), listed by Resvoll-Holmsen (1927) and still indicated by a question mark by Hultén & Fries (1986). However, Rønning (1959) has convincingly argued that the report was based on a misinterpretation of the abbreviation 'Rhod.' which actually referred to *Rhodiola*.

*Salix callicarpaea* Trautv.

Previously reported from Svalbard (Hultén 1964, Rønning 1979), but the material most probably refers to *S. arctica* Pallas. See note (73).

*Saxifraga aurea* (Hadač) Rønning

Described as species by Rønning (1996) to include yellow-flowered plants of *S. cespitosa* (see note 77). Not accepted by us.

*Silene furcata* Rafin. subsp. *angustiflora* (Rupr.) Walters

Treated as *Melandrium angustiflorum* (Rupr.) Walp. by Rønning (1979), but this taxon is now considered to be a more southern subspecies (or species), with a few occurrences in Fennoscandia. The Svalbard taxon is subsp. *furcata*.

*Silene uralensis* (Rupr.) Bocq. subsp. *apetala*

Reported by Rønning (1979) and others as *Melandrium apetalum*, but this is now considered to be a Fennoscandian taxon. The Svalbard and Greenland subspecies is *Silene uralensis* subsp. *uralensis*. See note (83).

*Stellaria borealis* Bigel.

Reported from Bjørnøya by Rønning (1959) as *S. calycantha*, but redetermined as *S. humifusa* by Engelskjøn & Schweitzer (1970). It was still mapped from Bjørnøya by Hultén & Fries (1986).

*Stellaria ciliatiseppala* Trautv.

Reported as *S. edwardsii* R. Br. by numerous early authors, and later by Hultén (1943) and Chater & Heywood (1964), but is here included in the *S. longipes* Goldie aggregate. See note (84).

*Stellaria crassipes* Hult.

Reported by numerous authors, but is here included in the *S. longipes* Goldie aggregate. See note (84).

*Taraxacum ceratophorum*, (Ledeb.) DC.

Reported from the Hornsund area by Triloff (1943). The record refers to *T. brachyceras* (see Kuc & Dubiel 1995).

*Taraxacum nivale* Lange

Reported from the Hornsund area by Triloff (1943). The record refers to *T. arcticum* (see Kuc & Kubiel 1995).

## Synonyms

The list includes as synonyms only names used in recent literature and which may cause misunderstandings. Different spelling forms are not included.

- Alopecurus alpinus* Sm. non Vill. = *A. borealis* Trin.
- Arenaria ciliata* L. subsp. *pseudofrigida* Ostenf. & Dahl. = *A. pseudofrigida* (Ostenf. & Dahl) Juz.
- Arnica alpina* auct. = *A. angustifolia* M. Vahl subsp. *angustifolia*
- A. alpina* auct. subsp. *angustifolia* (M. Vahl) Maguire = *A. angustifolia* M. Vahl subsp. *angustifolia*
- Atriplex latifolia* Wahlenb. = *A. prostrata* Bouch. ex DC. subsp. *prostrata*
- Calamagrostis neglecta* auct. non (Ehrh.) G.M.S. = *C. stricta* (Timm.) Koeler
- Cakile arctica* Pobed. = *C. maritima* Scop. subsp. *islandica* (Gand.) Elven
- Campanula gieseckiana* Vest. = *C. rotundifolia* L. subsp. *gieseckiana* (Vest.) Witasek
- Cardamine nymanii* Gand. = *C. pratensis* L. subsp. *polemonioides* Rouy
- C. pratensis* L. subsp. *angustifolia* (Hook.) O.E. Schulz = *C. pratensis* L. subsp. *polemonioides* Rouy
- Carex amblyrhyncha* V. Krecz. = *C. marina* Dew.
- C. amphigena* (Fern.) Mack. = *C. glareosa* Wahlenb.
- C. fuliginosa* Schkuhr subsp. *misandra* (R. Br.) Nyman. = *C. misandra* R. Br.
- C. marina* auct. non Dewey = *C. glareosa* Wahlenb.
- C. setina* (Christ) V. Krecz. = *C. maritima* Gunn. subsp. *setina* (Christ) Egorova
- C. stans* Drej. = *C. aquatilis* Wahlenb. subsp. *stans* (Drej.) Hult.
- Cerastium hyperboreum* Tolm. = *C. arcticum* Lange
- Cochlearia arctica* Schlecht. = *C. groenlandica* L. (but see note 23)
- C. fenestrata* R. Br. = *C. groenlandica* L.
- C. officinalis* L. var. *anglica* (L.) Alef. = *C. anglica* L.
- C. officinalis* L. var. *arctica* (Schlecht.) Gel. = *C. groenlandica* L. (but see note 23)
- C. officinalis* var. *groenlandica* (L.) Gel. = *C. groenlandica* L.
- Cochleariopsis groenlandica* (L.) Á. & D. Löve = *Cochlearia groenlandica* L.
- Colpodium vacillans* (Th. Fr.) Polunin = *X Pucciniphippsia vacillans* (Th. Fr.) Tzvelev
- C. vahlii* (Liebm.) Nevski = *Puccinellia vahlii* (Liebm.) Scribn. & Merr.
- Cystopteris dickieana* R. Sim = *C. fragilis* (L.) Bernh. var. *dickieana* (R. Sim) Moore
- Cystopteris fragilis* (L.) Bernh. subsp. *dickieana* (Sim) Hyl. = *C. fragilis* (L.) Bernh. var. *dickieana* (Sim) Moore.
- Deschampsia brevifolia* auct. non R. Br. = *D. borealis* (Trautv.) Roshev.
- D. cespitosa* (L.) Beauv. subsp. *alpina* (L.) Hooker f. = *D. alpina* (L.) Roem. & Schultes
- D. glauca* auct. non Hartm. = *D. borealis* (Trautv.) Roshev.
- Draba bellii* Holm = *D. corymbosa* R. Br. ex DC.
- D. adamsii* Ledeb. = *D. pauciflora* R. Br.
- D. adamsii* auct. non Ledeb. = *D. microcarpa* Hook. (non Rønning 1964, 1979)
- D. cinerea* auct. non Adams = *D. arctica* J. Vahl
- D. glabella* Pursh. = *D. daurica* DC. (but see note 31)
- D. gredinii* E. Ekm. = *D. oxycarpa* Sommerf.
- D. groenlandica* auct. non E. Ekm. = *D. arctica* J. Vahl
- D. kjellmannii* Lid ex E. Ekm. = *D. corymbosa* R. Br. ex DC. p.p.
- D. macrocarpa* Adams = *D. corymbosa* R. Br. ex DC.
- D. micropetala* sensu Rønning 1964, 1979, non Hook. = *D. pauciflora* R. Br.
- D. oblongata* R. Br. ex DC = *Draba arctica* J. Vahl subsp. *groenlandica* (E. Ekm.) Böcher.
- D. oblongata* auct. non R. Br. ex DC. = *D. micropetala* Hook. (non Rønning 1964, 1979)
- Dupontia fisheri* R. Br. subsp. *pelligera* (Rupr.) Tzvelev = *D. fisheri* R. Br. s. str.
- D. fisheri* R. Br. subsp. *psilosantha* (Rupr.) Hult. = *D. psilosantha* Rupr.
- D. pelligera* (Rupr.) Á. Löve & Ritchie = *D. fisheri* R. Br. s. str.
- Empetrum hermaphroditum* Hagerup = *E. nig-*

- rum* L. subsp. *hermaphroditum* (Hagerup) Böcher.
- Equisetum arvense* L. subsp. *alpestre* (Wahlenb.) Rønning = *Equisetum arvense* L. subsp. *boreale* (Bong.) Á. Löve
- Equisetum arvense* L. subsp. *riparium* (Fr.) Rønning = *E. arvense* L. subsp. *boreale* (Bong.) Á. Löve
- Erigeron eriocephalus* J. Vahl = *Erigeron uniflorus* L. subsp. *eriocephalus* (J. Vahl) Cronq.
- Eriophorum triste* (Th. Fr.) Á. Löve & Hadač = *E. angustifolium* Honck. subsp. *triste* (Th. Fr.) Hult.
- Euphrasia arctica* auct. non Lange ex Rostrup = *E. frigida* Pugsley
- Festuca cryophila* Krecz. & Bobr. = *F. rubra* L. subsp. *arctica* (Hack.) Govor.
- F. richardsonii* Hook. = *F. rubra* L. subsp. *arctica* (Hack.) Govor.
- F. rubra* L. var. *mutica* Hartm. = *F. rubra* L. subsp. *arctica* (Hack.) Govor.
- Harrimanella hypnoides* (L.) Coville = *Cassiope hypnoides* (L.) D. Don
- Juncus albescens* (Lange) Fern. = *J. triglumis* L. subsp. *albescens* (Lange) Hult.
- Koenigia hadacii* Á. & D. Löve = *K. islandica* L. var. *arctica* Hadač
- Luzula confusa* Lindeb. = *L. arcuata* Sw. subsp. *confusa* (Lindeb.) Blytt
- Lycopodium selago* L. = *Huperzia selago* (L.) Bernh.
- Melandrium affine* J. Vahl = *Silene furcata* Raf.
- M. angustiflorum* (Rupr.) Walp. = *Silene furcata* Raf. subsp. *angustiflora* (Rupr.) Walters
- M. apetalum* (L.) Fenzl = *Silene uralensis* (Rupr.) Bocq. subsp. *apetala* (L) Fenzl
- M. furcatum* (Raf.) Hadač = *Silene furcata* Raf.
- Papaver radicum* Rottb. subsp. *dahlianum* (Nordh.) Rändel = *P. dahlianum* Nordh.
- Pedicularis dasyantha* (Trautv.) Hadač. = *Pedicularis lanata* Cham. & Schlecht. subsp. *dasyantha* (Trautv.) Hult.
- Phippsia algida* (Sol.) R. Br. subsp. *concinna* (Th. Fr.) Á. & D. Löve = *Phippsia concinna* (Th. Fr.) Lindeb.
- P. angustata* (R. Br.) Á. & D. Löve = *Puccinellia angustata* (R. Br.) Rand & Redf.
- P. angustata* subsp. *palibinii* (Th. Sør.) Á. & D. Löve = *Puccinellia angustata* subsp. *palibinii* (Th. Sør.) Tzvelev
- P. capillaris* (Liljebl.) Á. & D. Löve = *Puccinellia capillaris* (Liljebl.) Jansen
- P. phryganodes* (Trin.) Á. & D. Löve = *Puccinellia phryganodes* (Trin.) Scribn. & Merr.
- P. vilfoidea* (Anderss.) Á. & D. Löve = *Puccinellia phryganodes* subsp. *vilfoidea* (Anderss.) Tzvelev
- P. svalbardensis* (Rønning) Á. & D. Löve = *Puccinellia svalbardensis* Rønning
- P. tenella* (Lange) Á. & D. Löve = *Puccinellia tenella* (Lange) Holmb.
- P. vahliana* (Liebm.) Á. & D. Löve = *Puccinellia vahliana* (Liebm.) Scribn. & Merr.
- Poa alpigena* (Fr.) Lindem. = *P. pratensis* L. subsp. *alpigena* (Fr.) Hiit.
- P. lindebergii* Tzvelev = *P. arctica* R. Br. subsp. *stricta* (Lindeb.) Nannf.
- P. tolmatchewii* Roshev. = *P. arctica* R. Br. subsp. *cespitans* (Simm.) Nannf.
- Polygonum viviparum* L. = *Bistorta vivipara* (L.) S.F. Gray
- Potentilla emarginata* Pursh = *P. hyparctica* Malte
- P. hookeriana* Lehm subsp. *chamissonis* (Hult.) Hult. = *P. chamissonis* Hult.
- P. keilhau* Sommerf. = *P. pulchella* R. Br.
- P. lyngei* Jurtz. & Soják = *P. x insularis* Soják (but see note 59)
- P. nivea* L. subsp. *chamissonis* (Hult.) Hiit. = *P. chamissonis* Hult.
- P. pedersenii* auct. non (Rydb.) Ostenf. = *P. x insularis* Soják
- P. prostrata* Rottb. subsp. *chamissonis* (Hult.) Soják = *P. chamissonis* Hult.
- P. prostrata* Rottb. subsp. *floccosa* Soják = *P. nivea* L. subsp. *nivea*
- P. robbinsiana* Oakes subsp. *hyparctica* (Malte) D. Löve = *P. hyparctica* Malte
- P. rubricaulis* auct. non Lehm. = *P. x insularis* Soják
- P. subquinata* (Lange) Rydb. = *P. nivea* L. subsp. *subquinata* (Lange) Hult.
- Puccinellia coarctata* Fern. & Weath. = *P. capillaris* (Liljebl.) Jansen
- P. palibinii* Th. Sør. = *P. angustata* (R. Br.) Rand & Redf. subsp. *palibinii* (Th. Sør.) Tzvelev
- Ranunculus pedatifidus* auct. non Sm. = *R. affinis* R. Br.
- R. samojedorum* Rupr. = *R. hyperboreus* Rottb. subsp. *arnellii* Scheutz
- Rhodiola arctica* A. Boriss. = *R. rosea* L. subsp. *arctica* (A. Boriss.) Á. & D. Löve
- Sagina intermedia* Fenzl = *S. nivalis* (Lindb.) Fr.
- Saxifraga groenlandica* L. = *S. cespitosa* L.
- S. platysepala* (Trautv.) Tolm. = *S. flagellaris*



Sternb. subsp. *platysepala* (Trautv.) A.E. Por-sild  
*Sedum arcticum* (A. Boriss.) Rønning = *Rhodiola rosea* L. subsp. *arctica* (A. Boriss.) Á. & D. Löve  
*S. rosea* (L.) Scop. subsp. *arcticum* (A. Boriss.) Engelskjøn & Schweitzer = *Rhodiola rosea* L. subsp. *arctica* (A. Boriss.) Á. & D. Löve  
*Silene wahlbergella* Chowdh. = *S. uralensis* (Rupr.) Bocq. subsp. *apetala* (L.) Bocq.  
*Stellaria calycantha* (Ledeb.) Bong. = *S. borealis* Bigel.  
*Stellariacrassipes* Hult. = *S. longipes* Goldie coll.  
*Vaccinium gaultherioides* Bigel. = *V. uliginosum* L. subsp. *microphyllum* Lange

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A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae and cyanobacteria

## Part 2. Bryophytes

ARNE A. FRISVOLL and ARVE ELVEBAKK



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Bryophytes were mentioned for the first time in the Svalbard literature in 1675. The early bryological history up to 1875 is thoroughly reviewed, and the important later papers are presented. All known papers and books with reports of bryophytes from Svalbard have been scanned for taxonomic and geographical information. In all, 563 bryophyte species (current names excluding synonyms) have been considered. Of these, 190 have been shown or critically considered to be erroneous, leaving a total of 373 accepted bryophytes (85 hepatics and 288 mosses in 137 genera). One hundred and fifty (26 hepatics and 124 mosses) are accepted from Bjørnøya, and five of these are not known from the rest of Svalbard. Short or sometimes more extensive comments are made on 315 accepted and all rejected species; the comments usually include all reported localities with literature references, as well as numerous unreported localities based on own herbarium material. Six species are reported from Svalbard for the first time, and *Plagiothecium svalbardense* is described as new. One hundred and one valid bryophyte names (29 species, 3 subspecies, 58 varieties and 11 forms) have been based on type material from Svalbard, and 18 of these are basionyms of accepted species (Appendix 1). Two exsiccates have appeared, viz. Musci Spetsbergenses Exsiccati (Berggren 1875, with 220 numbered specimens) and Bryophyta Svalbardensia exsiccata (Bednarek-Ochyra et al. 1987, with 80 numbers). Numerical and alphabetical lists, including some revisions, are given to both (Appendix 2). Many of the considered Svalbard papers describe bryophyte vegetation, and a survey of all communities whose names are based on or include bryophytes, are provided (Appendix 3).

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## Introduction

In this study we have checked and reconsidered

all known literature references to Svalbard bryophytes. Many specimens of rare or taxonomically difficult taxa reported by previous authors have been seen and revised. Because of many erroneous identifications we have become sceptical to reports of new taxa in papers of non-taxonomic character. This is especially the case with names solely mentioned in tables or lists from vegetation analyses (see below). Therefore, it was decided to exclude such dubious names and consider them better to be confirmed through future studies than to be erroneously accepted from Svalbard here. The aim has been to present a realistic list devoid of many questionable names.

Bryophytes were mentioned from Svalbard for the first time by Martens (1675); but although he described and figured about 12 vascular plants and 3–4 algae (see also Heuglin 1874; Holm 1896), he only referred to bryophytes collectively two times (as “Mos-Kräuter”): “All the herbs and mosses grow upon the grit and sand of the stones, where the water falleth down, and on that side of

the hill which the east and north winds cannot easily come at." (transl. in Martens 1855, 45, see Martens 1675). And regarding his 'Kraut als Mauer-Pfeffer' (*Saxifraga oppositifolia*) he stated (same transl., 51): "We found this herb on the low lands of the English Haven, afterwards we found abundance of it amongst the mosses on the 26th of June [1671]." In Norges Svalbard- og Ishavsundersøkelser (1942) there is a reference to Martens (1675) and his name Englischer Hafen, which is given as an early name of the sound Sørgattet between Danskøya and Spitsbergen.

### *Bryological reports 1774–1875*

The first bryophytes from Svalbard (5 mosses, 2 liverworts) were reported by Phips (1777: 109), viz. *Racomitrium lanuginosum* (as *Bryum hypnoides*), *Polytrichum commune*, *Drepanocladus aduncus* (as *Hypnum*), *Anthelia julacea* (as *Jungermannia*), two sterile species of *Bryum* resembling Dillenius' (1741) *Bryum trichodes læte virens*, [*capitulis cernuis oblongis*] and *Bryum hypnoides pendulum* [*sericeum, coma insigni atro-rubente*], and one sterile species of *Jungermannia* resembling Dillenius' (1741) *Lichenastrum ramosius, foliis trifidis*. According to Lindberg (1883) the first Dillenian phrase-name refers to *Pohlia nutans*, the second to *Bryum alpinum*, and the third to *Plagiochila spinulosa*. Of the above species *Polytrichum commune* s.str., *Bryum alpinum* and *Plagiochila spinulosa* are not accepted from Svalbard. Unfortunately, no locality is given with regard to plants. The only mentioned collecting sites are found in the animal catalogue, viz. Sjuøyane and "dem Gestade von Smeerenbergs Hafen" (Phips 1777, 100, 105f.). The bryophytes were collected in 1773 at the northern part of Svalbard, perhaps at the last-mentioned locality on Amsterdamøya (Kuc 1973a; and maps with travel routes in Phips 1777).

The next work including bryophytes from Svalbard (Brown 1820) reported *Racomitrium lanuginosum* (as *Trichostomum*), *Bryum pseudotriquetrum* (as *B. ventricosum*), *Climacium dendroides* (as *Hypnum*), *Dicranum* spp.?, *Orthothecium rufescens*? (as *Hypnum*), *Plagiomnium undulatum*? (as *Bryum ligulatum*), and *Andreaea alpina* (original question marks); the three last names are rejected by us. The plants were collected in 1818 "in three or four visits to

the shore about King's Bay and Mitre Cape [at the outermost northern side of Kongsfjorden]" (Scoresby 1820, 148 and footnote to Appendix V; see also Brown 1820).

Hooker (1825) reported *Bryum caespitium* and *Polytrichastrum alpinum* (as *Polytrichum*) without localities; the former species is not accepted here. The specimens were collected in 1823.

Hooker (1828) reported 18 mosses and 2 liverworts. They were collected during W. E. Parry's expedition in 1827, which tried to reach the North Pole. The botanical material was therefore collected far to the north on Svalbard, viz. at Hecla-hamna in Sorgfjorden, Spitsbergen NE (15 mosses), and the islands Lågøya (2 mosses), Waldénøya (4 mosses, 1 liverwort), Vesle Tavleøya (1 moss) and Rossøya NW and N of Nord-austlandet. Rossøya is the northernmost island in Svalbard (80°50'N), and from there he reported six bryophytes, viz. *Anastrophyllum minutum* (as *Jungermannia*), *Drepanocladus aduncus* (as *Hypnum*), *Hypnum cupressiforme*, *Pohlia cruda* (as *Bryum*), *Polytrichastrum alpinum* (as *Polytrichum septentrionale*), and *Racomitrium lanuginosum* (as *Trichostomum*). In this paper *Hypnum cupressiforme* is excluded from Svalbard.

Keilhau's (1831) expedition in 1827 visited Bjørnøya (20–23 August), the Sørkapp area (3 September) and Edgeøya SW (11–19 September), see below. In his interesting book of travel he mentioned two mosses from Edgeøya SW, viz. *Hypnum cuspidatum* (probably *Calliergon richardsonii*) and *Aulacomnium turgidum* (as *Mnium*). He also described wetland bryophyte vegetation, see Appendix 3.

Sommerfelt (1833) named and published Keilhau's entire plant collection. In all he listed 26 mosses and 3 liverworts: Bjørnøya, 14 mosses, 1 liverwort; the Sørkapp area (Tokrossøya, Øyrlandet, Sommerfeltbukta below Kistefjellet), 10 mosses, 1 liverwort; Edgeøya SW ("Stans-Forland") (Russian station by Habenichtbukta and excursions especially across Grunnlinesletta), 16 mosses, 1 liverwort; and Spitsbergen (without exact locality (Frisvoll, transl.): "It is stated that the plants given from Vest-Spitsbergen are collected by captain Petersen in Tromsø at Keilhau's request.", cf. Sommerfelt 1833, 252), 17 mosses, 2 liverworts. Sommerfelt also made the following observation in a comment on *Polytrichastrum alpinum* (as *Polytrichum*) (Frisvoll, transl.): "As



evidence of the harshness of the climate it may be pointed out, that among the bryophytes only this together with *Bryum caespitium* and *Splachnum urceolatum* [Hedw. = *Tetraplodon mnioides*] were found with sporophytes." We consider that 8 of his mosses were erroneously reported (included the above *Bryum* species).

The first list of the bryophytes of Svalbard was compiled by Lindblom (1840), who included the reports in the studies cited above, and in addition an unpublished manuscript with 42 bryophyte names (Frisvoll, transl.: "Inventory of plants collected on Spitzbergen in the years 1838 and 1839" by J. Vahl; his specimens originate from Bellsund and Magdalenefjorden, see Lindberg 1867 below). Lindblom's (1840) study includes 59 species names; as many as 17 of these are excluded here. Unfortunately, no localities were given. His publication can be said to terminate the introductory period of bryological investigations in Svalbard (Kuc 1973a). Lindblom's (1840) bryophyte list was accurately reprinted by Beilschmied (1842).

Lindberg (1862) reported 4 liverworts and 46 mosses without localities; according to Lindberg (1867), they were collected by Nordenskiöld in 1858 from (Frisvoll, transl.) "the southwestern part without more information".

Livesay (1870) collected 5 mosses and 2 liverworts at Klovningen 11 July 1869, and later in the summer two mosses from Tusenøyane SW of Edgeøya.

Heuglin (1874) reported 1 hepatic and 19 mosses; he mentioned no localities for bryophytes, but according to the collecting sites of vascular plants, he visited Isfjorden, several localities in the southern and eastern parts of Spitsbergen, and Edgeøya. The material was collected on expeditions in 1870 and 1871.

The breakthrough in the bryological exploration of the archipelago was made by Lindberg (1867) and Berggren (1875); together they described 67 new taxa and reported numerous new species.

Lindberg (1867) reported 158 species including 35 taxa new to science (10 species, 1 subspecies and 24 varieties, see Appendix 1); the descriptions or diagnoses of 25 of the new taxa were reprinted by Milde (1868). Lindberg (1867) had restudied Vahl's material reported by Lindblom (1840), and gave localities and a list of 19 species or varieties (Frisvoll, transl.) "only found by J. Vahl on Spitsbergen (Bellsund 1838 and Magdalenefjorden

1839)". The rest of his material originated from Swedish expeditions in 1858 (leg. A. E. Nordenskiöld) and 1861 (leg. A. J. Malmgren). He lists 22 localities whose current names are as follows:

- Spitsbergen: (1) southwestern part, (2) Isfjorden, (3) Kongsfjorden, (4) Krossfjorden, (5) Danskøya with (6) Kobbefjorden, (7) Amsterdamøya [with] (8) Smeerenburg, (9) Raudfjorden, (10) Sorgfjorden, (11) Lomfjorden, and (12) Lovénberget.
- Hinlopenstretet: (13) Southern Vaigattøyane and (14) Fosterøyane.
- Nordaustlandet: (15) Wahlenbergfjorden, (16) Russøyane [in] (17) Murchisonfjorden, (18) Storsteinhalvøya with (19) Langgrunnodden, (20) Lågøya, (21) Brennevinsfjorden, and (22) Sjuøyane.

Lindberg never collected on Svalbard himself; his accurate observations regarding the state of the herbarium material are informative (Lindberg 1867: 536, Frisvoll, transl.):

[M]ost of Svalbard's bryophyte species occur solely as more or less undeveloped and frost-bitten forms, . . . [T]hey suffer considerably from the unfavourable climatic conditions, because usually the whole plant assumes a darker colour shade; the shoots become shorter, more branched and more compact; even the leaves . . . become more imbricate, shorter, more obtuse and also more erect or adpressed and cucullate, and often also terminally whitish and pellucid because the chloroplasts are frozen and ruined; the costa, if excurrent as a long hair or point in well-developed plants, is rarely excurrent here; the leaf cells possess more sparse and less high papillae on the cuticula and sometimes they become quite smooth; the seta and capsule become shorter, thicker and more erect; the urn becomes shorter and more straight, the peristome teeth paler, smoother and more or less brittle, and sometimes they are missing altogether; finally the calyptra becomes darker, more compressed and, if hairy, still more shaggy. . . ; the spores become smoother and sometimes smaller. As regards the sterile dioicous species, usually only female organs are formed; the male seems therefore to suffer most from the effect of the cold, so that the whole plant becomes completely sterile. Due to these circumstances, the determination often takes much time and is done

with unusually great difficulty, so that many of the bryophytes in this account were studied at least six times before we [i.e. I] considered the determinations completely reliable.

Berggren (1875) visited Svalbard in 1868, and the Archipelago and its bryophytes certainly impressed him deeply. He gives many exact observations and enthusiastic passages regarding different topics; when describing the colours of arctic bryophytes the acute bryologist became lyrical (p. 18):

Die Zellmembranen der Blätter und mitunter auch die Kapseln sind oft schön gelb, roth oder schwarz gefärbt. Diese Farbe zeigt ihre Klarheit am besten unter dem Mikroskop. Die Kapsel von *Splachnum Wormskjoldii* und *Tetraplodon mnioides* haben im frischen Zustande eine tief purpurbraune, die von *Bryum oeneum*, *B. arcticum* und *B. archangelicum* eine hell orangegelbe Farbe. Die tiefschwarze Farbe der Rasen ist besonders schön bei *Andreaea Blyttii* und *Sarcoscyphus Ehrhartii* var. *arcticus*, ferner bei *Seligeria polaris*, *Jungermannia polaris* und *Jung. divaricata* var. *incurva*. Die Blätter der beiden ersten sind unter dem Mikroskope bei durchfallender Beleuchtung orangegelb oder dunkel karmosinroth. *Hypnum sarmentosum*, *H. revolvens*, *H. badium* und *Cinclidium arcticum* zeichnen sich durch ihre purpurbraune, *Brachythecium salebrosum* var. *arcticum* durch ihre hellgelbe glänzende, *Orthothecium chryseum* und *strictum* durch ihre goldgelbe Farbe aus, und bei anderen, z. B. *Hypnum turgescens*, *H. brevifolium*, ist die orangegelbe Färbung kenntlich. [*Splachnum* = *Aplodon*, *Bryum oeneum* = *B. rutilans*, *Sarcoscyphus* = *Marsupella arctica*, *Jungermannia* var. = *Cephaloziella arctica*, *Hypnum* = *Loeskypnum*, *Pseudocalliergon*, *Scorpidium* or *Warnstorfia*, *Brachythecium* = *B. turgidum*.]

Berggren (1875) reported 226 species (187 mosses, 39 liverworts), among them 32 taxa new to science, viz. 2 species, 25 varieties and 5 forms (see Appendix 1). He reported bryophytes from the following localities visited by himself: Bjørnøya, Isfjorden included Grønfjorden, Colesbukta, Adventfjorden and Nordfjorden, Prins Karls Forland (southern point), St. Jonsfjorden, Spitsbergen west facing Prins Karls Forland, Kongsfjorden, Danskøya (especially Kobbefjorden), Amsterdamøya (especially Smeerenburg), Spitsbergen NW facing Amsterdamøya,

Liefdefjorden, Lomfjorden, Hinlopenstretet (without more exact sites, perhaps i.a. Berggrenøya which is one of the many Vaigattøyane and is named after him), Brennevinsfjorden (at Depotodden), Castrénøya, Nordkapp (at Chermisøya) and Sjuøyane (of which only Parryøya is mentioned by name). Also, material collected in 1864 by A. J. Malmgren at Hornsund, Edlundfjellet at Spitsbergen E and Kvalpynten at Edgeøya was included. Many of Lindberg's (1867) reports based on material collected by Nordenskiöld, Vahl and Malmgren were reviewed. He supplied extensive information on floristics and aut- and synecology, and his work will always be an important source of information. Most of the taxa reported by Berggren were distributed in an exsiccatum, see Appendix 2. See also the introduction to Appendix 3 regarding bryophyte vegetation types described from Svalbard.

### Comments on later sources

A century later Kuc (1973a) presented a review of the mosses of Svalbard; he included a survey of the history of bryological studies of the archipelago, and for the period 1875–1970 we refer to his work (however, all the relevant publications are also cited in the present paper). He listed most previous literary records of mosses and presented detailed distribution maps of 119 species. Because he did not distinguish between checked herbarium material and literature references, many of his maps are highly unreliable and ought not to have been published. Kuc (1973a) did not include Bjørnøya and the eastern islands Hopen, Kong Karls Land and Kvitøya. His treatment includes 265 species accepted by him and 46 species supposed to be doubtfully correct or erroneously determined, in all 311 species names.

The major papers on Svalbard hepatics are those of Watson (1922), Arnell (in Arnell & Mårtensson 1959) and Rejment-Grochowska (1967), which altogether list 77 accepted species.

Some of the species that were accepted by Kuc (1973a), Arnell & Mårtensson (1959) and Rejment-Grochowska (1967) have been rejected here. For some genera this reevaluation was started by Frisvoll (1978d, 1981a) who listed accepted species within *Barbilophozia*, *Brachythecium*, *Grimmia*, *Hygrohypnum*, *Lophozia* subgen. *Leiocolea* and *Schistochilopsis*, *Mnium*,

*Plagiothecium*, and *Seligeria*. Other basic sources include monographs of the genera *Encalypta* (Horton 1983), *Jungermannia* (Vána 1973, 1974, 1975), *Orthotrichum* (Frisvoll & Lewinski 1981), *Pseudocalliergon* (Hedenäs 1992), *Racomitrium* (Frisvoll 1983c), *Sphagnum* (Flatberg & Frisvoll 1984a), *Sanionia* (Hedenäs 1989a), *Scorpidium* and *Hamatocaulis* (Hedenäs 1989b), and *Tetraplodon* (Frisvoll 1978c).

The European bryophyte catalogues by Duell (1983, 1984, 1985) list a number of species from "Svalbard" that are lacking in all the studies cited above and also in any known primary literature. Duell (pers. comm.) kindly informed us about some taxa that were erroneously listed from Svalbard in these papers. He included the island Jan Mayen in Svalbard which is not in accordance with the political situation; in addition, Jan Mayen differs greatly phytogeographically from Svalbard. Based on a recent study of the bryophyte flora of Jan Mayen (Frisvoll 1983a), we have traced 12 species names listed from "Svalbard" by Duell which must refer to Jan Mayen only. As these species have never been reported from Svalbard proper, they are not in our list of rejected species but are included in a separate list. Duell (1992) treated Jan Mayen with Iceland; he corrected most of the errors but at the same time unfortunately created new ones including erroneous statements and interpretations with regard to a preliminary version of our manuscript (quoted as "Elvebakk, A. & Frisvoll, A.A. 1992. A catalogue of Svalbard plants and fungi. Part VIII. Bryophytes. 46 p. Manuscript."). The presence of the hepatic species on Jan Mayen, Bjørnøya and the rest of Svalbard is included by Söderström (1995).

Some information on Svalbard bryophytes is found in studies primarily dealing with other geographical areas. Steere (1978, in *The Mosses of arctic Alaska*) and Long (1985) and Murray (1987, both in *Illustrated moss flora of arctic North America and Greenland*) include Svalbard in the total distribution record of the species; however, the Svalbard references are often taken from previous publications and bring no new information. The moss flora of arctic parts of the former USSR (Abramova et al. 1961) has many references to species from Bjørnøya and "Spitsbergen". Several of these species have not been traced in the primary Svalbard literature by us, and as the preface (translation supplied by the Norwegian Polar Institute) does not indicate the inclusion of

new primary data from areas outside the former USSR, we have not accepted these species.

Sanio (1883, 1887) includes a few Svalbard localities for species in *Drepanocladus* s.l., but his taxonomy is quite impossible; he usually refers to Berggren specimens and is not considered further.

In a paper by Hagen (1952), a number of rare or southern species were reported as new to Svalbard, and the publication has usually been considered of dubious value. We have tried to trace the reported specimens in the Norwegian herbaria, but without success, and some of the most probable misidentifications have been excluded by previous authors as well as by us. Nevertheless, some species that were excluded as dubious before (e.g. *Barbilophozia barbata*, *Palustriella decipiens*, *Tortella tortuosa*) have later been confirmed from other localities on Svalbard. This exemplifies some of the difficulties met with when compiling a catalogue like this.

A special problem is represented by some recent floristical or mainly ecological and phytosociological papers that include names of bryophytes not reported from Svalbard before, such as Serebryanny et al. (1985), Karczmarz & Świąś (1988, 1989a), Dubiel & Olech (1990: 44, 64: *Ornithotrichum* (sic) *pylaisii*, *Cinclidium rotundum* (sic) as well as *C. subrotundum*), Kobayashi et al. (1990) and Świąś & Karczmarz (1991a, 1993), with many new names appearing in lists and tables, but no notice has been made that these species were new to Svalbard. Some of these records are quite unreliable and many have not been accepted here. Acock (1940, table 6) reported *Plagiothecium flexicaule*, Gugnacka-Fiedor & Noryskiewicz (1982, table 2) *Distichum* (sic) *tenuifolium*, and Hadač (1989, 163) *Scapania oligochaeta*; the names are unknown to us. Also confusions such as the following occur: *Orthothecium* ( $\approx$  *Orthotrichum*) *breutelii* (= *pylaisii*) (Summerhayes & Elton 1928, 230, 241); *Hylocomium* ( $\approx$  *Hygrohypnum*) *palustre* (= *luridum*) (Polunin 1945, 98); *Plagiomnium* ( $\approx$  *Mnium*) *thomsonii* (Karczmarz & Świąś 1989a, 91); and *Scapania* ( $\approx$  *Cephalozia*?) *bicuspidata* (Dubiel & Olech 1990, 67).

We have tried to loan voucher specimens representing some of the reports, but this has been difficult in most cases. However, there has been no time to search for and loan of all specimens of dubious but still highly interesting reports which should have been checked. Many specimens

reported by Arnell & Mårtensson (UPS), Berggren (LD, S), Eurola (OULO), Frahm (priv. herb.), Kuc (KRAM) and Lindberg (H-SOL) have been loaned and revised. Unfortunately, neither has it been possible to undertake a full revision of our own specimens of many difficult genera (especially *Brachythecium*, *Bryum*, *Drepanocladus* s.l., *Dicranum*, *Lophozia*, *Pohlia*, *Polytrichum* s.l. and *Scapania*). About 7000 Svalbard specimens collected in 1973, 1974 and 1977 by A. A. Frisvoll are at TRH.

Eight students from the University of Trondheim participated in the international MAB project (Man and the Biosphere), where the Norwegian contribution was localised to Svalbard. Their theses (cand. real. and cand. scient.) were not published, but facsimiled in about 50 copies and distributed to scientists and institutions. The theses include phytosociological tables with a large number of bryophyte names, most of which refer to common Svalbard bryophytes; however, rare bryophytes are referred to as well as names which are excluded from the Svalbard flora in the present paper. Because the theses cannot be regarded as published literature, they are not taken into consideration in the comments on the species. They are referred to in Øritsland (1986) and included in the present list of references (see Brandshaug 1982; Brattbakk 1979; Dahle 1983b; Elvebakk 1979; Hermansen 1979; Herstad 1981; Lund 1979; Olsen 1982). An unpublished thesis by Nilsen (1992) falls in the same category.

Two species have been described from subfossil Holocene sediments (Schimper 1870), see Appendix 1, cf. also Andersson (1910).

### *Nomenclature and number of species*

The nomenclature of the mosses is in accordance with Frisvoll et al. (1995) which is mainly based on Corley et al. (1981), Corley & Crundwell (1991), Anderson et al. (1990), Söderström, Hedenäs & Hallingbäck (1992) and Grolle (1983). The nomenclature of the *Warnstorfia*-*Calliergon* group follows Hedenäs (1993) and species in the family Pottiaceae Zander (1993). A list of selected synonyms is included. Common Norwegian names follow Frisvoll et al. (1995).

A number of subspecific taxa have been listed in the literature and most of them were reviewed

by Kuc (1973a). Only a few have been mentioned here. Several species are represented on Svalbard only by a taxon different from the type taxon (e.g. *Racomitrium canescens* ssp. *latifolium* and *Sphagnum fimbriatum* ssp. *concinnum*). Some of these may deserve the rank of species. Until recently *Plagiomnium medium* ssp. *curvatulum* was in this category; it was convincingly assigned to specific rank by Wyatt et al. (1993).

The small island Bjørnøya is situated halfway between the Norwegian mainland and Spitsbergen, and could therefore be expected to house a number of more southern species. But the bryophyte flora of the island is badly known, the only sources are Sommerfelt (1833, material collected by B. M. Keilhau on a visit 20–28.8.1827), Berggren (1875, visit 1868), Watson (1922) who studied specimens collected by Summerhayes & Elton (1923, visit 13–23.6.1921), and Engelskjøn (1986, visit 9–28.8.1983, his collection at TROM of ca. 180 specimens has been studied by us). Of these only Berggren devoted his study especially to bryophytes. He reported 13 species from Bjørnøya but not from the rest of Svalbard, viz. *Brachythecium glaciale*, *Dichodontium pellucidum*, *Hypnum vaucheri*, *Lescurea incurvata*, *L. plicata*, *Marsupella condensata*, *Orthotrichum alpestre*, *Pohlia wahlenbergii*, *Racomitrium sudeticum*, *Schistidium maritimum*, *Scorpidium scorpioides*, *Sphagnum lindbergii* and *Syntrichia norvegica* (Berggren 1875: 32, nomenclature of this paper and only accepted species). Today this is true of five species (only two from Berggren's list), viz. *Kiaeria falcata*, *Lescurea plicata*, *Pseudocalliergon angustifolium*, *Racomitrium sudeticum* and *Sphagnum riparium*. We accept 26 hepatics and 124 mosses, in all 150 bryophytes from Bjørnøya; they are marked (B) in the list of accepted species. A trained bryologist could probably collect many new species from Bjørnøya. We have rejected the report of 10 liverworts and 18 mosses; they are included in the list of rejected species, although Bjørnøya is not always mentioned explicitly there.

There are evident regional differences in the bryophyte flora of Svalbard. There are most species in the central fjord districts of Spitsbergen, and more species in western than in eastern parts of the archipelago. According to Philippi (1973: table 2) 186 bryophytes were known from Kongsfjorden, 174 from Hornsund and 112 from Edgeøya NW/Barentsøya SW. Hofmann (1968) lists 20 bryophytes from Kvitøya. But, except for Bjørn-

øya, we have not differentiated between various islands/areas. This should be done in a revised list. However, some authors have published alphabetical or systematical bryophyte lists purported to be complete from a study area. Some have supplied their lists with taxonomical and/or ecological notes (below marked T and E; m = Musci only, h = Hepaticae only; \* = with comprehensive comments). Not included here are important works which at the same time comment on material and localities from many areas (especially Berggren 1875, regarding Bjørnøya, Spitsbergen and Nordaustlandet, and Arnell 1900 regarding eastern Svalbard). Areas and authors: Hornsund (Kuc 1963a\*: m, TE; Rejment-Grochowska 1967\*: h, TE), Bellsund S (Rzętkowska 1988a: E), Kaffiøyra at Forlandsundet (Boińska & Gugnacka-Fiedor 1986: E), 'Sassen Quarter' (Hadač 1946, see below), Kongsfjorden (Arnell & Mårtensson 1959\*: TE), Edgeøya NW/Barentsøya SW (Hofmann 1968; Philippi 1973\*: TE; Heinemeijer 1979), Kong Karls Land, Svenskøya (Hofmann 1968), Kvitøya (Hofmann 1968). Otherwise, most of the geographical information about species has to be scanned from text and tables and is more difficult of access.

The list of accepted species from Svalbard includes 373 names, viz. 85 hepatics and 288 mosses. Our list of rejected species now totals 190 names, viz. 45 hepatics and 145 mosses (not counting synonyms)! The rarest mosses on Svalbard, viz. those then found 1–3 times, have been listed by Frisvoll & Blom (1993); the list includes 14 liverworts and 21 mosses (35 species) found once, 10 liverworts and 15 mosses (25 species) found twice, and 6 liverworts and 11 mosses (17 species) found thrice, in all 77 rare species. A few more rare species have been added in this paper.

There are few recent surveys of bryophytes from middle and high arctic areas. Schuster & Damsholt (1974) recognise 136 species in their study of the hepaticae of West Greenland from 66°N to 72°N (p. 15): "The only other areas in the Arctic at similarly high latitudes with a comparably rich and diversified hepatic flora are the north slope and coast of Aaska and (possibly) oceanic Spitsbergen." With regard to Svalbard they attach importance to "the modifying but attenuated effect of the Gulf Stream". The small island Bjørnøya is situated at 74°30'N, and the rest of Svalbard between ca. 76°30'N and 80°50'N, which is far to the north compared with the treated Greenland area. We accept only 85 of the 130

hepatic species that have been reported from Svalbard. There are almost certainly more Svalbard species in some genera (e.g. *Cephaloziella*, *Lophozia* s.l., *Scapania*), but on the other hand we may have accepted a few erroneous reports. It appears that not more than 100 hepatics grow on Svalbard.

Brassard (1971a) summed up the known occurrence of mosses in the Canadian High Arctic or Queen Elizabeth Islands, ca. 75°N to 83°N. This area is considerably larger than Svalbard but has fewer mosses, in all he recognised 233 species. In another paper Brassard (1976) added two species; more have surely been discovered later, but the figure points to the order of magnitude of the number of mosses in the area. We accept 288 mosses from Svalbard, and it is probable that more than 300 occur there. So we estimate that about 400 bryophyte species grow on Svalbard.

The bryophytes can be referred to geographical elements, but it is not appropriate to follow up the matter here. The most interesting group is probably the circumpolar arctic element; Steere's (1976) list includes 67 species of which 48 are recognised from Svalbard by us. Steere did not know or recognise *Plagiothecium berggrenianum*, *Racomitrium panschii* or *Tetraplodon paradoxus*, and Brassard (1971a, 1976) added *Funaria arctica*, *Oreas martiana* and *Tetraplodon pallidus* to the element. And there are still more species with such a distribution (perhaps as many as 100 more, cf. Steere 1978: 23). Several recently described *Schistidium* species clearly belong here (Blom 1996).

In the annotations the occurrence of accepted species reported in the literature is usually mentioned in geographical order, from south (Bjørnøya) to north (Spitsbergen W to Nordaustlandet) and in the east (Spitsbergen E, Edgeøya, Barentsøya and Kong Karls Land). The new localities are always listed in this geographical manner. The literature reports of the rejected species are usually listed in chronological order.

Much could be said about the locality names used in the literature. Some authors of older works give no localities at all. On the basis of written information from the expedition in question we may, however, be able to map their routes and the harbours visited. Often the name of a fjord is given; this is a popular but inexact identification of a locality, because we are not always told what part of the shore is considered. Berggren's (1875) Advent Bai, Kings Bai, Liefde

Bai, etc., are examples of such wide localisation. But a terrestrial name may also embrace too large an area. Lindberg (1862) lists species collected by Nordenskiöld in the "south-western part, without more information" (Lindberg 1867, 538, Frisvoll, transl.). Hadač (1946) uses the name 'Sassen Quarter', which is not a name of the Sassen area but of the whole district (450 km<sup>2</sup>) between Sassendalen, Eskerdalen, Adventdalen, Adventfjorden and Sassenfjorden (Hadač 1944 and 1946, 129; Norges Svalbard- og Ishavsundersøkelser 1942). The name is not in use today, but it is given by us when a name is included in his list of bryophytes (Hadač 1946, 135f) but not in the tables (where exact sites are given).

We have compromised with regard to the exactness of localities. The given distribution of rare species are usually quite detailed, while the 'fjord method' has been used for the more common species. The following should be noted: Although rarely stated, almost all information about bryophytes in Hornsund is from the northern coast. At Nordfjorden in Isfjorden almost all reports are from the eastern coast. The name 'Bellsund S' is used about occurrences reported from the nearby Lognedalsflya, Dyrstadflya, Lyellstranda and Calypsostranda between Recherchefjorden and Dunderbukta on the southern coast of Bellsund (Karczmarc & Świąś 1988, 1989a, 1990b; Rzętkowska 1988a, b; Świąś & Karczmarz 1991a, 1993).

*Plagiothecium svalbardense* Frisv. is described here as a new species, and *Campylium arcticum*, *C. protensum*, *Kiaeria falcata*, *Pseudocalliergon angustifolium*, *S. holmenianum* and *S. submuticum* are reported as new to Svalbard. Numerous previously unpublished localities are referred to. Authors are requested to make comments about new Svalbard bryophytes according to the present list of accepted species and to include specimens in a stated herbarium.

## Ecosystem Component Values

Most species in the list have been assigned *Ecosystem Component Values*, which in most cases are tentative. The list includes vernacular Norwegian names (Frisvoll et al. 1995). An asterisk in the list indicates comments.

## Definitions

### R Rarity on Svalbard

- 3 = Very rare
- 2 = Rare, ca. 3–15 localities known at present
- 1 = Scattered or common, at least locally

### P Phytogeographical importance

- 3 = Strongly disjunct or described from Svalbard and not yet known elsewhere
- 2 = Belonging to a phytogeographical element of special interest on Svalbard
- 1 = More or less widespread

### E Ecological indicator value

- 3 = Very high (specialised, stenoic)
- 2 = Intermediate
- 1 = Low, euryoic

### A Local abundance

- 3 = Dominant, in places more than 50% cover in its habitats
- 2 = Subdominant, 20–50% cover
- 1 = Sparse

### I Importance to vertebrate animals

- 3 = Important as a highly preferred fodder plant
- 2 = Of secondary importance
- 1 = Of no importance

The values of phytogeography refer to total distribution patterns and/or Svalbard patterns. A very rare species on Svalbard is phytogeographically interesting and has a high value although it may be a widespread species elsewhere. A Svalbard endemic has a high value although it may be widespread on Svalbard. No values are indicated in cases where no information exists or in cases where the information is too scarce or uncertain.

## List of Accepted Species

Species accepted also from Bjørnøya are marked (B); *Kiaeria falcata*, *Lescurea plicata*, *Pseudocalliergon angustifolium*, *Racomitrium sudeticum* and *Sphagnum riparium* are only known from there and are marked (B!). The list includes 85 hepatics and 288 mosses, in all 373 bryophytes in 137 genera.

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(H = hepatics; * = comments)				
<i>Abietinella abietina</i> (Hedw.) Fleisch. – Granmose	1	1	3	1	1
<i>Alcina brevirostris</i> (Hook. & Grev.) Kindb. – Småtøffelmose	1	2	2	1	1 *
<i>Amblyodon dealbatus</i> (Hedw.) Bruch & Schimp. – Stakemose	3	3	3	1	1 *
<i>Amblystegium serpens</i> (Hedw.) Schimp. – Trådkrypmose (B)	1	1	2	1	1 *
<i>Amphidium lapponicum</i> (Hedw.) Schimp. – Fjellpolstermose	1	1	2	–	1 *
<i>Anastrophyllum minutum</i> (Schreb.) Schust. – Tråddraumose	1	1	2	2	1H *
<i>Andreaea blytii</i> Schimp. – Bresotmose (B)	2	2	3	3	1 *
<i>A. obovata</i> Thed. – Felesotmose	2	1	3	3	1 *
<i>A. rupestris</i> Hedw. – Bergsotmose	1	1	2	2	1 *
<i>A. sparsifolia</i> Zett. – Raspsotmose (B)	1	2	3	1	1 *
<i>Aneura pinguis</i> (L.) Dum. – Feittmose	1	1	2	1	1H
<i>Anthelia julacea</i> (L.) Dum. – Ranksnømose	3	1	2	1	1H *
<i>A. juratzkana</i> (Limpr.) Trev. – Krypsnømose (B)	1	1	2	2	1H *
<i>Aongstroemia longipes</i> (Sommerf.) Bruch & Schimp. – Stiftmose	2	1	2	1	1 *
<i>Aplodon wormskioldii</i> (Hornem.) Kindb. – Kadavermose (B)	1	1	3	3	1 *
<i>Arctoa anderssonii</i> Wich. – Sveipjøkulmose	2	3	3	1	1 *
<i>A. fulvella</i> (Dicks.) Bruch & Schimp. – Faksjøkulmose	1	2	3	2	1 *
<i>Arnellia fennica</i> (Gott.) Lindb. – Kragemose	2	2	2	1	1H *
<i>Athalamia hyalina</i> (Sommerf.) Hatt. – Navlemose	2	2	3	1	1H *
<i>Aulacomnium palustre</i> (Hedw.) Schwaegr. – Myrfiltmose (B)	1	1	1	3	– *
<i>A. turgidum</i> (Wahlenb.) Schwaegr. – Fjellfiltmose (B)	1	1	1	3	2
<i>Barbilophozia barbata</i> (Schreb.) Loeske – Skogskjeggmoser	3	2	–	1	1H *
<i>B. hatcheri</i> (Evans) Loeske – Grynskjeggmoser (B)	1	1	1	1	1H *
<i>B. kunzeana</i> (Hüb.) K. Müll. – Myrskjeggmoser	1	1	1	1	1H
<i>B. lycopodioides</i> (Wallr.) Loeske – Gåsefotskjeggmoser (B)	1	1	–	1	1H *
<i>B. quadriloba</i> (Lindb.) Loeske – Kloskjeggmoser	1	1	1	1	1H *
<i>Bartramia ithyphylla</i> Brid. – Stivkulmose (B)	1	1	2	2	1 *
<i>Blasia pusilla</i> L. – Flekkmose	3	3	3	1	1H *
<i>Blepharostoma trichophyllum</i> (L.) Dum. – Piggrådmose (B)	1	1	1	2	1H *
<i>Blindia acuta</i> (Hedw.) Bruch & Schimp. – Rødmesigmose (B)	1	1	2	2	1
<i>Brachythecium collinum</i> (C. Müll.) Schimp. – Kryplundmose	3	2	–	1	1 *
<i>B. coruscum</i> I. Hag. – Blakklundmose	–	2	–	1	1 *
<i>B. glaciale</i> Schimp. – Snølundmose (B)	3	3	2	3	1 *
<i>B. reflexum</i> (Starke) Schimp. – Sprikelundmose (B)	3	3	–	1	1 *
<i>B. trachypodium</i> (Brid.) Schimp. – Skortelundmose	2	1	2	2	1 *
<i>B. turgidum</i> (Hartm.) Kindb. – Fjell-lundmose (B)	1	1	2	3	1 *
<i>Breidleria pratensis</i> (Spruce) Loeske – Skrukkemose	2	1	–	–	1 *
<i>Bryobrittonia longipes</i> (Mitt.) Horton – Tungemose	3	3	2	1	1 *
<i>Bryoerythrophyllum recurvirostrum</i> (Hedw.) Chen – Raudfotmose	1	1	2	1	1
<i>Bryum algovicum</i> C. Müll. – Ribbevrangmose (B)	1	1	–	2	2 *
<i>B. amblyodon</i> C. Müll. – Nikkevrangmose	2	1	–	2	– *
<i>B. arcticum</i> (R. Brown) Bruch & Schimp. – Krylvrangmose (B)	1	–	–	–	1
<i>B. argenteum</i> Hedw. – Sølvvrangmose	1	1	3	1	1 *
<i>B. binum</i> (Schreb.) Turn. – Tvillingvrangmose (B)	2	1	1	–	1 *
<i>B. calophyllum</i> R. Brown – Holtannvrangmose	2	1	–	–	1 *
<i>B. creberrimum</i> Tayl. – Brakkvrangmose	3	3	–	1	1 *
<i>B. cryophilum</i> Mårt. – Rosevrangmose (B)	1	2	3	3	– *
<i>B. nitidulum</i> Lindb. – Jøkulvrangmose (B)	1	1	–	–	1 *
<i>B. pallens</i> Anon. – Vinvrangmose (B)	2	1	–	–	1 *
<i>B. pallescens</i> Schwaegr. – Filtvrangmose (B)	1	1	–	–	1 *
<i>B. pseudotriquetrum</i> (Hedw.) Gaertn. et al. – Bekkevrangmose (B)	1	1	2	3	– *
<i>B. purpurascens</i> (R. Brown) Bruch & Schimp. – Kjöttvrangmose	2	1	–	–	1 *

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<i>B. rutilans</i> Brid. – Skjørvrangmose (B)	2	1	–	–	1 *
<i>B. salinum</i> Limpr. – Fjærevrangmose	–	1	3	–	1 *
<i>B. subneodamense</i> Kindb. – Sumpvrangmose	2	2	–	1	1 *
<i>B. weigelii</i> Spreng. – Kjeldevrangmose	3	3	–	1	1 *
<i>B. wrightii</i> Sull. & Lesq. – Blodvrangmose (B)	1	3	3	1	1 *
<i>Calliergon richardsonii</i> (Mitt.) Kindb. – Sumptjønmmose (B)	1	1	2	3	2 *
<i>Campylium arcticum</i> Williams – Tundrastjernemose	1	2	3	3	1 *
<i>C. chrysophyllum</i> (Brid.) J. Lange – Sigdstjernemose	3	3	3	1	1 *
<i>C. longicuspis</i> (Lindb. & H. Arn.) Hedenäs – Polarstjernemose	3	3	–	1	1 *
<i>C. polygamum</i> (Schimp.) J. Lange & C. Jens. – Strandstjernemose (B)	1	1	2	2	1 *
<i>C. protensum</i> (Brid.) Kindb. – Skogstjernemose	3	3	3	1	1 *
<i>C. stellatum</i> (Hedw.) J. Lange & C. Jens. – Myrstjernemose (B)	1	1	2	1	1
<i>Campylopus schimperi</i> Milde – Filtsåtemose	3	3	–	1	1 *
<i>Catoscopium nigrum</i> (Hedw.) Brid. – Svartknoppmose (B)	1	1	3	3	1
<i>Cephalozia ambigua</i> Mass. – Snøglefsemose (B)	1	1	2	1	1H *
<i>C. bicuspidata</i> (L.) Dum. – Broddglefsemose	3	1	–	1	1H *
<i>C. lunulifolia</i> (Dum.) Dum. – Myrglefsemose	3	3	–	1	1H *
<i>C. pleniceps</i> (Aust.) Lindb. – Storglefsemose	1	1	–	1	1H *
<i>Cephaloziella arctica</i> Bryhn & Douin – Fjellpistremose (B)	1	1	1	2	1H *
<i>C. uncinata</i> Schust. – Tundrapistremose	2	2	–	1	1H *
<i>Ceratodon antarcticus</i> Card. – Polarvegmose	–	3	3	1	1 *
<i>C. heterophyllum</i> Kindb. – Buttvegmose	3	–	–	1	1 *
<i>C. purpureus</i> (Hedw.) Brid. – Ugrasvegmose (B)	1	1	2	2	– *
<i>Cinclidium arcticum</i> (Bruch & Schimp.) Schimp. – Fjellgittermose (B)	1	2	2	2	1 *
<i>C. latifolium</i> Lindb. – Fagergittermose	1	2	2	2	1 *
<i>C. stygium</i> Sw. – Myrgittermose (B)	2	1	2	1	1 *
<i>C. subrotundum</i> Lindb. – Rundgittermose	2	2	2	1	1 *
<i>Cirriphyllum cirrosum</i> (Schwaegr.) Grout – Fagerveikmose	2	2	2	2	1 *
<i>Cladopodiella francisci</i> (Hook.) Jørg. – Fjellsnutemose	3	3	–	1	1H *
<i>Climacium dendroides</i> (Hedw.) Web. & Mohr – Palmemose (B)	2	1	3	2	1 *
<i>Cnestrum alpestre</i> (Hüb.) Mogensen – Skortemyggmose	3	3	–	1	1 *
<i>C. glaucescens</i> (Lindb. & H. Arn.) Mogensen & Steere – Tundramyggmose	1	3	1	1	1 *
<i>Conostomum tetragonum</i> (Hedw.) Lindb. – Hjelmose (B)	1	1	3	1	1
<i>Coscinodon cribrosus</i> (Hedw.) Spruce – Oldingmose	3	3	3	1	1 *
<i>Cratoneuron filicinum</i> (Hedw.) Spruce – Kalkmose (B)	1	1	–	1	1 *
<i>Cryptocolea imbricata</i> Schust. – Leppemose	3	3	2	1	1H *
<i>Cynodontium strumiferum</i> (Hedw.) Lindb. – Halsbyllskortemose	2	1	2	1	1 *
<i>C. tenellum</i> (Bruch & Schimp.) Limpr. – Småskortemose (B)	2	1	2	1	1 *
<i>Cyrtomnium hymenophylloides</i> (Hüb.) T. Kop. – Hinnetrollmose	1	1	2	1	1 *
<i>C. hymenophyllum</i> (Bruch & Schimp.) Holmen – Tuetrollmose	1	1	2	2	– *
<i>Dichodontium pellucidum</i> (Hedw.) Schimp. – Sildremose (B)	1	1	2	1	1 *
<i>Dicranella crispa</i> (Hedw.) Schimp. – Rakgrøftemose	2	1	–	1	1 *
<i>D. grevilleana</i> (Brid.) Schimp. – Sprikegrøftemose	2	1	–	1	1 *
<i>D. palustris</i> (Dicks.) E. Warb. – Kjeldegrøftemose	3	3	2	1	1 *
<i>D. subulata</i> (Hedw.) Schimp. – Faksgrøftemose	2	1	–	1	1 *
<i>D. varia</i> (Hedw.) Schimp. – Kantgrøftemose (B)	3	3	–	1	1 *
<i>Dicranoweisia crispula</i> (Hedw.) Milde – Krusputemose (B)	1	1	3	3	1 *
<i>Dicranum acutifolium</i> (Lindb. & H. Arn.) Weim. – Luggsigd	2	2	–	1	1 *
<i>D. angustum</i> Lindb. – Grassigd	–	–	2	–	– *
<i>D. elongatum</i> Schwaegr. – Såtesigd	1	1	–	2	– *
<i>D. flexicaule</i> Brid. – Lyngsigd	2	2	–	1	1 *
<i>D. fuscescens</i> Sm. – Bergsigd (B)	1	1	1	–	1 *



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<i>D. laevidens</i> Williams – Polarsigd (B)	1	2	2	2	2	*
<i>D. majus</i> Sm. – Blanksigd (B)	1	1	1	1	–	*
<i>D. scoparium</i> Hedw. – Ribbesigd (B)	2	1	–	1	1	*
<i>D. spadiceum</i> Zett. – Rørsigd (B)	1	1	–	1	–	*
<i>D. tauricum</i> Sapehin – Borksigd	3	3	–	1	1	*
<i>Didymodon acutus</i> (Brid.) K. Saito – Glanskurlemose (B)	2	1	3	–	1	*
<i>D. asperifolius</i> (Mitt.) Crum et al. – Heikurlemose (B)	1	1	3	–	1	*
<i>D. fallax</i> (Hedw.) Zand. – Vegkurlemose	3	3	3	1	1	*
<i>D. johansenii</i> (Williams) Crum – Nasekurlemose	3	3	3	1	1	*
<i>D. tophaceus</i> (Brid.) Lisa – Tungekurlemose	3	3	3	3	1	*
<i>Diplophyllum albicans</i> (L.) Dum. – Stripefoldmose (B)	3	3	3	1	1H	*
<i>D. taxifolium</i> (Wahlenb.) Dum. – Bergfoldmose	2	1	2	1	1H	
<i>Distichium capillaceum</i> (Hedw.) Bruch & Schimp. – Puteplanmose (B)	1	1	2	2	–	
<i>D. hagenii</i> Philib. – Polarplanmose	2	2	3	1	1	*
<i>D. inclinatum</i> (Hedw.) Bruch & Schimp. – Stridplanmose	1	1	2	3	1	
<i>Ditrichum crispatissimum</i> (C. Müll.) Par. – Kjempebust (B)	–	1	–	–	–	*
<i>D. cylindricum</i> (Hedw.) Grout – Rubust	3	3	–	1	1	*
<i>D. flexicaule</i> (Schwaegr.) Hampe – Storbust (B)	1	1	2	2	2	
<i>Drepanocladus aduncus</i> (Hedw.) Warnst. – Leirklo (B)	1	1	–	–	1	*
<i>Encalypta affinis</i> Hedw. f. – Ruklokkemose	3	3	–	1	1	*
<i>E. alpina</i> Sm. – Fjellklokkemose (B)	1	1	2	1	1	
<i>E. brevicollis</i> (Bruch & Schimp.) Ångstr. – Glattklokkemose	3	3	–	1	1	*
<i>E. brevipes</i> Schljak. – Frostklokkemose	3	3	–	1	1	*
<i>E. longicollis</i> Bruch – Sporeklokkemose	2	3	3	1	1	*
<i>E. mutica</i> I. Hag. – Buttklokkemose	3	2	3	1	1	*
<i>E. procera</i> Bruch – Trådklokkemose	1	1	2	1	1	
<i>E. rhaptocarpa</i> Schwaegr. – Raudklokkemose (B)	1	1	2	1	1	*
<i>Eurhynchium pulchellum</i> (Hedw.) Jenn. – Kryp moldmose	1	1	–	1	1	*
<i>Fissidens adianthoides</i> Hedw. – Saglommemose	3	3	2	1	1	*
<i>F. arcticus</i> Bryhn – Polarlommemose	–	–	–	1	1	*
<i>F. osmundoides</i> Hedw. – Stivlommemose	1	1	2	1	1	*
<i>F. viridulus</i> (Anon.) Wahlenb. – Leirlommemose	–	–	2	1	1	*
<i>Funaria arctica</i> (Berggr.) Kindb. – Polarbråtemose	1	2	3	3	1	*
<i>Grimmia affinis</i> Hornsch. – Seterknausing	2	2	3	1	1	*
<i>G. anodon</i> Bruch & Schimp. – Vomknausing	2	1	3	1	1	*
<i>G. donniana</i> Sm. – Vardeknausing	3	1	–	1	1	*
<i>G. elatior</i> Bals. & De Not. – Krinsknausing	3	3	–	1	1	*
<i>G. incurva</i> Schwaegr. – Urdknausing	1	1	2	1	1	*
<i>G. sessitana</i> De Not. – Svaknausing	3	3	–	1	1	*
<i>G. subsulcata</i> Limpr. – Foldknausing	3	3	–	1	1	*
<i>G. torquata</i> Grev. – Krusknausing	2	1	–	1	1	*
<i>Gymnocolea inflata</i> (Huds.) Dum. – Torvdy mose	2	2	3	1	1H	*
<i>Gymnomitrium apiculatum</i> (Schiffn.) K. Müll. – Broddåmose	3	2	2	1	1H	*
<i>G. concinnatum</i> (Lightf.) Corda – Rabbeåmose (B)	1	1	2	1	1H	
<i>G. corallioides</i> Nees – Kølleåmose (B)	1	1	3	3	2H	
<i>Hamatocaulis vernicosus</i> (Mitt.) Hedenäs – Alvemose	3	3	3	–	1	*
<i>Haplomitrium hookeri</i> (Sm.) Nees – Tussemose	3	3	–	1	1H	*
<i>Harpanthus flotovianus</i> (Nees) Nees – Kjeldesalmose	3	3	–	1	1H	*
<i>H. scutatus</i> (Web. & Mohr) Spruce – Kystsalmose (B)	3	3	3	1	1H	*
<i>Hennediella heimii</i> (Hedw.) Zand. – Fjaeremose (B)	1	1	3	1	1	*
<i>Hygrohypnum alpestre</i> (Hedw.) Loeske – Svullbekkemose (B)	2	1	–	1	1	*
<i>H. cochlearifolium</i> (Vent.) Broth. – Skeibekkemose	2	1	–	1	1	*

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<i>H. luridum</i> (Hedw.) Jenn. – Lurvbekkemose	2	1	3	1	1	*
<i>H. ochraceum</i> (Wils.) Loeske – Klobekkemose (B)	3	3	–	1	1	*
<i>H. polare</i> (Lindb.) Loeske – Jøkulbekkemose (B)	1	1	3	1	1	
<i>Hylocomium splendens</i> (Hedw.) Schimp. – Etasjemose (B)	1	1	2	3	2	*
<i>Hymenostylium recurvirostrum</i> (Hedw.) Dix. – Sprungemose	1	1	3	2	1	*
<i>Hypnum bambergeri</i> Schimp. – Kloflette (B)	1	1	3	2	1	
<i>H. callichroum</i> Brid. – Dunflette	2	1	–	1	1	
<i>H. revolutum</i> (Mitt.) Lindb. – Jøkulflette (B)	1	1	2	–	–	
<i>H. vaucheri</i> Lesq. – Gullflette (B)	2	1	3	1	1	
<i>Isopterygiopsis pulchella</i> (Hedw.) Iwats. – Skøreblankmose (B)	1	1	1	1	1	
<i>Jungermannia confertissima</i> Nees – Nyrlesleivmose	–	–	–	1	1H	*
<i>J. polaris</i> Lindb. – Kalksleivmose (B)	1	–	–	1	1H	*
<i>J. sphaerocarpa</i> Hook. – Hjulsleivmose	2	–	–	1	1H	*
<i>J. subelliptica</i> (Kaal.) Levier – Puslesleivmose	2	–	1	1	1H	*
<i>Kiaeria blytii</i> (Schimp.) Broth. – Bergfrostmose (B)	1	1	2	2	1	
<i>K. falcata</i> (Hedw.) I. Hag. – Sigdlrostmose (B!)	3	3	3	–	1	*
<i>K. glacialis</i> (Berggr.) I. Hag. – Jøkulfrostmose (B)	1	1	3	3	1	
<i>K. starkei</i> (Web. & Mohr) I. Hag. – Snøfrostmose (B)	3	3	3	1	1	*
<i>Leptobryum pyriforme</i> (Hedw.) Wils. – Pæremose	1	1	3	2	1	*
<i>Lescuraea incurvata</i> (Hedw.) Lawt. – Krokraspmose (B)	3	3	–	1	1	*
<i>L. plicata</i> (Web. & Mohr) Broth. – Storraspmose (B!)	3	3	–	1	1	*
<i>Loeskypnum badium</i> (Hartm.) Paul – Messingmose (B)	1	1	2	1	1	
<i>Lophozia badensis</i> (Gott.) Schiffn. – Dvergflik	3	1	2	1	1H	*
<i>L. bicrenata</i> (Hoffm.) Dum. – Aurflik	3	3	–	1	1H	*
<i>L. gillmanii</i> (Aust.) Schust. – Broddflik	2	2	–	1	1H	*
<i>L. grandiretis</i> (Kaal.) Schiffn. – Blodflik	3	2	1	1	1H	*
<i>L. heterocolpos</i> (Hartm.) Howe – Piskflik	1	1	1	1	1H	*
<i>L. hyperarctica</i> Schust. – Isflik	–	–	–	1	1H	*
<i>L. latifolia</i> Schust. – Aksflik	3	2	1	1	1H	*
<i>L. longidens</i> (Lindb.) Macoun – Hornflik (B)	2	1	–	1	1H	*
<i>L. opacifolia</i> Meyl. – Blåflik	2	2	–	1	1H	*
<i>L. pellucida</i> Schust. – Kløftflik	–	3	2	1	1H	*
<i>L. perssonii</i> Buch & S. Arn. – Kalkflik	3	2	3	1	1H	*
<i>L. polaris</i> (Schust.) Schust. & Damsh. – Polarflik	–	2	–	1	1H	*
<i>L. rutheana</i> (Limpr.) Howe – Praktflik	3	3	–	1	1H	*
<i>L. sudetica</i> (Hüb.) Grolle – Raudflik (B)	1	1	1	1	1H	
<i>L. ventricosa</i> (Dicks.) Dum. – Grokornflik (B)	2	2	–	1	1H	*
<i>L. wenzelii</i> (Nees) Steph. – Skeiflik	1	1	1	1	1H	*
<i>Marchantia alpestris</i> (Nees) Burgeff – Fjelltvare (B)	1	1	3	3	1H	*
<i>M. polymorpha</i> L. – Ugrastvare	–	1	–	–	1H	*
<i>Marsupella arctica</i> (Berggr.) Bryhn & Kaal. – Polarhutremose	2	–	3	–	1H	*
<i>M. condensata</i> (C. Hartm.) Kaal. – Trinnhutremose (B)	3	1	2	1	1H	*
<i>Meesia triquetra</i> (Richter) Ångstr. – Skruesvanemose (B)	1	1	3	2	1	
<i>M. uliginosa</i> Hedw. – Nervesvanemose (B)	2	1	2	1	1	*
<i>Mesoptychia sahlbergii</i> (Lindb.) Evans – Midnattsolmose	3	3	3	1	1H	*
<i>Mielichhoferia elongata</i> (Hook.) Nees & Hornsch. – Kopparkismose	3	3	3	1	1	*
<i>Mnium blytii</i> Bruch & Schimp. – Blåtornemose	2	3	–	1	1	*
<i>M. marginatum</i> (Dicks.) P. Beauv. – Raudtornemose (B)	2	1	–	–	1	*
<i>M. spinosum</i> (Voit) Schwaegr. – Strøtornemose	2	2	3	1	1	*
<i>M. thomsonii</i> Schimp. – Bergtornemose	1	1	2	1	1	*
<i>Molendoa tenuinervis</i> Limpr. – Tettmose (B)	3	3	3	1	1	*
<i>Mylia taylorii</i> (Hook.) S. Gray – Raudmuslingmose	3	3	–	1	1H	*

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(H = hepatics; * = comments)				
<i>Myurella julacea</i> (Schwaegr.) Schimp. – Skåltrinnmose (B)	1	1	1	1	1
<i>M. tenerima</i> (Brid.) Lindb. – Spisstrinnmose	1	1	2	1	1 *
<i>Nardia geoscyphus</i> (De Not.) Lindb. – Skåltrappemose	3	3	1	1	1H *
<i>Odontoschisma macounii</i> (Aust.) Underw. – Fjellskovlmose	1	2	3	1	1H
<i>Oncophorus virens</i> (Hedw.) Brid. – Myrsprikemose (B)	1	1	2	3	2 *
<i>O. wahlenbergii</i> Brid. – Fjellsprikemose (B)	1	1	2	3	2 *
<i>Oreas martiana</i> (Hoppe & Hornsch.) Brid. – Alpmose	3	3	–	1	1 *
<i>Orthothecium chryseon</i> (Schwaegr.) Schimp. – Gullhaustmose (B)	1	1	2	3	1
<i>O. intricatum</i> (Hartm.) Schimp. – Sigdhaustmose	2	1	–	–	1 *
<i>O. lapponicum</i> (Schimp.) C. Hartm. – Lappaustmose	3	3	–	1	1 *
<i>O. strictum</i> Lor. – Ravhaustmose (B)	1	1	1	1	1
<i>Orthotrichum alpestre</i> Bruch & Schimp. – Seterbustehette (B)	3	2	–	1	1 *
<i>O. obtusifolium</i> Brid. – Buttustehette	2	2	3	2	1 *
<i>O. pallens</i> Brid. – Gulltannbustehette	2	2	3	1	1 *
<i>O. pellucidum</i> Lindb. – Tuebustehette	2	1	3	1	1 *
<i>O. pylaisii</i> Brid. – Fuglebustehette (B)	1	1	2	1	1
<i>O. sordidum</i> Sull. & Lesq. – Holtannbustehette	2	2	3	1	1 *
<i>O. speciosum</i> Nees – Duskustehette	1	1	2	1	1
<i>Paludella squarrosa</i> (Hedw.) Brid. – Pipereinsarmose (B)	1	1	2	2	1
<i>Palustriella decipiens</i> (De Not.) ●chyra – Fjærtuffmose	3	3	3	1	1 *
<i>Peltolepis quadrata</i> (Saut.) K. Müll. – Mørkleggsmose	3	2	2	2	1H *
<i>Philonotis tomentella</i> Mol. – Grannkjeldmose (B)	1	1	2	3	1 *
<i>Plagiobryum demissum</i> (Hook.) Lindb. – Raudkrylmose	3	3	3	1	1 *
<i>P. zieri</i> (Hedw.) Lindb. – Bleikkrylmose (B)	2	2	2	1	1 *
<i>Plagiomnium curvatulum</i> (Lindb.) Schljak. – Fjellfagermose	–	1	–	–	1 *
<i>P. ellipticum</i> (Brid.) T. Kop. – Sumpfagermose (B)	1	1	1	3	1
<i>Plagiopus oederiana</i> (Sw.) Crum & Anders. – Nålepute-mose	1	1	2	1	1 *
<i>Plagiothecium berggrenianum</i> Frisv. – Grasjammnemos	2	3	–	1	1 *
<i>P. denticulatum</i> (Hedw.) Schimp. – Flakjammnemos	2	1	–	1	1 *
<i>P. svalbardense</i> Frisv. – Polarjammnemos	2	1	3	1	1 *
<i>Platydictya jungermannioides</i> (Brid.) Crum – Hårmose (B)	1	1	1	1	1
<i>Pleurocladula albescens</i> (Hook.) Grolle – Bremose (B)	1	1	–	1	1H *
<i>Pleurozium schreberi</i> (Brid.) Mitt. – Furumose	2	1	3	3	1 *
<i>Pogonatum dentatum</i> (Brid.) Brid. – Fjellkrukkemose	2	2	2	1	1 *
<i>P. urnigerum</i> (Hedw.) P. Beauv. – Vegkrukkemose	1	1	2	1	1
<i>Pohlia andrewsii</i> Shaw – Krokknoppnikke	–	–	–	1	1 *
<i>P. atropurpurea</i> (Wahlenb.) H. Lindb. – Bruntann-nikke	3	3	3	1	1 *
<i>P. cruda</i> (Hedw.) Lindb. – ●palnikke (B)	1	3	3	3	–
<i>P. crudoides</i> (Sull. & Lesq.) Broth. – Rørnikke	3	2	–	1	1 *
<i>P. drummondii</i> (C. Müll.) Andrews – Raudknoppnikke (B)	1	1	2	1	1 *
<i>P. elongata</i> Hedw. – Svanenikke	2	1	1	1	1 *
<i>P. filum</i> (Schimp.) Mårt. – Svartknoppnikke	2	1	–	1	1 *
<i>P. nutans</i> (Hedw.) Lindb. – Vegnikke (B)	1	1	1	1	– *
<i>P. obtusifolia</i> (Brid.) L. Koch – Snønikke (B)	2	1	2	1	1 *
<i>P. prolifera</i> (Breidl.) H. Arn. – Trådknoppnikke	–	1	–	1	1 *
<i>P. wahlenbergii</i> (Web. & Mohr) Andrews – Kaldnikke (B)	3	1	2	3	–
<i>Polytrichastrum alpinum</i> (Hedw.) G.L. Sm. – Fjellbinnemos (B)	1	1	1	3	2 *
<i>P. longisetum</i> (Brid.) G.L. Sm. – Brembinnemos	3	3	1	1	1 *
<i>P. sexangulare</i> (Brid.) G.L. Sm. – Snøbinnemos (B)	1	1	3	3	1 *
<i>Polytrichum hyperboreum</i> R. Brown – Aurbjørnemos	1	1	1	3	3
<i>P. jensenii</i> I. Hag. – Strandbjørnemos (B)	2	1	–	–	– *
<i>P. juniperinum</i> Hedw. – Einerbjørnemos (B)	–	1	–	–	1 *

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(H = hepatics; * = comments)				
<i>P. piliferum</i> Hedw. – Rabbebjørnemose	1	1	3	3	–
<i>P. strictum</i> Brid. – Filtbjørnemose	1	1	2	3	2
<i>P. swartzii</i> Hartm. – Pelsbjørnemose	2	1	2	1	1
<i>Prasanthus suecicus</i> (Gott.) Lindb. – Rabbemose	1	1	3	1	1H
<i>Preissia quadrata</i> (Scop.) Nees – Skjøtmose (B)	1	1	2	2	1H
<i>Pseudocalliergon angustifolium</i> Hedenäs – Snøgulmose (B!)	3	3	–	–	1
<i>P. brevifolium</i> (Lindb.) Hedenäs – Polargulmose (B)	1	1	–	–	1
<i>P. trifarium</i> (Web. & Mohr) Loeske – Navargulmose	2	1	2	1	1
<i>P. turgescens</i> (T. Jens.) Loeske – Kvapgulmose (B)	1	1	3	2	1
<i>Pseudoleskeella rupestris</i> (Berggr.) Hedenäs & Söderstr. – Fjelltråkle mose (B)	1	1	2	1	1
<i>P. tectorum</i> (Brid.) Broth. – Klotråkle mose (B)	2	1	2	1	1
<i>Psilopilum cavifolium</i> (Wils.) I. Hag. – Småkomagmose	–	2	2	1	1
<i>P. laevigatum</i> (Wahlenb.) Lindb. – Storkomagmose	1	2	2	2	1
<i>Pterigynandrum filiforme</i> Hedw. – Reipmose	2	1	2	1	1
<i>Psidium ciliare</i> (L.) Hampe – Bakkefrynse (B)	1	1	1	2	2H
<i>Racomitrium canescens</i> (Hedw.) Brid. – Sandgråmose	1	1	2	2	–
<i>R. ericoides</i> (Brid.) Brid. – Fjørgråmose (B)	1	1	2	2	–
<i>R. fasciculare</i> (Hedw.) Brid. – Knippegråmose (B)	2	2	3	1	1
<i>R. lanuginosum</i> (Hedw.) Brid. – Heigråmose (B)	1	1	2	3	–
<i>R. panschii</i> (C. Müll.) Kindb. – Tundragråmose	1	2	2	–	–
<i>R. sudeticum</i> (Funck) Bruch & Schimp. – Setergråmose (B!)	3	3	3	1	1
<i>Rhizomnium andrewsianum</i> (Steere) T. Kop. – Polarrundmose	2	3	2	–	1
<i>Rhytidiadelphus squarrosus</i> (Hedw.) Warnst. – Engkransmose (B)	2	2	3	–	1
<i>Saetia glaucescens</i> (Hedw.) Broth. – Eirmose	1	1	1	1	1
<i>Sanionia nivalis</i> Hedenäs – Fjellbleikmose	2	2	2	1	1
<i>S. orthothecioides</i> (Lindb.) Loeske – Storblikmose (B)	2	2	2	1	1
<i>S. uncinata</i> (Hedw.) Loeske – Kloblek mose (B)	1	1	1	3	2
<i>Sauteria alpina</i> (Nees) Nees – Kratermose (B)	1	1	3	3	1H
<i>Scapania calcicola</i> (H. Arn. & J. Perss.) Ingham – Kalktviblad mose	3	3	2	1	1H
<i>S. curta</i> (Mart.) Dum. – Aurtviblad mose (B)	2	1	–	1	1H
<i>S. cuspiduligera</i> (Nees) K. Müll. – Spriketviblad mose (B)	2	3	–	1	1H
<i>S. gymnostomophila</i> Kaal. – Skortetviblad mose	3	2	2	1	1H
<i>S. hyperborea</i> Jørg. – Bruntviblad mose (B)	2	1	–	1	1H
<i>S. irrigua</i> (Nees) Nees – Sumptviblad mose (B)	2	1	–	1	1H
<i>S. kaurinii</i> Ryan – Hettetviblad mose	2	2	–	1	1H
<i>S. mucronata</i> Buch. – Broddtviblad mose	2	2	–	1	1H
<i>S. obcordata</i> (Berggr.) S. Arn. – Småtvblad mose (B)	2	1	–	1	1H
<i>S. paludicola</i> Loeske & K. Müll. – Bogetviblad mose	2	1	–	1	1H
<i>S. parvifolia</i> Warnst. – Børdtviblad mose	3	2	–	1	1H
<i>S. simmonsii</i> Bryhn & Kaal. – Polartviblad mose	–	–	–	1	1H
<i>S. spitsbergensis</i> (Lindb.) K. Müll. – Piggtviblad mose	2	2	–	1	1H
<i>S. subalpina</i> (Lindenb.) Dum. – Tvillingtviblad mose	3	1	–	1	1H
<i>S. tundrae</i> (H. Arn.) Buch. – Tundratviblad mose	2	2	–	1	1H
<i>S. uliginosa</i> (Lindenb.) Dum. – Kjeldetviblad mose	3	3	–	1	1H
<i>Schistidium frigidum</i> Blom – Reipblomster mose	–	–	–	–	–
<i>S. frisvollianum</i> Blom – Vorteblo mster mose	–	–	–	–	–
<i>S. grandirete</i> Blom – Polarblomster mose	–	–	–	–	–
<i>S. holmenianum</i> Steere & Brassard – Tundrablo mster mose	–	–	–	–	–
<i>S. maritimum</i> (Turn.) Bruch & Schimp. – Saltblo mster mose (B)	3	3	3	–	1
<i>S. papillosum</i> Culm. – Raudblo mster mose	1	1	–	1	1
<i>S. pulchrum</i> Blom – Glansblo mster mose (B)	–	–	–	–	–
<i>S. rivulare</i> (Brid.) Podp. – Bekkeblo mster mose (B)	1	1	3	3	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(H = hepatics; * = comments)				
<i>S. submuticum</i> Blom – Rekkeblomstermose	–	–	–	–	*
<i>S. tenerum</i> (Zett.) Nyh. – Tråddblomstermose	1	2	3	3	1 *
<i>S. umbrosum</i> (Zett.) Blom – Klippeblomstermose	–	–	–	–	*
<i>S. venetum</i> Blom – Fjellblomstermose	–	–	–	–	*
<i>Scorpidium cossonii</i> (Schimp.) Hedenäs – Brunmakkmose (B)	1	2	2	3	– *
<i>S. revolvens</i> (Anon.) Rubers – Raudmakkmose (B)	–	1	1	3	2 *
<i>S. scorpioides</i> (Hedw.) Limpr. – Stormakkmose (B)	1	1	3	3	1 *
<i>Seligeria diversifolia</i> Lindb. – Passblygmose	3	3	2	1	1 *
<i>S. oelandica</i> C. Jens. & Medel. – Begerblygmose	3	3	3	1	1 *
<i>S. polaris</i> Berggr. – Polarblygmose	1	2	3	1	1 *
<i>S. tristichoides</i> Kindb. – Radblygmose	3	3	2	1	1 *
<i>Sphagnum aongstroemii</i> C. Hartm. – Fjelltorvmose	2	2	2	1	1 *
<i>S. arcticum</i> Flatb. & Frisv. – Polartorvmose	2	3	2	1	1 *
<i>S. balticum</i> (Russ.) C. Jens. – Svelttorvmose	2	2	2	1	1 *
<i>S. fimbriatum</i> Wils. & J. D. Hook. – Frynsetorvmose	1	2	2	1	1 *
<i>S. girgensohnii</i> Russ. – Grantorvmose	1	1	2	1	1 *
<i>S. lindbergii</i> Lindb. – Bjørnetorvmose (B)	3	3	2	1	1 *
<i>S. obtusum</i> Warnst. – Butt-torvmose	3	2	2	1	1 *
<i>S. olafii</i> Flatb. – Frosttorvmose	2	3	2	1	1 *
<i>S. riparium</i> Ångstr. – Skartorvmose (B!)	3	3	3	1	1 *
<i>S. squarrosum</i> Crome – Spriketorvmose (B)	1	2	2	3	1 *
<i>S. teres</i> (Schimp.) Ångstr. – Beitetorvmose	2	2	2	1	1 *
<i>S. tundrae</i> Flatb. – Tundratorvmose	2	3	2	1	1 *
<i>S. warnstorffii</i> Russ. – Rosetorvmose	1	1	2	1	1 *
<i>Splachnum vasculosum</i> Hedw. – Knappmøkkmose (B)	1	1	3	1	1 *
<i>Stegonia latifolia</i> (Schwaegr.) Broth. – Knollmose	1	1	2	1	1 *
<i>Straminergon stramineum</i> (Brid.) Hedenäs – Grasmose (B)	1	1	2	1	1 *
<i>Syntrichia norvegica</i> Web. – Fjellhårstjerne (B)	2	1	–	1	1 *
<i>S. ruralis</i> (Hedw.) Web. & Mohr – Putehårstjerne (B)	1	1	2	3	2 *
<i>Tayloria acuminata</i> Hornsch. – Spisstrompetmose	2	2	3	1	1 *
<i>T. lingulata</i> (Dicks.) Lindb. – Myrtrompetmose	2	1	2	1	1 *
<i>Tetralophozia setiformis</i> (Ehrh.) Schljak. – Rustmose	1	1	3	2	1H
<i>Tetraplodon blyttii</i> Frisv. – Kuppellenmose	3	3	3	1	1 *
<i>T. mnioides</i> (Hedw.) Bruch & Schimp. – Fagerlemenmose (B)	1	1	3	1	1 *
<i>T. pallidus</i> I. Hag. – Gull-lemenmose	2	2	3	1	1 *
<i>T. paradoxus</i> (R. Brown) I. Hag. – Blindlemenmose	2	2	3	1	1 *
<i>Timmia austriaca</i> Hedw. – Raudsliremose (B)	1	1	1	2	–
<i>T. bavarica</i> Hessel. – Grottesliremose	1	1	2	1	1 *
<i>T. comata</i> Lindb. & H. Arn. – Grannsliremose	2	1	–	1	1 *
<i>T. norvegica</i> Zett. – Vortesliremose (B)	1	1	–	1	1 *
<i>T. sibirica</i> Lindb. & H. Arn. – Tundrasliremose	2	2	–	1	1 *
<i>Tomentypnum nitens</i> (Hedw.) Loeske – Gullmose (B)	1	1	2	3	2 *
<i>Toriella fragilis</i> (Hook. & Wils.) Limpr. – Skjørvmose (B)	1	1	2	1	–
<i>T. tortuosa</i> (Hedw.) Limpr. – Putevrimose	2	1	3	1	1 *
<i>Tortula cernua</i> (Hüb.) Lindb. – Kryltustmose	2	2	3	1	1 *
<i>T. euryphylla</i> Zand. – Setertustmose	2	2	2	1	1 *
<i>T. laureri</i> (Schultz) Lindb. – Nikketustmose	2	–	–	1	1 *
<i>T. leucostoma</i> (R. Brown) Hook. & Grev. – Krølltustmose (B)	1	1	–	1	1 *
<i>T. mucronifolia</i> Schwaegr. – Torntustmose	1	1	2	1	1 *
<i>T. systylia</i> (Schimp.) Lindb. – Hatt-tustmose	3	3	2	1	1 *
<i>Trichostomum arcticum</i> Kaal. – Tundrasvamose	1	2	2	1	1 *
<i>T. crispulum</i> Bruch – Kalksvamose	3	3	3	1	1 *

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(H = hepatics; * = comments)				
<i>Tritomaria exsectiformis</i> (Breidl.) Loeske – Stihoggattann	3	3	–	1	1H *
<i>T. polita</i> (Nees) Jørg. – Bekkehoggattann	1	1	–	1	1H *
<i>T. quinquedentata</i> (Huds.) Buch – Storhoggattann (B)	1	1	1	1	1H *
<i>T. scitula</i> (Tayl.) Jørg. – Grottehoggattann	1	1	1	1	1H
<i>Voitia hyperborea</i> Grev. & Arnott – Snabelmose	1	3	3	1	1 *
<i>Warnstorfia exannulata</i> (Schimp.) Loeske – Vrangnøkkemose (B)	2	1	3	3	1 *
<i>W. fluitans</i> (Hedw.) Loeske – Vassnøkkemose (B)	2	1	2	3	1 *
<i>W. pseudostraminea</i> (C. Müll.) Tuom. & T. Kop. – Pyttnøkkemose	3	3	2	1	1 *
<i>W. sarmentosa</i> (Wahlenb.) Hedenäs – Blodnøkkemose (B)	1	1	2	3	–
<i>W. tundræ</i> (H. Arn.) Loeske – Hakenøkkemose (B)	2	–	–	–	1 *

## Comments on accepted species

When nothing else is stated the comments on distribution and ecology refer to Svalbard. The symbol ° before a name refers to the list of comments on rejected species. The names are the same as in Frisvoll et al. (1995), and synonyms are not always presented here (cf. List of selected synonyms, and Wijk et al. 1959, 1962, 1964, 1967, 1969; Corley et al. 1981; Corley & Crundwell 1991; Söderström, Hedenäs & Hallingbäck 1992; Grolle 1983).

### *Aloina brevirostris* (Hook. & Grev.) Kindb.

Reported from several sites at Hornsund (Kuc 1963a, 1964), one locality at Adventfjorden (Berggren 1875, as *Tortula*), Adventdalen (Frisvoll 1981a: 96), and Edgeøya NW (Philippi 1973). Collected at Nordfjorden (below Tschermakfjellet) and Kongsfjorden (Frisvoll unpubl.).

### *Amblyodon dealbanus* (Brid.) Bruch & Schimp.

Reported from Bohemanflya in Isfjorden (Kobayashi et al. 1990: Table 7) and Regnardneset in Krossfjorden (Frisvoll 1978d).

### *Amblystegium serpens* (Hedw.) Schimp.

Reported from Bjørnøya (Dixon 1922; Summerhayes & Elton 1923: 227), one locality at Hornsund (Kuc 1963a), Bellsund S (Karczmarz

& Świąś 1990b; Świąś & Karczmarz 1991a), with reservation from Midterhukken at Bellsund (Eur-ola & Hakala 1977, as *A. cf. serpens*), Billefjorden (Acock 1940: Table 5), Kongsfjorden (Brossard et al. 1984: Table 1) and Edgeøya N (Heinemeyer 1979: Tabel 3). Lindberg's (1867) *Hypnum collinum* from Russøyane in Murchisonfjorden is *A. serpens* (H-SOL). Collected at Sassenfjorden, Nordfjorden, Ekmanfjorden, Krossfjorden, Bockfjorden, Liefdefjorden and Reinsdyrflya (Frisvoll unpubl.).

### *Amphidium lapponicum* (Hedw.) Schimp.

Reported from Hornsund (Kuc 1963a), Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1993), near Longyearbyen (Frahm 1977), Adventfjorden W, Kapp Thorsden and Lomfjorden (Berggren 1875, as *Amphoridium*), and Kongsfjorden (Wall 1979). Also collected at Sassenfjorden, Billefjorden, Ekmanfjorden, Krossfjorden (Frisvoll unpubl.) and Frankenhavøya at Barentsøya (TRH, leg. R. Hjelmstad). Sometimes it grows on soil (Berggren 1875).

### *Anastrophyllum minutum* (Schreb.) Schust.

Widespread and common. "Most of the collected material can be referred to var. *grandis*. . . ." (Arnell & Mårtensson 1959, as *Sphenolobus*), which has been shown to be a superfluous name for the typical variety, var. *minutum* (Koponen et al. 1977: Annotation 6–7); the name of the smaller taxon is var. *weberi* (Mart.) Kartt. (Söderström, Hedenäs & Hallingbäck 1992; Söder-

ström, Karttunen & Hedenäs 1992). See also °*A. cavifolium*.

### *Andreaea blyttii* Schimp.

A rare moss confined to extremely late snow beds on quartzitic or granitic rocks, preferably in the mountains. Known from Bjørnøya, Hornsund, several sites at Spitsbergen NW (Brøggerhalvøya, Danskøya, Smeerenburgfjorden, Bockfjorden, Liefdefjorden), and Nordaustlandet (Brennevinsfjorden, Nordkapp on Chermisideøya, Parryøya) (Elvebakk 1984: Fig. 2, the two dots in Vestfjorden are misplaced and refer to the Bockfjorden sites).

### *Andreaea obovata* Thed.

Scattered on Svalbard and characteristic of moderate pebble snowbeds on siliceous substrates. Known from Vårsolbukta in Bellsund; Bjørndalen, Longyearbyen and Dickson Land in Isfjorden; and from about eight localities between Brøggerhalvøya and Liefdefjorden at Spitsbergen NW (Elvebakk 1984: Fig. 1).

### *Andreaea rupestris* Hedw.

A common and variable species even when *A. sparsifolia* is treated as a species (see Kuc 1963a and 1973a, regarding subordinate epithets). Berggren (1875) described the new *A. papillosa* var. *brevifolia* from Bjørnøya: "Entspricht *A. alpestris*, unterscheidet sich jedoch von dieser Art durch ihre grossen eckigen dickwandigen Zellen." Murray (1987) reestablished *A. alpestris* (Thed.) Schimp. as a species, and reported it to be rare in the American Arctic and common in Greenland; it has not been reported from Svalbard, where it nevertheless may occur.

### *Andreaea sparsifolia* Zett.

On Svalbard this species appears to be reasonably well separated from *A. rupestris* both morphologically and ecologically; *A. rupestris* is a saxicolous species, whereas *A. sparsifolia* mainly grows on finetextured soils between rocks and pebbles. Lindberg (1867) described *A. papillosa* from Svalbard. In the diagnosis of the protologue he distinguished between it and *A. sparsifolia* as follows:

"*Andr. sparsifolia* habet folia dissita, subsecunda, acuta, cellulis multo minoribus minusque incrassatis et papillosis." (*A. s.* has more distant, subsecund and acute leaves, and much smaller and less incrassate and papillose cells.) Some of these differences may prove to be important. The taxon was called *A. rupestris* var. *papillosa* by Murray (1987), but according to the synonym list (and pers. comm. in litt. 1993) its correct species name will be *A. sparsifolia*. Nyholm (1969) treated it as *A. obovata* var. *papillosa*, and the comment by Murray (1987) indicates that it is in need of more study: "... I have treated var. *papillosa* as closer to [*A.*] *rupestris* than to *A. obovata*, but not without hesitation." (see also Söderström, Hedenäs & Hallingbäck 1992: Annotation 23). For the present we reluctantly follow Murray's (1987, 1988) opinion regarding synonyms of the taxon.

### *Anthelia julacea* (L.) Dum.

Old records of this species are not reliable (Phips 1774; Lindberg 1867, as *Jungermannia*). Reported by Berggren (1875, as *Jungermannia*) from several localities, but the material was revised as *A. juratzkana* by Arnell & Mårtensson (1959). Rejment-Grochowska (1967) discussed these species and reported two nearby localities of *A. julacea* from Arieakammen and Rotjesfjellet at the N side of Hornsund: "One tuft of this species was found with the sporangia fixed on short stalks and hidden in the perianthium and the leaves at the top of the stem." Karczmarz & Świąt (1989a) reported it from Bellsund S. Certain identification of the two *Anthelia* species usually requires fertile material; regarding differences in sexuality, perianth and elater appearance, see Schuster (1974). The elater structure is an easily observed and reliable (?) microscopic characteristic, which perhaps should be checked in the reported Svalbard material (but see Steere & Inoue 1978). Schuster (1983: 581, Fig. 64) presents a map and comments on the world distribution of the two *Anthelia* species.

### *Anthelia juratzkana* (Limpr.) Trev.

Common. "However, the species is considerably less important ecologically here than in the alpine belt of the Scandes." (Arnell & Mårtensson 1959). It is one of a very few Svalbard liverworts that

regularly produce sporophytes. See also *A. julacea*.

*Aongstroemia longipes* (Sommerf.) Bruch & Schimp.

Reported from Lognedalsflya at Bellsund S (Święs & Karczmarz 1991a), Chamberlindalen in Recherchefjorden (Święs & Karczmarz 1991b), by Höganäsbrean E of Sveagruva in Van Mijenfjorden (Persson 1942), and Erdmanflya in Isfjorden and Ny-Ålesund and Gluudneset in Kongsfjorden (Frisvoll 1981a). The minute species is always sterile and probably widespread.

*Aplodon wormskioldii* (Hornem.) Kindb.

Widespread. Not previously reported from Bjørnøya (cf. Berggren 1875, as *Splachnum*: "Auf Beeren Eiland nicht aufgefunden."). Collected there by S. Dunfjell, T. Engelskjøn and O. Skifte in 1983 (TROM). See also *Bryum algovicum*.

*Arctoa anderssonii* Wich.

Reported from Krossfjorden and Bockfjorden (Frisvoll 1978d), and collected at Bjørndalen (Pilarberget) and Sverdruphamaren near Longyearbyen and Hallwylfjellet (900 m a.s.l.) in Adventdalen (Frisvoll unpubl.). An interesting arctic species which in Fennoscandia is recorded only from N Sweden and C Norway (Nyholm 1987).

*Arctoa fulvella* (Dicks.) Bruch & Schimp.

Reported from Linnédalen (Frahm 1977) and the NW and N parts of Svalbard (Kongsfjorden, Danskøya, Amsterdamøya, Brennevinsfjorden, Castrénøya, Parryøya) (Berggren 1875, as *Dicranum*; Arnell & Mårtensson 1959). Recently collected at Bjørndalen, Adventdalen (Hallwylfjellet), Krossfjorden (Signehamna), Bockfjorden (Trolltindane 1100 m a.s.l.) (Frisvoll unpubl.) and Brennevinsfjorden at Nordaustlandet (O, leg. A.H. Neilson). The species is not listed from Svalbard by Nyholm (1987). See also *Diphyllum alibicans*.

*Arnellia fennica* (Gott.) Lindb.

Reported from the Ny-Ålesund area (Berggren 1875, as *Southbya*; not found again by Arnell & Mårtensson 1959), Vestfjorddalen (Frisvoll 1981a), and Barentsøya SW and Edgeøya NW (Philippi 1973). Collected at Moskusdalen in Sassen (one shoot seen, L.B. Jacobsen pers. comm.), the Kapp Wijk area in Nordfjorden, and Liefdefjorden (Wulffberget) (Frisvoll unpubl.). In Fennoscandia it is a strongly bicentric species.

*Athalamia hyalina* (Sommerf.) Hatt.

First reported from Bjørnøya by the author of the name (Sommerfelt 1833, as *Marchantia*) and later by Berggren (1875, as *Clevea*), who also listed it from Nordfjorden (see below) and Lomfjorden. Lindberg (1867, as *Sauteria*) reported it from Kongsfjorden. However, these Svalbard reports were disregarded by Lindberg (1877; see also Arnell 1900: 99; Rejment-Grochowska 1967: 531) who referred them to *Sauteria alpina* and stated that that species (Frisvoll, transl.) "... is not at all rare on Spitsbergen, where it, besides *Marchantia polymorpha*, is the only observed *Marchantiacea* (!), at least as far as we know." The statement about the Bjørnøya and Spitsbergen reports of *A. hyalina* was repeated by Lindberg (1882, in comment on *Sauteria alpina*). According to Arnell (in Arnell & Mårtensson 1959) the report of *Mannia pilosa* from Nordfjorden by Berggren (1875) refers to *A. hyalina* (as *Clevea*). Reported from NW Sørkapp Land (Dubiel & Olech 1990: Tab. 12, as *Clevea*), the valley between Trollfuglfjella and Tolmodryggen in Dicksonfjorden (Frisvoll 1981a: 95, in comment on *Lophozia hyperarctica*), and Kongsfjorden (Arnell in Arnell & Mårtensson 1959, as *Clevea*; referred many specimens to his new f. *rufescens*, which differs from f. *hyalina* by having purple ventral scales). Collected at Billefjorden (by Svenskehuset), Ekmanfjorden (Blomesletta and Coraholmen) and Idodalen in Dicksonfjorden (Frisvoll unpubl.).

*Aulacomnium palustre* (Hedw.) Schwaegr.

One of the commonest mosses on Svalbard. Var. *imbricatum* Bruch & Schimp. has obtuse to rounded and entire apex, as opposed to the acute and dentate apex of var. *palustre*. The former is reported without locality by Theriot (1907), and



from Hornsund (Kuc 1963a) and Linnédalen and Russekeila (Hagen 1952). At Hornsund var. *imbricatum* was stated to be common and var. *palustre* very rare or doubtful. Var. *imbricatum* is probably common also in other areas. Because of its obtuse apex it is more like *A. turgidum*, but the leaf form alone, ovate-lanceolate in var. *imbricatum* and elongate-obovate in *A. turgidum*, will distinguish them.

### *Barbilophozia barbata* (Schreb.) Loeske

Reported from Linnédalen (Hagen 1952, as '*Lophozia barbata* var. '), Nordfjorden (by Kongressfjellet), and Blomstrandhalvøya in Kongsfjorden (Frisvoll 1981a). This is the northernmost localities in the world for this non-arctic species (see Schuster 1969).

### *Barbilophozia hatcheri* (Evans) Loeske

See °*B. floerkei* and *B. lycopodioides*.

### *Barbilophozia lycopodioides* (Wallr.) Loeske

Typical plants of *B. lycopodioides* possess broad, bordered and mucronate leaf lobes, and ventral leaf bases and amphigastria with many cilia. However, Svalbard plants are often small, and there sometimes seems to be difficult to draw a sound distinction between it and *B. hatcheri*. Old records may refer to *B. hatcheri* (see Arnell & Mårtensson 1959). The only Bjørnøya report is by Berggren (1875, as *Jungermannia*), who did not distinguish well between this species and *B. hatcheri* (as *J. lycopodioides* var. *cavifolia*).

### *Barbilophozia quadriloba* (Lindb.) Loeske

A frequent species in calcareous districts. According to Arnell (in Arnell & Mårtensson 1959, as *Orthocaulis*) it is "commonest as var. *glareosa*". "*L. [ophozia] quadriloba* is a baffling and complex *typus polymorphus* in the Arctic." (Schuster & Damsholt 1974).

### *Bartramia ithyphylla* Brid.

Widespread and often common. Listed from Svalbard both as var. *ithyphylla* and var. *strigosa* (see

Kuc 1963a). We are in favour of recognising the closely related *B. breviseta* Lindb. as a species (see also Frisvoll 1983a). It was reported from Bockfjorden by Frisvoll (1978d), but the studied material has few sporophytes, and more finds should be made to confirm its occurrence there. Perhaps Berggren (1875, in comment on *B. ithyphylla*) alludes to that taxon when stating: "Der Fruchtsiel mitunter sehr kurz, das Peristom . . . schlecht entwickelt und die Zähne wie verstümmelt."

### *Blasia pusilla* L.

First reported from near Svenskehuset in Billefjorden (Frisvoll 1978d), the oldest building on Spitsbergen and a centre of human activity in the second half of the nineteenth century, and later collected at Foxdalen in Adventdalen by S. Sivertsen in 1986 (TRH, unpubl.) and at Ny-Ålesund by T. Prestø (pers. comm.) in 1992. Introduced by man?

### *Blepharostoma trichophyllum* (L.) Dum.

One of the commonest hepatics on Svalbard (see *Cephaloziella arctica*). Arnell (in Arnell & Mårtensson 1959) and Rejment-Grochowska (1967) consider that all Svalbard material belongs to var. *brevirete*. However, Świąć & Karczmarsz (1991b, 1993) report both var. *trichophyllum* and var. *brevirete* from Bellsund S and Chamberlindalen in Recherchefjorden: "Ssp. *brevirete* is an exclusively Arctic taxon . . . [but] the situation . . . is . . . complex, with a broad zone of intergradation geographically and (in part) seasonally, between '*trichophyllum*' and '*brevirete*' characters. . . . As a matter of practicality, we refer all plants having elongated leaf lobes with elongated cells to ssp. *trichophyllum*." (Schuster & Damsholt 1974).

### *Brachythecium collinum* (C. Müll.) Schimp.

Correctly reported from Hornsund by Kuc (1963a, as var. *subjulaceum*); but the material (KRAM) belongs to the typical variety. The report from Russøyane in Murchisonfjorden (Lindberg 1867, as *Hypnum*) is based on robust dense-growing plants of *Amblystegium serpens* (H-SOL).

*Brachythecium coruscum* I. Hag.

Mårtensson (in Arnell & Mårtensson 1959) discussed the problematic status of *B. turgidum* s.l. He found it difficult to accept more than that species in the *albicans/salebrosus* group on Svalbard. It is especially the slender plants from dry habitats that are difficult to interpret. Most of them obviously represent habitat modifications of the same genotype as the more turgid plants growing in neighbouring more humid habitats: "Associated mosses such as *Drepanocladus uncinatus*, *Hylocomium splendens* and *Orthothecium chryseum* are also much more slender than usual in these habitats (e.g. exposed flat rock and earth slopes). And why should not *B. turgidum* behave similarly?" (Arnell & Mårtensson 1959: 160). However, there are similar plants which are not habitat modifications of *B. turgidum*. They are, inter alia, more branched and have more broadly and longly decurrent leaves; they belong to *B. coruscum*. So far the species is known with certainty only from Bockfjorden (Frisvoll unpubl., det. conf. R. Ochyra who compared two Svalbard specimens with the type of the name). The taxon has been reported from Barentsøya S (Hofmann 1968, as *B. groenlandicum*) and Edgeøya NW (Heinemeijer 1979, as *B. groenlandicum*). Brassard (1971b) gives differential characteristics between *B. turgidum* and *B. coruscum* (as *B. groenlandicum*) in Ellesmere Island, but not all the mentioned differences seem to fit the Svalbard material well. According to R. Ochyra (in litt.) *B. coruscum* is a soft and irregularly branched plant with leaf margin rather narrowly recurved below and in the apex often flat, and *B. turgidum* is often a rigid plant with closely imbricate leaves whose margin is usually distinctly recurved at the apex.

*Brachythecium glaciale* Schimp.

Reported from Bjørnøya where it formed large stands (Berggren 1875; Engelskjøn 1986: 87 and Figure 3: "The first 10 m of the transect are uniform *Drepanocladus uncinatus*-*Brachythecium glaciale* carpets. . ."), from Kiærstranda at the S side of Brøggerhalvøya (Frahm 1977), and from the area near the hot springs of Bockfjorden (Frisvoll 1978d). A specimen from Bockfjorden possesses two sporophytes. The report from Stuphallet in Kongsfjorden (Wegener et al. 1992) is

based on a specimen of *Eurhynchium pulchellum* (rev. det. Frisvoll).

*Brachythecium reflexum* (Starke) Schimp.

Reported as a dominant species in a *Salix herbacea* community at Bjørnøya by Engelskjøn (1986). We have seen three mixed specimens of *B. reflexum* and the closely related and more arctic *B. glaciale* from there (TROM). Frisvoll (1978d) reported *B. glaciale* from the hot springs Trollkjeldene in Bockfjorden. But *B. reflexum* grows also there: A reinvestigation of the material collected in 1974 revealed that of ten specimens are two *B. glaciale*, two *B. reflexum*, and six a mixture of both. When compared with *B. glaciale*, *B. reflexum* is less robust, less glossy and more regularly (subpinnately or pinnately) branched; its stem leaves are less concave, less ovate, less imbricate and have a longer costa; the branch leaves are less ovate and have also a longer costa. The difference in branching habit seems to be an important and easily recognised taxonomic characteristic between the two.

*Brachythecium trachypodium* (Brid.) Schimp.

Widespread but scattered. Also reported as *B. payotianum* Boul. (Philippi 1973), a taxon which is treated as *B. trachypodium* var. *payotianum* by Wijk et al. (1959).

*Brachythecium turgidum* (Hartm.) Kindb.

Common. Some authors (e.g. Berggren 1875, as *B. salebrosus* var. *arcticum*; Arnell & Mårtensson 1959) comment on the close similarity between Svalbard ecads of this species and *Cirriphyllum cirrosus*. Brassard (1971b) comments on the same problem in Ellesmere Island. See also *B. coruscum*, °*B. albicans*, °*B. frigidum*, °*B. rutabulum*, \**B. salebrosus*, °*B. udum* and °*Cirriphyllum piliferum*.

*Breidleria pratensis* (Spruce) Loeske

"This species is represented by an almost unbranched, pale green type with almost orthophyllous, appressed leaves." (Mårtensson in Arnell & Mårtensson 1959, as *Hypnum*).

Reported (as *Hypnum*) from Bellsund S (Karczmarz & Świąś 1988: 233), 'Sassen Quarter' (Hadač 1946), Billefjorden (Acocck 1940), Kongsfjorden (Lindberg 1867, first report; Berggren 1875; Arnell & Mårtensson 1959) and Barentsøya S and Edgeøya N (Philippi 1973). Collected at Adventfjorden (Advent City), Adventdalen, Nordfjorden (Kapp Wijk), Dicksonfjorden (Kapp Smith), Ekmanfjorden (Blomesletta), Kiærstranda at Brøggerhalvøya S, and Reinsdyrflya (Dvergkilen and Reinstrandodden) (Frisvoll unpubl.).

### *Bryobrittonia longipes* (Mitt.) Horton

Reported from two nearby sites in the Kapp Wijk area and one in Wijdefjorden (Vestfjorddalen) (Frisvoll 1981a). The species has not been found in Fennoscandia. It has a distinct arctic distribution area (Horton 1983), and its occurrence in North America and Svalbard is therefore of particular phytogeographical interest.

### *Bryum algovicum* C. Müll.

Frequent and often fertile: "Kaum habe ich irgendwo einen solchen Reichthum an Früchtem eines *Bryum* gesehen wie hier angeeigneten Stellen." (Berggren 1875, as *B. pendulum*). Seems to be especially vigorous on old dung, when the first nitrophilous colonisers (of Splachnaceae) are disappearing: "It seems possible to demonstrate a succession here [on muskox droppings], with *Haplodon wormskjoldii* [sic] as the first invader, this is followed by *Tetraplodon mnioides* and *Voitia hyperborea*, which finally more and more will be replaced by species of *Bryum* (especially *B. pendulum*)." (Holmen 1955). *Bryum pauperidens* has only been reported from the type locality at Brucebyen in Billefjorden (Acocck 1940; Jones 1951). According to the protologue (Jones 1951; see also Corley et al. 1981; Nyholm 1993) it is very close to and perhaps conspecific with *B. algovicum*. Berggren (1875: 15, as *B. pendulum*) noted that the capsules of this and other mosses are preferred as food by the snow bunting (*Plectrophenax nivalis*). See also °*B. knowltonii*.

### *Bryum amblyodon* C. Müll.

Mostly reported as a taxon within *B. inclinatum*

or as a supposed synonym (Lindberg 1867 and Berggren 1875, as *B. inclinatum* var. *gracile*; Hadač 1946, as *B. inclinatum intumesc.[ens]*, *B. graefianum*, *B. kaurinianum*), see also Kuc (1969, 1973a). Podpera (1973b) cited Svalbard localities for the following names: *B. inclinatum* ssp. *inclinatum* var. *intumescens* (p. 33), var. *gracile* Lindb. (p. 38), var. *alpestre* (p. 38), var. *haemochroodes* (p. 46), var. *græfianum* (p. 51), var. *haematostomum* (p. 60), ssp. *spitzbergense* (Arnell) Podp. (p. 147) [see *B. salinum*], and ssp. *kaurinianum* (p. 157). We doubt that such a host of subordinate taxa of *B. amblyodon* grows on Svalbard. Later reported by Gugnacka-Fiedor & Noryskiewicz (1982: Table 8; same as in Boińska & Gugnacka-Fiedor 1986, as *B. inclinatum*), Rzętkowska (1988a, b, as *B. imbricatum*), Dubiel & Olech (1990: Tab. 26, 1992: Tab. I, as *B. inclinatum*), Karczmarz & Świąś (1990b, as *B. inclinatum*), and Świąś & Karczmarz (1991b, 1993, as *B. inclinatum*). The name *B. inclinatum* has probably been used in a collective sense, and the status of the species on Svalbard is not clear. It may have been confused with *B. salinum* and other taxa. The reported specimens should be restudied, but this is, however, not always easy: "Since [Lindberg's (1867) specimen of var. *gracile* (S, syntype)] has no fruits, I have not been able to re-determine it." (Mårtensson in Arnell & Mårtensson 1959, as *B. inclinatum*).

### *Bryum argenteum* Hedw.

Known from scattered localities in bird cliffs where it probably is common. It is widespread on Edgeøya, at "... Küste sowie an Vogelfelsen, hier ökologisch durch salzhaltige Nahrungsreste und Exkremente der Gryllteiste (*Cephus grylle*) bedingt. . . ." (Philippi 1973). "It is considered to have been introduced by the sea-birds themselves." (Summerhayes & Elton 1923: 277; see also Berggren 1875).

### *Bryum bimum* (Schreb.) Turn.

Reported without locality (Sommerfelt 1833), as frequent at Hornsund (Kuc 1963a), and from Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a, 1993), Adventdalen with a question mark (Hadač 1946: 144), and Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982: Table 5; Boińska & Gugnacka-Fiedor

1986). It was not reported by Arnell & Mårtensson (cf. Kuc 1973a). Arnell's (1900) *B. ventricosum* var. *synoicum* described from Svenskøya is probably the same. There is also a subfossil report by Schimper (1870). The species may be similar to, and is often treated within *B. pseudotriquetrum*. No authors (except Arnell) mention sporophytes or a synoicous condition of their plants, and the correctness of such reports may be questioned until this has been verified. See also *B. nitidulum*.

### *Bryum calophyllum* R. Brown

Reported without locality by Heuglin (1874), but as he included '*B. obtusifolium* Ldbg.' (= *B. cryophilum*) as a synonym, the record is unreliable. Reported from the N side (Kuc 1963a; Dubiel & Olech 1992) and from Sergeiëvfjellet at the S side of Hornsund (Dubiel & Olech 1990: 70), from Bellsund S (Karczmarz & Świąś 1988, 1989a, 1990b; Świąś & Karczmarz 1993), Recherche-fjorden (Karczmarz & Świąś 1990a; Świąś & Karczmarz 1991b), the W side of Adventfjorden and Nordfjorden (Berggren 1875), and from Kaf-fjøyra by Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982: Table 1, 6; Boińska & Gugnacka-Fiedor 1986). Collected at Sørkapp (TROM, leg. S. Kristoffersen 1930), Berzeliusdalen in Van Mijenfjorden (TRH, leg. O.I. Rønning), Kapp Linné, Kongsfjorden and Bockfjorden (Frisvoll unpubl.).

### *Bryum creberrimum* Tayl.

Reported by Arnell & Mårtensson (1959, as *B. cuspidatum*; det. E. Nyholm) on the basis of a specimen from "mossy tundra" at Ny-Ålesund previously published as *B. inclinatum* (Armitage 1937). It has also been reported in vegetation tables from Bohemanflya by Kobayashi et al. (1990: 56, as *B. lisae* var. *cuspidatum*). (See *B. pallescens* regarding a *Bryum* taxon from Ny-Ålesund resembling *B. creberrimum*; for the present we are not quite convinced that the accepted report of *B. creberrimum* from there is based on a specimen different from this taxon, but we have not seen the specimen.)

### *Bryum cryophilum* Mårt.

Common. On the basis of specimens from NW

Svalbard this beautiful moss was first described as *B. obtusifolium* (Lindberg 1867). Typical along streamlets and in percolation areas on siliceous substrates, "... and sometimes the entire vegetation is coloured blood red by *Bryum cryophilum*." (Barkman 1987: 125). This arctic/subarctic species is bicentric in Fennoscandia (Mårtensson 1949).

### *Bryum nitidulum* Lindb.

Described on the basis of material from Bellsund, Raudfjorden and Brennevinfjorden (Lindberg 1867), and later reported many times (see Kuc 1973a; Gugnacka-Fiedor & Noryskiewicz 1982; Boińska & Gugnacka-Fiedor 1986: "The most frequent species, occurring on the moraines of all glaciers, is *B. nitidulum*."). But many or most of the records may refer to other species. Mårtensson (in Arnell & Mårtensson 1959) did not find it in the Kongsfjorden area, and considered the Kongsfjorden material reported by Berggren (1875) to belong to *B. pallescens*. Berggren's specimens from Bjørnøya and Grønfjorden seen by us (LD) are *B. bimum*: the segments of the inner peristome are widely perforated, the cilia appendiculate, and the spores in the former 16–19 µm and in the latter about 16 µm. Engelskjøn (1986: 91) also reports it from Bjørnøya. Before all the reported specimens are revised the status of *B. nitidulum* on Svalbard remains uncertain; we think the name has served as a pigeonhole for depauperate material of many species. The type material is in a bad state and the interpretation of its characteristics are therefore problematic (Arnell & Mårtensson 1959). See also *B. pallescens*.

### *Bryum pallens* Anon.

Reported a few times (see Kuc 1973a, and below), but its status on Svalbard is uncertain. It may have been confused with other red Brya, especially *B. rutilans* and *B. arcticum*. However, the former is almost never fertile while the latter is synoicous, and the report of male and fruiting plants from Kongsfjorden by Lindberg (1867) seems convincing. But Arnell & Mårtensson (1959) considered that the actual specimen (H-SOL) was "too poor to permit a complete re-examination". It is odd that the *B. ?neum* (= *B. rutilans*) reported by Berggren (1875) is stated to be ♂ fertile, and if

not quite erroneously interpreted it may in part refer to *B. pallens*. Podpera (1973a, as *B. pallens* and f. *abbreviata*, f. *microphylla*) reported a few localities from the Isfjorden area. Dubiel & Olech (1990: Tab. 1, 13) listed *B. pallens* in six communities and regarded it a differential species of their *Polygonum viviparum* community; but since they do not include *B. arcticum* in their tables we doubt that (all) the material is correctly named. Hadač (1989) listed *B. pallens* in a vegetation table from Barentsburg, Karczmarz & Świąś (1990b) and Świąś & Karczmarz (1991a, 1993) from Bellsund S, and Świąś & Karczmarz (1991b) from Chamberlindalen in Recherchefjorden. There is also a subfossil report by Schimper (1870). It has not been reported from Bjørnøya, but a dioicous specimen (archegonia only) collected there by S. Dunfjell, T. Engelskjøn and O. Skifte in 1983 (TROM), is probably this species.

### *Bryum pallescens* Schwaegr.

Reported many times (see Kuc 1973a). "Most of the fruiting *Bryum* material from perpendicular rock surfaces of bird cliffs is fairly typical *B. pallescens*. In all probability the non-fruiting cushions of various form and size which are so abundant in these localities also belong to this species." (Arnell & Mårtensson 1959). *Bryum teres* Lindb., whose type is from Raudfjorden and Russøyane, is alternately placed close to *B. pallescens* (Arnell & Mårtensson 1959), *B. nitidulum* (Berggren 1875; Kuc 1973a) or treated as a species (Anderson et al. 1990). The reports of *B. lonchocaulon* (*B. cirrhatum*), *B. subglobosum* and *B. subrotundum* (see Kuc 1973a; Dubiel & Olech 1990; Świąś & Karczmarz 1991a, 1993) are also included here. Thus treated, *B. pallescens* is very variable, and, according to Anderson et al. (1990), includes three species (*B. lonchocaulon*, *B. pallescens* and *B. teres*). Since the type area of *B. nitidulum* and *B. teres* is Svalbard, a special study of their taxonomic status should be made there. Mårtensson (in Arnell & Mårtensson 1959, in comment on *B. pallescens*) describes plants of a common *Bryum* from sandy soil in Ny-Ålesund, which "have something of *B. cuspidatum* in their general appearance", see *B. creberrimum*. We have collected and studied the same taxon and can confirm Mårtensson's observations, and in addition state that it is synoicous. Perhaps some authors have named such plants *B. lonchocaulon*

(*B. cirrhatum*), and if so, this may be well-founded.

### *Bryum pseudotriquetrum* (Hedw.) Gaertn. et al.

"One of the commoner bryophytes in Spitsbergen [≈ Svalbard]" (Kuc 1973a). "Sehr formenreich: an nassen Stellen zarte, entfernt beblätterte, kaum wurzelfilzige Sprosse, an trockenen Stellen kräftige, stark wurzelfilzige Formen, an den trockensten Stellen schließlich stark gerötete, kurzstengelige Formen. Dazwischen zahlreiche Übergänge." (Philippi 1973). The reports of *B. crispulum* are included here [regarding important descriptions and comments on the taxon, see Hagen 1899–1904 (as species), Jensen 1939 (as *B. pseudotriquetrum* ssp.) and Mårtensson (1956: 165, as doubtful species)]. Berggren's (1875) reports of *B. pseudotriquetrum* var. *cavifolium* and var. *compactum* were referred to *B. crispulum* by Hagen (1899–1904): "Aus Spitzbergen besitzte ich Exemplare von mehreren Standorten ohne Lokalangabe (leg. et comm. Berggren)." The taxon was also reported by Hagen (1908), Summerhayes & Elton (1928: 205), Hadač (1946: 157, as *B. ventricosum crispulum*), Kuc (1963a), Podpera (1973a, as *B. pseudotriquetrum* ssp. *crispulum*), Karczmarz & Świąś (1990b) and Świąś & Karczmarz (1991b, 1993). There are evident taxonomical problems within *B. pseudotriquetrum* s.l.: "On the whole arctic types as well as alpine–montane ones of this species seem to be very difficult to survey." (Mårtensson in Arnell & Mårtensson 1959). See also *B. subneodamense*.

### *Bryum purpurascens* (R. Brown) Bruch & Schimp.

Included in a bryophyte list from subfossil sediments by Schimper (1870). Reported from NW Sørkapp Land (Dubiel & Olech 1990: 64), Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a, 1993), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b), Moskushamn in Adventfjorden (Hadač 1946: 151, as 'var. *grapeanum*'; quoted also by Podpera 1973b, as var. *grapeanum* Podp., with the following comment [Frisvoll, transl.]: "To this taxon belongs apparently small specimens I have seen from . . . Moskushamn . . . , leg. E. Hadač; they are gracile, with setae only 1.5 cm long, but the

peristome has nevertheless prominent lamellae and are not transversely striolate dorsally.”), and SW Spitsbergen and Sorgfjorden (Lindberg 1862, 1867). It appears that no specimen of quite typical *B. purpurascens* has been commented on in the literature, and therefore the reports may need confirmation. Some of the cited authors do not include the frequent and similar *B. arcticum* (which has cross-walls between its basal peristome lamellae).

### *Bryum rutilans* Brid.

By Berggren (1875, as *B. æneum*) reported from Bjørnøya, several localities at the W and N side of Spitsbergen and Nordaustlandet (Grønfjorden, Adventfjorden, Nordfjorden, Kongsfjorden, Smeerenburg, Liefdefjorden, Lomfjorden, Parryøya), and from Kvalpynten at Edgeøya SW. The specimen from Parryøya is convincingly characterised: “Eine grosse Menge Fäden, . . . sind in den Blattwinkeln vorhanden. . . .” Mårtensson (in Arnell & Mårtensson 1959) apparently saw and confirmed several of Berggren’s specimens, but some of his reports may not be reliable (see *B. pallens*). Further reported as “rather not frequent” at Hornsund (Kuc 1963a, as *B. oeneum*), from Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a, 1993), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b), Tempelfjorden (Summerhayes & Elton 1923: 279), with some uncertainty from Kongsfjorden (Arnell & Mårtensson 1959), and from Klovningen (Wulff 1902; specimen studied by Podpera 1973a). Collected at Nordfjorden (Kapp Wijk), Ekmanfjorden (Flintholmen), Dicksonfjorden (Heimenfjellet SW), Kongsfjorden, and Bockfjorden (Germaniahøgden SE) (Frisvoll unpubl.).

### *Bryum salinum* Limpr.

Reported from Kongsfjorden by Arnell & Mårtensson (1959) and Thannheiser & Hofmann (1977). *Bryum spitsbergense*, based on material from the E side of Spitsbergen by Storfjorden (Arnell 1900), is perhaps a synonym. See also *B. amblyodon*.

### *Bryum subneodamense* Kindb.

Reported from Hornsund where it was quite fre-

quent (Kuc 1963a, 1994b, as *B. ovatum*), Bellsund S (Karczmarz & Świąś 1988, as *B. ovatum*), Edgeøya (Heinemeijer 1979, as *B. ovatum*), and Kong Karls Land (Arnell 1900, as *B. neodamense* var. *ovatum*, first report). Hornsund material was distributed in an exsiccatum by Bednarek-Ochyra et al. (1987; see also Bednarek-Ochyra 1993, a specimen in the TRH set belongs to *B. cryophilum*). Part of the material described as *B. pseudotriquetrum* var. *cavifolium* by Berggren (1875), and alluded to as such by Mårtensson (in Arnell & Mårtensson 1959, in comment on *B. pseudotriquetrum*), probably belongs to the present taxon: “The extremely turgid types have a very strange appearance compared with normal ones, but they appear always to be connected with these by intermediate types. Characters such as form and concavity of the leaves, length and strength of the nerve, distinctness of the revolute margins, and size and form of the cells do not seem to give any clear picture of the variation but show that it is very great.” It is possible that some reports of *B. crispulum* and *B. subneodamense* consider one and the same taxon (cf. *B. pseudotriquetrum*). We treat the Svalbard material here referred to *B. subneodamense*, and that reported as *B. neodamense*, as one species, but the problem needs more study.

### *Bryum weigelii* Spreng.

Reported from Bellsund by Berggren (1875, as *B. duvalii*) based on a specimen with dubious provenance (see *Chiloscyphus polyanthos*), from Bellsund S by Świąś & Karczmarz (1991a), and from Hopen by Jørgensen (1929, as *B. duvalii*). According to Philippi (1973) erroneously reported from Edgeøya by Hofmann (1968). Distributed in an exsiccatum by Bednarek-Ochyra et al. (1987). We have seen an exsiccate specimen (TRH) from Ariedalen at Hornsund; it is made up of reddish, densely crowded weak stems with short leaves (1.2–1.6 mm including the typically broadly and longly decurrent part). It is stated to have grown “on banks of melt water channel in wet situation”. Not listed from Svalbard by Nyholm (1993).

### *Bryum wrightii* Sull. & Lesq.

An arctic moss reported from Bjørnøya (Dixon 1922; Summerhayes & Elton 1923: 221, as *B.*

*globosum*), the W side of Spitsbergen from Hornsund to Kongsfjorden (many authors, see Kuc 1973a; Podpera 1973b; Karczmarc & Świąś 1990a, 1993), Reinsdyrfla (Rønning 1965: Table 2, 3) and Sorgfjorden (Wulff 1902, as *B. mamillatum* var. *globosum*; specimen confirmed by Podpera 1973b, as *B. globosum*). Collected at Bockfjorden (Trollkjeldene) and Liefdefjorden (Wulffberget SW) (Frisvoll unpubl.). *Bryum globosum* Lindb. based on material from Kongsfjorden, is a synonym. "The fruiting plants are very beautiful. . . ." (Arnell & Mårtensson 1959). "Dixon (1922) was so impressed by the bright rosy capsule color of recently collected specimens from Spitzbergen that he proposed an unnecessary new variety, *Bryum globosum* var. *ruberimum*, apparently not realizing at the time that this was the normal condition of living capsules of the current year's growth." (Steere & Murray 1974). Typical of dry limestone ridges and similar sites.

*Calliergon richardsonii* (Mitt.) Kindb.

Common in suitable habitats. *Calliergon obtusifolium* Karcz. was described on the basis of material from Kapp Thordsen (Karczmarz 1966; see also Karczmarz 1971), and later reported by Frahm (1977), Brossard et al. (1984: Table 1), Boińska & Gugnacka-Fiedor (1986), Karczmarz & Świąś (1990b), Świąś & Karczmarz (1991a, b), and mapped on Svalbard by Karczmarz & Świąś (1989a). However, the type material of *C. obtusifolium* belongs to *C. richardsonii* (Hedenäs 1993). See also °*C. cordifolium*, °*C. giganteum* and °*C. orbiculari-cordatum*. Only the three last-mentioned species have been reported from Bjørnøya, but the reports probably refer to *C. richardsonii*; we have seen many specimens from there collected by T. Engelskjøn in 1983 (TROM).

*Campylium arcticum* Williams

The species has been found to be frequent on Svalbard by L. Hedenäs (pers. comm.).

*Campylium chrysophyllum* (Brid.) J. Lange

Several authors have reported *C. zemliae* (see Kuc 1973a; Frahm 1977; Świąś & Karczmarz 1991a, b, 1993 – in the last paper also report of

*C. polygamum*) from Svalbard. Środoń (1960: 10) called it *C. chrysophyllum* var. *zemliae*. Duell (1985) listed *C. chrysophyllum* because of the supposed synonym *C. zemliae*, but the status of the latter needs more study. Recently, *C. chrysophyllum* has been confirmed from Svalbard by L. Hedenäs (pers. comm.).

*Campylium longicuspis* (Lindb. & H. Arn.) Hedenäs

An arctic species previously treated within *Amblystegium* and at present only known from arctic E Siberia and one locality near Gluudneset E of Ny-Ålesund, leg. S. Arnell & O. Mårtensson 1956 (Hedenäs 1988a; see also Arnell & Mårtensson 1959, in comment on *Repanocladus lycopodioides*).

*Campylium polygamum* (Schimp.) J. Lange & C. Jens.

"Blüthenstand, Blattbasis und Nerv variirt, so dass nach den arktischen Exemplaren zu urtheilen kaum genug Grund vorhanden ist diese Art und die vorige [*C. stellatum*] zu trennen." (Berggren 1875). The *Campylium* species were previously confused, and L. Hedenäs (pers. comm.) recognises three common and three rare (*C. chrysophyllum*, *C. protensum*, *C. longicuspis*) species on Svalbard.

*Campylium protensum* (Brid.) Kindb.

See *C. polygamum*.

*Campylopus schimperi* Milde

A southern species which is recorded only from Ossian Sarsfjellet at the head of Kongsfjorden (Frisvoll 1978d). A taxon reported from Ny-London at the nearby Blomstrandhalvøya (Polunin 1945: 93, as *Campylopus* n.sp.) may belong here; it grew in closely compacted *Dryas* tussocks: "Indeed, mosses occurred mostly as mere scraps that needed a lot of picking out, but nevertheless included an apparently undescribed species of *Campylopus*." This material could not be located by Arnell & Mårtensson (1959: 132).

*Cephalozia ambigua* Mass.

See *C. bicuspidata*.

*Cephalozia bicuspidata* (L.) Dum.

Reported a few times, but the name has often been used in a collective sense; the reports by Lindberg (1867, as *Jungermannia bicuspidata*  $\beta^*$  *gracillima*) and Arnell (1900) refer to *C. ambigua* (Arnell & Mårtensson 1959). Rejment-Grochowska (1967) pointed out differences between the two and reported both from Hornsund: "The stems [of *C. bicuspidata*] are sterile and similar to *C. ambigua*, but the leaf cells are larger, the cell walls thinner and the leaf lobes longer than in *C. ambigua*." Both taxa were also reported from Bellsund S and Chamberlindalen in Recherchefjorden (Karczmarz & Świąś 1989a; Świąś & Karczmarz 1991b). The common Svalbard taxon is *C. ambigua*. Their chromosome number is different:  $n = 9$  in *C. ambigua*,  $n = 18$  in *C. bicuspidata*. "When chromosome counts . . . are not available, identification of much material remains highly subjective." (Schuster 1988). Therefore, the presence on Svalbard of *C. bicuspidata* is perhaps not yet absolutely certain. Because of the identification problems, *C. ambigua* is frequently treated as a subspecies of *C. bicuspidata*.

*Cephalozia lunulifolia* (Dum.) Dum.

Reported from Fugleberget at Hornsund (Rejment-Grochowska 1967, as *C. media*) and Bellsund S (Karczmarz & Świąś 1989a, as *C. media*). "The problem of separating sterile plants of *C. lunulifolia* and *C. pleniceps* in the Arctic is critical. . . . Evidently *L.* [= *C.* !] *lunulifolia*, in the Arctic, is able to produce vigorous phenotypes which in vegetative criteria totally bridge the gap between temperate zone *lunulifolia* and temperate zone *pleniceps*. Criteria of sterile plants thus besome of dubious value. . . ." (Schuster 1988: 182f). See also Schuster & Damsholt (1974).

*Cephalozia pleniceps* (Aust.) Lindb.

Reported from near Longyearbyen (Eurola 1968: 27), Adventfjorden (Crundwell 1978), 'Sassen Quarter' (Hadač 1946), Bohemanflya (Kobayashi et al. 1990: 56), Kongsfjorden (Persson 1942), and collected at Adventdalen (Bolternosa) and

Ekmanfjorden (Blomesletta) (Frisvoll unpubl.). See also *C. lunulifolia*.

*Cephaloziella arctica* Bryhn & Douin

"After *Blepharostoma trichophyllum* the commonest hepatic in the [Kongsfjorden] district." (Arnell & Mårtensson 1959). "Hier [on moist clayey sand by Smeerenburg on Amsterdamøya] wachsen auf weiten Strecken *Hypnum sarmentosum*, *Sarcoscyphus Ehrharti* var. *arcticus* und *Jungermannia divaricata*  $\epsilon$  *incurva*, die beiden letzteren in tief schwarzroten Rasen weit und breit den Boden bedeckend. . . ." (Berggren 1875: 30). (*Hypnum* = *Warnstorfia*, *Sarcoscyphus* = *Marsupella arctica*, *Jungermannia* = *Cephaloziella arctica*.) See also °*C. divaricata*.

*Cephaloziella uncinata* Schust.

Reported from between Moskushamn and Advent City in Adventfjorden by Crundwell (1978), who also renamed specimens from one locality in Longyearbyen and many in Kongsfjorden reported by Arnell (in Arnell & Mårtensson 1959, as *C. subdentata*), and supposed that the 'Sassen Quarter' report of Hadač (1946, as *Cephalozia striatula*) belongs here. Collected from several stations in the Kapp Wijk area (Frisvoll unpubl.). The reports of *Cephaloziella subdentata* from Hornsund (Rejment-Grochowska 1967) and of *C. striatula* from Deltaneset between Adventfjorden and Sassenfjorden (Persson 1942) probably also are this species. It has not been reported from the European mainland (Duell 1983).

*Ceratodon antarcticus* Card.

This name has been mentioned in the Svalbard literature once before, when Theriot (1907) reported *C. arcticus* 'Kindb.' without locality [actually (Kindb.) Card. in Ther. *comb. nov.*, predating '(Kindb.) Roth' 1913 of Wijk et al. (1959) and Burley & Pritchard (1990)] (Frisvoll, transl.): "The author [i.e. Kindberg] regards this as a subspecies of *C. purpureus*. It is remarkable by its compact, tomentose tufts and its small leaves with wider and less chlorophyllose areolation than in the type. Mr. Cardot whom I owe



this determination, remarks that its areolation resembles *C. antarcticus* Card. and *C. grossiretis* Card. from the Antarctic which, however, are different in other characters." In their taxonomic revision of *Ceratodon* Burley & Pritchard (1990) found that *C. purpureus* ssp. *arcticus* Kindb. (Kindberg 1898), whose type is from Kobbefjorden at Danskøya and collected by Berggren in 1868, is indistinguishable from material of *C. antarcticus*. The oldest name of the taxon is actually *C. purpureus* ssp. *arcticus*, whereas *C. antarcticus* and its synonym *C. grossiretis* date from 1900 and 1906, respectively! The southern distribution comprises the Antarctic mainland (Antarctic Peninsula, Victoria Land, Enderby Land), S. Georgia, S. Orkney Is., S. Shetland Is. and Bouvetøya; in the north it is known from the type of *C. purpureus* ssp. *arcticus* and with some uncertainty from "other arctic-alpine specimens"; "... there is no evidence to suggest that the two populations are other than conspecific. ..." (Burley & Pritchard 1990). Summerhayes & Elton (1928: 231) reported both *C. purpureus* and *C. arcticus* from the isolated Isispynten at Nordaustlandet E. The species has never been found with sporophytes, which is the reason why its relationship and occurrence are somewhat obscure. The width of the mid-leaf cells is 8–12  $\mu\text{m}$  in *C. purpureus* and 13–22  $\mu\text{m}$  in *C. antarcticus*, and this is the main practical difference between them. Three species of *Ceratodon* are now known from Svalbard, and the previously so-called weedy and dull genus has become interesting. A revision of all Svalbard specimens will probably show that the three species partly grow in different habitats and have different frequency and distribution there. The habitat of *C. antarcticus* is said to be "Terrestrial on bare soil, rock crevices and ledges; often associated with bird colonies." (Burley & Pritchard 1990). It was (probably) described for the first time by Berggren (1875, in comment on *C. purpureus*): "Auf Parry's Insel bei 80°40' n.Br. auf den Guanolagen der Vogelberge wächst eine ... Form, die sich durch ihre breiten Blätter mit aussergewöhnlich starkem Nerv auszeichnet, der entweder unter der Spitze endet oder zu einer kurzen Spitze ausläuft. Die Zellen des Blattes sind gross [...] ... Am Nordkap auf den Felsen der Brandewijne und Kobbé Bai [type locality of ssp. *arcticus*] auf gleichartigem Boden kommen Formen vor, die ... doch etwas schlanker sind und schmalere Blätter haben."

### *Ceratodon heterophyllus* Kindb.

Berggren (1875) described *C. purpureus* var. *rotundifolius* based on material from Adventfjorden (Burley & Pritchard 1990; their 'Adventborg' is an error of 'Adventbai'; they state that the type is Berggren 30b, this number is not mentioned by Berggren but is included in the survey of his exsiccate in Appendix 2). Berggren's variety is a synonym of *C. heterophyllus* dating from 1892. From Hornsund Kuc (1963a) reported *C. purpureus* f. *obtusifolius* which refers to the same taxon. Arnell (1900, in comment on *C. purpureus*) described a specimen from whalebone at Svenskøya as "... eine arktische Form mit eiförmigen, am häufigsten abgerundet stumpfen Blättern, deren Rippe unter der Spitze aufhört. ..." This accurate description probably refers to *C. heterophyllus*. See also comments on the taxon by Arnell (1918, as *C. purpureus* var. *rotundifolius*), Kuc (1973b, as *C. purpureus* var. *rotundifolius*) and Ireland (1980). The spore size is the best distinguishing characteristic between *C. heterophyllus* (18–21  $\mu\text{m}$ ) and *C. purpureus* (10–17  $\mu\text{m}$ ), but sporophytes have only been found in Alaska and Taymyr. "Collection of fertile material of *Ceratodon purpureus* var. *rotundifolius* from Spitsbergen ... is required to confirm the distribution of *C. heterophyllus*." (Burley & Pritchard 1990). The next best characteristic is the mid-leaf cell width: 12–16(22)  $\mu\text{m}$  in *C. heterophyllus* and 9–12(14)  $\mu\text{m}$  in *C. purpureus*. The leaves of *C. heterophyllus* are entire at apex and concave and obtuse and often cucullate, but sterile alpine (not mentioning arctic) morphs of *C. purpureus* with entire margin cannot be separated from *C. heterophyllus* (Burley & Pritchard 1990). Field work and revision of herbarium material will show whether they always can be separated on Svalbard. The study of mixed material may solve the problem. The species has an arctic circumpolar distribution and is also known from the Alps (Burley & Pritchard 1990).

### *Ceratodon purpureus* (Hedw.) Brid.

See *C. antarcticus* and *C. heterophyllus*.

### *Cinclidium arcticum* (Bruch & Schimp.) Schimp.

Common in calcareous areas. The species is easily modified by the habitat. Its great morphological

variation is surveyed by Mårtensson (in Arnell & Mårtensson 1959) including comments on ssp. *polare* Kindb. and f. *gracillima* Berggr. with type material from Svalbard. The latter was described as follows: "Eine forma *gracillima*, deren Blätter kaum ein Viertel der gewöhnlichen Grösse haben, wächst an der Westküste gegenüber Charles' Foreland." (Berggren 1875: 68).

### *Cinclidium latifolium* Lindb.

This beautiful moss has been reported from the N side of Hornsund (Bednarek-Ochyra et al. 1987, specimen in TRH is *C. subrotundum*), Bellsund S (Karczmarz & Świąś 1989b; Świąś & Karczmarz 1991a), Recherchefjorden W (Karczmarz & Świąś 1990a), Isfjordfylla, Adventdalen and Brøggerhalvøya W (Frahm 1977), "the Isfjorden district" and Kongsfjorden (Arnell & Mårtensson 1959, first report), Stuphallet west of Ny-Ålesund (Wall 1979), and Edgeøya NW (Heinemeyer 1979; Barkman 1987). According to Philippi (1973) the report of this species from Barentsøya by Hofmann (1968, det. K. Holmen !, cf. Holmen 1957b) was based on *Cyrtomnium hymenophyllum*. Also collected at Sassenfjorden (Diabasodden), Sauriedalen, Nordfjorden (Kapp Wijk), Ekmanfjorden (Blomesletta), Dicksonfjorden (Kapp Smith), Bockfjorden (by Watneliøya), and Liefdefjorden (Sørdalsodden) (Frisvoll unpubl.). See also \**Mnium stellare*.

### *Cinclidium stygium* Sw.

Reported from Bjørnøya (Summerhayes & Elton 1923: 228), Hornsund (Kuc 1963a, 1994b), Bellsund S (Karczmarz & Świąś 1989b, 1990b; Świąś & Karczmarz 1993), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b), Isfjord Radio (Hagen 1952), Todalen in Adventdalen (Eurola 1971a: 98), Bohemanneset, Billefjorden and Tempelfjorden (Summerhayes & Elton 1923: 254, 260, 279), Billefjorden (Acock 1940: Table 2), Gipsdalen (Dixon 1922: "Berggren [1875] records only *C. arcticum* B. & S., but the present plant cannot be that, as the cells are distinctly in divergent rows."), Brøggerhalvøya (Frahm 1977: "viel seltener als *C. arcticum*."), Kongsfjorden (Arnell & Mårtensson 1959; Wall 1979), Reinsdyrfylla (Dahle 1983a), Heclahamna in Sorgfjorden (Hooker 1828, is more probably *C. arcticum* which was described in 1846), and

Hopen (Jørgensen 1929, also report of *C. arcticum*). Collected at Bjørndalen, Nordfjorden (Kapp Wijk), Ekmanfjorden (Blomesletta) and Liefdefjorden (Sørdalsodden) (Frisvoll unpubl.). Dixon (1922), Summerhayes & Elton (1923, specimens named by Dixon), Acock (1940) and Wall (1979) do not report the ubiquitous *C. arcticum*, and their reports are therefore less reliable. There is also a subfossil report by Schimper (1870). When a synoicous inflorescence cannot be demonstrated (noted by Arnell & Mårtensson 1959), the best distinguishing character with regard to *C. arcticum* is the structure of the upper leaves with their apiculus. See also \**Mnium stellare*.

### *Cinclidium subrotundum* Lindb.

Reported from NW Sørkapp Land (Dubiel & Olech 1990: 64), Hornsund (Kuc 1963a, 1994b), Bellsund S (Karczmarz & Świąś 1988, 1989b; Świąś & Karczmarz 1993), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b), Stormyra at Van Mijenfjorden N (Eurola 1971a: Table 1), Isfjord Radio (Hagen 1952), Kongressdalen (Hadač 1989: 153), Colesbukta (Arnell 1900, first report), 'Sassen Quarter' (Hadač 1946), Prins Karls Forland (Hagen 1908), and Agardhbukta and Barentsøya SW (Philippi 1973). Collected at Bjørndalen and Adventdalen (from Dammyra to Janssonhaugen) (Frisvoll unpubl.). See also *C. latifolium*.

### *Cirriphyllum cirrosum* (Schwaegr.) Grout

Scattered but widespread. Lindberg (1867) reported *Hypnum herjedalicum* from Wahlenbergfjorden: "Although this name is commonly used as a synonym of *C. cirrosum*, Lindberg's Spitsbergen material, which Dr. [H.] Persson kindly loaned me, is not the same." (Kuc 1973a: 444). But he did not refer it to another species. Regarding material of *Brachythecium turgidum* s.l. resembling *Cirriphyllum*, see \**C. piliferum* and °*Brachythecium frigidum*.

### *Cladopodiella francisci* (Hook.) Jørg.

Only reported once from moist soil at Zepelinfjellet near Ny-Ålesund (Arnell & Mårtensson 1959).

*Climacium dendroides* (Hedw.) Web. & Mohr

Reported from Bjørnøya (Dixon 1922; Summerhayes & Elton 1923: 223; Engelskjøn 1986), Spitsbergen without locality (Sommerfelt 1833). Hornsund (Kuc 1963a, 1994b; Bednarek-Ochyra et al. 1987), Isbjørnhamna in Hornsund and Trygghamna in Isfjorden (Eurola 1968: Tab. 4, 6; from the latter locality also by Dahl & Hadač 1946), Bellsund S (Karczmarz & Świąż 1990b; Świąż & Karczmarz 1991a, 1993), Midterhuken at Bellsund (Eurola & Hakala 1977: Table 2), Isfjordflya and Brøggerhalvøya W (Frahm 1977), W of Grønfjorden (Hadač 1989: 147), Kaffiøya by Forlandsundet (Boińska & Gugnacka-Fiedor 1986), Kongsfjorden (Brown 1820, as *Hypnum*, first report; Lindberg 1867; Arnell & Mårtensson 1959), 'northern Spitsbergen' (Bailey & Halliday pers. comm. to Kuc 1973a), Floraberget at the head of Murchisonfjorden on Nordaustlandet (Eurola & Hakala 1977: Table 8), Barentsøya N (Hjelmstad 1981: Tabell 7), and Barentsøya SW/Edgeøya NW (Philippi 1973). Not reported by Hadač (1946, see Kuc 1973a). Collected at Billefjorden (Svenskehuset and Skansbukta, TRH – leg. O.I. Rønning), Nordfjorden (Tschermafjellet), Dicksonfjorden (Heimenfjellet SW), Krossfjorden (Ole Hansenkammen) and Bockfjorden (Germaniahøgden SE) (Frisvoll unpubl.). Sometimes it is less dendroid (cf. Kuc 1963a: Figure 23). Its ecology on Svalbard is interesting, as it always grows at manured sites and usually below bird cliffs (Arnell & Mårtensson 1959). A similar restricted ecology is noted for some weedy species widely distributed in temperate regions (e.g. *Bryum argenteum*, *Marchantia polymorpha* s.l., *Pleurozium schreberi*, and *Rhytidiadelphus squarrosus*).

*Cnestrum alpestre* (Hüb.) Mogensen

Published as new to Svalbard by Frisvoll (1978d), who pointed out that some of the specimens might belong to *Oncophorus* (= *Cnestrum*) *glaucescens*. A reexamination by Mogensen & Steere (1979) concluded that 7 specimens from Kongsfjorden and Bockfjorden belong to *C. alpestre*; the remaining 22 specimens were referred to *C. glaucescens*. Reported from Dyrevika in Kongsfjorden by Wegener et al. (1992).

*Cnestrum glaucescens* (Lindb. & H. Arn.) Mogensen & Steere

See also *C. alpestre*. *Cnestrum glaucescens* is an interesting arctic species also known from a few localities in northern Fennoscandia (Nyholm 1987).

*Coscinodon cribrosus* (Hedw.) Spruce

Collected in rock crevices of a bird cliff at Kolfjellet near Camp Morton in Van Mijenfjorden (Elvebakk et al. 1987, leg. A. Elvebakk 1986, TROM), and from a bird manured rock at Arctowskifjellet in Adventdalen (Frisvoll & Blom 1993, leg. A.A. Frisvoll, det. E. Nyholm, TRH).

*Cratoneuron filicinum* (Hedw.) Spruce

A variable taxon whose arctic expressions have caused much confusion. Many have reported on var. *curvicaule* (see Kuc 1973a), and it is still uncertain how this Svalbard material shall be interpreted or named. It is described by Berggren (1875, as *Hypnum filicinum* var. *curvicaule*): "Weicht von der Hauptform ab durch Fehlen der Paraphyllien, durch die plötzlich zugespitzten Blätter, deren Rippe unter der Spitze verschwindet. . . ." See also *Drepanocladus aduncus* and *Callialaria curvicaulis*.

*Cryptocolea imbricata* Schust.

Only found on calcareous substrates in Vestfjordalen in Wijdefjorden (Frisvoll 1981a). The species was previously known from N Sweden in mainland Europe (Schuster & Mårtensson 1978). Its distribution pattern is correlated with unglaciated areas in N America, and the Svalbard locality is therefore interesting phytogeographically.

*Cynodontium strumiferum* (Hedw.) Lindb.

Reported from Bellsund S (Świąż & Karczmarz 1993), Linnévatnet (Hagen 1952), Bohemanflya (Kobayashi et al. 1990), Dyrevika in Kongsfjorden (Wegener et al. 1992, conf. det. Frisvoll), and Krossfjorden (Ebeltoftthamna) and Bockfjorden (Germaniahøgden) (Frisvoll 1981a). Collected at Dicksonfjorden (Lyckholmdalen) (Frisvoll unpubl.). It grows mainly in habitats

influenced by bird manuring like rocks and mounds used as bird perches.

*Cynodontium tenellum* (Bruch & Schimp.) Limpr.

Reported from Hornsund (Kuc 1963a), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b, also report of °*C. polycarpon*) and Kongsfjorden (Arnell & Mårtensson 1959). Collected at Bjørndalen, Todalen in Adventdalen, several sites in Krossfjorden, and Bockfjorden (Germaniahøgden) (Frisvoll unpubl.). See also °*C. polycarpon*.

*Cyrtomnium hymenophylloides* (Hüb.) T. Kop.

Reported without locality by Theriot (1907, as *Mnium*: "En petite quantité et en mélange."), and from Hornsund (Kuc 1963a), Bellsund S (Karczmarz & Świąś 1988, 1989b; Świąś & Karczmarz 1993), and Linnédalen (Hagen 1952, as *Mnium*). Not reported from Kongsfjorden by Arnell & Mårtensson (1959, as *Mnium*) who mentioned dwarf specimens resembling it, which were interpreted as young *C. hymenophyllum*. However, we have ascertained that *C. hymenophylloides* is frequent in Kongsfjorden as well as in other calcareous areas. We have specimens also from the Isfjorden area [Adventdalen (Bolterdalen, Foxdalen), Sassenfjorden (Diabasodden), Nordfjorden (Kapp Wijk), Dicksonfjorden (Heimenfjellet), Ekmanfjorden (Blomesletta)], Krossfjorden (Fanciullipynten), Bockfjorden (Trollkjeldene, Jotunkjeldene), Liefdefjorden (Næssøpynten) and Reinsdyrflya (Reinstrandodden and Dvergkilen). A short leaf apiculus never fails to occur in *C. hymenophylloides*, whereas an apiculus is absent in *C. hymenophyllum*, and this key character will always distinguish the two, even if studied with a hand lense. The common habitat of *C. hymenophylloides* is within frost cracks in the soil. See also °*M. stellare*.

*Cyrtomnium hymenophyllum* (Bruch & Schimp.) Holmen

Common (see Kuc 1973a). The species is almost never fertile (Holmen 1957a). It has been found with abundant sporophytes at Nordfjorden (Kapp

Wijk 1973), and also at Krossfjorden (Camp Zoe) (Frisvoll 1981b: Fig. 81). Otherwise, sporophytes are only known from Greenland and Yukon (Koponen in Nyholm 1993).

*Dichodontium pellucidum* (Hedw.) Schimp.

Reported from Bjørnøya (Berggren 1875), Bellsund S (Karczmarz & Świąś 1988, 1990b; Świąś & Karczmarz 1993), Recherchefjorden (Karczmarz & Świąś 1990a; Świąś & Karczmarz 1991b), Isfjord Radio (Hagen 1952), Bohe-manflya (Kobayashi et al. 1990), Adventfjorden (Persson 1942), and Trollkjeldene in Bockfjorden (Frisvoll 1978d). Collected at Bjørndalen, Adventdalen, Sassenfjorden (Diabasodden), Billefjorden, Nordfjorden, Dicksonfjorden, Ekmanfjorden (Blomesletta), Kongsfjorden, Kollerfjorden, Vestfjorddalen and Reinsdyrflya (Frisvoll unpubl.).

*Dicranella crispa* (Hedw.) Schimp.

Reported from SW Spitsbergen (Lindberg 1862), Bellsund S (Świąś & Karczmarz 1991a, as *Anisothecium*). Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b, as *Anisothecium*), Grønfjorden and Adventfjorden (Berggren 1875, but a specimen from the last locality was considered to belong to *D. grevilleana* by Kuc 1973a), and Longyeardalen and Kongsfjorden (Arnell & Mårtensson 1959). Also collected in Bjørndalen, Longyearbyen, Adventdalen (many places), and Kongsfjorden (Frisvoll unpubl.). See also *D. varia*.

*Dicranella grevilleana* (Brid.) Schimp.

Reported from one locality at the N side of Hornsund (Kuc 1963a), from near Longyearbyen (Frahm 1977), Kaffiøyra at Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982; Bońska & Gugnacka-Fiedor 1986), and Sorgfjorden (Lindberg 1867, as *Dicranum grevillei*). Collected at Billefjorden, Nordfjorden (Kapp Wijk area), Kongsfjorden and Reinsdyrflya (Frisvoll unpubl.). See also *D. crispa*.

*Dicranella palustris* (Dicks.) E. Warb.

Reported from "a plane terrace at foot of Arie-

kammen and Fugleberget" in Hornsund, and distributed in an exsiccatum by Bednarek-Ochyra et al. (1987; see also Bednarek-Ochyra 1993), and from Bohemanflya by Kobayashi et al. (1990). We have seen an exsiccate specimen (TRH), and it is made up of typically robust plants. *Dicranella palustris* was not listed from Svalbard by Nyholm (1987).

### *Dicranella subulata* (Hedw.) Schimp.

Reported from Hornsund (Kuc 1963a), Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1993), and Smeerenburg at Amsterdamøya and Kobbefjorden at Danskøya (Berggren 1875). Also collected at Bjørndalen, Adventdalen and Kongsfjorden (Frisvoll unpubl.).

### *Dicranella varia* (Hedw.) Schimp.

Reported from Bjørnøya (Summerhayes & Elton 1923: 223), the Adventfjorden area without exact locality (Berggren 1875, as var. *obtusifolia* nov. var.), Adventdalen by Innerhytta (Frahm 1977), at delta in front of Helvetiadalen (Frisvoll 1981a, as *Anisothecium*, mixed with the rare *Pohlia atropurpurea* and other minute species colonizing banks of a glacier river), and below a bird cliff at Tschermakfjellet in Nordfjorden (Frisvoll & Blom 1993: 44). A report from Kongsfjorden by Armitage (1937) refers to *D. crispa* (Arnell & Mårtensson 1959). Var. *obtusifolia* has been reported only from Svalbard; it may be of little taxonomic importance.

### *Dicranoweisia crispula* (Hedw.) Milde

A dominant species on siliceous boulders in snow beds (Elvebakk 1984), but also common in more exposed habitats. Loose cushions (moss-balls) grow on loamy soil with frost activity. "... auf dem Erdboden wachsend, vorzugsweise im Sandsteingebiet auf hartem steinigem Boden eine 2 Zoll hohe Form in lockeren Rasen, mit sichelförmig gekrümmten Blättern und selten fruchtend. ..." (Berggren 1875, as *Weissia*).

### *Dicranum acutifolium* (Lindb. & H. Arn.) Weim.

Reported from two localities at Forlandsundet

(Gugnacka-Fiedor & Noryskiewicz 1982; Boińska & Gugnacka-Fiedor 1986) and Kongsfjorden (Arnell & Mårtensson 1959, as *D. muehlenbeckii* var.; Wegener et al. 1992). The upper leaf cells are always irregular, and the taxon appears to include all previous correctly named reports of *D. muehlenbeckii* sensu Nyholm (1954) from the archipelago (cf. Kuc 1973a), see also °*D. muehlenbeckii* and °*D. brevifolium*. It is apparently widespread but probably not common.

### *Dicranum angustum* Lindb.

First reported by Bryhn (1909), and in the last decades it has been frequently reported from Svalbard. Nyholm (1987) distinguishes between *D. angustum* and *D. laevidens*, which for a long time have been treated as synonyms by most authors. A differentiation between them may not be unproblematic with regard to arctic material. The bulk of the Svalbard material possesses elongate, thick-walled and porose cells throughout the whole leaf. According to Nyholm (1987) these characteristics are typical of *D. laevidens*. *Dicranum angustum* has shorter, more thin-walled and less porose cells throughout the leaf. We have seen a few specimens with rather short, thin-walled and non-porose leaf cells; they have tentatively been referred to *D. angustum* s.str. The problem is in need of more study. Arnell & Mårtensson's (1959) material is *D. laevidens*: "The leaf cells are long and have thick porose walls." Many of Kuc's (1963a) specimens (KRAM) of °*D. groenlandicum* belong to *D. angustum/laevidens*. On the other hand, five specimens (KRAM) named *D. angustum* by Kuc (1963a) belong to *D. spadiceum* (3), *D. elongatum* and *Kiaeria glacialis*.

### *Dicranum elongatum* Schwaegr.

The cushions of *D. elongatum* are normally very dense with red-brown rhizoid felt, and they usually include plants of *Anastrophyllum minutum*; according to Hagen (1908: 327) the moss and liverwort "are woven together into compact, almost woody tufts". However, dense-growing ecads of *D. fuscescens*, with erect non-flexuose leaves and quite thick-walled leaf cells, may be very similar in appearance (see *D. fuscescens*). The broad costa and even more thick-walled

non-papillose cells (also in young leaves) are diagnostic characteristics of *D. elongatum*. It is certainly frequent, but may be less common on Svalbard than generally believed.

### *Dicranum flexicaule* Brid.

The taxon is frequently present as large deep cushions (to 10 cm); the shoots are robust with falcate leaves along the whole stem and especially at the top. The leaves are large, the upper margin denticulate, and the costa usually not or slightly excurrent. There are usually few papillae on upper leaf cells and margin; but sometimes there are more fairly high papillae, and the back of the nerve is sometimes quite papillose in its upper part. This is surprising because the Svalbard *D. fuscescens* is so little papillose. The cell structure of the upper part of the leaves varies much. Sometimes the cells are strongly irregular (as it is stated to be in the floras), but they may also be more regular. However, the robustness and structure of the falcate shoots, and the appearance of the broad leaves with shortly or not excurrent costa place these plants in *D. flexicaule* (sensu Nyholm 1987). Kuc's (1963a) *D. fuscescens* var. *fuscescens* f. *falcifolium* is this species (KRAM, 5 specimens).

### *Dicranum fuscescens* Sm.

The possible specific distinction between *D. fuscescens* and *D. flexicaule* is disputed. However, they seem to represent different genotypes or genotype groups, and sometimes grow together in mixed stands. A Berggren specimen from Grøn-fjorden (LD) is made up of two tufts; one is *D. flexicaule* and the other *D. fuscescens* mixed with a little *D. flexicaule*. The orientation and size of the upper leaves of intimately mixed plants of the two are markedly different, in *D. flexicaule* falcate and about 3–3.4 mm long and 0.65–0.75 mm broad, in *D. fuscescens* erect–flexuose and about 1.8–2.0 mm long and 0.45–0.50 mm broad. It is the relative difference which is of interest here, because the tuft is compact and both taxa comparatively small. Mixed stands are also known from C and E Norway (Frisvoll unpubl.; see also Kellomäki et al. 1977). The general appearance including size of plants and orientation of leaves, and the relative length and dentation of the upper

lamina and costa, may be more important as differentiating characteristics than subtle dissimilarities in the structure of cells and papillae (stressed e.g. by Nyholm 1987; Jóhannsson 1991: 119). Typical boreal *D. fuscescens* is doubtfully present on Svalbard, and the relationship between this lowland and the arctic and alpine ecads needs further studies. The Svalbard plants frequently grow in very dense cushions of about the same appearance as *D. elongatum*, and some specimens may not be easily separated from that species (see also Berggren 1875: 25: “*Dicranum elongatum*, formenreich wie sonst nirgends, oft 3–4 Zoll tiefe kompakte Rasen bildene, oft von den Formen des *D. fuscescens* kaum zu unterscheiden. . .”). *Dicranum fuscescens* is usually known by its relatively broader leaf lamina and narrower costa, its less incrassate leaf cells, and its more or less papillose upper leaf cells and costa. The top of exposed cushions are made up of very dense-growing plants with modified, non-papillose short leaves whose subula is strongly reduced. Plants growing in less dense cushions possess more of the well-known characteristics of non-arctic plants, but such specimens are not common. These plants have erect–flexuose leaves with a long–excurrent and  $\pm$  papillose costa. *Dicranum fuscescens* was reviewed as frequent on Svalbard by Kuc (1973a), but has usually been treated collectively including *D. flexicaule*.

### *Dicranum laevidens* Williams

This is the common taxon of *D. angustum* s.l. on Svalbard, see *D. angustum*. The taxon is arctic and known from Svalbard, N Fennoscandia, arctic Russia, Greenland and North America (Nyholm 1987). Most Svalbard specimens of *D. angustum* s.l. will now key out as *D. laevidens*. Also collected at Bjørnøya (TRØM, leg. S. Dunfjell and T. Engelskjøn 1983).

### *Dicranum majus* Sm.

The Svalbard *D. majus* is frequently orthophyllous, but otherwise it principally agrees with boreal material. The teeth and dorsal papillae of the subula are usually somewhat reduced but still present, and leaf transverse sections show the typical structure of the costa and the rectangular lumen of the lamina cells. *Dicranum scoparium* has quadratic lamina cells in cross section. Wide-

spread in the less calcareous districts, especially where there is much *Sphagnum*. In calcareous areas it has been frequently confused with *D. spadiceum* (q.v.). Not reported from Bjørnøya but recently collected there (TROM, leg. S. Dunfjell, T. Engelskjøn and O. Skifte 1983).

### *Dicranum scoparium* Hedw.

Little reported and probably also scattered in reality. The Svalbard material of *D. scoparium* s.l. is variable, but does not include specimens of °*D. bonjeanii* or °*D. leioneuron*. These species have been thought to occur there (see Kuc 1973a), because the dorsal leaf lamellae and marginal teeth of the Svalbard *D. scoparium* may be strongly reduced and sometimes entirely absent, and the leaf apex sometimes quite obtuse (Kuc 1963a: Fig 12). But the costa is strong in the lower half of the leaves, and transverse sections reveal that it is distinctly dorsally convex and includes many stereid bands. In *D. bonjeanii* s.l. the costa is flat and weak. This difference is very pronounced in mixed stands from the Norwegian mainland, and there is no important variation in the structure of this part of the costa of the Svalbard *D. scoparium*. In our opinion this characteristic is much more important than the variation in the easily modified leaf apex with its lamellae and teeth. We have seen six *D. scoparium* specimens (KRAM) named *D. bonjeanii* var. *anomalum* and two named *D. latifolium*/*D. leioneuron* by Kuc (1963a, 1973a), and in addition studied specimens from many parts of Svalbard. One specimen of *Sphagnum squarrosum* (TROM, leg. T. Engelskjøn BB 003.2) from Bjørnøya includes a shoot of *D. scoparium*, and it is new to the island. The *D. bonjeanii* of some authors (e.g. Berggren 1875, specimens in LD) refers at least in part to *D. laevidens*. The variation of *D. scoparium* s.l. excluding *D. bonjeanii* s.l. is still great, and it is possible that the arctic ecad should be recognised as a separate taxon.

### *Dicranum spadiceum* Zett.

The only common *Dicranum* species in calcareous areas. Rønning (1965) includes only one *Dicranum* species, viz. *D. majus*, in his vegetation tables from *Dryas* vegetation on Svalbard; most of the records certainly refer to *D. spadiceum*. The species is usually shiny yellowish brown; its

leaves are made up of an ovate basal lamina which rapidly narrows into a channelled subula. When dry, the subula is typically erect-flexuose. There are few or no marginal teeth at the subula. When known, the macroscopical characteristics makes this a rather easily recognised species both in the field and laboratory. Some orthophyllous plants of *D. majus* may look like *D. spadiceum*, but possess, inter alia, a less channelled leaf apex with marginal teeth and more elongate and thin-walled upper leaf cells.

### *Dicranum tauricum* Sapehin

Reported from SW Spitsbergen, Magdalene-fjorden and Kobbefjorden by Lindberg (1867, as *D. strictum*), who also summarised the differences between this species and his own °*D. fragilifolium*. Previously, he had reported the latter on the basis of the SW Spitsbergen specimen (Lindberg 1862). Berggren (1875: 39, as *D. strictum*) indicated a locality of *D. tauricum* at Miseryfjellet, Bjørnøya. The reports of *D. tauricum* were considered erroneous by Kuc (1973a, as *D. strictum*), whereas he accepted the report of *D. fragilifolium* (as did Nyholm 1987). However, we have seen a specimen from each of Lindberg's three localities (H-SOL), and they belong, surprisingly, to *D. tauricum*. The cells are thin-walled in the whole leaf; the costa is fairly narrow, and in transverse section it has no stereids and only one to rarely two layers of cells ventral to the guide cells. In *D. fragilifolium* the leaf cells are more thick-walled; the costa is slightly wider and in transverse section it possesses poorly differentiated stereid bands towards the base, and two to three layers of cells ventral to the guide cells (Lawton 1971; Hegewald 1992, and comparative herbarium material from Scandinavia). In Fennoscandia it is mostly corticolous (Nyholm 1987), the northernmost confirmed locality from there is in Alta in Northern Norway (Hegewald 1992).

### *Didymodon acutus* (Brid.) K. Saito

A bird cliff species which has been overlooked and which is probably widespread in suitable habitats; it has been reported from nine localities in Kongsfjorden, Krossfjorden, Bockfjorden, Liefdefjorden and at Reinsdyrflya (Frisvoll 1978d). Collected at Bjørnøya in 1983 (TROM,

leg. T. Engelskjøn and O. Skifte). See also °*D. icmadophilus*.

*Didymodon asperifolius* (Mitt.) Crum et al.

Reported from NW Sørkapp Land (Dubiel & Olech 1990: 55, as *Barbula*), Hornsund (Kuc 1963a, as *Barbula*), Bellsund S (Karczmarz & Świąś 1988; Świąś & Karczmarz 1991a, 1993, as *Barbula*), Mimerdalen (Hadač 1989: 163), Billefjorden (Acock 1940; Jones 1951, as *D. spitsbergensis*), Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982; Boińska & Gugnacka-Fiedor 1986), Kongsfjorden (Frisvoll 1985b), Reinsdyrflya (Dahle 1983a), Frankenhøya at Barentsøya (Hjelmstad 1981), and Edgeøya NW (Heinemeijer 1979, as *Barbula rufa*). Collected at Bjørnøya (TROM, leg. S. Dunfjell & T. Engelskjøn 1983), Adventdalen, Sassenfjorden (Diabasodden), Nordfjorden, Krossfjorden, Bockfjorden and Liefdefjorden (Frisvoll unpubl.). It has sometimes been confused with reddish terrestrial *Schistidium* species: An exsiccate specimen (No. 32, TRH) from Hornsund named *S. apocarpum* (Bednarek-Ochyra et al. 1987) is this species.

*Didymodon fallax* (Hedw.) Zand.

Reported from near the hot springs at Bockfjorden (Frisvoll 1978d, as *Barbula*) and in rock crevices near Kapp Wijk at Nordfjorden (Frisvoll & Blom 1993). Also reported from ridge vegetation at Dyrevika and Stuphallet in Kongsfjorden by Wegener et al. (1992, as *Barbula*), but may have been confused with *Cnestrum glaucescens* which was sent (by L.B. Jacobsen) as a possible material.

*Didymodon johansenii* (Williams) Crum

Reported from bird cliffs and boulders used as bird perches. Four localities in Kongsfjorden, Liefdefjorden and Bockfjorden are known at present. Formerly it was only known from North America and Siberia and it has been regarded as a glacial relict (Frisvoll 1978d).

*Didymodon tophaceus* (Brid.) Lisa

Only reported from areas close to the hot springs

Trollkjeldene and Jotunkjeldene at Bockfjorden, where it was locally common (Frisvoll 1978d). The species is essentially non-arctic and occurs in scattered localities in the lowlands of Fennoscandia.

*Diplophyllum albicans* (L.) Dum.

Reported from Bjørnøya (Summerhayes & Elton 1923: 226) and Amsterdamøya (Berggren 1875). In the former locality it was said to grow inside crevices between boulders, from where the authors mentioned also 9 mosses and 12 other liverworts. The latter locality was said to include *Arctoa fulvella* growing at "... die chaotischer Trümmerfelder von Gneissblöcken an den Gebirgsabhängen, wo sie ... in den dunklen Höhlen unter den Felsenblöcken mit *Grimmia contorta* in Menge auftritt und wo auch zu finden sind *Scapania nemorosa*, ... *Jungermannia albicans* und *taxifolia*, *J. plicata*, *Andreæa papillosa*, *Jungerma. setiformis* und *Polytrichum commune*." (Berggren 1875: 31, and also p. 97 in comment on *Scapania nemorosa*). (*G. contorta* = *G. incurva*, *Scapania nemorosa* ≈ *S. spitsbergensis*, *Jungermannia* = *Diplophyllum*, *Barbilophozia* or *Tetralophozia*.) *Diplophyllum albicans* is a western species rarely found north of Tromsø in Norway (Jørgensen 1934; Elvebakk unpubl.), and the locality in NW Svalbard is phytogeographically remarkable. "Das Vorkommen auf Spitzbergen scheint mir kaum möglich; vielleicht gründet sich die Angabe auf eine alte, unkontrollierte Bestimmung." (Buch 1928). The identification of Berggren's material has been confirmed by Arnell & Mårtensson (1959), and we have also studied a specimen (LD). Its leaves have a distinct vitta and a smooth cuticle, and the stem cortex is 3–4 stratose. It is accepted also from Bjørnøya, but we have not seen the material; it may belong to the more arctic *D. taxifolium* which has not been reported from there.

*Distichium hagenii* Philib.

Almost universally overlooked and confused with *D. inclinatum*. Reported from Hornsund [Kuc 1963a; but the peristome of the capsule of his Figure 8 is inaccurately redrawn from Hagen (1899–1904: Taf. 1, Fig. 2) and does not show the crucial peristome characteristic of the species, see e.g. Nyholm (1987)]; Bellsund S (Świąś &



Karczmarz 1991a, 1993); Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b); in vegetation tables from Bohemanflya (Kobayashi et al. 1990, but they include only *D. hagenii* of that genus and this is unrealistic); and from Nordaustlandet (Mårtensson & Persson MS in Kuc 1973a). The *D. inclinatum* of the salt-tolerant bryophyte society mentioned by Frahm (1977) from Isfjord Radio and Brøggerhalvøya SW is probably for the most part *D. hagenii*. Dahle (1983a) used the collective designation *D. hagenii/inclinatum* in his tables from Reinsdyrflya. Frequent on sea shores and collected at Kapp Linné, Longyearbyen, Adventdalen, Sassenfjorden (Diabasodden), Nordfjorden (Kapp Wijk area), and Ekmanfjorden (Flintholmen) in the Isjorden area, and from Kongsfjorden (common) and Bockfjorden (Frisvoll unpubl.).

*Ditrichum crispatisimum* (C. Müll.) Par.

Often regarded as a variety of *D. flexicaule*, but considered to be a separate widespread species by Frisvoll (1985a; see also Smith 1993), who also listed it from Svalbard, where it is fairly common in moist habitats: "The species [*D. flexicaule*] is very variable but is generally met with as the long-leaved type." (Arnell & Mårtensson 1959). Reported from Stuphallet in Kongsfjorden by Wegener et al. (1992). Not explicitly reported from Bjørnøya by Berggren (1875), but it was probably seen also there as "der bekannten langblättrigen Form". Collected at Bjørnøya by S. Dunfjell and T. Engelskjøn in 1983 (TROM).

*Ditrichum cylindricum* (Hedw.) Grout.

Reported from SW Spitsbergen by Lindberg (1862, as *Trichodon*; 1864a, b, as *Trichodon oblongus*; 1867, as *Ceratodon oblongus*); his fertile specimen (H-SOL) has been studied. Also reported in vegetation tables from Trygghamna (Eurola 1968) and Kaffiøra at Forlandsundet (Boińska & Gugnacka-Fiedor 1986). Four specimens reported by Polunin (1945, as *Trichodon oblongus*) from Kongsfjorden have been renamed *Distichium capillaceum* (see Arnell & Mårtensson 1959). Collected at Dicksonfjorden (Idodalen), Lilliehöökfjorden (bird cliff at Nilsfjellet), Kollerfjorden (bird cliff behind Speidarneset) and Bockfjorden (Trolltindane) (Frisvoll unpubl.); these specimens are sterile.

*Drepanocladus aduncus* (Hedw.) Warnst.

Common and strongly modified by the habitat; it is often very gracile. Sometimes it looks like *Cratoneuron filicinum* and has been thought to represent °*Pseudoleskea chilensis* and °*Callialaria curvicaulis*. Hadač (1946: 143f, 151, 157) used the names *D. aduncus* and *D. polycarpus* about Svalbard material. Also Nyholm (1965) recognises *D. polycarpus* as a separate species, but it is now usually included in *D. aduncus*. According to L. Hedenäs (pers. comm.) *D. aduncus* is taxonomically unclear in arctic areas.

*Encalypta affinis* Hedw. f.

Only reported once from Reinsdyrflya at N Spitsbergen (Frisvoll 1978d).

*Encalypta brevicollis* (Bruch & Schimp.) Ångstr.

Collected from the summit of Sherdalfjellet near Ny-Ålesund (Frisvoll 1978d). Reported from Dyrevika at the N side of Kongsfjorden (Wegener et al. 1992), but the material sent on loan was sterile and (probably) erroneously named.

*Encalypta brevipes* Schljak.

Reported by Frisvoll & Blom (1993) on the basis of a nice specimen collected at Platåberget near Longyearbyen by A. Myrmæl in 1991. It has mature sporophytes with short setae (about 2 mm), smooth gymnostomous capsules with spores 37–48 µm, and fringed calyptrae with a short rostrum (see Horton & Murray 1976).

*Encalypta longicollis* Bruch

A phytogeographically interesting species collected at nine localities in Kongsfjorden, Bockfjorden and Liefdefjorden, always from *Dryas* communities (Frisvoll 1978d). Included in vegetation tables from Brøggerhalvøya by Brattbakk (1986). The distribution area includes Alaska, Newfoundland, Svalbard, Arctic Siberia, one locality in N Sweden, Ukraine, and the Alps (Horton 1982, 1983; Belland & Brassard 1980; Ignatov & Afonina 1992).

*Encalypta mutica* I. Hag.

Reported from Barentsburg (Hadač 1989: 166), and from dry limestone localities at Nordfjorden (Kapp Wijk) and Kongsfjorden (Juttaholmen) (Frisvoll 1981a). The distribution map by Horton (1983) shows large gaps between three areas (Alaska/W Canada, Svalbard and Fennoscandia), and Ignatov & Afonina (1992) report it from Russia NW and the Baltic countries. The species is of phylogeographical interest.

*Encalypta rhyptocarpa* Schwaegr.

Widespread and frequent. "Die Stengel sind an geschützten humusreichen Stellen an der Baien des Eisfjords bisweilen zollhoch, die Kapsel hat ihren[n]ormale Form und das Peristom ist vollständig entwickelt; an anderen Stellen ist der Stengel niedrig, der Fruchtsiel und die Kapsel kurz und das Peristom unvollständig, es ist die Var.  $\beta$  *leptodon* Lindb." (Berggren 1875). There are also plants with affinity to *E. rhyptocarpa*, whose capsules lack a peristom and which therefore may be mistaken for *E. brevipes* and *E. mutica*. The taxonomic status of this gymnostomous taxon is uncertain; it is, *inter alia*, distinguished from the two mentioned species by the lack of a fringed calyptra.

*Eurhynchium pulchellum* (Hedw.) Jenn.

Reported from Grønfjorden where it was collected in 1868 (Berggren 1875, as *E. diversifolium*), Nordfjorden (Frisvoll 1981a: 101), and Barentsøya and Edgeøya (Philippi 1973; Heine-meijer 1979). However, the species has been much overlooked, and more than 30 specimens are now known from different parts of C and N Spitsbergen (Frisvoll unpubl.). See also *Brachythecium glaciale*.

*Fissidens adianthoides* Hedw.

Listed from 'Spitsbergen' by Abramova et al. (1961). A southern temperature demanding species only known from Ossian Sarsfjellet (Frisvoll 1978d), Kapp Wijk (leg. A.A. Frisvoll) and Sassendalen (leg. A. Elvebakk) (Frisvoll & Blom 1993).

*Fissidens arcticus* Bryhn

The specimens previously called *F. arcticus/bryoides* (Frisvoll 1981a) have been referred to *F. arcticus* and *F. viridulus* by Nyholm (1987). Only two specimens from Billefjorden and Kongsfjorden were named *F. arcticus* by Nyholm. It is known from Svalbard, Greenland and arctic North America (Nyholm 1987). See also *F. viridulus* and *F. exilis*.

*Fissidens osmundoides* Hedw.

Reported from Bellsund S (Karczmarz & Świąż 1990b), Chamberlindalen in Recherchefjorden (Świąż & Karczmarz 1991b), Bohemanflya (Kobayashi 1990: Table 4, 6), Billefjorden (Acock 1940: Table 2–3), Adventfjorden and Kongsfjorden (Berggren 1875), Kongsfjorden (Arnell & Mårtensson 1959; Frisvoll 1978, in comment on *Campylopus schimperi* and *Fissidens adianthoides*; Wegener et al. 1992), Reinsdyrfllya (Dahle 1983a), 'northern Spitsbergen' (Bailey & Halliday pers. comm. to Kuc 1973a), and in a species list from lichen or moss heath "compiled from many different localities" in and on both sides of Hinlopenstretet (Summerhayes & Elton 1928: 204). Collected at Adventdalen, Nordfjorden (Kapp Wijk), Dicksonfjorden (Heimenfjellet SW), Krossfjorden (Camp Zoe, Regnardneset), and Bockfjorden (N of Nygaardbreen) (Frisvoll unpubl.).

*Fissidens viridulus* (Anon.) Wahlenb.

The name is mentioned in the text by Berggren (1875: 36, in comment on *Dicranella crispa*), but the same material is probably called *F. incurvus* in his species catalogue. Most of the specimens referred to *F. arcticus/bryoides* by Frisvoll (1981a) have been renamed *F. viridulus* by Nyholm (1987). Thus it appears to be a frequent species known from Adventdalen, Ekmanfjorden and Nordfjorden in the Isfjorden area, and from Kongsfjorden, Liefdefjorden and Bockfjorden. Its main habitat is in frost cracks in the soil (see also *Cyrtomnium hymenophylloides*).

*Funaria arctica* (Berggr.) Kindb.

Described by Berggren (1875, as *F. hygrometrica* var.) based on material from Adventfjorden and

Lomfjorden. Later reported from Hornsund (Kuc 1963a, 1964), Longyearbyen and/or lower Adventdalen (Frahm 1977), Longyearbyen and Ny-Ålesund (Arnell & Mårtensson 1959, as *F. hygrometrica* var.), and Stuphallet in Kongsfjorden (Wegener et al. 1992). Collected below bird cliffs at Tschermakfjellet in Nordfjorden and on Flinholmen in Ekmanfjorden (Frisvoll unpubl.).

### *Grimmia affinis* Hornsch.

Recorded from three localities in Bockfjorden, all of which are used as bird perches (Frisvoll 1978d).

### *Grimmia anodon* Bruch & Schimp.

Only found in bird cliffs. Reported from Kongsfjorden and Liefdefjorden (Frisvoll 1978d) and collected at Adventdalen and Dicksonfjorden (Kapp Smith and Idodalen) (Frisvoll unpubl.).

### *Grimmia donniana* Sm.

Polunin's (1945) report from Kongsfjorden is doubtful, a specimen (BM) consists of *Trichostomum arcticum* (Arnell & Mårtensson 1959), a curious misidentification or possibly a label error, as it has been collected in the same area (Sherdalfjellet, Ossian Sarsfjellet) later (leg. A.A. Frisvoll). It was also reported from Magdalenefjorden (Lindberg 1867, as *G. Donnii*), and from Barentsøya and Edgeøya at Freemansundet (Philippi 1973; Heinemeijer 1979). The description of Philippi's (1973) material may indicate that it is another species: "... die Haarspitzen sind kurz und können teilweise auch fehlen, die Zellen des Blattgrundes ... kurzrechteckig (Verhältnis Länge zu Breite wie 2 : 1, Größe 24 × 12 µ), die Zellen der oberen Blatthälfte quadratisch und dünnwandig, ca. 8–10 µ groß." Perhaps *G. subsulcata*?

### *Grimmia elatior* Bals. & De Not.

Reported by Frisvoll & Blom (1993); the specimen was collected from dolerite rocks at Blomesletta in Ekmanfjorden in 1973 (leg. A.A. Frisvoll).

### *Grimmia incurva* Schwaegr.

Reported from Skoddefjellet (Środoń 1960: 9, as *Grimmia* cf.) and several sites at the N side of Hornsund (Kuc 1963a), Kapp Guisnez between Kongsfjorden and Krossfjorden (Arnell & Mårtensson 1959), Amsterdamøya and Danskøya (Berggren 1875, as *G. contorta*: "Hier massenhaft in dunklen Höhlungen zwischen Felsentrümmern auf erde oder Steinen. . . .", see also *Diplophyllum albicans*), and NW part of Nordaustlandet (Mårtensson & Persson MS and Blake Jr. MS, in Kuc 1973a). Collected at seven localities in Kongsfjorden and Krossfjorden, five localities in Bockfjorden (e.g. Trolltindane 1100 m a.s.l.), Liefdefjorden (Siktefjellet) and Reinsdyrfla (Frisvoll unpubl.).

### *Grimmia sessitana* De Not.

Reported by Frisvoll & Blom (1993); the specimen was collected from sandstone rocks at Bjørndalen (leg. A.A. Frisvoll, det. E. Nyholm). Greven (1995a,b) reported it from Nybyen in Longyearbyen.

### *Grimmia subsulcata* Limpr.

Lindberg (1867) described *G. jacquinii* var. *subimberbis* from Amsterdamøya, and this taxon was later treated within °*G. alpestris* (Berggren 1875; Kuc 1973a) and °*G. caespiticia* (Wijk et al. 1962; Frisvoll et al. 1984). The type specimen has now been revised and found to correspond to *G. subsulcata* (E. Nyholm pers. comm.). This name was used by Frisvoll & Blom (1993)

### *Grimmia torquata* Hornsch.

Reported from the N side of Hornsund (Kuc 1964a), Bellsund S (Karczmarz & Świąś 1988; Świąś & Karczmarz 1993), Ossian Sarsfjellet in Kongsfjorden (Arnell & Mårtensson 1959), Kobbefjorden (Berggren 1875, locality uncertain because he could not remember collecting it there), and "northern part of the Archipelago" (Bailey & Halliday pers. comm. to Kuc 1973a: 403, 421). Collected at Bjørndalen (Fuglefjella), Nordfjorden (Kongressfjellet), Kongsfjorden (Sherdalfjellet), Krossfjorden (Signehamna) and Bockfjorden (top of Trolltindane and towards Germaniahøgden) (Frisvoll unpubl.).

*Gymnocolea inflata* (Huds.) Dum.

Reported from the Hornsund area (Rejment-Grochowska 1967), Bellsund S (Karczmarz & Świąs 1989a), Vassdalen in Van Mijenfjorden (Hadač 1989), Barentsburg (Bednarek-Ochyra et al. 1987), Bohemanflya (Kobayashi et al. 1990: Table 8), Adventfjorden [Berggren 1875, as *Jungermannia inflata* var. *rigidiuscula*, "zwischen Hypnen und *Cinclidium arcticum*" and therefore perhaps the unreported calciphilous *G. borealis* (Frisv. & Moen) Schust.?, Agardhbukta (Philippi 1973; Elvebakk unpubl.) and Edgeøya NW (Heinemeyer 1979). At Agardhbukta it formed large carpets on strongly acidic shale deposits, and its distribution is probably limited by the substrate. Duell (1983) included Svalbard in the distribution of *G. acutiloba*, but we think that is an error.

*Gymnomitrium apiculatum* (Schiffn.) K. Müll.

Reported from Bohemanflya (Kobayashi et al. 1990: Table 4, 7), Danskøya (Arnell & Mårtensson 1959), and by the lake Hajern at Lilliehöökfjorden (Frisvoll & Blom 1983).

*Hamatocaulis vernicosus* (Mitt.) Hedenäs

Reported several times in the old Svalbard literature (see Kuc 1973a, as *Drepanocladus*). It was later reported (as *Drepanocladus*) from Bjørnøya (Engelskjøn 1986; also by Summerhayes & Elton 1923), NW Sørkapp Land (Dubiel & Olech 1990: 54), Bellsund S (Karczmarz & Świąs 1988, 1990b; Świąs & Karczmarz 1991a, 1993), Chamberlindalen in Recherchefjorden (Świąs & Karczmarz 1991b), Bohemanflya (Kobayashi et al. 1990: Table 7), and the Forlandsundet area (Boińska & Gugnacka-Fiedor 1986). Several Svalbard specimens have been shown to belong to *Scorpidium revolvens* s.l. (see Hagen 1899–1904: 321, in comment on *Hypnum intermedium*; Arnell & Mårtensson 1959 and Kuc 1973a, in comment on *Drepanocladus vernicosus*). But there is one verified specimen, collected at the N side of Adventdalen towards Mälardalen in 1954 by A.C. Crundwell (S. L. Hedenäs pers. comm.; Frisvoll & Blom 1993).

*Haplomitrium hookeri* (Sm.) Nees

Only reported from the mountain slope of Sverdruphamaren at Longyearbyen (Arnell & Mårtensson 1959). A rare or very rare species in Central Europe and Scandinavia (Arnell 1956; Høiland & Pedersen 1975). The nearest known locality is at Vadsø in Finnmark, N Norway (Frisvoll & Blom 1993).

*Harpanthus flotovianus* (Nees) Nees

Reported from Wijdefjorden (Wulff 1902, as *H. flotowii*) and Svenskøya at Kong Karls Land (Arnell 1900: ". . . spärlich in einem Mischrasen mit *Jungermannia quinquedentata*, *J. Floerkei*, *Amblystegium stellatum* u.s.w. Eine für die Spitzbergische Inselgruppe neue Art."). (*Jungermannia* = *Tritomaria*, *Barbilophozia*; *Amblystegium* = *Campylium*.) The reports of this characteristic species are included here although it is thought to be in need of confirmation (but what else could it be?); it is odd that it has not been found later. The species is common in Finnmark county, northernmost Norway (Jørgensen 1934).

*Harpanthus scutatus* (Web. & Mohr) Spruce

Reported as "present in small quantity in material from" Bjørnøya (Watson 1922; Summerhayes & Elton 1923: 225), Forlandsundet (Hermansen-øya), and Prins Karls Forland (Watson 1922): "The specimens, as Mr. [D. A.] Jones remarked, were very variable in regard to infolding of leaves, frequency and size of underleaves, and amount of thickening of cell-angles, much more so than is usual in British plants." The northernmost known Norwegian locality is in Rana in Nordland county (Jørgensen 1934), and the reports may need confirmation.

*Hennediella heimii* (Hedw.) Zand.

"Frequent around the coast of the archipelago" (Kuc 1973a, as *Pottia*). The arctic ecad, var. *arcticus* (Lindb.) Zand., is sometimes treated as a species (e.g. by Steere 1978, as *Pottia obtusifolia* (R. Brown) C. Müll.), and it is the common taxon on Svalbard. The present species has usually been referred to the genera *Pottia* or *Desmatodon*, but has not been a fit element in either. Zander (1993)

transferred it to the essentially austral genus *Hennediella*; its species has, i.a., "lanceolate leaves . . . bordered by a band of usually elongate thick-walled cells, with usually serrulate to dentate and almost always plane . . . upper laminal margins. . . .".

*Hygrohypnum alpestre* (Hedw.) Loeske

Reported from Bjørnøya and Kobbefjorden at Danskøya (Berggren 1875, as *Hypnum*), from two nearby sites at Hornsund (Kuc 1963a), Ossian Sarsfjellet in Kongsfjorden (Arnell & Mårtensson 1959), and from Agardhbukta and SW Barentsøya (Philippi 1973). Collected at Adventdalen (Todalen) and Bockfjorden (Frisvoll unpubl.).

*Hygrohypnum cochlearifolium* (Vent.) Broth.

Reported from Isfjord Radio by Hagen (1952). According to Arnell & Mårtensson (1959) the reports of *H. molle* from Adventfjorden and Danskøya (Kobbefjorden) by Berggren (1875, as *Hypnum*) refer to this species; and they reported it themselves from Longyearbyen. Eurola & Hakala (1977) included it with reservation in a vegetation table from Hunnberget in Murchisonfjorden at Nordaustlandet. Later collected in Adventdalen (Bolterdalen and W of Passhytta) (Frisvoll unpubl.).

*Hygrohypnum luridum* (Hedw.) Jenn.

Reported from Hornsund (Kuc 1963a), Mälardalen in Adventfjorden (Eurola 1968: Table 6), Tempelfjorden (Hartmann 1980: 115), Kongsfjorden (Polunin 1945, as *H. palustre* var. *julaceum*; Arnell & Mårtensson 1959), Hunnberget in Murchisonfjorden (Eurola & Hakala 1977) and SW Barentsøya and NW Edgeøya (Philippi 1973). Collected in Billefjorden, Nordfjorden, Dicksonfjorden, Vestfjorddalen and Liefdefjorden (Frisvoll unpubl.). In Kongsfjorden the species "seems to prefer moist rock surfaces at or near the bases of bird cliffs. . . ." (Arnell & Mårtensson 1959).

*Hygrohypnum ochraceum* (Wils.) Loeske

Reported from three localities on Bjørnøya and

at Grønfjorden by Berggren (1875, as *Hypnum*), and from Adventdalen (west of Passhytta) by Frisvoll (1981a).

*Hylocomium splendens* (Hedw.) Schimp.

The common Svalbard ecad is made up of simple pinnate plants, rarely it is more branched: "Auf Beeren Eiland noch mit niederliegendem Stengel in lockeren Rasen aber je weiter nördlich desto mehr aufrecht wachsend mit dichter gedrängten, wenig verzweigten Stengeln, kurzen aufwärts gerichteten Aestchen und plötzlich in eine kurze Spitze verlaufenden Stengelblättern." (Berggren 1875). The taxonomic problems presented by the different morphological ecads of *H. splendens* s.l. are unsettled. The Svalbard material has sometimes been treated as a species, *H. alaskanum* (Lesq. & James) Aust. The taxonomy of *H. alaskanum* is discussed by Persson (in Persson & Gjærevoll 1961): "As far as I can see all or practically all material from Arctic . . . belongs to *H. alaskanum*." The opposite view is held by Steere (1978): ". . . *H. alaskanum* can be only a stunted physiological-ecological tundra form or ecotype of *Hylocomium splendens* which does not merit nomenclatural recognition at any taxonomic level." The variation of *H. splendens* s.l. in Svalbard is described and figured by Kuc (1963a). See also Müller (1892, as *Hypnum alaskanum*, first report), Theriot (1907, as *Hylocomium splendens* var. *gracilius*) and Størmer (1940, as *H. splendens* var. *alaskanum*). A review of the taxonomic treatment of *H. alaskanum* is given by Persson & Viereck (1983).

*Hymenostylium recurvirostre* (Hedw.) Dix.

Reported from Kongsfjorden (Arnell & Mårtensson 1959, as *Gymnostomum*), Liefdefjorden (Berggren 1875, as *G. curvirostre*), Bockfjorden (Frisvoll 1978d, in comment on *Didymodon tophaceus*) and Sorgfjorden (Lindberg 1867, as *G. curvirostre*). Collected at Adventdalen, Sassenfjorden (Diabasodden), Billefjorden, Nordfjorden, Dicksonfjorden, Krossfjorden and Vestfjorddalen (Frisvoll unpubl.). The species frequently grows on soil (Berggren 1875), as well as on rocks as usual in more southern latitudes (Arnell & Mårtensson 1959).

*Jungermannia confertissima* Nees

Reported from the Ny-Ålesund area by Vána (1974) based on a specimen published by Arnell & Mårtensson (1959, as *J. pusilla*), see °*J. jenseniana*. The entire Svalbard material of *Jungermannia* ought to be restudied. It seems that it occurs there with one or two species from each of three pairs of closely related taxa, viz. *J. obovata* – *J. subelliptica*, *J. sphaerocarpa* – *J. confertissima*, and *J. pumila* – *J. polaris*. Their problematic status in the Arctic is thoroughly discussed by Schuster (1988).

*Jungermannia polaris* Lindb.

The type of the name was collected in Sorgfjorden by Malmgren in 1861 (Lindberg 1867). Probably widespread in calcareous districts; it includes also *J. schiffneri* published as new to Svalbard by Arnell & Mårtensson (1959). See also °*J. pumila*.

*Jungermannia sphaerocarpa* Hook.

Reported from NW Sørkapp Land (Dubiel & Olech 1990), Fugleberget in Hornsund (Rejment-Grochowska 1967), Bellsund S (Karczmarz & Świąs 1988, 1989a; Świąs & Karczmarz 1991a), and Chamberlindalen in Recherchefjorden (Świąs & Karczmarz 1991b), all reports as *Solenostoma sphaerocarpum* var. *nana*. See also *J. confertissima*.

*Jungermannia subelliptica* (Kaal.) Levier

First reported from Grønfjorden (Berggren 1875, as *J. gentiana*). Later reported by Arnell & Mårtensson (1959, as *Plectocolea*) from Longyearbyen and the Ny-Ålesund area where it was common. Therefore it is probably much more frequent than the reports indicate. See also °*J. obovata*.

*Kiaeria falcata* (Hedw.) I. Hag.

Listed from Svalbard by Duell (1984), but this may consider Jan Mayen. Perhaps therefore it was listed from Svalbard with a question mark by Nyholm (1987). We do not know of any primary report from Svalbard. Collected at Bjørnøya by S. Berggren in 1868 (see *K. starkei*) and by S.

Dunfjell, T. Engelskjøn and O. Skifte in 1983 (TROM).

*Kiaeria starkei* (Web. & Mohr) I. Hag.

Reported from Bjørnøya (Berggren 1875; Dixon 1922; Summerhayes & Elton 1923: 225, all as *Dicranum*), Bellsund S (Karczmarz & Świąs 1988, 1990b; Świąs & Karczmarz 1993), Chamberlindalen in Recherchefjorden (Świąs & Karczmarz 1991b), the southernmost part of Prins Karls Forland (Berggren 1875, as *Dicranum*), and Edgeøya and the E side of Spitsbergen at Kvalvågen (Philippi 1973). We have seen two of Berggren's exsiccate specimens (No. 12 *Dicranum starkei*, LD); the one from Bjørnøya (Mount Misery 1868) is *K. falcata*, whereas that from Prins Karls Forland is correctly named. The leaves of the material of *K. falcata* have distinctly papillose subula with short cells, and slightly widened but not inflated alar cells; the material of *K. starkei* has more elongate cells in a non-papillose subula, and inflated thin-walled alar cells. Dixon (1922) and Summerhayes & Elton's (1923) record of *K. starkei* from Bjørnøya may also need to be reexamined (it was said to grow "directly on rocks" and "have the habit of *Blindia acuta*"). This ubiquitous snow bed species in the Scandinavian mountains is evidently very rare on Svalbard.

*Leptobryum pyriforme* (Hedw.) Wils.

Reported from Hornsund (Kuc 1963a), Bellsund S (Rzętkowska 1988a, b; Karczmarz & Świąs 1989a; Świąs & Karczmarz 1991a), three sites in Grønfjorden and Pyramidene in Billefjorden (Hadač 1989: Table 2, 5, 11, 20), W side of Adventfjorden (Berggren 1875: 57, first report), Adventdalen (Frahm 1977), De Geerdalen and Botneheia in Sassenfjorden (Hadač 1946: 142, 153), four sites in Kongsfjorden (Arnell & Mårtensson 1959: "A common species in Ny-Ålesund and in the immediate surroundings of the coalmines. . . . In addition to areas inhabited by man the species also occurs on bird perches, e.g. on the soil on earth slopes below bird cliffs. It fruits abundantly."), and Edgeøya NW (Philippi 1973). Collected at Longyearbyen, Nordfjorden (Tschermakfjellet and Kapp Wijk), Ekmanfjorden (Flintholmen), Liefdefjorden (Wulffberget) and Bockfjorden (in front of Adolfsbreen and Trollkjeldene) (Frisvoll unpubl.).

*Lescuraea incurvata* (Hedw.) Lawt.

Reported from Bjørnøya (Berggren 1875, as *Pseudoleskea atrovirens*), and the hot springs at Bockfjorden (Frisvoll 1978d).

*Lescuraea plicata* (Web. & Mohr) Broth.

Only reported from Bjørnøya by Berggren (1875, as *Ptychodium*) and Summerhayes & Elton (1923: 227, as *Brachythecium*); we have seen a Berggren specimen (LD). Not reported from there by Engelskjøn (1986), but present in abundance in some specimens of *Brachythecium turgidum* (TROM) collected by him.

*Lophozia badensis* (Gott.) Schiffn.

Reported from Recherchefjorden (Karczmarz & Świąć 1990a; Świąć & Karczmarz 1991b, as *Leiocolea*) and three localities in Kongsfjorden (Arnell & Mårtensson 1959, as *Leiocolea*). Schuster & Damsholt (1974) state that "... all collections from the [Greenland] Arctic are critical insofar as they tend to show a mixture of 'badensis' and 'collaris' characters." Schuster (1988) reported °*Lophozia collaris* from S Greenland based on a single collection: "The aspect approached *L. badensis*, and, initially, I felt it should go there." However, after a detailed study he changed his mind. He did not report *L. badensis*. The Svalbard material may need to be restudied.

*Lophozia bicrenata* (Hoffm.) Dum.

Reported from Rotjesfjellet in Hornsund (Rejment-Grochowska 1967, as *Isopaches*) and Billefjorden (Watson 1922; Summerhayes & Elton 1923: 260). Watson (1922) mentioned the characteristic odor of the species. Kell Damsholt (pers. comm.) considers it very unlikely that *L. bicrenata* occurs on Svalbard; and he supposes the reports may refer to *L. alboviridis* Schust., a recently described species which is known from Greenland and which is calciphilous as opposed to the acidophilous *L. bicrenata*. See Schuster (1988) concerning a comparison between the two. Until the Svalbard material has been restudied we will not change the name.

*Lophozia gillmanii* (Aust.) Schust.

Reported from Nordfjorden, Ekmanfjorden, Vestfjorddalen and Kongsfjorden by Frisvoll (1981a, as *Leiocolea*).

*Lophozia grandiretis* (Kaal.) Schiffn.

So far reported only "from moist coal-intermingled soil" at Longyearbyen (Arnell & Mårtensson 1959); we have seen a specimen (UPS), and it belongs to var. *grandiretis*.

*Lophozia heterocolpos* (Hartm.) Howe

Reported from six sites at Hornsund (Rejment-Grochowska 1967, as *Leiocolea*), Recherchefjorden W (Karczmarz & Świąć 1990a, as *Leiocolea*), Kongressdalen (Hadač 1989), and three sites in Kongsfjorden (Arnell & Mårtensson 1959, as *Leiocolea*). One specimen from Kongsfjorden was referred to var. *arctica* (of *Leiocolea heterocolpos*), and that taxon has also been reported from Bockfjorden (Frisvoll 1978, as *Leiocolea heterocolpos harpanthoides* in comment on *Lophozia opacifolia*). Świąć & Karczmarz (1991a) probably reported it from Bellsund S [as '*Lophozia arctica*' (S. Arn.) comb. ined. ?, err. cit. in syn. pro *Leiocolea arctica* S. Arn., K. Müll. in Rabenh. Krypt. Fl. 6.1: 694. 1954]. Previous reports of *Lophozia collaris* from Bellsund (Lindberg 1867, collected by J. Vahl in 1838) and Linnévatnet (Hagen 1952) perhaps also belong here, see °*L. collaris* and Arnell & Mårtensson (1959, in comment on *Leiocolea heterocolpos*). Collected at Longyearbyen, Sassenfjorden (Diabasodden), Nordfjorden (Kapp Wijk), Dicksonfjorden (Heimenfjellet), Ekmanfjorden (Blomesletta), Bockfjorden (Jotunkjeldene and Trollkjeldene), and Liefdefjorden (Store Måkeøya) (Frisvoll unpubl.). Probably overlooked, but may be quite rare or absent from N and E Svalbard.

*Lophozia hyperarctica* Schust.

This species was described by Schuster (1961) and has been reported from a few localities in the Arctic including one from Svalbard (Dicksonfjorden) (Frisvoll 1981a). Bisang (1991) monographed *Lophozia* subgen. *Schistochilopsis*, but was not quite convinced that the Svalbard specimen belongs to *L. hyperarctica* because it was

dead and devoid of oil bodies. The same specimen was studied by K. Damsholt (pers. comm.): "● oil bodies ca. 14 pr. cell, relatively large and papillose-segmented (made up of many small drops). The leaf lobes possess brownish secondary pigmentation (never present in the *L. incisa* complex), and old stems have brownish cell walls in their lower half [Frisvoll, transl.]." Although it was found to differ somewhat from neoarctic material, he referred it to *L. hyperarctica*.

### *Lophozia latifolia* Schust.

Reported as common in Longyeardalen and Kongsfjorden, and also presumably observed and collected at Magdalenefjorden and Danskøya by Arnell (in Arnell & Mårtensson 1959). But according to Grolle (1967, see also Schuster 1969) all European records except one from Svalbard are based on erroneous identifications; the accepted specimen has perianths and originates from the slope of Zeppelinfjellet by Ny-Ålesund. The presence of the species on Svalbard should be confirmed.

### *Lophozia longidens* (Lindb.) Macoun

Reported from Bjørnøya and Bohemanneset (Watson 1922; Summerhayes & Elton 1923: 226, 252), Hornsund (Rejment-Grochowska 1967), Bellsund S (Karczmarz & Świąś 1989a), and Kong Karls Land (Arnell 1900, as *Jungermannia*, first report). Collected at Brøggerhalvøya (Brøggerfjellet) (Frisvoll unpubl.).

### *Lophozia opacifolia* Meyl.

Reported from Ekmanfjorden, Billefjorden and Bockfjorden by Frisvoll (1978d, 1981a). Probably also known from Magdalenefjorden, Kvalvågen at the E side of Spitsbergen, and Barentsøya, see °*L. incisa*.

### *Lophozia pellucida* Schust.

Reported by Frisvoll & Blom (1993). The material was collected from moist sand at the moraine in front of Karlsbreen in Bockfjorden (leg. A.A. Frisvoll, det. conf. K. Damsholt). The leaf lobes have masses of orange-yellow gemmae and the lobes are similarly coloured.

### *Lophozia perssonii* Buch & S. Arn.

Reported from Haavimbjellet, Prins Heinrichøya and Blomstrandhalvøya in the Kongsfjorden area (Arnell & Mårtensson 1959). The species is rare in Fennoscandia (Arnell 1956). It has been reported four times from mainland Norway (Frisvoll 1983b; Frisvoll & Blom 1993), and have later turned out to be frequent on clayey soil in Trondheim, Sør-Trøndelag (Frisvoll unpubl.).

### *Lophozia polaris* (Schust.) Schust. & Damsh.

Listed as questionable on Svalbard by Duell (1983). Reported from Kongressdalen by Hadač (1989: 153, specimen named by J. Vána). The species is thoroughly described by Schuster & Damsholt (1974).

### *Lophozia rutheana* (Limpr.) Howe

Reported from rich fen habitats in the Kapp Wijk area in Nordfjorden (Frisvoll 1978d), and collected from similar sites in the lower part of Adventdalen and Sauriedalen (Frisvoll unpubl.). In Fennoscandia it is a widespread indicator of rich fens (Moen 1985).

### *Lophozia ventricosa* (Dicks.) Dum.

First reported from Kobbefjorden (Danskøya) and Smeerenburg (Amsterdamøya) by Lindberg (1867, as *Jungermannia ventricosa* "IB. laxa \*gemmipara", "II porphyroleuca A. 2B. 1 pulchella", and "II porphyroleuca B.γ. laxa \*gemmipara"). Later reported from Kong Karls Land and Prins Karls Forland (Arnell 1900, as *Jungermannia*). Watson (1922; same as in Summerhayes & Elton 1923: 226, 252) reported it from Bjørnøya, Bohemanneset and Prins Karls forland; the material from the latter locality was said to possess the characteristic gemmae. The reports have to be reconsidered according to an updated taxonomy of the group. Schuster (1969) reported *L. ventricosa* as frequent in arctic N America and Greenland, and its arctic ecads are probably also present on Svalbard. *Lophozia ventricosa* var. *confusa* Schuster (1969) has ciliate perianth mouth and may be confused with °*L. longiflora*, previously called *L. porphyroleuca* (see Lindberg's names above). It is noteworthy that



*L. ventricosa* was not reported by Arnell (in Arnell & Mårtensson 1959). A useful key to the arctic taxa of *L. ventricosa* in Greenland, together with descriptions, discussions and illustrations, is given by Schuster & Damsholt (1974).

### *Lophozia wenzelii* (Nees) Steph.

Probably frequent. *Lophozia groenlandica* (Nees) Macoun was mentioned by Berggren (1875, in comment on *Jungermannia attenuata*); reported from Colesbukta (Bryhn 1909); regarded as common in Kongsfjorden and also at Longyearbyen and Magdalenefjorden (Arnell & Mårtensson 1959, figured with ciliate perianth mouth and oil bodies of *L. silvicola* type, cf. comment by Schuster 1969: 592, footnote 183); and reported from Hornsund (Rejment-Grochowska 1967), Bellsund S (Karczmarz & Świąs 1988, 1989a, 1990b; Świąs & Karczmarz 1991a, 1993) and Chamberlindalen in Recherchefjorden (Świąs & Karczmarz 1991b). See also Philippi (1973, in comment on *L. wenzelii*). It has been indicated that *L. groenlandica* is an American species, while the European material belongs to *L. murmanica* (Schljakov 1976–1981; Schuster 1988; see also Schuster & Damsholt 1974: 89f). It remains to see where the material of this purportedly common Svalbard taxon belongs. The name was typified and made a synonym of *L. wenzelii* by Damsholt (1994).

### *Marchantia alpestris* (Nees) Burgeff

Usually reported to be the only or common species of the genus, which often is subdominant below bird cliffs and characteristic of this habitat. Syn.: *M. polymorpha* ssp. *montivagans* Bischl. & Boisselier.

### *Marchantia polymorpha* L.

Several authors have claimed that all *Marchantia* from Svalbard belongs to *M. alpestris* (see e.g. Arnell & Mårtensson 1959). According to Rejment-Grochowska (1967) some material from Hornsund has thalli “with very well distinguished midrib”, and she states “. . . that in this region both species occur and *M. polymorpha* has a larger area than *M. alpestris*.” A good comparison between the two is given by Warncke (1968). The thorough treatment by Schuster

(1992) may help to solve the problem; according to him *M. polymorpha* “appears to be lacking from the Arctic”, but he had apparently not studied any Svalbard material. Syn.: *M. polymorpha* ssp. *ruderalis* Bischl. & Boisselier.

### *Marsupella arctica* (Berggr.) Bryhn & Kaal.

An arctic species which is known from the type localities at Smeerenburg on Amsterdamøya and Kobbefjorden on Danskøya (Berggren 1875, as *Sarcoscyphus emarginatus* var. *arcticus* and — in the text pp. 11, 18, 29, 31 — also as *S. ehrharti* var. *arcticus*), and from Bjørndalen (Fuglefjella) and Adventdalen (Bolternosa) (Frisvoll unpubl.). See also *Cephaloziella arctica*.

### *Marsupella condensata* (C. Hartm.) Kaal.

Reported from Bjørnøya by Berggren (1875, as *Gymnomitrium*), but no specimen from there could be traced by Arnell & Mårtensson (1959) who, however, themselves reported it from Danskøya.

### *Meesia uliginosa* Hedw.

Probably frequent, but overlooked when sterile. Not previously reported from Bjørnøya, but sterile materiale (in a specimen of *Calliergon richardsonii*) was collected there by T. Engelskjøn in 1983 (TROM, det. Frisvoll).

### *Mesoptychia sahlbergii* (Lindb.) Evans

A very conspicuous species found on calcareous substrate near Kapp Wijk (Frisvoll 1981a) and in Sassendalen (Elvebakk unpubl.). Previously it was known only from unglaciated or partially glaciated parts of Alaska, Yukon, Ellesmere Island and Siberia (Steere & Inoue 1975; Konstantinova et al. 1992). The presence of this species on Svalbard is therefore of interest from a bryogeographical point of view.

### *Mielichhoferia elongata* (Hook.) Nees & Hornsch.

Only reported from the south side of Bjørndalen near Longyearbyen (Frisvoll 1981a).

*Mnium blyttii* Bruch & Schimp.

Reported from Grønfjorden (Berggren 1875), Eskerdalen (Frahm 1977), Kongsfjorden (Wegener et al. 1992), Bockfjorden (Frisvoll 1978: 130, in comment on *Lophozia opacifolia*), Reinsdyrflya (Dahle 1983a), and Edgeøya (Heinemeyer 1979). Collected at Isfjorden S of Bjørndalen, Longyearbyen, and Kapp Wijk in Nordfjorden (Frisvoll unpubl.).

*Mnium marginatum* (Dicks.) P. Beauv.

Scattered but probably somewhat overlooked. The only *Mnium* species reported from Bjørnøya is *M. marginatum* (Sommerfelt 1833, as *Bryum*); the genus probably occurs there and the report is therefore accepted, but it may refer to another species. Reported from Hornsund (Kuc 1963a), Bellsund S (Karczmarz & Świąż 1989b), upper Adventdalen and Brøggerhalvøya (Frahm 1977, points out differences with regard to *M. thomsonii*), Kongsfjorden (Wegener et al 1992, no report of *M. thomsonii*), and Sorgfjorden (Lindberg 1867, first report; also report of *M. thomsonii*, as *M. orthorrhynchum*). Collected in Kongsfjorden (Gluudneset and Blomstrandhalvøya) (Frisvoll unpubl.). Kuc (1963a: 334 and Table 2) had some difficulties in distinguishing between *M. thomsonii* (as *M. orthorrhynchum*) and *M. marginatum* at Hornsund, and he recognised both and in addition *M. marginatum* var. *riparium* with intermediate characteristics. The type of *Mnium riparium* Mitt. refers to dioicous populations of the usually synoicous *M. marginatum*, but otherwise they are not different (Crundwell 1962; Koponen et al. 1977: Annotation 221; Koponen 1980). A restudy of Kuc's specimens will probably show they can be divided between the two species in question. Kuc (1973a) suspected that *M. marginatum* "may prove to be commoner than *M. orthorrhynchum*" in Svalbard, but we are convinced the opposite is the case. Teeth and spinulae are often reduced in the sterile arctic *M. thomsonii*, and its cells are frequently slightly collenchymatous, and the cell size (predominantly < 17 µm in *M. thomsonii* and > 20 µm in *M. marginatum*) is the reliable distinguishing characteristic there.

*Mnium spinosum* (Voit) Schwaegr.

Reported from *Dryas* communities in Kongs-

fjorden (Blomstrandhalvøya) and at Reinsdyrflya (Frisvoll 1978d). Also collected at Bjørndalen, Adventdalen, Kapp Wijk, and Blomesletta in the Isfjorden area (Frisvoll unpubl.).

*Mnium thomsonii* Schimp.

See *M. marginatum*.

*Molendoa tenuinervis* Limpr.

Reported from bird cliffs near Ny-Ålesund (Frisvoll 1978d). Collected at Bjørnøya (TROM, leg. S. Dunfjell and T. Engelskjøn 1983), Nordfjorden (N side of Kongressfjellet), Ekmanfjorden (Blomesletta) and Dicksonfjorden (W side of Heimenfjellet and Idodalen) (Frisvoll unpubl.). It is a phytogeographically interesting species that is known from central Europe, Svalbard, NE European and arctic Siberian Russia (Ignatov & Afonina 1992), and North America.

*Mylia taylorii* (Hook.) S. Gray

A southern species collected in Kongsfjorden "inter *Racomitrium hypnoides*" by A.J. Malmgren in 1861 (Lindberg 1867, as *Jungermannia Taylori* α *genuina*; see also Arnell & Mårtensson 1959). We have seen a specimen labelled "Kingsbay 1861 Malmgren" (H-SOL). The small piece is made up of typical plants with reddish-tinged leaves whose upper part is deflexed in the usual manner; microscopically, the leaves show the diagnostically cracked cuticle. It is a remarkable occurrence which is unrecorded in the floras. Müller (1954–1957) indicates that \**M. anomala* is known from Svalbard (see also Schuster 1983: 521, Fig. 25), but this must be a confusion or an error.

*Myurella tenerrima* (Brid.) Lindb.

The species has not always been well understood. Mårtensson (in Arnell & Mårtensson 1959) treated it within *M. julacea*; he found that "... in addition to normal stems, shoots or part of shoots with non-appressed, distant, apiculate leaves may occur in a specimen." Philippi (1973) reported both species, but wondered whether *M. tenerrima* was only "ein Sumpfform" of *M.*

*julacea*. But they are without doubt two good species, and mixed stands are not rare on Svalbard. Exposed plants of *M. tenerrima* have often (sub)imbricate leaves in the Arctic — as opposed to the distant leaves of non-exposed and non-arctic plants. Probably overlooked.

*Nardia geoscyphus* (De Not.) Lindb.

Reported from Brattegddalen in Hornsund (Rejment-Grochowska 1967) and in vegetation tables from Bjørndalen (Eurola 1968) and Gludneset in Kongsfjorden (Bratbakk et al. 1978). Also collected by Tredalshytta in Adventdalen (Frisvoll unpubl.).

*Oncophorus virens* (Hedw.) Brid.

Less common than the ubiquitous *O. wahlenbergii*, but still widespread. Philippi (1973) was unable to distinguish between the two, and he even presented a histogram to show the medium leaf length of his collective *O. virens*. Such a quantitative approach to the taxonomy of the two is of course impossible. The usual qualitative differences between them are present also on Svalbard. Their small ecads, often called *O. virens* var. *arcticum* and *O. wahlenbergii* var. *compactum*, are “parallel forms well distinguished by the (often only a little) recurved leaf margin of the first one” (Kuc 1963a, as *Cynodontium*).

*Oncophorus wahlenbergii* Brid.

The morphological variation of the taxon is very large, and it is present almost everywhere in the calcareous areas. Without much experience with arctic material its small modifications are difficult to know. Mårtensson (in Arnell & Mårtensson 1959: 148) found it hard to recognise *Catoscopium nigrum* in the field because of “the high frequency of curious short-leaved *Oncophorus* types resembling it in general appearance”. See also *O. virens*.

*Oreas martiana* (Hoppe & Hornsch.) Brid.

Reported from behind Knattodden at the N side of Magdalenefjorden by Bonnot (1974). The species is phytogeographically very interesting as it occurs in widely scattered localities in North

America (Brassard et al. 1982), and is not found in the area between Svalbard and Central Europe.

*Orthothecium intricatum* (Hartm.) Schimp.

Much rarer than its common twin *O. strictum*. Reported from Bellsund S (Karczmarz & Świąś 1988; Świąś & Karczmarz 1993), Recherche-fjorden (Rzętkowska 1988a, b; Świąś & Karczmarz 1991b), four localities at the S side of Isfjorden (Hagen 1952), and Dyrevika in Kongsfjorden (Wegener et al. 1992); see also the discussion by Berggren (1875, in comment on *O. strictum*). Collected at Nordfjorden (Kapp Wijk, Kongressfjellet) and Bockfjorden (Trollkjeldene) (Frisvoll unpubl.). The material we have seen possesses slightly secund, longly acuminate leaves with plane margin.

*Orthothecium lapponicum* (Schimp.) C. Hartm.

Reported by Frisvoll & Blom (1993). The specimen was collected in Liefdefjorden from below a bird cliff at Wulffberget above Hornbækpollen, where it grew together with species like *Aplodon wormskioldii*, *Tetraplodon pallidus* and *T. paradoxus* (leg. A. A. Frisvoll, det. conf. L. Hedenäs). The occurrence together with these nitrophilous species is certainly a mere coincidence. Previously known from NE Sweden (Hedenäs 1988b) and Alta in Finnmark, N Norway (Frisvoll unpubl.).

*Orthotrichum alpestre* Bruch & Schimp.

Reported from Bjørnøya by Berggren (1875), but two specimens collected by him in 1868 are labelled ‘Spitzbergen’, see Frisvoll & Lewinsky (1981) who also presented distribution maps of all *Orthotrichum* species on Svalbard. Reported from Brucebyen in Billefjorden by Lewinsky & Soldán (1994). The *O. alpestre* reported from Kongsfjorden by Arnell & Mårtensson (1959) and from Isfjordfløya and Kiærstranda by Frahm (1977), belongs to *O. pellucidum*.

*Orthotrichum obtusifolium* Brid.

Restricted to bird cliffs where it may be quite common. Known from Nordfjorden, Kongsfjorden/Krossfjorden and Bockfjorden (Frisvoll 1978, as *Nyholmia*; Frisvoll & Lewinsky 1981).

*Orthotrichum pallens* Brid.

Restricted to bird cliffs or sites used as bird perches. Known from inner part of Isfjorden, Brøggerhalvøya, Magdalenefjorden and Reinsdyrflya (Frisvoll & Lewinsky 1981).

*Orthotrichum pellucidum* Lindb.

Described on the basis of material from Sorgfjorden (Lindberg 1867), and known from C and N Spitsbergen (Frisvoll & Lewinsky 1981). In mainland Europe only known from N Sweden (Lewinsky 1980).

*Orthotrichum sordidum* Sull. & Lesq.

An arctic species not known from mainland Europe (Duell 1985). On Svalbard it is an exclusive bird cliff species (Frisvoll & Lewinsky 1981). The statement by Berggren (1875, in comment on *O. breutellii*) that "... die Zähne schmaler und der Spitze mehr durchlöchert sind. ..." may refer to *O. sordidum*.

*Palustriella decipiens* (De Not.) Ochyra

Reported from Russekeila (Hagen 1952, as *Cratoneuron*), and later collected from the nearby Grønfjorden (Kongressdalen) by O.I. Rønning in 1958 (TRH, det. A. A. Frisvoll, conf. L. Hedenäs; Frisvoll & Blom 1993).

*Peltolepis quadrata* (Saut.) K. Müll.

As far as we know not reported in any primary literature, but listed from Svalbard in floras (Müller 1954–1957; Arnell 1956). Collected at Nordfjorden (Kapp Wijk) Ekmanfjorden (Blomesletta) and Kongsfjorden (Blomstrandhalvøya) (Frisvoll unpubl.).

*Philonotis tomentella* Mol.

See °*P. arnellii*, °*P. caespitosa* and °*P. fontana*.

*Plagiobryum demissum* (Hook.) Lindb.

Reported from Blomesletta at Ekmanfjorden (Frisvoll 1978d), and Sassenfjorden (Diabasodden) (Frisvoll & Blom 1993), always sterile.

*Plagiobryum zieri* (Hedw.) Lindb.

Only reported from Bjørnøya, Nordfjorden (Berggren 1875, as *Zieria julacea*), and Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b). But the species is widespread and known from the following additional areas: Adventdalen, Foxdalen, Sassenfjorden (Diabasodden), Nordfjorden (Kapp Wijk), Ekmanfjorden (Blomesletta), Kongsfjorden (by Lovénbreen and Ossian Sarsfjellet) and Reinsdyrflya (Frisvoll unpubl.). Kuc (1973a) states that Mathey-Dupraz (1912) reported this species, but he used the name *Bryum julaceum* Schr. which is a synonym of °*Anomobryum filiforme* with synonym *A. julaceum* (Gaertn. et al.) Schimp. *julaceum*.

*Plagiomnium curvatulum* (Lindb.) Schljak.

Reported from Bellsund S (Karczmarz & Świąś 1989b, as *P. medium* ssp.), Kapp Linné (Koponen 1977, as *P. medium* ssp.), Kobbefjorden at Danskøya [Koponen 1971, as *P. medium* ssp., based on the type of *Mnium medium* var. *integrifolium* Lindb. (Lindberg 1868; same as in Lindberg 1867, as *M. medium*)], Barentsøya (Hofmann 1968, as *M. medium*), and Kong Karls Land (Arnell 1900, as *Astrophyllum medium*, with comment on the synoicous inflorescence of the material). Also collected at Colesbukta (TRH, leg. O.I. Rønning 1960, det. A. A. Frisvoll), the Longyearbyen area, Kapp Wijk in Nordfjorden, and the Ny-Ålesund area (Frisvoll unpubl.). Wyatt et al. (1993) confirmed that the allopolyploid *P. medium* s.l. is heterogeneous, and found that the arctic/subarctic *P. curvatulum* and the more southern *P. medium* s.str. have different origin and ought to be treated as different species. One of the parent species of *P. curvatulum* is the ubiquitous *P. ellipticum*, and when sterile they are "very difficult to separate" from each other (Koponen in Nyholm 1993; see also comments on arctic material of the two by Koponen 1971: 349, as *P. medium* ssp.).

*Plagiopus oederiana* (Sw.) Crum & Anders.

Reported from Bellsund S (Świąś & Karczmarz 1993), Adventfjorden (Berggren 1875, as *Bart-ramia oederi*), 'Sassen Quarter' (Hadač 1946, as *P. oederi*), Ny-Ålesund (Frahm 1977, as *P. oederi*), and Wahlenbergfjorden at Nordaustlan-

det (Lindberg 1867, as *Bartramia oederi*). But the species is more common than these sites indicate, as it is also found in Adventdalen, Sassenfjorden (Diabasodden), Nordfjorden, Ekmanfjorden, Dicksonfjorden, Kongsfjorden, Krossfjorden, Vestfjorddalen, Bockfjorden, and Liefdefjorden (Frisvoll unpubl.). It often grows on soil. See also *°Bartramia pomiformis*.

*Plagiothecium berggrenianum* Frisv.

First accurately described as part of a collective *P. denticulatum* by Berggren (1875: 81) and therefore named after him: "... die Blätter wie allseitig gestellt, dem Stengel angedrückt, konkav, plötzlich zugespitzt mit zurückgebogener Spitze. Diese Form, ... hat eine strohgelbe Farbe, hohen Stengel und ist dem Habitus nach *Hypnum* [*Straminergon*] *stramineum* ähnlich." The species was validly described and reported from steep slopes below bird cliffs in distinctly siliceous areas at Bellsund, Krossfjorden and Parryøya (Frisvoll 1981a). It is phytogeographically very interesting and is otherwise known from Thule/Qanaaq in Greenland, one locality in arctic Canada, several localities in Alaska (Frisvoll 1984), and from scattered sites in the Russian (European and Siberian) arctic (O.M. Afonina pers. comm.; Ignatov & Afonina 1992), and is therefore circumarctic.

*Plagiothecium denticulatum* (Hedw.) Schimp.

Widespread but infrequent. Reported from Hornsund (Kuc 1963a, as var. *obtusifolium*), Kongsfjorden, Magdalenefjorden and Danskøya (Arnell & Mårtensson 1959, as *P. denticulatum* s.str.), Kobbefjorden at Danskøya (Lindberg 1867, as *Hypnum*), Danskøya, Amsterdamøya and Parryøya (Berggren 1875, see also *P. berggrenianum* and *°P. laetum*), Kvalvågen at Spitsbergen E (Philippi 1973), and perhaps from NW Edgeøya (Heinemeijer 1979, as *Plagiothecium* spec.). Collected at Fuglefjella west of Bjørndalen, Krossfjorden and Bockfjorden (Frisvoll unpubl.).

*Plagiothecium svalbardense* Frisv. spec. nov.

Musculus surculimbus subulaceis; caespitosus, pulvinos densos formans; folia ovata, distincte api-

culata; foliorum cellulae magnitudine 7–10 x 80–110 µm. Holotype: Krossfjorden, Kollerfjorden, below a bird cliff in Christian Michelsenfjella W, alt. 50 m., 22 July 1974 A.A. Frisvoll (TRH), isotypes (O, S, TRH). Regarding thorough description, illustrations and relationship to *°P. laetum*, *°P. piliferum*, *P. cavifolium* (never reported from Svalbard), and *P. denticulatum*, see Frisvoll (1981a: 98f., Fig. 3–4 in comment on *P. laetum* s.l.). A reinvestigation of all the material has made it clear that it does not fit into *P. laetum*. The majority of the leaves of *P. svalbardense* are quite or almost symmetrical whereas most leaves of *P. laetum* are distinctly asymmetrical. Their form is also otherwise different; in *P. svalbardense* they are ovate and fairly suddenly narrowed into an apiculus, while in *P. laetum* they are more evenly narrowed towards a shorter apex (Frisvoll 1981a: Fig. 4). The shoots of *P. svalbardense* are frequently subulaceous and rarely complanate, whereas *P. laetum* is one of the *Plagiothecium* species with really complanate shoots. The previous statements (Frisvoll 1981a) regarding this character are therefore modified here. The areolation of the leaves of *P. svalbardense* is strikingly more lax than in *P. laetum* (Frisvoll 1981a). – Previously reported as *P. piliferum* var. *brevifolium* by Kuc (1963a) and *P. laetum* s.l. or '*P. laetum* Svalbard plant' by Frisvoll (1981a). Kuc's specimens (KRAM) agree with the rest of the material. Apparently, the taxon occurs on non-calcareous substrate and is at present known from all the three major basement rock areas of Svalbard: Hornsund, Krossfjorden, Bockfjorden, and Sjuøyane (N of Nordaustlandet).

*Pleurocladula albescens* (Hook.) Grolle

Reported from Bjørnøya, Bellsund, Grønfjorden, Nordfjorden, Prins Karls Forland and Smeerenburg (Berggren 1875, as *Jungermannia islandica*), many localities in Kongsfjorden, and Longyearbyen and Danskøya (Arnell & Mårtensson 1959, as *Pleuroclada*: "seems to be represented mainly by its var. *islandica*"), Kvalvågen at the E side of Spitsbergen (Philippi 1973, as *Pleuroclada*), and Edgeøya (Heinemeijer 1979, as *Pleuroclada*). Also collected at Billefjorden (Frisvoll unpubl.). There are evidently two taxa in *Pleurocladula*, but their status has been much disputed (see Krzakowa 1972; Szweykowski 1984:

1134 and footnote 6 [by Schuster]). The arctic situation is discussed by Schuster & Damsholt (1974), and Schuster (1988): "There, if any segregation into two chief genotypic clusters . . . exists it is totally masked by the obvious phenotypic malleability of the taxon." (Schuster 1988).

*Pleurozium schreberi* (Brid.) Mitt.

Sommerfelt (1833) reported *Hypnum parietinum* L. from Spitsbergen and Edgeøya, and Lindblom (1840, as *H. parietinum*; see also Kuc 1973a, as *Entodon*) accepted this as a report of *P. schreberi* – a fact which, however, may be questioned [no report of the much more common *Hylocomium splendens*: *Hypnum parietinum* L. ex With. 1801 = *Hylocomium splendens*, *Hypnum parietinum* L. ex Wahlenb. 1812 *hom. illeg.* = *P. schreberi* fide Wijk et al. 1964]. Reported from NW Sørkapp Land (Dubiel & Olech 1990: Tab. 8), many localities at the N side of Hornsund (Kuc 1963a, as *Entodon*, 1994b), Bellsund S (Świąś & Karczmarz 1991a, 1993), Bellsund (Lindberg 1867, as *Hypnum*, leg. Vahl 1838), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b), Kongressdalen (Hadač 1989: 153), Isfjord Radio and Longyearbyen (Hagen 1952, as *Hylocomium*), Adventdalen and Bohemanneset (Lid 1967: Table 12 and 20, as *Hylocomium*; in the same tables also *H. splendens*, but three specimens named *H. schreberi* by Lid are as well *H. splendens* – herb. O), Kapp Thordsen in Nordfjorden (Arnell 1900, as *Hylocomium parietinum*; see comment by Arnell & Mårtensson 1959), Fuglehuken (A. Elvebakk unpubl.), Grimaldifjellet between Kongsfjorden and Krossfjorden (Arnell & Mårtensson 1959; specimen seen, herb. O), and Kobbefjorden at Danskøya (Berggren 1875: 90, as *Hypnum*: "mit *Hylocomium splendens* . . . , hochstengelig und kräftig."; conf. O. Mårtensson, cf. Arnell & Mårtensson 1959). Collected at Signehamna in Krossfjorden and Germaniahøgden SE at Bockfjorden (Frisvoll unpubl.). The species is therefore known only from the whole western side of Spitsbergen. It usually grows in bryophyte mats in favourable habitats and therefore often at bird cliffs. "Turgid pinnate types of *Hylocomium splendens* . . . often resemble *P. schreberi* very much in their general appearance . . . , but have paraphyllia." (Arnell & Mårtensson 1959: 161, 163).

*Pogonatum dentatum* (Brid.) Brid.

Reported from Hornsund where it was stated to be common (Kuc 1963a, 1973a, as *P. capillare*), Recherchefjorden W (Karczmarz & Świąś 1990a, as *P. capillare*), Linnédalen (as *P. capillare*) and Barentsburg (Hadač 1989: 153, 160), Eskerdalen (Frahm 1977, as *P. capillare*), Bohemanflya (Kobayashi et al. 1990), and Dyrevika in Kongsfjorden (Wegener et al. 1992, who, however, kept no material). It has been looked for in vain in other areas (see Arnell & Mårtensson 1959), and is evidently quite rare compared with *P. urnigerum*. We have seen Kuc's specimens (KRAM).

*Pohlia andrewsii* Shaw

Reported from 'Spitsbergen' by Shaw (1981a), and more precisely from Smeerenburg and Sjuøyane by Shaw [1981b, based on specimens reported as *Bryum annotinum* ♀ *bulbilliferum* by Lindberg (1867) and *Webera annotina* by Berggren (1875); see also Czernyadjeva & Ignatov (1991)]. Reports of *P. annotina* (q.v.) presumably refer also to this species: ". . . überall nur spärlich und steril aber am meisten mit einer Menge theils rundlicher [= probably *P. andrewsii*] theils langgestreckter [= probably *P. prolifera*] Bulbillen in den Blattwinkeln" (Berggren 1875, as *Webera*). Reported as common at Hornsund by Kuc (1963a, as *P. grandiflora* var. *grandiflora*: "Several bulbils together in each axil, cuplike in shape, composed of rounded cells with some sharp teeth on the upper margin.") and from Daudbjørnpynten at the E side of Sørkapp Land by Kuc (1963b, as *P. grandiflora*: "gemmae in the corners of the leaves. several in each, cup-like in shape, and terminating in several sharp teeth, tufts shining."). We have much unpublished material and *P. andrewsii* is probably common in W and N Svalbard. So far there are no reports of *P. annotina* s.l. from E Svalbard.

*Pohlia atropurpurea* (Wahlenb.) H. Lindb.

A rare species only found once at Adventdalen colonizing fluvial deposits (Frisvoll 1981a, as *Mniobryum*).

*Pohlia crudoides* (Sull. & Lesq.) Broth.

Reported from Hornsund (Kuc 1963a), Bellsund S (Świąś & Karczmarz 1991a, 1993), Chamberlin-

dalen in Recherchefjorden (Świąś & Karczmarz 1991b), and Magdalenefjorden (Arnell & Mårtensson 1959). Collected at Bjørndalen, Krossfjorden and Bockfjorden (Frisvoll unpubl.).

### *Pohlia drummondii* (C. Müll.) Andrews

Although Arnell (1900, as *P. commutata*) stated that this was "Eine nach Berggren auf Spitzbergen häufige Art", it was reported for the first time by him from many localities at Kong Karls Land. Berggren (1875) reported only *P. ludwigii*, but the mention of "Bulbillen" may indicate that he also studied or collected *P. drummondii*. And when discussing the occurrence of branchlets in the upper leaf axils of *B. rutilans* (p. 62, as *B. æneum*) he states: "Es erinnern diese gewissermassen an die Knospen der an denselben Stellen häufig wachsenden *Webera Ludwigii*." As Mårtensson (in Arnell & Mårtensson 1959) and Philippi (1973) point out *P. drummondii* may not always be easy to identify, but it is certainly common in the calcareous areas. Included from Bjørnøya on the basis of Berggren's (1875) report of *Webera ludwigii*. See also *P. obtusifolia* and *P. ludwigii*.

### *Pohlia elongata* Hedw.

Reported from several localities by Lindberg (1867, as *P. polymorpha*), Berggren (1875, as *Webera polymorpha*) and Kuc (1963a, as *P. acuminata*). Listed in vegetation tables from NW Sørkapp Land (Dubiel & Olech 1990: 69), Bellsund S (Karczmarz & Świąś 1990b, Świąś & Karczmarz 1991a, as *P. acuminata*, 1993, as *P. polymorpha*), and Recherchefjorden (Karczmarz & Świąś 1990a, as *P. polymorpha*; Świąś & Karczmarz 1991b), reported from Kaffiøya at Forlandsundet by Gugnacka-Fiedor & Noryskiewicz (1982: Table 8, as *P. acuminata*) and Boińska & Gugnacka-Fiedor (1986), and collected from several localities in C and N Spitsbergen (Frisvoll unpubl.). The taxonomy of *P. elongata* s.l. is obscure, as different treatments and synonymy are met with in different works. On Svalbard it is hardly present as var. *elongata*, although *P. acuminata* is usually, and *P. polymorpha* sometimes, treated as synonymous with it. The arctic-alpine taxon is sometimes considered a species, *P. minor* Schwaegr. (Wijk et al. 1967); its correct varietal name appears to be

*P. elongata* var. *greenii* (Brid.) Shaw (Anderson et al. 1990), which is the same as var. *polymorpha* of Nyholm (1958) and var. *minor* of Nyholm (1993). The traditional differences between the taxa are as follows: Plants paroicous (var. *elongata*, var. *greenii*), or autoicous and at times simultaneously paroicous (var. *acuminata*); capsule narrowly elongate with neck often longer than the urn (var. *elongata*), capsule shorter with neck as long as the urn (var. *acuminata*), or capsule short and ovate with neck shorter than the urn (var. *greenii*) (Jensen 1939, mainly). Moreover, var. *greenii* has the smallest leaves with the shortest cells, and is probably the common (or only) Svalbard taxon.

### *Pohlia filum* (Schimp.) Mårt.

Reported from one or two localities at the N side of Hornsund (Kuc 1963a, as *P. gracilis*), Bellsund S (Świąś & Karczmarz 1993, as *P. gracilis*), and Klovningen (Wulff 1902, as *P. commutata* var. *gracilis*). Collected at Nordfjorden, Kongsfjorden, Bockfjorden and Liefdefjorden (Frisvoll unpubl.). Probably overlooked.

### *Pohlia nutans* (Hedw.) Lindb.

A very common species. Some authors (Lindberg 1867; Berggren 1875; Boińska & Gugnacka-Fiedor 1986; Świąś & Karczmarz 1993) reported ssp. *schimperi* C. Müll. under various names (see Kuc 1973a, as *P. rutilans* non *Bryum rutilans* = *B. oeneum* of Kuc), and this is a frequent taxon on Svalbard. Nyholm (1993) treats *P. schimperi* (C. Müll.) Andrews as a species, but the only key characteristic mentioned is colour, viz. green in *P. nutans* and red in *P. schimperi*. The problem is certainly more complex, and needs further studies.

### *Pohlia obtusifolia* (Brid.) L. Koch

Reported by some old and recent authors (see Kuc 1973a; Gugnacka-Fiedor & Noryskiewicz 1982: Table 1, 6; Boińska & Gugnacka-Fiedor 1986; Karczmarz & Świąś 1988, 1989a; Kobayashi et al. 1990: Table 7; Świąś & Karczmarz 1991a). Berggren (1875, as *Webera cucullata*) reported it from Bjørnøya, Lindberg (1867, as *Bryum cucullatum*) from Lågøya and Sjuøyane at Nord-austlandet, Summerhayes & Elton (1928: 203f, as

*Webera cucullata*) from Fosterøyane in Hinlopenstretet, and Hofmann (1968) from Barentsøya; the other reports are from the whole western side of Spitsbergen. Some reports may need to be checked, because *P. obtusifolia* is similar to other species of the genus and especially to *P. drummondii* (see e.g. Kuc 1963a, in comment on *P. drummondii*). Important differential characteristics are pointed out by Shaw (1981a: 32f): "Alpine populations of *P. drummondii* that seem to lack propagula may be confused with *P. obtusifolia*. . . . When sterile, *P. obtusifolia* can be distinguished from *P. drummondii* by its subtly cucullate leaf apex, wider, laxer leaf cells (ca. 15 µm wide or more) [8–11(14) µm in *P. drummondii*], and by its less distinct red pigmentation, although it is sometimes pink-stemmed." Sporophytes have been reported by Lindberg (1867) and Berggren (1875).

*Pohlia prolifera* (Bridl.) H. Arn.

Probably reported as part of a collective °*P. annotina* by Berggren (1875, as *Webera*), see *P. andrewsii*. *Pohlia prolifera* was described in 1888 (as *Webera*), but only recently treated as a member of the Svalbard bryoflora: It has been reported from Hornsund (Kuc 1963a, as *P. grandiflora* ssp.), Bellsund S (Świąs & Karczmarz 1991a), Chamberlindalen in Recherchefjorden (Świąs & Karczmarz 1991b), and Spitsbergen N (Bailey & Halliday pers. comm. to Kuc 1973a, as *P. grandiflora* ssp.). Collected at Bjørndalen (Pilarberget N), Longyearbyen, Billefjorden (Rotundafjellet), Adventdalen (five sites from Todalen to Arnica-dalen), Kongsfjorden (Willeberget and Ossian Sarsfjellet), Bockfjorden (Germaniahøgden SE) (Frisvoll unpubl.) and Biskayerhuken (TRH, leg. O.I. Rønning). See also °*P. ludwigii*.

*Polytrichastrum alpinum* (Hedw.) G.L. Sm.

Very common and variable, but plants ". . . with the characters of var. *septentrionale* . . . are most frequent." (Arnell & Mårtensson 1959, as *Pogonatum*). Many names have been used about Svalbard material (see Kuc 1973a, as *Polytrichum*). Of these, var. *fragile* and var. *septentrionale* are sometimes treated as species, and their correct species names are *Polytrichastrum lamellosum* (James) comb. ined. (originally as

*Pogonatum*) and *P. norvegicum* (Hedw.) Schljak., respectively (Long 1985; Söderström, Hedenäs & Hallingbäck 1992). Schriebl (1991, as *Polytrichum*) cultivated taxa within *P. alpinum* s.l.: "Nach dem studium des Typusmaterials und achtjährigen Kulturversuchen erwiesen sich die Varietäten von *P. alpinum*: *arcticum*, *septentrionale*, als überflüssig und werden ab nun eingezogen. . . . Es ließen sich keine Hinweise auf genetisch fixierte Rasen finden." He did not cultivate var. *fragile*. The second taxonomic comment on a Svalbard bryophyte concerns a specimen of *P. alpinum* from Edgeøya (Sommerfelt 1833, as *Polytrichum*) [Frisvoll, transl.]: "Very depauperate . . . , so that it, by the short, almost erect leaves, somewhat approaches *P. septentrionale*, but *folia evidenter serrata* shows that it belongs here." Regarding the first taxonomic comment, see *Tetraplodon paradoxus*.

*Polytrichastrum longisetum* (Bridl.) G.L. Sm.

Reported from one locality at Hornsund by Kuc (1963a, as *Polytrichum gracile*), as subfossil from Semmeldalen (Serebryanny et al. 1985, as *Polytrichum gracile*), and from Barentsburg and distributed in their exsiccate by Bednarek-Ochyra et al. (1987; see also Bednarek-Ochyra 1993). We have seen Kuc's specimen (KRAM) as well as an exsiccate specimen (TRH). The report from Adventdalen (Frisvoll & Blom 1993) was an error. This is a boreal species which reaches the southernmost parts of the Arctic (Long 1985).

*Polytrichastrum sexangulare* (Bridl.) G.L. Sm.

Unless otherwise stated the species has been named *Polytrichum norvegicum*. Reported from Bjørnøya, and with reservation from Grønfjorden and Kobbefjorden by Berggren (1875, as *Polytrichum*: "Die Exemplare von den zwei letztgenannten Orten gehören vielleicht zu *P. alpinum* var. *septentrionale*. . . ."), the N side of Hornsund (Kuc 1963a), Bellsund S (Świąs & Karczmarz 1991a), Chamberlindalen in Recherchefjorden (Świąs & Karczmarz 1991b), Vengsletta at the N side of Van Mijenfjorden, Grønfjorden and Kongressdalen (Hadač 1989, as *Polytrichum*), Russekeila (Hagen 1952), N of Adventfjorden (Wall 1979), Eskerdalen (Frahm 1977), Bohemanneset (Lid 1967, one specimen



seen is small *P. alpinum*, herb. O), Bohemanflya (Kobayashi et al. 1990), and NW Edgeøya (Heinemeyer 1979). There is also a subfossil report by Schimper (1870, as *Polytrichum*). Collected at Adventdalen, Nordfjorden (Kapp Wijk) and Bockfjorden (Frisvoll unpubl.), one specimen from the last locality includes a sporophyte. The end cells of the leaf lamellae are usually smooth, and rarely papillose, in this species; both conditions occur in Svalbard. Papillose plants may actually be the commoner there; of the own material mentioned above, that from Nordfjorden has smooth and the other comparatively coarsely papillose lamellae end cells. Plants with papillose end cells may easily be confused with small *P. alpinum* (cf. Berggren and Lid above). The differences between them are summed up by Long (1985). From Fennoscandia Nyholm (1969) mentions only smooth end cells of lamellae. In Iceland the end cells are very rarely papillose: "Oftast er hann sléttur að ofan en örsjaldan eru þar örmáar vörtur." (Jóhannsson 1990, as *Polytrichum*). It would have been interesting to study the taxonomic status and occurrence of the papillose *P. sexangulare*.

### *Polytrichum jensenii* I. Hag.

The taxonomy of the arctic *P. commune* s.l. is not yet clarified, even after the removal of the distinctive *P. swartzii*. The Svalbard *P. commune* s.l. has, e.g., leaves with incurved margin devoid of teeth or with a few bulging cells at the uppermost part; a stout and almost smooth hairpoint; and leaf lamellae with a deep sinus of the end cells and high, papillae-like thickenings on each side (t.s.). The material is in agreement with the illustration of the arctic North American *P. commune* var. *diminutum* (I. Hag.) Long sensu Long (1985), who states that this name is a synonym of *P. jensenii*. Material of the same taxon from the Chukotski peninsula is figured and named *P. algidum* by Kuc (1966), but that name refers to another taxon, see *P. swartzii*. However, Schriebl (1991: 467, 469, 473, 483, Icon 6) postulates that *P. jensenii* has dentate leaves with long fragile hairpoint, and that the end cells of the leaf lamellae are shallowly grooved or platelike; he cultivated taxa of *P. commune* s.l., and treated *P. commune*, *P. perigoniale*, *P. uliginosum* and his *P. jensenii* as different species. We have studied type material of both *P. jensenii* (C, holotype)

and *P. jensenii* var. *diminutum* I. Hag. (TRH, syntype: "Polytr. \* 'propinquum var. diminutum' [separate label in Hagen's hand], [Norway, Sør-Trøndelag, Oppdal, på vej] til Sneh.[ætt]1[= en], 25.7.1878 Kiær, ex herb. Kiaer", cf. protologue), and find that they may not belong to the same taxon: Var. *diminutum* possesses the partly hyaline long leaf hairpoints ("Glashaaren") attributed to *P. jensenii* by Schriebl (1991), and in addition it has a denticulate leaf margin, and shallowly grooved or platelike end cells of the leaf lamellae. The type is depauperate (2–3 cm) as it originates from the alpine region, but in nearby subalpine areas it occurs as large plants. The hyaline hairpoint of the uppermost leaves resembles that of *P. hyperboreum*. Schriebl (1991: 483) seems to have cultivated such plants collected in "Lappland". Var. *diminutum* needs more study. The type of *P. jensenii* has fairly short and stout leaf hairpoints which sometimes are subhyaline (bleached), but they are not as in var. *diminutum*. Its leaf margin is incurved and without teeth, and the end cells of the leaf lamellae are usually deeply furrowed. The plants in the type is more than 20 cm long, and must have grown in a protected moist habitat. The known Svalbard material is much less elongate, but agrees with the type of *P. jensenii* in all important characteristics. And any taxon of *P. commune* s.l. recognised by Schriebl (1991, presupposing that his *P. jensenii* does not include the type of the name) is not known from Svalbard. Hagen (1914: 59) supposed that the *P. commune* reported and commented on by Berggren (1875: "Der Blatt-rand ist wenig oder fast nicht gesägt.") referred to his *P. jensenii*. That name was also used by Jensen (1939), Abramova et al. (1961) and Flatberg & Frisvoll (1984: 308, from Bockfjorden as *P. commune* var.). The other authors reported *P. commune* unless otherwise stated: Mentioned by Phips (1774), but this is hardly reliable because he did not report the more common species of the genus. Reported from Hornsund (Kuc 1963a, 1994b, as *P. commune* var. *humile*), Longyearbyen (Eurola & Hakala 1977: Table 6), Bohemanflya (Kobayashi et al. 1990), Smeerenburg (Lindberg 1867), Klovningen (Livesay 1870), Amsterdamøya and nearby mainland, and Edlundfjellet at the E side of Spitsbergen (Berggren 1875). [A specimen from the last locality includes only elongate (to 15 cm long, both gracile and more robust) plants of *P. alpinum* var. *fragile*, leg. Malmgren 1874 (O).] Collected at Bjørnøya

(TROM, leg. S. Dunfjell, T. Engelskjøn and O. Skifte 1983), Berzeliusdalen in Van Mijenfjorden (OULU, leg. S. Eurola), Fuglefjella W of Bjørndalen, Adventdalen, Idodalen in Dicksonfjorden, Bockfjorden (Frisvoll unpubl.), and Kapp William by Svenskegattet (TRH, leg. O.I. Rønning). Exsiccate specimens from Hornsund (No. 16 and 70, TRH) distributed as *Polytrichastrum alpinum* (Bednarek-Ochyra et al. 1987) are *P. jensenii*. So far it is therefore known only from Bjørnøya and the whole western part of Spitsbergen including adjacent islands.

*Polytrichum juniperinum* Hedw.

Probably rather rare; regarding previous reports of this (and the next) species prior to 1970, see Kuc (1973a), who thinks that "... it has probably been frequently confused with other species. . . .". See also *P. strictum*.

*Polytrichum strictum* Brid.

Common. Not found on Bjørnøya by Berggren (1875: 74, as *P. juniperinum* var.), who did not report *P. juniperinum* s.str. from Svalbard at all. Summerhayes & Elton (1923: 221) reported *P. juniperinum* from Bjørnøya and did not mention *P. strictum*. The former is accepted from there; but the report may refer to the latter, which is the commoner of the two in the arctic.

*Polytrichum swartzii* Hartm.

Svalbard specimens of *P. swartzii* s.l. are from 1–15 cm long; the end cells of the leaf lamellae are thin-walled and flat-topped or shallowly grooved, and usually much broader than tall, many of the end cells are paired and somewhat irregular, and in side view they are flat or slightly crenate without the papillae-like thickenings of *P. commune* s.l. (cf. Long 1985). We have studied an isotype of *P. algidum* I. Hag. & C. Jens. ("Østgrønland; Scoresby-Sund, Søbred paa Kobberpynten, 750 Fod o. H., 5–1892 leg. N. Harz", TRH), which is very similar to the Svalbard specimens. This is perhaps the correct name of the arctic taxon, because the type of *P. swartzii* from the lowland in S Sweden (Stockholm) is stated to have serrate leaves and isodiametric end cells (t.s.) of the lamellae (Long 1985). Eurola (1971a) reported *P. commune* cf. var. *jensenii* from the fen

Stormyra at the N side of Van Mijenfjorden; Kuc (1973a) was right in supposing that this referred to *P. algidum* (OULU, 5 specimens collected by Eurola). Listed from Svalbard by Long (1985) whose source (pers. comm.) was Steere (1978), but we do not know *his* source or any certain primary literary record of the species. Two herbarium specimens collected in Nordaustlandet by A.H. Neilson in 1966 exist (O, det. Frisvoll), from Duvefjorden (Godfreybukta, low wet area above river) and Rijpfjorden (Polarjomyra, well-developed bog) (Frisvoll & Blom 1993). In 1977 collected at six sites in Adventdalen, from Dammyra at the lower part of the valley to the side valley Arnicaadalen; one of the specimens is a mixture of *P. swartzii* and *P. jensenii* (Frisvoll unpubl.).

*Prasanthus suecicus* (Gott.) Lindb.

Reported by Rejment-Grochowska (1967) from Rotjesfjellet in Hornsund, by Karczmarz & Świąs (1990a) from Recherchefjorden W, and by Arnell (in Arnell & Mårtensson 1959) from Kongsfjorden (four sites), Magdalenefjorden and Danskøya. Collected in Adventdalen (top of Hallwylfjellet), Kongsfjorden (Sherdalfjellet and Brøggerfjellet), Bockfjorden (top of Trolltindane) and Liefdefjorden (in front of Albertbreen) (Frisvoll unpubl.). "Certainly overlooked by earlier collectors. . . ." (Arnell & Mårtensson 1959).

*Preissia quadrata* (Scop.) Nees

Schuster (1992) distinguishes between a temperate-boreal dioicous taxon, ssp. *quadrata*, and a subarctic-arctic autoicous taxon, ssp. *hyperborea* Schust. The Svalbard plant probably belongs to ssp. *hyperborea*. If so, *Preissia commutata* var. *minor-arctica* Berggr. described from Nordfjorden is its only known synonym (see also Lindberg & Arnell 1889).

*Pseudocalliergon angustifolium* Hedenäs

Recently described and reported from Fennoscandia and the Kola peninsula (Hedenäs 1992). A specimen from the outlet brook of Avtjønna at the N coast of Bjørnøya proved to be this species (TROM, leg. S. Dunfjell, T. Engelskjøn and O. Skifte 1983, det L. Hedenäs 1994).

*Pseudocalliergon brevifolium* (Lindb.)  
Hedenäs

Reported in a wide sense as *Drepanocladus lycopodioides*, partly as f. *brevifolius*, from numerous localities on Svalbard (see Kuc 1973a). The genus *Pseudocalliergon* was monographed by Hedenäs (1992); *P. brevifolium* is an arctic species unknown from the Norwegian mainland, while *P. lycopodioides* is non-arctic. *Drepanocladus latifolius* (cf. Kuc 1973a: 440) is a synonym of *P. brevifolium* (Hedenäs 1992).

*Pseudoleskeella rupestris* (Berggr.) Hedenäs  
& Söderstr.

First reported by Berggren (1875: 75, as "*Pseudoleskea catenulata* var. *rupestris* (*Leskea rupestris* Berggr.)"). It has been confused with °*P. nervosa* and °*P. catenulata*. Its taxonomy was clarified by Wilson & Norris (1989, as *P. sibirica*), and its nomenclature by Hedenäs & Söderström (1991). The *Pseudoleskeella* species are frequent in bird cliffs and other manured sites. This species has presumably been reported from Russøyane in Murchisonfjorden at Nordaustlandet, Kvalpynten at Edgeøya SW (Lindberg 1867, as *Hypnum catenulatum*; Berggren 1875, as *Pseudoleskea catenulata*), Barentsøya SW/Edgeøya NW (Philippi 1973, as *Leskeella nervosa*), and otherwise from Bjørnøya and the W and N side of Spitsbergen (see Kuc 1973a, as *Leskea catenulata* and *L. nervosa*).

*Pseudoleskeella tectorum* (Brid.) Broth.

Berggren (1875: 76, as *Pseudoleskea*) probably reported close tufts or mixed stands of this species and *P. rupestris* (as *Pseudoleskea catenulata*) from Bjørnøya and Kobbefjorden at Danskøya. Mårtensson (in Arnell & Mårtensson 1959) treated *P. tectorum* within his *Leskeella nervosa*; he described the great variation of the Kongsfjorden material of the collective taxon, but was unwilling to recognise more than one species. Recent taxonomic work (Wilson & Norris 1989) and more specimens from the area have shown that he had two species, viz. *P. tectorum* and *P. rupestris*. It appears that *P. tectorum* are reported only from Bjørnøya and the W and N side of Spitsbergen (but see Philippi 1973, in comment on *Leskeella nervosa* from Barentsøya SW/Edgeøya NW).

*Psilopilum cavifolium* (Wils.) I. Hag.

First reported from Isfjorden, Adventfjorden, Kobbefjorden and Parryøya (Hagen 1914, as *P. tschuctschicum*; cf. Kuc 1973a), and later from Hornsund (Kuc 1963a, as *P. laevigatum* var.), Bohemanfya (Kobayashi et al. 1990), and SW Barentsøya and NW Edgeøya (Philippi 1973). Mårtensson (in Arnell & Mårtensson 1959) tentatively used the name about material from Kongsfjorden. Collected at Longyearbyen, Adventdalen and Kongsfjorden (Frisvoll unpubl.). Both *P. cavifolium* and *P. laevigatum* are arctic and prefer open siliceous mineral soil. They definitively behave as separate species on Svalbard (see comments by Arnell & Mårtensson 1959; Kuc 1963a).

*Psilopilum laevigatum* (Wahlenb.) Lindb.

This is the commoner of the two *Psilopilum* species, see *P. cavifolium*. Berggren (1875: 23, 29–30) also used the name *P. arcticum*.

*Racomitrium canescens* (Hedw.) Brid.

A common plant typical of unstable or gravelly sites on rather dry substrates, possibly avoiding granitic, quartzitic and limestone rocks like its relative *R. ericoides* (Elvebakk 1984). On Svalbard it occurs only as ssp. *latifolium* (C. Jens.) Frisv., the epithet has previously been used about material from Castrénøya by Berggren (1875: 24, as var. *latifolium* Berggr. nom. nud. which may refer to *R. panschii*). The distribution of all *Racomitrium* species on Svalbard was mapped by Frisvoll (1983c).

*Racomitrium fasciculare* (Hedw.) Brid.

Known from Bjørnøya, Sørkapp Land E, Hornsund, and a few localities at Spitsbergen NW (Krossfjorden, Danskøya, Amsterdamøya) and Nordaustlandet N (Nordkapp, Parryøya) (Kuc 1963a, b; Frisvoll 1983c). Recently reported from Recherchefjorden W (Karczmarz & Świąż 1990a), Chamberlindalen in Recherchefjorden (Świąż & Karczmarz 1991b), and Berzeliusdalen at the N side of Van Mijenfjorden (Elvebakk et al. 1987). The species is characteristic of wet surfaces of strongly acidic rocks and gravel, and the habitat requirements probably delimit its distribution on

Svalbard. The plants may be nearly unbranched (cf. Berggren 1875).

*Racomitrium lanuginosum* (Hedw.) Brid.

One of the most common bryophytes on Svalbard forming dense carpets in humic, siliceous areas on stable substrates. Known from all districts including the outlying Bjørnøya, Hopen, Kong Karls Land and Kvitøya. Frisvoll (1983c) reported on a mixed stand between normally greyish plants and plants where the otherwise hyaline part of the leaf was chlorophyllous. In moist habitats the leaf hairpoint is often strongly reduced.

*Racomitrium panschii* (C. Müll.) Kindb.

A circumarctic species that has not been found in mainland Europe. So far not known from Bjørnøya, Spitsbergen south of Van Mijenfjorden, NW Spitsbergen from north of Isfjorden to Raudfjorden, Edgeøya, or Kong Karls Land (Frisvoll 1983c). Its ecology is similar to that of *R. canescens*, and they often grow together or in mixed stands.

*Racomitrium sudeticum* (Funck) Bruch & Schimp.

Collected twice from temporarily percolated quartzitic rocks at the base of the mountain Miseryfjellet on Bjørnøya in 1868 (Berggren 1875; see also Frisvoll 1983c). This is the northernmost known localities in the world for any species in the *R. heterostichum* group (Frisvoll 1988). Reported from ridge vegetation at Dyrevika in Kongsfjorden (Wegener et al. 1992; Wegener 1993); the material (sent by L. B. Jacobsen) is sparse and was, unfortunately, first thought to be correctly named, but a reexamination revealed that it belongs to the genus *Schistidium*.

*Rhizomnium andrewsianum* (Steere) T. Kop.

See *R. pseudopunctatum* and *R. punctatum*.

*Rhytidiadelphus squarrosus* (Hedw.) Warnst.

A rare species growing among other pleu-

rocarpous mosses in favourable localities. Reported from Bjørnøya (Engelskjøn 1986), Hornsund (Kuc 1963a, 1994b), Bellsund (Lindberg 1867) and more precisely Midterhuken at Bellsund (Eurola & Hakala 1977: Table 2), Fuglehukuken (A. Elvebakk unpubl.) and Krossfjorden (Frisvoll & Blom 1993). Evidently favoured by or dependent on bird manuring.

*Saelania glaucescens* (Hedw.) Broth.

Reported from Bellsund by Vahl in Lindblom (1840, as *Didymodon*; regarding the locality see Lindberg 1867: 537, as *Trichostomum*) and not found again until reported by Frisvoll (1981a) from numerous localities in the Isfjorden area, Kongsfjorden and Liefdefjorden, and by Kobayashi et al. (1990: Table 4) from Bohemanflya.

*Sanionia nivalis* Hedenäs

A recently described snow bed species reported from Prins Karls Forland and Reinsdyrflya (Hedenäs 1989a), and also known from Grønfjorden, Breinosa in Adventdalen, Danskøya, Bockfjorden, Fosterneset at the mouth of Sorgfjorden, Brennevinfjorden and Duvefjorden (L. Hedenäs pers. comm.).

*Sanionia orthothecioides* (Lindb.) Loeske

Widely distributed along coasts, and recently reported and confirmed from Bjørnøya, Signehamna in Krossfjorden, Danskøya (lectotype locality) and Parryøya (Hedenäs 1989a). Also verified from other main parts of Svalbard except Spitsbergen E, Barentsøya, Hopen, Kong Karls Land and Kvitøya (ca. 45 specimens studied, L. Hedenäs pers. comm.). Previous reports of *Drepanocladus uncinatus* var. *subjulaceus* (see Kuc 1973a) may refer to this species. Hagen's (1908) *Hypnum uncinatum* var. *faeneum* (regarding previous Svalbard reports see Kuc 1973a, as *Drepanocladus uncinatus* f. *foenus* !) is probably also this species (Hedenäs 1989a; see also Dixon 1912, in comment on *Hypnum uncinatum*). We have seen a nice specimen of mixed *S. orthothecioides* and *S. uncinata* from Sørkapp (TROM, leg. S. Kristoffersen 1930), and mixed stands between the two are probably frequent. They were reported already by Berggren (1875: 25, 27, 86): "*Hypnum uncinatum* var. *orthothecioides*,

massenhaft, oft untermischt mit der Hauptform von *H. uncinatum*. . . ”.

### *Sanionia uncinata* (Hedw.) Loeske

Common. According to Kuc (1963a, 1973a, as *Drepanocladus*) eleven varieties and forms of this species grow on Svalbard. But the ubiquitous *S. uncinata* is easily modified by the habitat, and the size of the plants and falcateness of the leaves are given no taxonomic value by Hedenäs (1989a: 407). Some very tiny plants from dry habitats may have a weak costa and unplicate leaves. On the basis of this morph Berggren (1875, as *Hypnum*) described var. *gracillimum*, but the name is placed in synonymy of the main species by Hedenäs (1989a). Some reports of subordinate names may refer to *S. nivalis* and, especially, to the common *S. orthothecioides*.

### *Sauteria alpina* (Nees) Nees

The first reports of *Athalamia hyalina* (as *Marchantia* or *Sauteria*) from Svalbard refer to *S. alpina*: “Beeren Eiland (1827, M. Keilhau; 1868, Sv. Berggren). Spitsbergia, plur. locis (1861, A.J. Malmgren; 1868, Sv. Berggren).” (Lindberg 1882). A characteristic and common species of late alkaline snowbeds (Elvebakk 1985), and often present in large quantities. See also *Athalamia hyalina*.

### *Scapania calcicola* (H. Arn. & J. Perss.) Ingham

Reported from two localities in Kongsfjorden (Prins Heinrichøya and Blomstrandhalvøya) by Arnell (in Arnell & Mårtensson 1959). Damsholt & Long (1979) made the combination *S. calcicola* ssp. *ligulifolia* (Schust.) Damsh. & Long (based on the neoarctic *S. ligulifolia* (Schust.) Schust.) and presented a distribution map of the collective species. The above Svalbard report was kept in ssp. *calcicola* as its only arctic occurrence. Duell (1983) listed ssp. *ligulifolia* from Svalbard, whereas ssp. *calcicola* was included from there with a question mark. It seems that the above decisions were taken without studying the Svalbard material, and this should evidently be done.

### *Scapania curta* (Mart.) Dum.

First mentioned by Berggren (1875) from sandy soil at Adventfjorden, but this is *S. cuspiduligera* according to Arnell & Mårtensson (1959; see however also Arnell 1922). Reported from Bjørnøya and Bohemanneset (Watson 1922; Summerhayes & Elton 1923: 226, 252), Dunøyane at the mouth of Hornsund where it formed brown tufts on the peat (Rejment-Grochowska 1967), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b), Ossian Sarsfjellet in Kongsfjorden (Arnell & Mårtensson 1959), and Kong Karls Land (Arnell 1900, as *Martinellia*). Philippi (1973) mentions *S. curta* in his discussion of the variation of *S. irrigua* at SW Barentsøya, NW Edgeøya and Agardhbukta. Arnell (in Arnell & Mårtensson 1959) reported four species of Sect. *Curtae* (sensu Arnell 1956), viz. *S. calcicola*, *S. curta*, *S. mucronata* (as *S. praetervisa*) and *S. parvifolia*, and Świąś & Karczmarz (1991b) reported °*S. scandica*. A restudy of the Svalbard material of these taxa is strongly needed.

### *Scapania cuspiduligera* (Nees) K. Müll.

Reported from Bjørnøya and Grønfjorden (Berggren 1875, as *S. bartlingii*), Adventfjorden (Persson 1942), Smeerenburg and Magdalenefjorden (Lindberg 1867, as *S. bartlingii* var. *elongata* n. var. and var. *obtusata*), and collected at Kapp Wijk (several sites), Kongsfjorden and Bockfjorden (Frisvoll unpubl.). See also *S. curta*.

### *Scapania gymnostomophila* Kaal.

Reported from Ekmanfjorden (Blomesletta) and Nordfjorden (Kapp Wijk) in the Isfjorden area (Frisvoll & Blom 1993), and from Kongsfjorden (Blomstrandhalvøya) (Arnell & Mårtensson 1959).

### *Scapania hyperborea* Jørg.

Reported from Bjørnøya, and Grønfjorden on Spitsbergen by Arnell (1922, specimens collected by Berggren in 1868). Listed from Svalbard by Jørgensen (1934). Reported from one locality at Hornsund (Rejment-Grochowska 1967), the fen Stormyra (Euroala 1971a: Table 1) and Vassdalen (Hadač 1989) in Van Mijenfjorden, Kongsfjorden (Persson 1942; Arnell & Mårtensson 1959) and

Magdalenefjorden (Arnell & Mårtensson 1959), and mentioned from Barentsøya/Edgeøya/Agardhbukta as a possible part of a collective *S. irrigua* by Philippi (1973). In Greenland *S. hyperborea* is "plastic and difficult to comprehend", and "for this reason we treat the species . . . in terms of 'helvetica', 'kaurinii', 'hyperborea', and 'paludicola-degenii' phenotypes." Schuster & Damsholt (1974). See also *S. kaurinii*.

### *Scapania irrigua* (Nees) Nees

Reported from Bjørnøya (Watson 1922; Summerhayes & Elton 1923: 226), two localities at Hornsund (Rejment-Grochowska 1967), Bellsund S (Karczmarz & Świąt 1989a), Vassdalen in Van Mijenfjorden (Hadač 1989), Bjørndalen (Eurola 1968: 27), Gludneset in Kongsfjorden (Brattbakk et al. 1978), Smeerenburg (Lindberg 1867, as *γ. globulifera* \**purpurascens*; see also Arnell 1922), and in a wide sense including *S. curta* and *S. hyperborea* from Agardhbukta and many sites at Edgeøya and Barentsøya (Philippi 1973). Subspecies *rufescens* (Loeske) Schust. is not mentioned by the above authors (see, however, Lindberg's name), but since it is the common arctic taxon it may be the most frequent or only Svalbard representative of the aggregate species.

### *Scapania kaurinii* Ryan

Listed from 'Spitzbergen' by Müller (1954–1957); his possible primary source is unknown. Reported from Dunøyane and Torbjørnsenfjellet at Hornsund (Rejment-Grochowska 1967), and from Kongsfjorden, Magdalenefjorden and Danskøya (Arnell & Mårtensson 1959). Ecads of *S. hyperborea* (its "*kaurinii*" phase or "*kaurinii* syndrome") may sometimes be very similar to this species (Schuster 1974: 493 and Fig. 404: 9–10, 1988: 149).

### *Scapania mucronata* Buch

Reported from Vassdalen in Van Mijenfjorden (Hadač 1989) and Russekeila (Hagen 1952), and listed from 'Spitzbergen' by Müller (1954–1957). Arnell (in Arnell & Mårtensson 1959) reported *S. praetervisa* Meyl. from Kongsfjorden and discussed its taxonomic status versus *S. mucronata*.

Many authors treat *S. praetervisa* as a subspecies of *S. mucronata*. Until the Svalbard material has been restudied we believe that only one of the two is present there. Some of the old reports of *S. curta* probably also belong here.

### *Scapania obcordata* (Berggr.) S. Arn.

Described by Berggren (1875, as *Sarcoscyphus*) based on material from Bjørnøya, Isfjorden, Brennevinsfjorden and Nordkapp. Later reported from many sites at Hornsund (Rejment-Grochowska 1967), Bellsund S (Karczmarz & Świąt 1989a), Recherchefjorden W (Karczmarz & Świąt 1990a), Vassdalen in Van Mijenfjorden and Grønfjorden (Hadač 1989), and Longyearbyen, Ny-Ålesund and Magdalenefjorden (Arnell & Mårtensson 1959).

### *Scapania paludicola* (K. Müll.) K. Müll.

Reported from Hornsund (Rejment-Grochowska 1967), Stormyra (Eurola 1971a) and Vassdalen (Hadač 1989) in Van Mijenfjorden, Bohemianflya (Kobayashi et al. 1990: Table 8), and Smeerenburg (Arnell 1922, first report based on a specimen collected in 1861 by Malmgren). Collected from Adventdalen (Frisvoll unpubl.).

### *Scapania parvifolia* Warnst.

Reported from Magdalenefjorden and Danskøya by Arnell & Mårtensson (1959) as "A rather robust somewhat atypical form", and the specimens should therefore be restudied.

### *Scapania simmonsii* Bryhn & Kaal.

Reported from "Spitsbergen (det. Kaalaas, affirm. H. Buch)" by Buch (1933) without further geographical information. The species has an arctic distribution, and the only record from Fennoscandia is from the Petchenga area in the NW part of the Kola peninsula in Russia (Buch 1933; Arnell 1956).

### *Scapania spitsbergensis* (Lindb.) K. Müll.

Reported from one locality at Hornsund (Rejment-Grochowska 1967). Stuphallet in Kongsfjorden (Wegener et al. 1992, no material

kept, pers. comm. L. B. Jacobsen), Kongsfjorden and Danskøya (Arnell & Mårtensson 1959), and Amsterdamøya (Lindberg in Lindberg & Arnell 1889, as *Martinellia*, described on the basis of material collected by Berggren at Smeerenburg in 1868). See also °*S. nemorea* and *Diplophyllum albicans*.

*Scapania subalpina* (Lindenb.) Dum.

Reported from "the acidophil substratum on the E. slopes of Rotjesfj" in Hornsund by Rejment-Grochowska (1967), and from Bellsund S by Karczmarz & Świąs (1989a).

*Scapania tundrae* (H. Arn.) Buch

Reported from NW Sørkapp Land (Dubiel & Olech 1990: 63–64), Hornsund (Rejment-Grochowska 1967; Eurola 1968: 30), Bellsund S (Karczmarz & Świąs 1989a), Russekeila (Eurola 1968: 22), Grønfjorden [Buch 1928, based on Berggren's Musci Spetsbergenses Exsiccati no. 171 (H, as *S. undulata*), specimen collected in 1868; Jørgensen 1934] and Kongsfjorden, Magdalenefjorden and Danskøya (Arnell & Mårtensson 1959).

*Scapania uliginosa* (Lindenb.) Dum.

Reported from Mosselbukta at the mouth of Wijdefjorden at 79°52'N by Ekman (1993, specimen in S, conf. det. K. Damsholt). Until this find was made its northernmost locality was Thule in NW Greenland at 76°32'N (Schuster & Damsholt 1974).

*Schistidium frigidum* Blom

Common, as shown in a recent monograph of the *Schistidium apocarpum* group (Blom 1996). °*Schistidium apocarpum* (Hedw.) Bruch & Schimp. has been reported as common throughout the archipelago (see Kuc 1973a, as *Grimmia*), but it does not grow there.

*Schistidium frivollianum* Blom

Common in bird cliffs. Reported from Hornsund, Adventdalen, Nordfjorden, Dicksonfjorden,

Brøggerhalvøya, Kongsfjorden and Bockfjorden (Blom 1996).

*Schistidium grandirete* Blom

Frequent. Reported from Hornsund, Adventfjorden, Nordfjorden, Brøggerhalvøya and Barentsøya (Blom 1996).

*Schistidium holmenianum* Steere & Brassard

Rare (Blom, pers. comm.). Frahm (1977) stated that in Kongsfjorden the ecology of his *S. strictum* was strikingly similar to that of the recently described *S. holmenianum* from the neoarctic (Steere & Brassard 1976). See also °*S. andreaeopsis*.

*Schistidium maritimum* (Turn.) Bruch & Schimp.

A southern species reported from maritime cliffs at Bjørnøya (Berggren 1875; Engelskjøn 1986), and from Isfjord Radio (Frahm 1977, Elvebakk unpubl.). Engelskjøn's material from Bjørnøya belongs to spp. *maritimum* and ssp. *piliferum* (I. Hag.) B. Bremer (TROM, H. H. Blom pers. comm), whereas material from Spitsbergen belongs to ssp. *piliferum* (Bremer 1980).

*Schistidium papillosum* Culm.

This is the correct name of the common Svalbard plant previously referred to as *Grimmia gracilis* Schwaegr. or *S. strictum* (Turn.) T. Kop. & Isov. (Blom 1996).

*Schistidium pulchrum* Blom

Rare. So far it is the only species of the *Schistidium apocarpum* group known from Bjørnøya (TROM, leg. T. Engelskjøn 1983). Also reported from Ny-Ålesund and Kollerfjorden (Blom 1996).

*Schistidium rivulare* (Brid.) Podp.

"Common throughout the archipelago" (Kuc 1973a, as *Grimmia alpicola*). Bremer (1980) referred the Svalbard specimens to ssp. *latifolium* (Zett.) B. Bremer.

*Schistidium submuticum* Blom

*Ssp. arcticum* Blom is known from Stuphallet at the south side of Kongsfjorden (leg. A. A. Frisvoll 1974).

*Schistidium tenerum* (Zett.) Nyh.

Widespread. It is almost never found fertile, but plants with sporophytes have been collected at Ole Hansenkammen in Krossfjorden (Frisvoll unpubl.; Blom 1996, Fig. 86K).

*Schistidium umbrosum* (Zett.) Blom

Rare. Known from Ekmanfjorden, Krossfjorden and Bockfjorden (Blom 1996).

*Schistidium venetum* Blom

Only found at Blomesletta in Ekmanfjorden (Blom 1996, leg. A. A. Frisvoll 1973).

*Scorpidium cossonii* (Schimp.) Hedenäs

Reported from numerous localities (see Kuc 1973a, as *Drepanocladus intermedius*). It is much commoner on Svalbard than *S. revolvens*. The two species were thoroughly described and at the same time transferred to the genus *Scorpidium* by Hedenäs (1989b). This placing has not been universally accepted (see e.g. Anderson et al. 1990, as *Limprichtia*).

*Scorpidium revolvens* (Anon.) Rubers

Probably widespread and certainly most frequent in the less calcareous districts (see e.g. Boiška & Gugnacka-Fiedor 1986, as *Drepanocladus*), as opposed to *S. cossonii* which is a calcareous species (cf. the study from N Sweden by Kooijman & Hedenäs 1991). The status of *S. revolvens* on Svalbard is insufficiently known, because most authors have treated it in a collective sense. It has been collected from mixed stands with *S. cossonii* at Adventdalen (Frisvoll, unpubl.). See also report of mixed material from Canada by Persson & Sjørs (1960, in comment on *Drepanocladus intermedius*).

*Scorpidium scorpioides* (Hedw.) Limpr.

Regarding previous reports, see Kuc (1973a). At Storvatnet by Ny-Ålesund a mixed stand between typically falcate and julaceous straight-leaved plants has been found (leg. A. A. Frisvoll 1974, see Hedenäs 1989b: 17).

*Seligeria diversifolia* Lindb.

Reported from three localities at Ekmanfjorden and Dicksonfjorden (Frisvoll 1981a). The species has a disjunct occurrence in Europe and N America, which has been explained by the distribution of the ice sheets during the glaciations (Vitt 1976; Hedderson & Brassard 1992).

*Seligeria oelandica* C. Jens. & Medel.

Reported from Dicksonfjorden (see *S. tristichoides*), Kongsfjorden (Ochyra 1991, leg. Schäfer 1922), and the hot springs at Bockfjorden (Frisvoll 1978d). A phytogeographically interesting species otherwise known from Greenland, NW North America (Alaska, Yukon, W part of the North West Territories), Siberia (Chukots Peninsula), N and S Sweden, Norway (Troms: Signaldalen, L. Hedenäs pers. comm; Gudbrandsdalen), Ireland, Slovakia and Switzerland (Coker 1983; Frisvoll 1978d; Gos 1993; Nyholm 1987; Ochyra 1991).

*Seligeria polaris* Berggr.

Collected in 1868 and mentioned by Berggren (1873) as 'a new *Blindia* with curved seta'. When described (Berggren 1875) reported from the type localities in Grønfjorden, Adventfjorden, Nordfjorden, St. Jonsfjorden and Liefdefjorden, and characterised as "Eine der schönsten Zierden der Moosflora dieses Polarlandes". Not found again until about 100 years later when Philippi (1973) and Heinemeijer (1979) reported it from one locality at Barentsøya and Edgeøya, respectively. At the same time (1973–1977) collected at many localities from about sea level to 300 m a.s.l., in Adventdalen, Billefjorden, Nordfjorden, Dicksonfjorden (Idodalen) and Kongsfjorden (Frisvoll unpubl.). The latest report is from Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b).



*Seligeria tristichoides* Kindb.

Listed from 'Spitzbergen' by Mönkemeyer (1927). According to Ochyra (1991) the report was based on specimens collected in Kongsfjorden by Schäfer in 1922, and the material he saw (LE, S) was referred to *S. oelandica*. Mårtensson (in Arnell & Mårtensson 1959) studied a fertile specimen (same locality and collector, UPS), which he referred to *S. tristichoides* although "... the plants are more slender and less rigid than the *S. tristichoides* I know from the Scandes." (see Mårtensson 1956). Specimens with much ripe sporophytes have been reported from between Trollfuglfjella and Tolmodryggen in Dicksonfjorden (Frisvoll 1981a, mixed with *Lophozia hyperarctica*) and collected at Kongsfjorden (Steinflåstupet, 1974) (Frisvoll unpubl.). The shoots are quite three-ranked; the capsules are ovate or globular with a well-developed peristome; the spores are  $\pm 20 \mu\text{m}$ . In Dicksonfjorden it grew mixed with *S. oelandica*, which differs in its wide-mouthed capsule, short and obtuse peristome teeth, and large spores (25–30  $\mu\text{m}$ ). See also Philippi (1973: 11, in comment on *S. polaris*) regarding notes on the spore size of *Seligeria* species and on one more specimen (B) collected in Kongsfjorden by Schäfer.

*Sphagnum aongstroemii* C. Hartm.

Only known from Nordenskiöld Land (the area or peninsula between Van Mijenfjorden and Isfjorden) (Flatberg & Frisvoll 1984a; Hadač 1989: Table 6, 8, 9). Probably due to both edaphic and climatic reasons, the high frequency of *Sphagnum* species is particularly characteristic of moss tundra and wet vegetation types in this area. Distribution maps, descriptions, and a key to ten *Sphagnum* species on Svalbard have been presented by Flatberg & Frisvoll (1984a). Since then, two new species (*S. olafii* and *S. tundrae*) have been described, and *S. riparium* has been reported and confirmed from Bjørnøya.

*Sphagnum arcticum* Flatb. & Frisv.

Described by Flatberg & Frisvoll (1984a, b), and only known from Nordenskiöld Land. Except for Svalbard, *S. arcticum* is reported from many localities in Greenland (Lange 1993), Alaska (widespread) and five sites in the Canadian arctic (Andrus et al. 1992: Fig 1c), and one at the

Taymyr peninsula in Siberia (Flatberg & Frisvoll 1984b), and the species is of special phyto-geographical interest.

*Sphagnum balticum* (Russ.) C. Jens.

Known from Van Mijenfjorden, Colesbukta in Isfjorden, and Hamburgbukta and Magdalenefjorden at Spitsbergen NW (Flatberg & Frisvoll 1984a).

*Sphagnum fimbriatum* Wils. & J. D. Hook.

Known from Van Mijenfjorden, Isfjorden, Magdalenefjorden, Edlundfjellet at Spitsbergen E, Edgeøya NW and Kongsøya at Kong Karls Land (Flatberg & Frisvoll 1984a; Serebryanny et al. 1985). Probably also correctly reported from Barentsøya S (Philippi 1973). The Svalbard material belongs to ssp. *concinnum* (Berggr.) Flatb. & Frisv.

*Sphagnum girgensohnii* Russ.

Known from Van Mijenfjorden, S side of Isfjorden, scattered localities at NW Spitsbergen (Kongsfjorden, Hamburgbukta, Magdalenefjorden, Smeerenburg, Bockfjorden, Wijdefjorden), Birddalen at Laponiahelvøya on Nordaustlandet (second northernmost *Sphagnum* locality in the world), and Edgeøya NW (Flatberg & Frisvoll 1984a).

*Sphagnum lindbergii* Lindb.

Only known from some localities on Bjørnøya and two near-by localities on Spitsbergen (Van Mijenfjorden: Vengsletthytta and Vassdalen) (Berggren 1875; Flatberg & Frisvoll 1984a; Engelskjøn 1986; Hadač 1989: 141). It belongs to a southern bryoelement on Svalbard.

*Sphagnum obtusum* Warnst.

A rare species only known from Nordenskiöld Land (two localities at the N side of Van Mijenfjorden, Colesbukta at the S side of Isfjorden, and Adventdalen) (Flatberg & Frisvoll 1984a; K.I. Flatberg pers. comm.).

*Sphagnum olafii* Flatb.

Described by Flatberg (1993) and reported from the S side of Isfjorden (Colesbukta, Bjørndalen, Longyeardalen and Bolterdalen). It seems to be a 'Nordenskiöld Land species' and is probably present also at the N side of Van Mijenfjorden. It is most related to *S. arcticum*, and grows in tundra mire of somewhat sloping terrain, where it forms small mats and low hummocks.

*Sphagnum riparium* Ångstr.

Reports from Colesbukta (Berggren 1875, as *S. recurvum* var. *riparium*) and Stormyra in Van Mijenfjorden (Eurola 1971a: Tab. 1) refer to *S. obtusum* (Flatberg & Frisvoll 1984a). Later reported from Reindalen (Serebryanny et al. 1985) and Bjørnøya (Engelskjøn 1986: 98, 101). We have seen two duplicates of a correctly named specimen from Bjørnøya collected in 1983 (TROM; det. B. Lange, conf. K. I. Flatberg). The material of the Reindalen report is in need of confirmation.

*Sphagnum squarrosum* Crome

This is the most common *Sphagnum* on Svalbard, and it is partly dominant in certain 'mire' types on siliceous substrates, mainly in continental areas (Rønning 1961; Flatberg & Frisvoll 1984a). The Nordkapp locality on Chermsideøya (N of Nord-austlandet), discovered by Berggren in 1868, is of special interest as it is the northernmost *Sphagnum* locality in the world. There it grew, rather surprisingly, "an feuchten Bergabhängen." (Berggren 1875).

*Sphagnum teres* (Schimp.) Ångstr.

Known from Nordenskiöld Land and one locality at Dicksonfjorden (S side of Heimenfjellet) (Flatberg & Frisvoll 1984a; Serebryanny et al. 1985; Hadač 1989: Table 9). Also reported from Bellsund S (Karczmarz & Świąś 1988, 1989a), Chamberlindalen in Recherche fjorden (Świąś & Karczmarz 1991b) and Edgeøya NW (Heine-meijer 1979, cf. Flatberg & Frisvoll 1984a).

*Sphagnum tundrae* Flatb.

Recently described (Flatberg 1994) and reported

from Grøn fjorden, Colesbukta, Bjørndalen, and three side valleys off Adventdalen (Endalen, Todalen and Bolterdalen) on Svalbard, and from one locality in Alaska. Like *S. olafii* it seems to be a 'Nordenskiöld Land species' which will probably be found also at the N side of Van Mijenfjorden. It is most related to *S. teres*. It grows in less eutrophic tundra habitats and is favoured by a constant supply of ground water.

*Sphagnum warnstorfi* Russ.

Known from Van Mijenfjorden, Isfjorden and Dyrevika in Kongsfjorden. "We consider it unlikely that other red-pigmented *Acutifolia* species will be found in Svalbard." (Flatberg & Frisvoll 1984a).

*Splachnum vasculosum* Hedw.

Common (see Kuc 1973a). Frahm (1977) reported a mixed stand from Isfjordflya, with the typical ecad and a plant with longer and paler seta and narrower paler apophysis. The two appeared to be well-separated taxa. Brassard (1971b) distinguished between var. *vasculosum* and var. *heterophyllum* (Hook.) Brassard, and most specimens from the Canadian tundra and all from the arctic islands were referred to the latter variety. It was distinguished from var. *vasculosum* by its shorter seta, narrower apophysis and more pointed leaves. The Svalbard material should be restudied in the light of these alleged differences.

*Stegonia latifolia* (Schwaegr.) Broth.

Reported from one locality at Hornsund (Kuc 1963a), SW Spitsbergen and Sorgfjorden (Lindberg 1862, as *Pottia*; 1867, as *Anacalypta*), Bellsund S (Świąś & Karczmarz 1993), Chamberlindalen in Recherche fjorden (Świąś & Karczmarz 1991b, as *Pottia*), Adventfjorden and Lomfjorden (Berggren 1875, as *Pottia*), Tempelfjellet in Tempelfjorden (Persson 1942, as var. *pilifera*). Isfjordflya, upper part of Adventdalen and Ny-Ålesund (Frahm 1977), and SW Barentsøya (Philippi 1973). Collected at Billefjorden, Nordfjorden, Dicksonfjorden, Ekmanfjorden (Blomesletta), Krossfjorden and Liefdefjorden (Frisvoll unpubl.). Var. *pilifera* was treated as a species by Steere (1978, as *S. pilifera* (Dicks.) Crum et al.); the taxon seems to be rare on

Svalbard (known from Sassenfjorden, Ekmanfjorden and Kongsfjorden).

*Syntrichia norvegica* Web.

Reported (as *Tortula*) from Bjørnøya (Berggren 1875; Engelskjøn 1986; see also Arnell & Mårtensson 1959, in comment on *T. ruralis*), Hornsund (Kuc 1963a, as *T. ruralis* var.), Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a, 1993), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b), Billefjorden (Dobbs 1939: 134), Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982: Table 8; Boińska & Gugnacka-Fiedor 1986), Bockfjorden (Frisvoll 1978d: 126), and Wijdefjorden (Summerhayes & Elton 1928: 247).

*Tayloria acuminata* Hornsch.

Only reported from bird cliffs in the Kongsfjorden/Krossfjorden area (Frisvoll 1978d). Also collected at Nordfjorden (Kapp Wijk and Tschermafjellet, Frisvoll unpubl.). In mainland Norway it is only known from a few localities in the central continental parts (Frisvoll 1978b), and from the bird cliff Syltefjordstaueren in Båtsfjord, Finnmark (Sortland 1989). The arctic and subarctic occurrences are usually associated with bird cliffs, but the Kapp Wijk locality was at a hummock in a flat wetland area. However, such sites are often used as bird perches and therefore manured.

*Tayloria lingulata* (Dicks.) Lindb.

Reported from Bohemanflya (Kobayashi et al. 1990: 56) and from seven localities in Kongsfjorden, Liefdefjorden and at Reinsdyrflya (Frisvoll 1978d). Also collected at Kapp Wijk in Nordfjorden (Frisvoll unpubl.).

*Tetraplodon blyttii* Frisv.

This recently described species has been reported from Dicksonfjorden, Kongsfjorden and Krossfjorden (Frisvoll 1978c). Also collected at Bjørndalen (Frisvoll unpubl.). Otherwise it is known from the Norwegian mainland, the Swedish mountains (Jonsson 1991), and Jan Mayen (Frisvoll 1983a).

*Tetraplodon pallidus* I. Hag.

First collected at Heclahamna in Sorgfjorden during W.E. Parry's expedition in 1827, and named *Splachnum adamsianum* (Hooker 1828; Frisvoll 1978d: 244). Reported from Isfjordflya, Longyearbyen and Adventdalen (Frahm 1977), and from Bockfjorden (Frisvoll 1978c, one locality) and the Liefdefjorden/Reinsdyrflya area (Frisvoll 1978c, nine localities; Dahle 1983a). Collected by Rijpelva in Rijpfjorden (O, leg. A.H. Neilson). A specimen labelled "Kingsbay 1861, Malmgren" (O) is of particular interest. At that time the reindeer was common in Kongsfjorden, but later it was eradicated there, and no other herbarium specimen of *T. pallidus* from the thoroughly investigated area was known (see inter alia Arnell & Mårtensson 1959, in comment on *T. mnioides*). In 1978 a small reindeer population was reestablished in the area as a part of the MAB project (Øritsland & Alendal 1986), and the population increased to near 300 individuals in 1991 (Wegener et al. 1992). In 1993 *T. pallidus* was refound a few places at Brøggerhalvøya on reindeer droppings (Elvebakk unpubl.).

*Tetraplodon paradoxus* (R. Brown) I. Hag.

Also collected at Heclahamna in 1827 (see *T. pallidus*): "Amongst specimens of this moss gathered by Captain J.C. Ross, in the same tuft, . . . are stems upon longer stalks, bearing capsules without operculum [= *T. paradoxus*]; others, in which the separation between capsule and operculum is marked by a distinct suture; and some, finally, from which the operculum has fallen away, leaving exhibited the peristome, the teeth of which are united almost to the summit in fours [= *T. pallidus*]." (Hooker 1828, as *Splachnum adamsianum* with synonym: '*S. paradoxum*?') . Because of this mixing he studied their relationship and, unfortunately, concluded as follows regarding the value of *T. paradoxus*: "I should, therefore, be disposed to consider the former state as a variety or monstrosity, depending upon climate. . . . I may add, that, in dissecting the variety which possesses no distinct operculum, I can find, as may be expected, no trace whatever of peristome, although the capsules contain ripe seeds." (Actually, it has a hidden peristome, see Frisvoll 1978c: Fig. 14.) This is the first taxonomic comment on a Svalbard bryophyte. Berggren (1875: 55) reported *Splachnum paradoxum* R. Br.

as part of a collective *T. mnioides*; he noted the key characters "Kapsel braungelb" and "Deckel nicht leicht abfallend", and another place (p. 73) he called it *T. mnioides* var. *paradoxum*. Savicz (1924) clarified its taxonomy and reported it from Adventfjorden and Lomfjorden ["Lommebay, Beeren Eiland (Berggren)"]; her quotation of 'Beeren Eiland' is confusing here and refers presumably not to Bjørnøya]. Later reported from Bellsund S (Świąś & Karczmarz 1993), Adventdalen (Frahm 1977), 'Sassen Quarter' (Hadač 1946), and Reinsdyrflya (Dahle 1983a). The previous or this species may also be present at Hornsund (see Kuc 1963a, in comment on *T. mnioides*). Collected at Bockfjorden (Frisvoll unpubl.), see also Frisvoll (1978c, d).

*Timmia bavarica* Hessel.

See °*T. megapolitana*.

*Timmia comata* Lindb. & H. Arn.

Reported as frequent and widespread at the N side of Hornsund by Kuc (1963a); but only specimens from two sites were regarded as typical, and his comments regarding identification problems indicate that it may not be so frequent. An exsiccate specimen (No. 75, TRH) from Hornsund distributed as *T. norvegica* var. *excurrent* (= *T. comata*) (Bednarek-Łochyńska et al. 1987) is *T. austriaca*. Reported from Bellsund S by Świąś & Karczmarz (1993). Collected at Nordfjorden, Idodalen and Ekmanfjorden (Blomesletta) (Frisvoll unpubl.).

*Timmia sibirica* Lindb. & H. Arn.

Reported from Isfjorden, Kongsfjorden, Liefdefjorden, Bockfjorden and Vestfjorddalen (Frisvoll 1981a); it is not known from mainland Europe (Brassard 1979; Duell 1985).

*Tortella tortuosa* (Hedw.) Limpr.

Reported from Bellsund S (Świąś & Karczmarz 1991a, 1993), the Isfjord Radio area (Hagen 1952), and from *Dryas* vegetation at Kongsfjorden (Blomstrandhalvøya), Liefdefjorden (Wulffberget) and Bockfjorden (Frisvoll 1981a). The report from Dyrøvik and Stuphallet in

Kongsfjorden by Wegener et al. (1992) is based on *T. fragilis*. These are by far the northernmost known localities of *T. tortuosa*. See also °*T. arctica*.

*Tortula cernua* (Hüb.) Lindb.

A characteristic species in littoral vegetation, for a long time known only from one locality at Longyearbyen (Persson 1942, as *Desmatodon*). Later reported from several similar localities at Dickson Land, Liefdefjorden and Bockfjorden, and from one locality in Adventdalen away from the sea (Frisvoll 1981a, as *Desmatodon*). In northern Norway (see Hagen 1929) and on Svalbard this species usually grows close to the sea. Thus it may belong to a group of sea shore species with inland localities which have been thought to be relicts from earlier periods with higher sea levels (Hadač 1947).

*Tortula euryphylla* Zand.

Reported (as *Desmatodon latifolius* unless otherwise stated) from Hornsund (Kuc 1963a), SW Spitsbergen (Lindberg 1862, as *D. latifolius* var. *glacialis*; the specimen was renamed *D. obliquus* [= *Tortula leucostoma*] var. *muticus* by Lindberg 1867), Bellsund S (Świąś & Karczmarz 1993), upper part of Adventdalen (Frahm 1977), 'Sassen Quarter' (Hadač 1946), Magdalenefjorden (Vahl in Lindblom 1840, as *Trichostomum piliferum*, locality according to Lindberg 1867), and Kobbefjorden on Danskøya (Berggren 1875, compared with *Desmatodon systylius*, see *Tortula systylia*). Collected at Krossfjorden (Willeberget S) and Bockfjorden (Trollkjeldene) (Frisvoll unpubl.).

*Tortula laureri* (Schultz) Lindb.

Reported from a few sites at Hornsund (Kuc 1963a, as *Desmatodon*), and from the W side of Adventfjorden (Berggren 1875, as *Desmatodon*). Collected at Adventdalen (Brentskardet), Ekmanfjorden (Blomesletta), Nordfjorden (Kongressfjellet), Dicksonfjorden (Kapp Smith and Idodalen), and Kongsfjorden (Mitrahalvøya) (Frisvoll unpubl.).

*Tortula leucostoma* (R. Brown) Hook. & Grev.

As pointed out (Frisvoll 1981a, as *Desmatodon*, in comment on *D. systylius*), this is the most frequent Svalbard taxon of the genus. Zander (1993) found "no sharp difference between traditional '*Tortula*' peristomes with 32 similar rami . . . and '*Desmatodon*' peristomes with 16 teeth cleft to near the base", and in accordance to his treatment the genus *Desmatodon* is included in *Tortula* (whose type species is *T. subulata* Hedw.). Nyholm (1989) retained *Desmatodon* but referred the present species to *Tortula* on account of its close similarity to *T. muralis* (see that). *Tortula norvegica* and *T. ruralis* are treated in the genus *Syntrichia* (whose type species is *S. ruralis*).

*Tortula systylia* (Schimp.) Lindb.

Reported (as *Desmatodon*) from Bellsund S (Świąś & Karczmarz 1991a), Rotundafjellet in Billefjorden and Ossian Sarsfjellet in Kongsfjorden (Frisvoll 1981a), and Kobbefjorden (Berggren 1875: 27, but treated as *D. latifolius* [= *Tortula euryphylla*] in his species catalogue, p. 46). It has also been collected from bird cliffs in the Longyearbyen area (Frisvoll unpubl.).

*Trichostomum arcticum* Kaal.

The species was described in 1900 based on material collected at Recherchefjorden in 1899. *Grimmia spitsbergensis* described by Bizot & Thériot (1936) is the same (see also *G. ovalis*). Frisvoll (1978a) mapped its distribution on Svalbard. Not included there are reports from NW Sørkapp Land (Dubiel & Olech 1990), Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a, 1993), the Forlandsundet area (Boińska & Gugnacka-Fiedor 1986; Kuc 1994a), and Ny-Ålesund and Brøggerhalvøya (Frahm 1977, as *T. cuspidatissimum*). A few recent reports from previously known localities are not mentioned here.

*Trichostomum crispulum* Bruch

Reported from two nearby localities at Nordfjorden and Dicksonfjorden (W slope of Kongressfjellet and Heimenfjellet) by Frisvoll (1981a). It is a limestone species and belongs to

a southern bryoelement on Svalbard. In mainland Norway known as far north as Troms (L. Hedenäs pers. comm.).

*Tritomaria exsectiformis* (Breidl.) Loeske

Only reported from near Ny-Ålesund by Arnell & Mårtensson (1959); we have seen a specimen (UPS), according to K. Damsholt (pers. comm., based on some leaves and gemmae from a few shoots) it probably belongs to ssp. *exsectiformis* and not ssp. *arctica* Schust.

*Tritomaria polita* (Nees) Jørg.

Reported from a few sites at Hornsund (Rejment-Grochowska 1967, as *Saccobasis*), Bellsund S (Karczmarz & Świąś 1989a; Świąś & Karczmarz 1991a, 1993, as *Saccobasis*), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b, as *Saccobasis*), one locality in Kongsfjorden (Arnell & Mårtensson 1959, as *Saccobasis*), and Nordkapp (Berggren 1875, as *Jungermannia*; determination confirmed by Arnell in Arnell & Mårtensson 1959). Also collected at Bockfjorden, and this specimen probably belongs to ssp. *polymorpha* Schust. (Frisvoll unpubl.).

*Tritomaria quinquedentata* (Huds.) Buch

According to Rejment-Grochowska (1967) this is "The most common [liverwort] species in W. Svalbard, very variable, with a wide ecological amplitude. . .". Watson (1922, as *Lophozia*) and Summerhayes & Elton (1923: 254, as *Lophozia*) reported f. *turgida* from wet and flat bogs at Bohemanneset, and Arnell (in Arnell & Mårtensson 1959) var. *turgida* from Kongsfjorden; the taxon is now frequently given subspecific rank (Damsholt 1982). See also Persson & Viereck's (1983) comments on the treatment and value of the taxon.

*Voitia hyperborea* Grev. & Arnott

Reported from Adventfjorden (coll. Bjalynitzky-Birula, Savicz 1924), Adventdalen and Eskerdalen (Frahm 1977), Adventfjorden, Nordfjorden and Liefdefjorden (Berggren 1875), Heclahamna in Sorgfjorden (Hooker 1828, first report), Sorgfjorden and Lomfjorden (Lindberg 1867),

and Edgeøya NW (Philippi 1973). Mentioned by Summerhayes & Elton (1923: 279) when describing vegetation in Tempelfjorden, but they do not seem to report it from there. Collected at Bjørndalen and Bockfjorden (inter alia Trolltindane 1000 m a.s.l.), and also at Adventdalen and Liefdefjorden from where it was known before (Frisvoll unpubl.). See also *Bryum algovicum*.

#### *Warnstorfia exannulata* (Schimp.) Loeske

Reported from Bjørnøya and Grønfjorden (Berggren 1875, as *Hypnum*), Hornsund (Kuc 1963a; 1994b), Bellsund S (Karczmarz & Świąć 1988, 1990b; Świąć & Karczmarz 1991a, 1993), Chamberlindalen in Recherchefjorden (Świąć & Karczmarz 1991b), Stormyra in Van Mijenfjorden (Eurola 1971a: Table 1), Reindalen (Serebryanny et al. 1985), Vassdalen in Van Mijenfjorden and Grønfjorden (Hadač 1989), Linnédalen (Hagen 1952, as *Drepanocladus exannulatus* f. *orthophylla*), upper Adventdalen (Frahm 1977, as *D. exannulatus* var. *purpurascens*), from behind Richardlaguna at Prins Karls Forland (Summerhayes & Elton 1923: 243, as *Hypnum*), and Ny-Ålesund (Arnell & Mårtensson 1959). (Unless otherwise stated referred to *Drepanocladus*.) See also *W. fluitans* and °*W. trichophylla*.

#### *Warnstorfia fluitans* (Hedw.) Loeske

Reported in different genera (*Amblystegium*, *Drepanocladus*, *Hypnum*), from Bjørnøya as dominant (Engelskjøn 1986), from Bjørnøya (common) and Grønfjorden (Berggren 1875; Wulff 1902), Bellsund S (Karczmarz & Świąć 1988, 1990b; Świąć & Karczmarz 1991a, 1993), Recherchefjorden (Karczmarz & Świąć 1990a, 1991b), Reindalen (Serebryanny et al. 1985), Vassdalen in Van Mijenfjorden and Finneset E of Barentsburg (Hadač 1989), 'Sassen Quarter' (Hadač 1946), Reinsdyrflya (Summerhayes & Elton 1928: 225, as *Hypnum fluitans* group *Rotae*, and therefore probably another species), and Kong Karls Land (Arnell 1900). There is also a subfossil report by Schimper (1870).

#### *Warnstorfia pseudostraminea* (C. Müll.) Tuom. & T. Kop.

Reported from Brennevinsfjorden (Karczmarz

1971: 68, as *Drepanocladus*), with reservation from lower Reindalen (Eurola 1971a, as *Drepanocladus* cf.), and Adventdalen (Frisvoll & Blom 1993, det. conf. L. Hedenäs).

#### *Warnstorfia tundrae* (H. Arn.) Loeske

Only reported from Hornsund (Kuc 1963a, as *Drepanocladus exannulatus* var.) and Kongsfjorden (Arnell & Mårtensson 1959, as *Drepanocladus*). Some own collections indicate that it is frequent at W and N Spitsbergen, at least locally (Frisvoll unpubl.). Collected at Bjørnøya by T. Engelskjøn in 1983 (TROM).

### Comments on rejected species

Some southern species that are very unlikely to occur on Svalbard, and which have been excluded by previous authors, are mentioned without a comment. Regarding previous comments on many of the names below see Kuc (1973a), Arnell & Mårtensson (1959), Frisvoll & Lewinsky (1981), Frisvoll (1981a, 1983c), and Flatberg & Frisvoll (1984a). The below list includes the accepted names of 45 hepatics and 145 mosses rejected from Svalbard, in all 190 bryophyte names (not counting *Aulacomnium acuminatum*, *Hypnum nordenskiöldii*, *Leskea* sp. and *Trichostomum nordenskiöldii*).

#### *Amblystegium subtile* (Hedw.) Schimp.

Listed in a vegetation table from NW Sørkapp Land by Dubiel & Olech (1990: 54, as *Amblystegiella*), and from Bellsund S by Świąć & Karczmarz (1991a, as *Amblystegiella*). The reports are doubtfully correct.

#### *Amblystegium varium* (Hedw.) Lindb.

See °*Callialaria curvicaulis*.

#### *Anastrophyllum cavifolium* (Buch & S. Arn.) Lammes

Reported with reservation from Kvalvågen at the E side of Spitsbergen by Philippi (1973, as *Sphen-*

*olobus*). His comments on cell size indicate that this is not *A. cavifolium* but more probably *A. minutum* var. *minutum* (syn. var. *grande*, see *A. minutum*). See Schuster & Damsholt (1974: 37f) regarding comments on, and a list of, the so-called large-celled arctic hepatic taxa.

### *Andreaea alpina* Hedw.

Reported by Brown (1820) from Kongsfjorden, and by Vahl in Lindblom (1840) without locality.

### *Anomobryum filiforme* (Dicks.) Solms

Reported from Magdalenefjorden by Mathey-Dupraz (1912, as *Bryum julaceum* Schr.) and from near Isfjord Radio by Hagen (1952, as *A. juliforme*), but the reports are considered here as doubtfully correct.

### *Arctoa hyperborea* (Dicks.) Bruch & Schimp.

"*Dicranum hyperboreum*, auf Grönland ziemlich häufig, ist nicht auf Spitzbergen aufgefunden." (Berggren 1875, in comment on *Arctoa fulbella*, as *Dicranum*). Only reported from Hornsund by Eurola (1968). On the basis of this report the species was included from Svalbard by Nyholm (1987; Nyholm pers. comm.). No specimen labelled *A. hyperborea* is available in Eurola's herbarium (OULU, M. Ohenoja pers. comm.).

### *Aulacomnium acuminatum* (Lindb. & H. Arn.) Kindb.

[Not reported from Svalbard, but mentioned by Mårtensson (Arnell & Mårtensson 1959, in comment on *A. palustre*). This exclusively arctic species is known from Siberia, Greenland and arctic North America, and could be expected to occur also in Svalbard (see Holmen 1957b; Brassard 1971b; Steere 1978: 22ff).]

### *Barbilophozia attenuata* (Mart.) Loeske

Reported from Kobbefjorden (Lindberg 1867, as *Jungermannia attenuata* var. *laxifolia*; a specimen, in H-SOL, probably belongs to *Tritomaria*), Bjørnøya, several places along the W coast of Spitsbergen and Smeerenburg (Berggren 1875, as

*Jungermannia*), Kong Karls Land (Arnell 1900, as *Jungermannia gracilis*), Celsiusberget in Murchisonfjorden (Wulff 1902, as *Jungermannia gracilis*), Prins Karls Forland (Watson 1922; Summerhayes & Elton 1928: 248, as *Lophozia*), and Isfjord Radio (Hagen 1952, as *Lophozia*). It is not known from Greenland (Schuster 1988, 1969; Schuster & Damsholt 1974). "Also reported from Spitsbergen and eastward to Novaya Zemlya, Siberia (but these reports possibly refer in part to *L. binsteadii* or *L. atlantica*." (Schuster 1969). No species of *Lophozia* subgen. *Orthocaulis* sect. *Attenuatae* (sensu Schuster 1969) is known with certainty from Svalbard, and the reported material needs to be restudied.

### *Barbilophozia binsteadii* (Kaal.) Loeske

The name is mentioned from Edgeøya by Heinemeijer (1979, as *Orthocaulis* cf. *binsteadii* and *O. elongatus*/O. cf. *binsteadii*).

### *Barbilophozia floerkei* (Web. & Mohr) Loeske

*Jungermannia hatcheri*, the basionym of *B. hatcheri*, was described in 1898, and the early reports of *B. floerkei* could therefore be expected to be erroneous. Reported from Kobbefjorden by Lindberg (1867, as *Jungermannia Flörkei* I densifolia *A. major*  $\delta$  *gemmipara*), and as common in the basement rock areas at N Svalbard by Berggren (1875, as *Jungermannia*, "meisten als *I densifolia A major* oder *B minor*, auch als *AB1 arcuata*."), who also referred to one locality in E Svalbard (Edlundfjellet N of Barentsøya). Seven specimens named *Jungermannia floerkei* in Berggren's herbarium (LD) have been studied by us, and they belong to *Barbilophozia hatcheri* (5) and *Tritomaria quinquedentata*. The species was reported from Prins Karls Forland and Kong Karls Land (Svenskøya) (Arnell 1900, as *Jungermannia*), Prins Karls Forland (Hagen 1908, as *Jungermannia*), Bjørnøya (the same material reported by Watson 1922 and Summerhayes & Elton 1923, as *Lophozia*), from one locality in Kongsfjorden (Arnell in Arnell & Mårtensson 1959, as *Orthocaulis*), reported "from Svalbard for the first time" (Boińska & Gugnacka-Fiedor 1986; see also Gugnacka-Fiedor & Noryskiewicz 1982: Table 8) based on two collections from Forlandsundet, and from Stuphallet in Kongs-

fjorden (Wegener et al. 1992). Grolle (1960) considered that previous reports from Svalbard refer to other species; specimens collected by Malmgren, Arnell et Mårtensson, Berggren and Eaton were renamed *B. hatcheri*, and specimens collected by Berggren, Malmgren and Nordenskiöld were renamed *Tritomaria* sp. Due to the obvious misidentifications its occurrence on Svalbard should be confirmed. Schuster (1983: 609, Fig. 74) includes Svalbard in the world distribution of *B. floerkei* (as *Lophozia*), but his sources are probably those rejected here.

*Barbilophozia rubescens* (Schust. & Damsholt) Kartt. & Söderstr.

Arnell (in Arnell & Mårtensson 1959) reported *B. hatcheri*, and wrote about one of the specimens: "The plants . . . have fairly large leaf-cells (24–30 µm) and approach var. *grandiretis* Buch [ex Lammes]." This name is a synonym of *B. rubescens*, which may well occur on Svalbard. According to Schuster (1988, as *Lophozia*), *B. hatcheri* has marginal cells in lobes 20–24 µm and median cells from 20–25 to 28–32 µm wide; in *B. rubescens* the cells are 30–32 and 30–35 µm wide, respectively. The presence on Svalbard of *B. rubescens* needs to be confirmed.

*Bartramia pomiformis* Hedw.

Reported from Bellsund S by Świąż & Karczmarz (1991a). Also reported from Dyrevika in Kongsfjorden by Wegener et al. (1992), but the material (sent by L. B. Jacobsen) is *Plagiopus oederiana* (see also Jacobsen 1994:24).

*Brachythecium albicans* (Hedw.) Schimp.

Reported from Kongsfjorden by Polunin (1945) but this report has been considered to refer to slender plants of *B. turgidum* (Arnell & Mårtensson 1959). Later reported from the Forlandsundet area (Boińska & Gugnacka-Fiedor 1986), and from Bellsund S (Karczmarz & Świąż 1988). See also *B. coruscum*.

*Brachythecium erythrorrhizon* Schimp.

The name is used by Euroala & Hakala (1977, as *B. cf. erythrorrhizon*) about material from the mountain Alkhornet at the mouth of Isfjorden.

*Brachythecium frigidum* (C. Müll.) Besch.

Berggren (1875) stated about his new *B. salebrosum* var. *arcticum*: "Dem Habitus nach *Brachyth. cirrhosum* [!], = *Cirriphyllum cirrosum*] ähnlich. . . .". Mårtensson (in Arnell & Mårtensson 1959) described "A curious robust whitish green type" of *B. turgidum* which had "very concave leaves with a generally distinct piliferous apex. . . . At first glance one believes the plants to be *Cirriphyllum cirrosum*." He found that authentic material of *Hypnum rutabulum* var. *cavifolium* described by Lindberg (1867) "is almost identical with some of my turgid plants. . . . *B. udum* Hag. . . . seems also to lie within this variation amplitude." Frahm (1977) refers to Mårtensson's description and to similar own plants with "*Cirriphyllum*-artige Blattspitze. . . . Die geschilderte Form weist Ähnlichkeit mit der Beschreibung von *B. frigidum* (C. Müll.) Besch. aus Kanada auf." According to Lawton (1971) *B. frigidum* has, inter alia, deltoid-ovate leaves with flat margin; *B. turgidum* has ovate-lanceolate leaves with recurved margin. The described Svalbard taxon needs further studies. See also °*Cirriphyllum piliferum*.

*Brachythecium glareosum* (Spruce) Schimp.

Reported from Wijdefjorden by Summerhayes & Elton (1928: 232). Duell (1992) reported *B. glareosum* var. *alpinum* (De Not.) Limpr. without locality, "(leg. G. Philippi sub *B. turgescens* [sic, err. pro *turgidum*?])". See also °*B. latifolium*.

*Brachythecium latifolium* Kindb.

Reported from a 'bog' in Wijdefjorden by Summerhayes & Elton (1928: 237) and from Svenskøya by Hofmann (1968, as *B. nelsonii*). The material may be supposed to belong to the ubiquitous and very modifiable *B. turgidum*, and needs reexamination.

*Brachythecium mildeanum* (Schimp.) Milde

Reported from Bellsund S by Karczmarz & Świąż (1990b). See also °*B. udum*.

*Brachythecium plumosum* (Hedw.) Schimp.

Reported from Kobbefjorden (Lindberg 1867, as



*Hypnum*); it was stated to grow among *Bryoerythrophyllum recurvirostre* (as *Trichostomum rubellum*), and a small amount of a *Brachythecium* is present in the reported sample of that species (H-SOL). It is so sparse that it is difficult to name, but the leaves are somewhat plicate and have not the homogeneous basal cells of *B. plumosum*; however, they are sharply serrate unlike the leaves of *B. turgidum* s.l. It was later reported from Linnédalen by Hagen (1952). The *Hypnum plumosum* Huds. reported by Arnell (1900, see also Lindberg 1867 pro syn.) is a synonym of °*Brachythecium salebrosum*.

### *Brachythecium rivulare* Schimp.

Reported from Bjørnøya by Berggren (1875); a specimen (UPS) is typical *B. turgidum*. Listed from Bjørnøya and 'Spitsbergen' by Abramova et al. (1961). Reported from Bellsund S by Świąś & Karczmarz (1993). See also °*B. latifolium*.

### *Brachythecium rutabulum* (Hedw.) Schimp.

Lindberg (1867) described *Hypnum rutabulum* var. *cavifolium* which belongs to *B. turgidum* s.l. (see Berggren 1875: 80; Arnell & Mårtensson 1959; Wigh 1975: 479). See also \**B. frigidum*.

### *Brachythecium salebrosum* (Web. & Mohr) Schimp.

First reported from Sorgfjorden by Lindberg (1867) and from Adventfjorden by Berggren (1875); both authors also reported *B. turgidum* (as *B. salebrosum* var. and ssp., respectively), see also Kuc (1973a). Reported from Bjørnøya by Engelskjøn (1986); we have seen four specimens collected by him (TROM), and they belong to *B. turgidum*. Reported from Bellsund S by Świąś & Karczmarz (1991a). The common Svalbard taxon is *B. turgidum*, and the possible occurrence there of *B. salebrosum* is doubtful and needs confirmation. See also *B. coruscum*.

### *Brachythecium udum* I. Hag.

Reported from Prins Karls Forland by its author (Hagen 1908): "I have seen his material and am convinced that it is a distinct species. . . ." (Kuc 1973a). Later reported from 'Sassen Quarter'

(Hadač 1946: 135, 143, as *B. mildeanum* var. *udum* and *B. udum*). The systematic position of the taxon is disputed. It is often referred to *B. mildeanum*. Mårtensson (in Arnell & Mårtensson 1959) tended to associate it with turgid plants of *B. turgidum*, see also Corley et al. (1981: Annotation 252) and °*B. frigidum*. It is likely that Hagen's (1908) material includes the ubiquitous *B. turgidum* because *B. udum* is his only reported *Brachythecium*: "On Prince Charles Foreland it occurs in a smaller form markedly decumbent, in very loose tufts, or creeping in single individuals among grasses and other higher plants in moist sheltered places."

### *Bryum acutiforme* Limpr. in Hag.

"Ein unvollständiges Exemplar, von Berggren bei Advent-Bay in Spitzbergen gesammelt, und von ihm als *B. calophyllum* bestimmt, ziehe ich zu dieser Art." (Hagen 1899–1904, in the protologue of the name, and therefore to be regarded a syntype). Listed from Svalbard by Jensen (1939). Reported by Persson (1942, as *B. acutum*) from the Van Mijenfjorden area; the specimen (S) is annotated by E. Nyholm: "seems to be *B. calophyllum*, but bad material". Reported from 'Sassen Quarter' by Hadač (1946) and from Bellsund S by Świąś & Karczmarz (1991a, as *B. acutum*). The reports of this species from Svalbard need verification.

### *Bryum alpinum* With.

Phips (1774) reported two sterile species of *Bryum*, which were found to be like Dillenius' (1741) *Bryum trichodes laete virens*, [*capitulis cernuis oblongis*] and *Bryum hypnoides pendulum* [*sericeum, coma insigni atro-rubente*]. According to Lindberg (1883) the Dillenian names refer to *Pohlia nutans* and *Bryum alpinum*, respectively. *Pohlia nutans* is common on Svalbard. *Bryum alpinum* reaches Finnmark in Norway (Størmer 1969), and is unlikely to grow further north. Perhaps the old record refers to *Pohlia nutans* ssp. *schimperii* whose sterile reddish cushions may be quite like those of *B. alpinum*.

### *Bryum archangelicum* Bruch & Schimp.

Reported from two localities on Spitsbergen N (Lindberg 1867; Berggren 1875). However, Lind-

berg (1867) doubted whether his material was well separated from *B. algovicum* (as *B. pendulum*), and Berggren's (1875) material was stated to have only immature sporophytes. We have seen a Berggren specimen (O), it is made up of a synoicous plant with unripe capsules and can hardly be satisfactorily named.

### *Bryum blindii* Bruch & Schimp.

Reported by Frahm (1977) from Adventdalen/Eskerdalen, but the material (herb. Frahm) belongs to *Pohlia nutans*. It is made up of depauperate paroicous plants with short capsules as in ssp. *schimperii*.

### *Bryum caespitium* Hedw.

Reported by Hooker (1825, 1828), Sommerfelt (1833) and Vahl in Lindblom (1840), but these reports were rejected by Kuc (1973a), and from Bellsund S by Świąż & Karczmarz (1991a) and Chamberlindalen in Recherchefjorden by Świąż & Karczmarz (1991b). '*Bryum caespitosum*' reported by Tishkov (1986) is probably meant to be this species. Duell (1992: 91) states that the present authors reported *B. kunzei* Hornsch. from Svalbard. This taxon belongs to *B. caespitium* s.l. No reference at all was made to *B. kunzei* in a preliminary rough copy of the present paper seen by Duell!

### *Bryum capillare* Hedw.

Reported from Bellsund S by Świąż & Karczmarz (1991a). Its presence on Svalbard has to be confirmed.

### *Bryum cyclophyllum* (Schwaegr.) Bruch & Schimp.

In the primary literature only listed in a vegetation table from Bohemanflya by Kobayashi et al. (1990: Table 7, as *B. tortifolium*). Listed from Svalbard by Steere (1978) and Nyholm (1993). Some authors (e.g. Savicz-Ljubitzkaya & Smirnova 1970, as *B. tortifolium*) place *B. cryophilum* (as *B. obtusifolium*) as a synonym, and the Svalbard record probably refers to that taxon. The two are compared for the first time in the protologue of *B. obtusifolium* (Lindberg 1867) and by

Berggren (1875, in comment on *B. obtusifolium*). The differences between them are dealt with in some detail by Persson & Viereck (1983).

### *Bryum elegans* Nees

Arnell's (1900) *B. elegans* var. *sanguineum* described from Svenskøya is *B. rutilans* (type material seen, pers. comm. E. Nyholm). Perhaps the mention of *B. elegans* from Svalbard by Bryhn (1906), Podpera (1954) and Abramova et al. (1961) originates from Arnell's report. Recently reported from Bellsund S by Karczmarz & Świąż (1990b).

### *Bryum intermedium* (Brid.) Bland.

Berggren (1875: 12) mentions this name; but it is not included in his annotated list of species and the report is therefore considered dubious. Listed from Svalbard by Nyholm (1993).

### *Bryum knowltonii* Barnes

Reported from Bjørnøya, Grønfjorden and Adventfjorden by Berggren (1875, as "eine bemerkelseswerthe Form" of *B. lacustre*). Later reported from Wijdefjorden by Wulff (1902, as *B. lacustre*); the specimen (LD) has large capsules with cross walls on outer peristome teeth and belongs to *B. algovicum*. Reported from Isfjorden by Tishkov (1986, as *B. lacustre*). There is also a subfossil report by Schimper (1870, as *B. lacustre*). The uncontrolled reports need verification. Listed from Svalbard by Nyholm (1993).

### *Bryum longisetum* Schwaegr.

Mentioned in vegetation tables from Hornsund and Bjørndalen SW of Longyearbyen by Euroala (1968, as *Bryum* cf. *longisetum* var. *labradorense*).

### *Bryum mamillatum* Lindb.

Reported from Bjørnøya by Berggren (1875). The specimen is stated to have young sporophytes only, and the report is in need of confirmation.

*Bryum neodamense* C. Müll.

Reports of this species (see Kuc 1973a; Barkman 1987; Kobayashi et al. 1990: Table 7, as *B. pseudotriquetrum* f.; Świąś & Karczmarz 1991b – as *B. neodamense* unless otherwise stated) are included in *B. subneodamense*. According to Persson (in Persson & Sjørs 1960, as *B. ovatum*) *B. subneodamense* “is an arctic-alpine species most related to *B. neodamense* Itzigs. The latter is a lowland species which seems to be more or less replaced by *B. ovatum* to the north.” However, Karczmarz & Świąś (1988) reported both species from Bellsund S (as *B. neodamense* and *B. ovatum*), but their interpretation needs to be confirmed. Listed from Svalbard by Nyholm (1993), who does not mention *B. subneodamense*.

*Bryum schleicheri* Lam. & DC.

Reported from Bellsund S (Karczmarz & Świąś 1988, 1990b; Świąś & Karczmarz 1991a, 1993 – in the last paper both as var. *schleicheri* and var. *latifolium*), and Chamberlindalen in Recherche-fjorden (Świąś & Karczmarz 1991b, as var. *schleicheri* and var. *latifolium*), see also °*B. turbinatum*. It is hardly accepted from Fennoscandia by Nyholm (1993). The Svalbard reports need confirmation.

*Bryum turbinatum* (Hedw.) Turn.

Reported by Hooker (1828), Vahl in Lindblom (1840) and Berggren (1875, as *B. turbinatum* var. *latifolium*, only from Bjørnøya). According to Wijk et al. (1959) the variety belongs to °*B. schleicheri*. These old reports are unreliable and must be considered in the light of a modern species concept in *Bryum*. Hooker (1828) reported a *Bryum* species from Heclahamna in Sorgfjorden as follows: “*Bryum* ? *foliis ovato-rotundatis laxe imbricatis valde concavis acutis insigniter reticulatis, nervo ante apicem evanescente*. There is no fruit on this plant, which has entirely the habit of a *Bryum*, and will rank near to *B. turbinatum*: but the structure of its leaves is different from any that I am acquainted with.” If the described material exists it could probably be identified.

*Bryum uliginosum* (Brid.) Bruch & Schimp.

Only reported in vegetation tables from Bohe-

manfya by Kobayashi et al. (1990: Table 5, 7). It is mainly a southern lowland species in Fennoscandia (Nyholm 1993; Hallingbäck & Holmåsén 1985), and the report is in need of confirmation.

*Bryum veronense* De Not.

Reported once from a dry scree at Hornsund (Kuc 1963a; also in Savicz-Ljubitzkaya & Smirnova 1970); its usual habitat is moist sandy soil beside streams (Jensen 1939; Nyholm 1993). Kuc's material (KRAM) consists of dense cushions made up of filiform plants with reddish stems. Also the leaf bases and costa are reddish. The leaves are evenly arranged along the stem. In *B. veronense* the leaves are greenish and the shoot budlike. In the most filiform plants the leaves are 0.7 mm long and 0.55 mm broad, whereas in more robust stems they are about 1.3 mm long and 0.8 mm broad. The costa usually reaches the apex in the large leaves. The specimen represents strongly depauperate material of *Bryum* sp. non *B. veronense*. The taxonomic status of *B. veronense* has been disputed (Nyholm 1958: 245, 1993), but own field experience (at Driva river in Oppdal, C Norway) indicates that it is a good species.

*Callialaria curvicaulis* (Jur.) Ochyra

The taxon has been reported many times as *Cratoneuron filicinum* var. *curvicaule*, see summary in Kuc (1973a). Ochyra (1989) disregarded all Svalbard specimens he saw; Kuc's (1963a) specimens from Hornsund were identified as *Drepanocladus aduncus*. It seems that the specimens reported from Svalbard as *Cratoneuron arcticum* Steere are part of the same set of problems. Euroła & Hakala (1977) state that their *C. arcticum* is the same as *C. filicinum* var. *curvicaule*. We have seen eight specimens named *C. arcticum* by Euroła (OULU); they include almost nothing of the taxon in question but are made up of such different species as *Hypnum revolutum*, *Sanionia uncinata* and *Philonotis tomentella*. Philippi (1973) cited localities of *Cratoneuron arcticum* from widely separated areas; see also Frahm (1977) and Barkman (1987). Ochyra (1989) made *C. arcticum* a synonym of *Pseudoleskea chilensis* (Lor.) Ochyra – before that known as a southern hemisphere species. Until the reported Svalbard specimens have been revised according to the clarified taxonomy, *Callialaria curvicaulis* and

*Pseudoleskea chilensis* are rejected from Svalbard. The reports of \**Amblystegium varium* (Kuc 1963a) and *A. boreale* (Dixon 1933) probably also refer to the same mess (see Kuc 1973a).

*Calliergon cordifolium* (Hedw.) Kindb.

Reported from a number of localities in the early literature (see Kuc 1973a) and by Frahm (1977) and Kobayashi et al. (1990). This is not an arctic species, and thorough determination of large recent *Calliergon* collections indicates that the reports are erroneous and refer to the variable *C. richardsonii*. See also Hagen (1899–1904: 342, as *Hypnum*).

*Calliergon giganteum* (Schimp.) Kindb.

The slender Svalbard material reported as *C. giganteum* is not identical with material from more southern areas. The costa may be long and mostly unbranched, but the plants belong within the variation of *C. richardsonii* (L. Hedenäs pers. comm.).

*Calliergon megalophyllum* Mik.

Reported by Persson (1942); the material belongs to *C. richardsonii* (Kuc 1973a).

*Calliergon orbiculari-cordatum* (Ren. & Card.) Broth.

This arctic North American taxon was reported from Bjørnøya and four localities on Spitsbergen by Karczmarz & Kuc (1966; see also Karczmarz 1971), and mapped from Svalbard by Karczmarz & Świąś (1989a). Further reported from NW Sørkapp Land (Dubiel & Olech 1990: Tab. 22–23), Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a), and Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b). The Svalbard material called *C. orbiculari-cordatum* is not identical to the American material and belongs within the variation range of *C. richardsonii* (Hedenäs 1993, and pers. comm.).

*Calliergonella cuspidata* (Hedw.) Loeske

Reported by Keilhau (1831, as *Hypnum*) and Sommerfelt (1833, as *Hypnum*, same material),

and subfossil from Holocene sediments at Adventdalen by Göttlich & Hornburg (1982, as *Acrocladium*).

*Campylium elodes* (Lindb.) Kindb.

It was reported by Acock (1940, as *Hypnum elodes* Spr. forma) in his vegetation analyses from a shingle beach at Billefjorden and later by Heinemeijer (1979, as f. 'prostratum') from Edgeøya. The species is southern (Nyholm 1965) and the reports probably erroneous.

*Cephalozia catenulata* (Hüb.) Lindb.

Reported from Bjørnøya by Watson (1922, as *C. reclusa*; the same material reported by Summerhayes & Elton 1923: 226, as *C. serrifolia*) who himself considered the determination as doubtful.

*Cephalozia leucantha* Spruce

Reported from Bjørnøya (Watson 1922; Summerhayes & Elton 1923: 226), and listed with reservation in a vegetation table from the large mire area Stormyra in Van Mijenfjorden (Eurola 1971a, as *C. cf. leucantha*). "It barely penetrates into the Arctic. . . ." (Schuster & Damsholt 1974), and we consider the Svalbard reports in need of confirmation.

*Cephaloziella divaricata* (Sm.) Schiffn.

Reported as widespread by Berggren (1875, as *Jungermannia divaricata* var. *incurva*), but according to Arnell & Mårtensson (1959) this refers to *C. arctica*. Watson (1922, as *C. byssacea*) reported it from Prins Karls Forland: "The leaves were distant, two-third bilobed into acute segments; the apical leaves were eroded by the formation of two-lobed gemmæ; small 2–3-celled, subulate underleaves were present at the apices of the shoots." Under different names it is also mentioned by other authors. In Fennoscandia *C. divaricata* is supposed to be the only common species (Hallingbäck & Holmåsén 1985), while *C. arctica* is the common species on Svalbard (according to Arnell & Mårtensson 1959). Erroneously listed from Svalbard by Duell (1983, R. Duell pers. comm.). Material from strongly acidic substrates may correspond to *C. divaricata*

or another species different from the basiphilous *C. arctica*. The problem is in need of further studies. The most thorough recent treatment of the genus *Cephaloziella* from an arctic area (S Greenland) is presented by Schuster (1988), who points out that *C. arctica* "shows extraordinary malleability — so much so that its perimeters can hardly be adequately established." (!) See also Schuster & Damsholt (1974). It is probable that more than two *Cephaloziella* species occur on Svalbard.

*Cephaloziella grimsulana* (Gott. & Rabenh.) Lacout.

Reported from Bellsund S by Świąś & Karczmarz (1991a, 1993) and Karczmarz & Świąś (1990b), and from Chamberlindalen in Recherchefjorden by Świąś & Karczmarz (1991b). This is their only species of the genus, and that is quite unrealistic. Berggren (1875) stated that his *Jungermannia divaricata* var. *incurva* (= *Cephaloziella arctica*) is "Der schweizischen *J. grimsulana* Jack . . . sehr ähnlich."

*Cephaloziella integerrima* (Lindb.) Warnst.

Only reported from the mountain slope of Zepelinfjellet near Ny-Ålesund (Arnell & Mårtensson 1959). It is a rare lowland species in Fennoscandia (Arnell 1956; Hallingbäck & Holmåsén 1985), and listed as 'suboceanic' by Duell (1983), and the Svalbard material is in need of revision according to recent studies especially by Schuster (1988).

*Cephaloziella rubella* (Nees) Warnst.

Reported from Svenskøya and Kongsøya at Kong Karls Land by Arnell (1900, as '*Cephalozia bifida* (Schreb.) Lindberg' with synonym '*Jungermannia divaricata* Nees'). Reported from Raudfjorden by Wulff (1902, as *Cephalozia bifida* (Schreb.) Lindb.) and from Bohemanflya by Summerhayes & Elton (1923: 254, as *Cephaloziella bifida* Schiffn. and var. *erosa*). The taxon is called *C. rubella* var. *bifida* by Schuster (1980). Its presence on Svalbard needs confirmation.

*Cephaloziella spinigera* (Lindb.) Jørg.

Reported also as *C. subdentata*, see *C. uncinata*.

*Chiloscyphus polyanthos* (L.) Corda

Reported by Lindberg (1867, as var. *rivularis*); the same material was referred to by Schiffner (1912, as f. *luxurians*, Herb. Lindenberg 4446) when revising the genus in Europe. The actual material was mixed with *Bryum weigeli* and stated to have been collected by J. Vahl at Bellsund in 1838 (Berggren 1875: 66, in comment on *B. duvalii*). Listed from Svalbard in all floras (Müller 1954–1957, as *C. pallescens*; Arnell 1956 and Schuster 1980, as *C. polyanthus* and *C. pallescens*; Smith 1990, as *C. polyanthos* var. *polyanthos* and var. *pallescens*), and all statements probably refer to this single old report! However, Berggren (1875: 66) considered that ". . . das Vorkommen auf Spitzbergen von *Chiloscyphus polyanthus* . . . sehr zweifelhaft scheint. . .", and he supposed that the reported material had been erroneously labelled and possibly originated from the Scandinavian coast (the expedition visited northernmost Norway). The presence on Svalbard of this mainly non-arctic species needs to be confirmed.

*Cirriphyllum piliferum* (Hedw.) Grout

Reported by Hagen (1952). "As pointed out under *Brachythecium turgidum*, in my opinion at least two of Lindberg's (1867, p. 539) *C. cirrosum* refer to turgid types of the former species. I think therefore that other reports of *C. cirrosum* and *C. piliferum* from Svalbard must be read critically." (Arnell & Mårtensson 1959: 161). See also °*Brachythecium frigidum*.

*Cnestrum schisti* (Web. & Mohr) I. Hag.

Listed from 'Spitsbergen' by Abramova et al. (1961) and from Chamberlindalen in Recherche-fjorden by Świąś & Karczmarz (1991b). *Dicranum schisti* Lindb. reported by Summerhayes & Elton (1923: 225) from Bjørnøya and by Polunin (1945) from Kongsfjorden is a synonym of *Kiaeria blyttii* (but Polunin's material belongs to *Oncophorus wahlenbergii* according to Arnell & Mårtensson 1959: 129).

*Cynodontium fallax* Limpr.

Reported from several localities at Hornsund by Kuc (1963a), but four specimens (KRAM) have

been renamed *C. tenellum* (3) and *Dicranoweisia crispula* (Frisvoll unpubl.).

*Cynodontium gracilescens* (Web. & Mohr) Schimp.

Schimper (1870) has a subfossil report of "*Cynodontium* [sp.]. Dem *C. gracilescens* ähnlich, aber durch breitere und kürzere Blätter verschieden." The name was used by Berggren (1875: 34) when describing the variation of *C. polycarpon*; he simply states that near bird cliffs the plants become more like *C. gracilescens*, with broader, more obtuse and papillose leaves. Listed from Svalbard by Nyholm (1987), but the report is erroneous (E. Nyholm pers. comm.).

*Cynodontium polycarpon* (Hedw.) Schimp.

Reported by Lindberg (1862) from SW Spitsbergen, Lindberg (1867, as *Dicranum*) from Kobbefjorden and Sorgfjorden, and by Berggren (1875) from Bjørnøya and several localities in Spitsbergen. At this time *C. tenellum* was not yet distinguished as a species but usually treated as a variety of *C. polycarpon*. Berggren's (1875) material from Parryøya (O, 3 specimens) and Kobbefjorden (O) is *C. tenellum*. Kuc (1973a) stated that Berggren's material from Parryøya, Brennevinsfjorden and Grønfjorden belongs to *C. polycarpon*, but the specimens he examined need to be checked. All specimens we have studied possess obtuse perigonal leaves and lack an annulus of large separating cells (see Crundwell 1960). Also reported from Wijdefjorden (Summerhayes & Elton 1928: 230) and recently from near Barentsburg in Grønfjorden (Hadač 1989), Recherchefjorden (Karczmarz & Świąś 1990a; Świąś & Karczmarz 1991b), and Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a, 1993). Although we have seen no material of the Bjørnøya *C. polycarpon*, we think also this refers to *C. tenellum*.

*Dicranella cerviculata* (Hedw.) Schimp.

Reported as very rare, and associated with *Calliergon giganteum*, on Hermansenøya in Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982: Table 6; Boińska & Gugnacka-Fiedor 1986). Later reported from Bellsund S (Karczmarz & Świąś 1988), NW Sørkapp Land

(Dubiel & Olech 1990: 46, 62), Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b) and Barentsburg (Schumacher 1993, in specimen of the discomycete *Lamprospora minuta*; the material is revised and is *Leptobryum pyriforme*, herb. O). The lack of other, more probable *Dicranella* species in the above species lists and tables indicates that the reports need to be confirmed. There is also a subfossil report by Schimper (1870).

*Dicranella heteromalla* (Hedw.) Schimp.

The name is mentioned by Schimper (1870) in a list of subfossil bryophytes: "*Dicranum* sp.? Eine zu *Dicranella heteromalla* Hedw. hinneigende Form."

*Dicranoweisia cirrata* (Hedw.) Milde

Listed in vegetation tables from Kongsfjorden (Brossard et al. 1984), NW Sørkapp Land (Dubiel & Olech 1990: 64), and Chamberlindalen in Recherchefjorden (Świąś & Karczmarz 1991b, also report of *D. crispula*). The species is strongly southern in Fennoscandia (Størmer 1969).

*Dicranum bonjeanii* De Not.

The previous reports (see Kuc 1973a, 1994b) are rejected, see *D. scoparium*. Herbarium specimens named *D. palustre* and *D. palustre* var. *juniperifolium* (LD, O) by Berggren are *D. laevigens*.

*Dicranum brevifolium* (Lindb.) Lindb.

This is the correct name of *D. muehlenbeckii* in the sense of previous Fennoscandian authors (Nyholm 1987). The related *D. acutifolium* is widespread on Svalbard. Both are, inter alia, known by their leaf transverse sections which are like a pair of tongs (Nyholm 1987), but *D. flexicaule* has a slight tendency to show a similar type of transverse section. We have seen no typical Svalbard specimens of *D. brevifolium*, with the cells in the upper part of the leaf lamina regularly or roundedly quadrate and arranged in rows. Although it was listed from Svalbard by Podpera (1954, as *D. muehlenbeckii* var. *cirratum*) and Nyholm (1987), and reported from

Forlandsundet by Boinńska & Gugnacka-Fiedor (1986, as *D. muehlenbeckii* var.), we think this needs confirmation. Kuc's (1973a) statement that *D. brevifolium* was reported by Bryhn (1909) is erroneous as the only *Dicranum* included by him is *D. angustum*. But it was reported from 'Spitsbergen' by Bryhn (1906).

### *Dicranum fragilifolium* Lindb.

Reported by Lindberg (1862) and Heuglin (1874) without locality information. The reports were considered to be doubtful by Frisvoll (1981a), but the species was later listed from Bellsund S (Karczmarz & Świąś 1988, 1990b; Świąś & Karczmarz 1991a, 1993), Recherchefjorden (Karczmarz & Świąś 1990a; Świąś & Karczmarz 1991b), and in four vegetation tables from NW Sørkapp Land (Dubiel & Olech 1990). It was also listed from Svalbard by Nyholm (1987). Until more specific morphological characteristics are attributed to Svalbard material the reports should be rejected, see *D. tauricum*.

### *Dicranum groenlandicum* Brid.

"... von Spitzbergen besitze ich auch vom Prof. Berggren gesammelte Exemplare von derselben Art." (Arnell in Lindberg & Arnell 1890). Also reported, as "Spetsbergen: Berggren", by Kindberg (1898). A review of the previous reports in the Svalbard literature is given by Kuc (1973a). Kuc (1963a) reported this species to be "One of the commonest species of the dry tundra." at the N side of Hornsund. All Kuc's specimens (KRAM) have been revised by us and they belong to *D. acutifolium* (1), *D. angustum/laevidens* (10), *D. fuscescens* (3), and *D. spadiceum* (6). Recently it has been reported from Recherchefjorden and Bellsund S (Rzętkowska 1988a, b; Karczmarz & Świąś 1988, 1989a, 1990b; Świąś & Karczmarz 1991a, b, 1993), Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982; Boinńska & Gugnacka-Fiedor 1986) and Hornsund/NW Sørkapp Land (Dubiel & Olech 1990, 1992). *Dicranum groenlandicum* is absent from our large collections of *Dicranum* from Isfjorden, Kongsfjorden, Liefdefjorden and Bockfjorden, and is excluded here from the Svalbard flora (see also Arnell & Mårtensson 1959). The thick-walled leaf cells of other species (especially *D. laevidens* and *D. spadiceum*) have made these misinterpretations poss-

ible. *Dicranum groenlandicum* sensu Nyholm (1987) has, inter alia, more slender shoots and relatively narrower leaves than the mentioned species (except *D. fuscescens*). Jóhannsson's (1991) *D. groenlandicum* appears to be *D. laevidens* sensu the present interpretation. The types of the names may need to be checked.

### *Dicranum leioneuron* Kindb.

Reported by Savicz-Ljubitzkaya & Smirnova (1970) and Kuc (1973a), see *D. scoparium*.

### *Dicranum muehlenbeckii* Bruch & Schimp.

In Fennoscandia this name has been erroneously used for *D. brevifolium*. The true *D. muehlenbeckii* is known from only one Fennoscandian locality (Nyholm 1987), and is certainly absent from Svalbard. The correctly interpreted reports of *D. muehlenbeckii* sensu Nyholm (1954) from Svalbard refer to *D. acutifolium*. But Gugnacka-Fiedor & Noryskiewicz (1982: Table 1, 3, 7) reported both *D. acutifolium* and *D. muehlenbeckii* from Kaffiøyra at Forlandsundet; the latter was probably reported as var. *brevifolium* by Boinńska & Gugnacka-Fiedor (1986), see °*D. brevifolium*.

### *Dicranum scottianum* Turn.

Kindberg (1900: 84) reported this species in the following way: "*D. Scottii*, Turner. Spitzbergen: com. Mr. K. Johansson". Also listed from Svalbard by Podpera (1954, as *Orthodicranum scottianum* ssp. *anglicum*). The Norwegian and European distribution of this southern and western species is presented by Størmer (1969).

### *Didymodon icmadophilus* (C. Müll.) K. Saito

Listed from Svalbard by Duell (1984) and Nyholm (1989). However, we have seen no primary report, and Nyholm's report is an error (E. Nyholm pers. comm.). As the species is closely related to *D. acutus*, a taxonomic reevaluation (see Frisvoll 1978d, in comment on *D. acutus*) is perhaps needed. Steere (1978) and Brassard (1971b) report *D. icmadophilus* (as *Barbula*) from Alaska and Ellesmere Island, respectively, and

their plants are probably the same as the Svalbard taxon. But we cannot see that the taxon reported here is identical to *D. icmadophilus* from 'classical' localities in Central Norway (e.g. the Driva river in Oppdal, Sør-Trøndelag).

*Didymodon luridus* Hornsch.

Reported by Dobbs (1939): "Dark brown patches of moss on shingle bank near the wet 'tundra' consisting chiefly of *Barbula lurida* Lindb. and *Tortula* [= *Syntrichia*] *ruralis* Ehrh." Supposed to refer to *Didymodon asperifolius* by Kuc (1973a, sub nom. *Barbula lurida*).

*Drepanocladus sendtneri* (H. Müll.) Warnst.

Cited from a few older dubious references by Kuc (1973a; see also Arnell & Mårtensson 1959, in comment on *D. lycopodioides* and *D. intermedius*), and later reported from Forlandsundet (Gugnacka-Fiedor & Noryskiewicz 1982: Table 6; Boinńska & Gugnacka-Fiedor 1986) and Bellsund S (Karczmarz & Świąś 1988, 1990b), but interpreted by us as in need of confirmation. It was reported as a high temperature indicator in Holocene deposits at Semmeldalen by Serebryanny et. al (1985).

*Encalypta ciliata* Hedw.

The reports (see Kuc 1973a) are doubtful, because since then several *Encalypta* species with fringed calyptra have been reported. An Eurola (1971b) specimen (OULU) from Sveagrava is made up of a sterile *Encalypta* with long yellowish leaf hairpoint (*E. ciliata* has practically no hairpoint), and fertile *Tortula mucronifolia*. Recently reported from Bellsund S (Świąś & Karczmarz 1993) and Ny-Ålesund (Schumacher 1993, in specimen of the discomycete *Lamprospora seaweri*; the bad material is revised and is probably *E. procera*, herb. O).

*Encalypta spathulata* C. Müll.

Reported in vegetation tables from Russekeila by Eurola (1968: 14, as *E. rhaptocarpa* var.). The report is in need of confirmation, see °*E. ciliata*.

*Encalypta streptocarpa* Hedw.

Reported from SW Spitsbergen (Lindberg 1862), Trygghamna in Isfjorden (Eurola 1968: 14), Bellsund S (Świąś & Karczmarz 1991a, 1993) and Chamberlindalen in Recherche fjorden (Świąś & Karczmarz 1991b). It is probable that the reports refer to *E. procera* which sometimes is very similar to the more southern *E. streptocarpa* (see Horton 1983).

*Encalypta vulgaris* Hedw.

This southern species is doubtfully present on Svalbard. It was reported from Hornsund by Kuc (1963a, as var. *mutica*).

*Eremonotus myriocarpus* (Carring.) Pears.

Listed from Svalbard by Duell (1983), but the reference is erroneous (Duell pers. comm.). It was not recorded from Svalbard by Urmi (1978).

*Fissidens bryoides* Hedw.

Reported in a collective sense by Frisvoll (1981a), the specimens belong to *F. viridulus* and *F. arcticus*. Also reported by Dahle (1983a: Tab. 7).

*Fissidens exilis* Hedw.

Reported by Berggren (1875) based on "nur ein paar Individuen" from Adventfjorden. But he was uncertain about the determination: "Sollte wohl diese spitzbergische Pflanze eine eigene Species sein?" Perhaps it refers to *F. arcticus*?

*Fissidens incurvus* Röhl.

Reported by Berggren (1875), see *F. viridulus*.

*Grimmia alpestris* (Web. & Mohr) Hornsch.

*Grimmia jacquinii* var. *subimberbis* described from Amsterdamøya by Lindberg (1867) was transferred to *G. alpestris* by Berggren (1875; see also Kuc 1973a), but the type specimen has proved to be *G. subsulcata* (rev. E. Nyholm, pers. comm.; Frisvoll & Blom 1993). See also °*G. caespiticia* (below).



*Grimmia caespiticia* (Brid.) Jur.

The Lindberg (1867) report of *Grimmia jacquinii* var. *subimberbis* was interpreted as *G. caespiticia* by Wijk et al. (1962) and, accordingly, listed from Svalbard by Frisvoll et al. (1984). Also listed from there by Savicz-Ljubitzkaya & Smirnova (1970). See also *G. subsulcata*.

*Grimmia ovalis* (Hedw.) Lindb.

Reported by Dixon (1922) and Summerhayes & Elton (1923: 263) as *G. commutata*. Curiously enough the specimen belongs to *Trichostomum arcticum* (Frisvoll 1978a). *Grimmia ovalis* ssp. *spitsbergensis* (Biz. & Ther.) Podp., based on *G. spitsbergensis*, is also a synonym of *T. arcticum* (Arnell & Mårtensson 1959, as *T. cuspidatissimum*).

*Grimmia plagiopodia* Hedw.

Only reported from 'Sassen Quarter' by Hadač (1946) and possibly confused with the similar *G. anodon*, which has proved to be frequent and is known from the area. We consider that this very interesting report needs confirmation.

*Grimmia pulvinata* (Hedw.) Sm.

Reported by Vahl in Lindblom (1840). "Thus we find, e.g., in Lindblom's inventory of Spitsbergen's plants, published in Bot. Not. 1840, inter alia *Hypnum cupressiforme*, *Grimmia pulvinata*, *Tortula muralis*, *Orthotrichum affine* etc., which certainly never have been and never will be found there [Frisvoll, transl.]." (Lindberg 1867: 535)

*Gymnocolea acutiloba* (Schiffn.) K. Müll.

See *G. inflata*.

*Hamatocaulis lapponicus* (Norrl.) Hedenäs

Published from lower Reindalen by Eurola (1971a, as '*Drepanocladus* cf. *lapponicus*' and '*D. lapponicus* (incl. *D. vernicosus*)'). We have seen eight specimens (OULU) labelled *D. cf. lapponicus* and '*D. revolvens* (stem without central strand)'. Three of the four examined specimens have a central strand, and they all possess a stem

hyalodermis and 1–2 inflated alar cells. They belong to *Scorpidium revolvens*. Hedenäs (1989b) did not include any report of *H. lapponicus* from Svalbard.

*Herzogiella adscendens* (Lindb.) Iwats. & Schof.

Listed from Svalbard by Duell (1985), but the source of the report is doubtful (R. Duell pers. comm.).

*Homalothecium lutescens* (Hedw.) Robins.

Reported by Polunin (1945, as *Camptothecium*). Probably *Tomentypnum nitens*.

*Hygrohypnum duriusculum* (De Not.) Jamieson

Only reported from Bellsund S (Karczmarz & Świąś 1988; Świąś & Karczmarz 1993, as *H. dilatatum*). The report is in need of confirmation.

*Hygrohypnum molle* (Hedw.) Loeske

Reported by Berggren (1875, as *Hypnum*), see *H. cochlearifolium*, and as subfossil by Schimper (1870, as *Hypnum*: "Zehr kleine Form. Ziemlich häufig.").

*Hypnum cupressiforme* Hedw.

Reported by Hooker (1828), by Sommerfelt (1833) "from all places" (see Introduction), and by Świąś & Karczmarz (1991a) from Bellsund S; the name probably refers to different *Hypnum* species. See also °*Grimmia pulvinata*.

*Hypnum hamulosum* Schimp.

Reported from Lomfjorden based on material collected by Malmgren in 1861 (Lindberg 1867). The specimen (H-SOL) is made up of a few pale elongate stems of *H. revolutum* with somewhat weakly recurved leaf margin; however, the margin is denticulate as in that species, and there is a large group of small incrassate alar cells. Reported from Kong Karls Land (Svenskøya) by Arnell (1900, as *Stereodon*). Two specimens

(KRAM) from Hornsund reported by Kuc (1963a) belong to *H. callichroum* and *H. revolutum*, respectively. It was also reported from Adventdalen by Frahm (1977), but his material (herb. Frahm, 3 specimens) belongs to *H. revolutum*. Reported from Dyrevika in Kongsfjorden by Wegener et al. (1992), original material (sent by L.B. Jacobsen) is *H. vaucheri*. The only material which has not been revised is Arnell's, and we doubt that it is correctly named. There is also a subfossil report of "*Hypnum hamulatum*" by Schimper (1870); the name is not listed by Wijk et al. (1964, 1969) and may be a misprint for *H. hamulosum*.

### *Hypnum nordenskiöldii* Schimp.

Described from subfossil material (Schimper 1870) and referred to *Hypnum* subgen. *Limnobium* which is a synonym of *Hygrohypnum*. The diagnosis emphasises the differences with regard to *H. luridum*: "Differt ab *Hypno palustri*, foliis omnibus multo minoribus, acutioribus."

### *Jamesoniella* sp.

Reported in vegetation tables from Bohemanfya by Kobayashi et al. (1990: Table 6). The most northerly of the *Jamesoniella* species is *J. undulifolia* (Nees) K. Müll., which is reported from W Greenland north to Disco, and from Thule (77°48'N, see e.g. Schuster 1983: 605, Fig. 72). It could therefore well occur on Svalbard, but we suppose that the genus is erroneously reported.

### *Jungermannia atrovirens* Dum.

Reported with reservation by Philippi (1973, as *Solenostoma*) from Barentsøya, Edgeøya and Agardhbukta, but the cited material has been renamed *J. polaris* by Vána (1973). See also Persson (1942) and Arnell & Mårtensson (1959, in comment on *J. polaris*).

### *Jungermannia borealis* Damsh. & Vána

Only reported from Longyearbyen by Arnell & Mårtensson (1959, as *J. oblongifolia*). The material has been referred to *J. polaris* by Vána (1973).

### *Jungermannia exsertifolia* Steph.

Listed from Svalbard by Duell (1983), but the reference is erroneous (R. Duell pers. comm.).

### *Jungermannia gracillima* Sm.

Reported from Bellsund S by Święs & Karczmarz (1991a, as *Solenostoma crenulatum* var. *nana*).

### *Jungermannia jenseniana* Grolle

Reported by Arnell & Mårtensson (1959, as *J. pusilla*), but this specimen has been renamed *J. confertissima* by Vána (1974). Duell (1983) also reported *J. jenseniana* from Svalbard based on an unpublished reference which may not be correct (R. Duell pers. comm.).

### *Jungermannia obovata* Nees

Only reported from the Longyearbyen and Ny-Ålesund areas (Arnell & Mårtensson 1959, as *Plectocolea*). The specimens were renamed *J. subelliptica* by Vána (1975). Schuster (1988) found it difficult to distinguish between South Greenland material of *J. obovata* and *J. subelliptica*.

### *Jungermannia pumila* With.

Only reported from two sites in the Ny-Ålesund area (Arnell & Mårtensson 1959). Later, the taxonomy of *J. pumila/polaris* has been revised and thoroughly discussed by Vána (1973), Schuster & Damsholt (1974) and Schuster (1988). The possible difference between the two taxa is found in the form of the leaves, while the form of the perianth is less reliable. The common arctic taxon is *J. polaris*, and we consider that the presence of *J. pumila* should be confirmed according to the mentioned treatments.

### *Leskea* sp.

See °*Pterogonium* sp.

### *Lophozia bantriensis* (Hook.) Steph.

Listed from Svalbard by Müller (1954–1957) and Arnell (1956), but we have not seen any primary reports.

*Lophozia collaris* (Nees) Dum.

Reported by Lindberg (1867, as *Jungermannia mülleri* II *acuta*  $\alpha$  *major gonidiifera*) and Hagen (1952, as *Leiocolea muelleri*). The reports probably refer to *Lophozia heterocolpos* or its var. *arctica* which both are frequent (see Arnell & Mårtensson 1959, in comment on *Leiocolea heterocolpos*). See also *Lophozia badensis* and *L. heterocolpos*.

*Lophozia elongata* Steph.

Reported from Longyearbyen (Arnell & Mårtensson 1959, as *Orthocaulis*) and Hornsund (Rejment-Grochowska 1967, as *Orthocaulis*). Schuster (1988) pointed out that gemmae are lacking in this species, but both reports were based on gemmiferous material. See also °*Barbilophozia binsteadii*. *Lophozia* is one of the least known bryophyte genera on Svalbard, and may include several unpublished and poorly understood species. Important monographic studies on the genus have been done after the above reports, including descriptions of many new arctic taxa (e.g. by Schuster 1969, 1988). A monographic treatment of the Svalbard *Lophozia* is strongly needed.

*Lophozia excisa* (Dicks.) Dum.

Arnell & Mårtensson (1959) reported *L. kiaeri* Jørg. from Longyearbyen and Ossian Sarsfjellet at Kongsfjorden. The type of *L. kiaeri* belongs to *L. excisa* (Frisvoll 1982), but the identity of the Svalbard *L. kiaeri* is unknown. Reported with reservation from Bjørnøya by Watson (1922, as var. *cylindracea*). It is reported in a vegetation table from Bjørndalen by Eurola (1968) and listed from Svalbard by Duell (1983, as *L. excisa* var. *excisa*). The species may occur there, but its presence on Svalbard needs confirmation. Some of the 27 Svalbard specimens rejected as *L. latifolia* by Grolle (1967) may belong to *L. excisa*, but he does not state that.

*Lophozia incisa* (Schrad.) Dum.

Reported from Magdalenefjorden (Arnell & Mårtensson 1959), Kvalvågen at the E side of Spitsbergen and Barentsøya SW (Philippi 1973). Although Arnell (in Arnell & Mårtensson 1959)

points out that his material is *L. incisa* s. str., the specimens most likely belong to *L. opacifolia* (Frisvoll 1981a).

*Lophozia longiflora* (Nees) Schiffn.

Reported from rock crevices at Bjørnøya (Watson 1922; Summerhayes & Elton 1923, as *L. porphyroleuca*). The *L. longiflora* reported by Watson (1922) from Bjørnøya is probably meant to be the taxon treated as *L. ventricosa* var. *longiflora* by Smith (1990) (and whose correct varietal epithet appears to be var. *uliginosa* Schiffn., cf. Söderström, Karttunen & Hedenäs 1992). "... Müller [1954–1957] ... report[s] the species from ... Spitsbergen. Since *Lophozia porphyroleuca* is so nearly uniformly restricted to xylicolous sites, the report ... (based on Watson, 1922 [Bjørnøya only!]) is surely erroneous. ... " (Schuster 1969: 551, footnote 159). See also *L. ventricosa*.

*Lophozia murmanica* Kaal.

The name is mentioned from Svalbard by Duell (1983, as *L. groenlandica* with synonym *L. murmanica*). *Lophozia murmanica* (syn. *L. heteromorpha* Schust. & Damsh.) is a species of its own, while *L. groenlandica* is a synonym of *L. wenzelii* (Damsholt 1994 and pers. comm.).

*Lophozia obtusa* (Lindb.) Evans

Listed from Svalbard by Bisang (1991), but not reported in any primary literature known to us and therefore considered erroneous.

*Mannia pilosa* (Hornem.) Frye & Clark

Reported by Berggren (1875), but the specimen was referred to *Athalamia hyalina* by Arnell (in Arnell & Mårtensson 1959, as *Clevea*). Recently reported from Bellsund S by Świąż & Karczmarz (1993).

*Marsupella sprucei* (Limpr.) H. Bern.

The name is mentioned from Arnicadalen near Adventdalen by Hadač (1946: 147, as *Marsupella* ? *sprucei*). The genus is very rare on

Svalbard, but Elvebakk et al. (1987) reported *Marsupella* spp. from Berzeliusdalen.

*Meesia longiseta* Hedw.

Previously listed from Svalbard in several floras (Jensen 1939; Podpera 1954; Abramova et al. 1961), but Kuc (1973a) could not find any primary sources and did not accept this species. Recently reported from Bellsund S (Karcmarcz & Świąś 1988, 1990b; Świąś & Karcmarcz 1991a), NW Sørkapp Land (Dubiel & Olech 1990: 64) and Chamberlindalen in Recherchefjorden (Świąś & Karcmarcz 1991b). We have in vain asked the authors to see their reported material, and think the reports should be confirmed.

*Mnium stellare* Hedw.

Listed from Svalbard by Koponen in Nyholm (1993). But we have seen no primary report, and the record is regarded as an error. (Otherwise, he forgot to treat *Cinclidium latifolium* and did not include Svalbard in the distribution of *C. stygium* and *Cyrtomnium hymenophylloides*.)

*Mylia anomala* (Hook.) S. Gray

Listed from Svalbard by Müller (1954–1957), see *M. taylorii*.

*Myurella sibirica* (C. Müll.) Reim.

Listed from 'Spitsbergen' by Abramova et al. (1961) and Steere (1978), but according to Ochyra & Bednarek-Ochyra (1991) these reports "cannot be confirmed by the corresponding voucher specimens." Reported from Bellsund S by Karcmarcz & Świąś (1988) and Świąś & Karcmarcz (1993). If correct this is a most interesting member of the bryoflora of Svalbard. However, we think the reports need to be confirmed.

*Nardia scalaris* S. Gray

Reported by Hooker (1828, as *Jungermannia*) from Waldénøya, and by Acock (1940: 97, as *Alicularia*) from manured sites in a mire at Billefjorden. The reports should be confirmed.

*Odontoschisma denudatum* (Mart.) Dum.

Reported from Bellsund S by Świąś & Karcmarcz (1991a).

*Odontoschisma elongatum* (Lindb.) Evans

Reported from Vassdalen and Vengsletta in Van Mijenfjorden by Hadač (1989: 141). Schuster & Damsholt (1974) stated that the species was reported from 'Spitsbergen', but the source of their report is unknown. An old name of *Odontoschisma elongatum* is *Sphagnoecetis communis*, and, of *Odontoschisma macounii*, *Sphagnoecetis communis* var. *tessellata* Berggren (1875) described from Kongsfjorden. Perhaps there has been some confusion regarding these names.

*Odontoschisma sphagni* (Dicks.) Dum.

Reported from Bohemanflya by Summerhayes & Elton (1923: 254). The reports of three dark-coloured *Odontoschisma* species from Svalbard are enigmatic, and the specimens have to be restudied before we know their identity. May *Marsupella arctica* be involved?

*Oreoweisia torquescens* (Brid.) Wijk & Marg.

Reported from Kongsfjorden by Lindberg (1867, as *Weissia serrulata*), see also comment by Arnell & Mårtensson (1959, as *O. serrulata*) who were not able to trace Lindberg's specimen. The similar *Dichodontium pellucidum* (q.v.) has later been found in Kongsfjorden, and the report of *O. torquescens* needs confirmation.

*Orthothecium rufescens* (Brid.) Schimp.

Reported from Kongsfjorden with a question mark by Brown (1820, as *Hypnum*), and without locality by Lindberg (1862); this probably refers to *O. strictum* (which was described in 1864). Hagen (1952) reported *O. rufescens* from Isfjorden SW and Murchisonfjorden, and at the same time gave localities of *O. chryseon*, *O. intricatum* and *O. strictum*. Kuc (1963a) reported and figured var. *binervulum* (Mol.) Kuc from Hornsund. Material from Hornsund was included in an exsiccate by Bednarek-Ochyra et al. (1987), but a specimen (TRH) is reddish golden *O. chry-*

seon (cf. Berggren 1875 p. 78: “. . . auf Kalkgrund . . . die Farbe mehr ins Röthliche spielend. . .”). Reported from Bellsund S (Karczmarz & Świąś 1990b; Świąś & Karczmarz 1991a, 1993) and Chamberlindalen in Recherche-fjorden (Świąś & Karczmarz 1991b). We think the presence of *O. rufescens* in Svalbard needs to be confirmed.

### *Orthotrichum affine* Brid.

Reported with a question mark by Vahl in Lindblom (1840), see Frisvoll & Lewinsky (1981). See also °*Grimmia pulvinata*.

### *Orthotrichum rupestre* Schwaegr.

Reported by Dixon (1922), the specimen belongs to *O. speciosum* (Frisvoll & Lewinsky 1981).

### *Palustriella commutata* (Hedw.) Ochyra

Reported from Linnédalen by Hagen (1952, as *Cratoneuron*), see also °*P. falcata* (below).

### *Palustriella falcata* (Brid.) Hedenäs

In the Isfjorden area reported from Adventfjorden (Berggren 1875: 86, as *Hypnum commutatum* var. *sulcatum*: “spärlich zwischen *Hypnum pellucidum* [= *Hamatocaulis vernicosus*]”) and Billefjorden (Dobbs 1939: 134, as *Cratoneuron falcatum*: “found only on the drier part of the wet ‘tundra’”), and otherwise from Lomfjorden (Lindberg 1867, as *Hypnum commutatum* var. *sulcatum* f. *tenuis*) and Edgeøya (Heine-meijer 1979, as *Cratoneuron commutatum* f. *sulcatum*; found in his ‘*Dicranum elongatum* – Vegetatie’). All material is in need of reexamination; some reports are from rather dry habitats. A Lindberg specimen (H-SOL) labelled “Lomme-bay 1861, leg. Malmgren”, and a Berggren specimen (S) labelled “Adventbay 1868” do not include any *Palustriella* (pers. comm. L. Hedenäs) but probably material referable to *Drepanocladus* s.l.

### *Paraleucobryum longifolium* (Hedw.) Loeske

Reported in a vegetation table from NW Sørkapp

Land by Dubiel & Olech (1990: 41, as *Dicranum*). This is not an arctic species, and the report needs confirmation.

### *Philonotis arnellii* Husn.

Reported from the Isfjord Radio area by Hagen (1952). It is probably erroneously determined and may refer to filiform *P. tomentella*.

### *Philonotis caespitosa* Jur.

Only reported from Moskushamn in Adventfjorden and Deltanaset between Adventfjorden and Sassenfjorden by Hadač (1946: 143, 149) who considered it to be locally common. He even described a separate spring community, *Philonotidetum caespitosae*. We suggest that the frequency report by Hadač (1946) indicates a possible confusion with the ubiquitous and modifiable *P. tomentella*. See also °*P. fontana* (below).

### *Philonotis fontana* (Hedw.) Brid.

Frequently cited from Svalbard in the older literature, see the survey by Kuc (1973a). Most or all of these reports certainly refer to the collective species. Jørgensen (1929) reported *P. fontana* and *P. tomentella* from Hopen. Hadač (1946) reported *P. caespitosa*, *P. fontana* and *P. tomentella* from ‘Sassen Quarter’, but we do not think his determinations are reliable. Karczmarz & Świąś (1988) and Świąś & Karczmarz (1993) reported *P. fontana* and *P. tomentella* from Bellsund S; both grew at their locality 21 and *P. tomentella* was assigned to cover class 3 (21–50 % cover of 100 m<sup>2</sup>) and *P. fontana* to class 2 (6–20 %). Świąś & Karczmarz (1991b) reported also both species from Chamberlindalen in Recherche-fjorden. *Philonotis fontana* was reported from Forlandsundet by Bońska & Gugnacka-Fiedor (1986), and from Bjørnøya by Engelskjøn (1986), but these authors did not report the common *P. tomentella*. We believe that the presence of *P. fontana* s. str. on Svalbard needs confirmation.

### *Plagiochila porelloides* (Nees) Lindenb.

Listed from Svalbard by Duell (1983), but to our knowledge it has not been reported from there.

*Plagiochila spinulosa* (Dicks.) Dum.

Phips (1774) reported a sterile species of *Jungmannia* which was said to be not very different from Dillenius' (1741) *Lichenastrum ramosius, foliis trifidis*. According to Lindberg (1883) this name refers to *Plagiochila spinulosa*. No *Plagiochila* is known from Svalbard, not even *P. asplenoides* s. l., and *P. spinulosa* is definitely out of the question.

*Plagiomnium affine* (Bland.) T. Kop.

Kuc (1973a, as *Mnium*) states to have examined specimens from Hornsund and Kobbefjorden collected by Malmgren and Berggren, respectively, and he referred them to *P. ellipticum* (as *M. affine* var. *rugicum*). All reports (see Kuc 1973a; Rzętkowska 1988b) are certainly based on a collective treatment of the species. The six *Plagiomnium* species rejected from Svalbard here were mostly reported before the family and genus were taxonomically revised by Koponen (many papers, e.g. Koponen 1980; Koponen in Nyholm 1993).

*Plagiomnium cuspidatum* (Hedw.) T. Kop.

Reported by Sommerfelt (1833, as *Bryum*; see also Lindblom 1840, as *Mnium*). The *Astrophyllum cuspidatum* (L., Neck.) Lindb. of Arnell (1900) and Wulff (1902) is a synonym of *P. affine*.

*Plagiomnium elatum* (Bruch & Schimp.) T. Kop.

Reported from Billefjorden by Dobbs (1939, as *Mnium affine* var.).

*Plagiomnium medium* (Bruch & Schimp.) T. Kop.

The Svalbard material of *P. medium* s. l. belongs to *P. curvatulum*.

*Plagiomnium rostratum* (Schrader) T. Kop.

Reported by Hagen (1952, as *Mnium longirostre*).

*Plagiomnium undulatum* (Hedw.) T. Kop.

Listed with a question mark by Brown (1820, as

*Bryum ligulatum*; the synonymy is according to Koponen 1980).

*Plagiothecium laetum* Schimp.

Mentioned by Berggren (1875) as part of a collective *P. denticulatum*. Reported from Bockfjorden and Sjuøyane (Frisvoll 1981a). The material belongs to *P. svalbardense*.

*Plagiothecium piliferum* (Hartm.) Schimp.

Reported from Hornsund by Kuc (1963a, as var. *brevipilum*); his specimens (KRAM) belong to *P. svalbardense*.

*Pleurochaete squarrosa* (Brid.) Lindb.

Reported by Dobbs (1939). Supposed to refer to *Trichostomum arcticum* by Kuc (1973a, as *T. cuspidatissimum*).

*Pohlia annotina* (Hedw.) Lindb.

The *Pohlia* species with many propagula in each leaf axil from Svalbard (*P. andrewsii* and *P. proliger*) have been reported in a collective sense by Lindberg (1867, as *Bryum annotinum* ♀ *bulbilliferum*) and Berggren (1875: 59, as *Webera*). The identity of Kuc's (1963a) *P. annotina* "with single ovate bulbils in the axils" is obscure, because he at the same time reported *P. drummondii* and *P. filum* (as *P. gracilis*) which have such bulbills. Berggren (1875, as *Webera annotina*) reported specimens from Smeerenburg and Kobbefjorden with brown-red spherical gemmae on the rhizoids ("auf den Wurzelfäden braunrothe kugelförmige Bulbillen"); the identity of this material is obscure. See also *P. andrewsii*.

*Pohlia bulbifera* (Warnst.) Warnst.

Reported from Chamberlindalen in Recherche-fjorden (Świąś & Karczmarz 1991b) and Longyearbyen (Schumacher 1993, in specimen of the discomycete *Lamprospora miniata*; the material is revised and is *P. drummondii*, herb. O).

*Pohlia ludwigii* (Schwaegr.) Broth.

Reported from Smeerenburg (Lindberg 1867, as

*Bryum*) and from Bjørnøya and many localities throughout Svalbard (Berggren 1875, as *Webera*). Berggren (1875) stated that “Bulbillen” were usually at hand, and the reports presumably refer to or include the frequent *P. drummondii* which he did not mention. (*Bryum drummondii* C. Müll. was described in 1862 and its commonly used synonym *Webera commutata* Schimp. in 1876.) One specimen from Berggren’s exsiccate (No 65. *Webera Ludwigii*, Nordkapp 1868 Berggren, herb. O) possesses many elongate gemmae in each leaf axil; they are not unlike those of *P. prolifera*, but have laminate and not peglike leaf primordia (cf. Shaw 1981a). The material does not fit into any described taxon, and J. Shaw (pers. comm. 1994) thinks “this plant could be an offspring from a *P. drummondii* – *P. prolifera* cross”. Berggren (1875) also described and reported *Webera ludwigii* var. *subcarnosa* from six localities in bird cliffs at NW and N Svalbard. Type material is No. 65b in Berggren’s exsiccate, and two specimens have been available; they were sent to J. Shaw who kindly studied and named them *P. wahlenbergii* (Brennevinsfjorden 1868 Berggren, herb. O) and *P. nutans* (Parryøya 1868 Berggren, herb. O). All Berggren’s specimens must be studied before a lectotype can be selected for the name. Later reports of *P. ludwigii* are also less reliable: Karczmarz & Świąs (1990b) and Świąs & Karczmarz (1991a, list also *P. drummondii*) reported it from Bellsund S, Świąs & Karczmarz (1991b, no report of *P. drummondii*) from Chamberlindalen in Recherchefjorden, Hagen (1952, as *Webera*) from near Isfjord Radio, Summerhayes & Elton (1923: 278, as *Webera ludwigii* var. *subcarnosa*) from bird cliffs in Tempelfjorden, and Frahm (1977, no mention of *P. drummondii*) from Isfjord Radio and Kiærstranda. There is also a subfossil report by Schimper (1870, as *Webera ludwigii* var. *angustifolia*). All specimens of *P. ludwigii* s.l. need to be revised.

*Pohlia lutescens* (Limpr.) H. Lindb.

Reported from Bellsund S by Świąs & Karczmarz (1993). In Scandinavia known only from a few lowland localities in the south (Floravårdskommittén för mossor 1988; Frisvoll & Blom 1993).

*Pohlia sphagnicola* (Bruch & Schimp.) Broth.

A few old references were cited by Kuc (1973a),

and the name is also used in recent papers (e.g. by Karczmarz & Świąs 1988, 1990b; Świąs & Karczmarz 1991b). However, the dioicous *P. sphagnicola* has been widely confused with gracile plants of the paroicous *P. nutans* (see also Arnell & Mårtensson 1959, in comment on *P. nutans*). The former is a southern lowland species in Scandinavia. Lindberg (1862, 1867) and Arnell (1900) refer to male and female plants, respectively, but we still think their observations and conclusion should be confirmed.

*Polytrichum commune* Hedw.

See *P. jensenii*.

*Pseudobryum cinclidioides* (Hüb.) T. Kop.

Reported by Środoń (1960, as *Mnium*); according to Kuc (1973a) the specimen belongs to *Plagiomnium ellipticum*. Recently reported from Chamberlindalen in Recherchefjorden by Świąs & Karczmarz (1991b).

*Pseudocalliergon lycopodioides* (Brid.) Hedenäs

A southern species confused with the arctic *P. brevifolium* (see Hedenäs 1992) and perhaps with *P. angustifolium* which may be more common than known today.

*Pseudoleskea chilensis* (Lor.) ●chyra

See °*Callialaria curvicaulis*.

*Pseudoleskeella catenulata* (Schrad.) Kindb.

The Svalbard material has probably been confused with modifications of *P. rupestris* and *P. tectorum* forming dense cushions made up of plants with short leaves and incrassate cells. Regarding most previous reports, see Kuc (1973a, as *Leskea*). Summerhayes & Elton (1923: 223, as *Pseudoleskea*) reported *P. catenulata*, *P. tectorum* and ‘*P. tectorum* formas’ from Bjørnøya. Frahm (1977) reported *P. catenulata*, *P. nervosa* and *P. tectorum*, and discussed the differences between them, but we still think his determinations need to be checked.

*Pseudoleskeella nervosa* (Brid.) Nyh.

Material reported as *P. nervosa* from the Arctic is now considered to belong to a separate species, *P. rupestris*.

*Pterogonium* sp.

Subfossil material was reported as "*Pterogonium* oder *Leskea*" by Schimper (1870) and described as follows: "Foliis ovato-lanceolatis, margine revolutis, papillois, costa valida, in cuspidem excurrente." We have no good idea as to the identity of the reported material.

*Ptilidium pulcherrimum* (G. Web.) Vainio

Reported from Prins Karls Forland (Watson 1922), Kongsfjorden (Polunin 1945) and Linédalen (Hagen 1952). Polunin's specimen was renamed *P. ciliare* by Arnell & Mårtensson (1959), and the other reports are certainly also based on incorrectly named material.

*Ptilium crista-castrensis* (Hedw.) De Not.

Reported by Hagen (1952). It is challenging to speculate about the identity of the reported material. Perhaps *Sanionia*?

*Racomitrium affine* (Web. & Mohr) Lindb.

Cited from Svalbard by Duell (1984). His report refers to *R. sudeticum* which erroneously is treated as a synonym (see Frisvoll 1983c, 1988).

*Racomitrium aquaticum* (Schrad.) Brid.

Reported from near Isfjord radio by Hagen (1952). We have no idea as to the identity of the reported material.

*Racomitrium heterostichum* (Hedw.) Brid.

Not reported in his species catalogue but mentioned in the text (Berggren 1875: 8) as an example of epilithic species which "auf Spitzbergen genöthigt, sich auf dem Erdboden zu halten." Certainly the same as his *R. sudeticum*.

*Racomitrium microcarpon* (Hedw.) Brid.

Reported by Berggren (1875); the herbarium specimens belong to *R. fasciculare* (Frisvoll 1983c).

*Racomitrium pruinosum* (Wils.) C. Muell.

"One of the gatherings . . . showed the very long, white hair-points characteristic of the austral . . . *R. pruinosum*. . . ." (Dixon 1924). It is certainly *R. lanuginosum*.

*Rhizomnium pseudopunctatum* (Bruch & Schimp.) T. Kop.

Reported from a few localities in western Svalbard (see Kuc 1973a, as *Mnium*). The old reports probably refer to *R. andrewsianum* which at that time was undescribed, and until they are confirmed we consider also the recent reports to be erroneous (e.g. in the separate treatment of Mniaceae at Bellsund S by Karczmarz & Świąś 1989b; see also Karczmarz & Świąś 1990a, 1990b; Świąś & Karczmarz 1991b). There is also a subfossil report by Schimper (1870, as *Mnium subglobosum*).

*Rhizomnium punctatum* (Hedw.) T. Kop.

Reported from Kongsfjorden and Longyearbyen by Arnell & Mårtensson (1959, as *Mnium*). Their description makes it clear that they had collected *R. andrewsianum* which was described at about the same time (Steere 1958). Later reported from Midterhuken by Eurola & Hakala (1977) and Vassdalen in Van Mijenfjorden by Hadač (1989). We believe that also this material belongs to *R. andrewsianum*.

*Rhytidium rugosum* (Hedw.) Kindb.

Reported from Bjørnøya with a question mark by Sommerfelt (1833, as *Hypnum*) and from Spitsbergen by Vahl in Lindblom (1840, as *Hypnum*). Listed from 'Spitsbergen' by Abramova et al. (1961). "This species has a wide distribution in the Arctic and it could quite conceivably occur on Spitsbergen." (Kuc 1973a). It may possibly have been confused with robust plants of *Sanionia orthothecioides*.



*Scapania helvetica* Gott.

Reported from Bohemanneset by Watson (1922, as *S. curta* var. *geniculata*). Not known from northern Europe.

*Scapania nemorea* (L.) Grolle

Reported from Klovningen by Livesay (1870, as *Jungermannia nemorosa*) and from Smeerenburg, Kobbefjorden and Nordkapp by Berggren (1875, as *S. nemorosa*, partly as  $\beta$  *purpurascens*). The southern species is unlikely to grow on Svalbard. The reports refer to *S. spitsbergensis*; the holotype of that name is Berggren's Musci Spetsbergenses exsiccati no. 170 named *S. nemorosa* (Lindberg & Arnell 1889: 31, 'n. 70' err. pro n. 170; Grolle 1976). Regarding the habitat of Berggrens material from Amsterdamøya, see *Diplophyllum albicans*.

*Scapania scandica* (H. Arn. & Buch) Macv.

Reported from Chamberlindalen in Recherche-fjorden (Święs & Karczmarz 1991b). See also *S. curta*.

*Scapania undulata* (L.) Dum.

Reported from Bjørnøya, the W coast of Spitsbergen and Smeerenburg (Lindberg 1867, as B.  $\beta$  1 *gemmipara*; Berggren 1875). "Das Vorkommen auf Spitzbergen ist unsicher, da die einzigen dort gesammelten angeblichen *Sc. undulata* exemplare, diejenigen Berggrens, teils zu *Sc. tundrae* . . . und teils zu *Sc. hyperborea* . . . gehören." (Buch 1928: 144). See also *S. tundrae*.

*Schistidium andreaeopsis* (C. Müll.) Laz.

Reported from Hornsund by Ochyra & Afonina (1986). However, the type of the name has fragmentary or no leaf hairpoints (Frisvoll 1986), whereas the leaves illustrated by Ochyra & Afonina (1986) have quite long point. We are therefore sceptical to the report, and it needs to be verified. According to H. H. Blom (pers. comm.) *S. andreaeopsis* is not a synonym of *S. holmenianum*.

*Schistidium apocarpum* (Hedw.) Bruch. & Schimp.

Reported many times (see Kuc 1973a, as *Grimmia*), but the species does not occur on Svalbard (Blom 1996, cf. p. 141). See also *Didymodon asperifolius*.

*Schistidium confertum* (Funck) Bruch & Schimp.

Reported from Hornsund by Kuc (1963a, as *Grimmia*). The species is unlikely to grow on Svalbard (H. H. Blom pers. comm.).

*Schistidium flaccidum* (De Not.) Ochyra

Reported from Hornsund by Kuc (1963a, as *Grimmia*). The single specimen (KRAM) is sterile and the determination is erroneous, it may belong to *S. frigidum* (H. H. Blom pers. comm.).

*Schistidium strictum* (Turn.) T. Kop. & Iso.

See *S. papillosum*.

*Sphagnum capillifolium* (Ehrh.) Hedw.

Listed in vegetation tables from Bohemanflya by Kobayashi et al. (1990, as *S. nemoreum*). The species has previously been excluded from Svalbard (Flatberg & Frisvoll 1984a). See also *S. warnstorffii*.

*Sphagnum condensatum* Brid.

See Flatberg & Frisvoll (1984a).

*Sphagnum contortum* K.F. Schultz

Reported from Longyearbyen (Dixon 1922; Summerhayes & Elton 1923: 255, as *S. subsecundum* var.).

*Sphagnum fallax* (Klinggr.) Klinggr.

Reported by Wall (1979), the specimen is *S. squarrosum* (Flatberg & Frisvoll 1984a).

*Sphagnum fuscum* (Schimp.) Klinggr.

Reported by Polunin (1945) and Rønning (1961), their specimens are *S. fimbriatum* and *S. arcticum*, respectively (Flatberg & Frisvoll 1984a).

*Sphagnum majus* (Russ.) C. Jens.

Reported by Bryhn (1909, as *S. dusenii*), the specimen is *S. balticum* (Flatberg & Frisvoll 1984a). Recently reported from Vassdalen in Van Mijenfjorden by Hadač (1989: 141), the specimen should be restudied.

*Sphagnum recurvum* P. Beauv.

Reported by Paris (1905), see Flatberg & Frisvoll (1984a).

*Sphagnum rubellum* Wils.

Excluded from Svalbard and regarded as too thermophilous to possibly occur there; some specimens named *S. rubellum* belong to *S. warnstorffii* (Flatberg & Frisvoll 1984a). Reported from Colesbukta (p. 315), with a question mark from Reindalen (Table 1), and in Holocene deposits from Semmeldalen by Serebryanny et al. (1985).

*Sphagnum subfulvum* Sjörs

A report from Reindalen by Eurola (1971a) was based on *S. arcticum* (Flatberg & Frisvoll 1984a). Duell (1984) included it as he had not seen the latter study.

*Sphagnum subnitens* Russ. & Warnst.

Reported by Dixon (1922; same as in Summerhayes & Elton 1923: 255, as *S. acutifolium* var.) and Hadač (1946, as *S. plumulosum*), see Flatberg & Frisvoll (1984a) and Flatberg (1993).

*Splachnum ampullaceum* Hedw.

Reported by Eurola & Hakala (1977, as *S. cf. ampullaceum*). Also included in the habitat description of the fungus *Scutellinia minor* from Longyearbyen by Huhtinen (1987). The reports are certainly erroneous.

*Tetraplodon urceolatus* Bruch & Schimp.

Kuc (1973a, as *T. urceolatus* BSG., syn. *Splachnum urceolatum* Brid.) stated that this taxon was reported by Sommerfelt (1833) and Vahl in Lindblom (1840). However, they reported *Splachnum urceolatum* Hedw. because the genus *Tetraplodon* and *T. urceolatus* were described several years later (Bruch et al. 1844), and *Splachnum urceolatum* Hedw. is not the basionym (and therefore not a nomenclatural synonym) of *T. urceolatus* Bruch & Schimp. (but probably a taxonomic synonym of *T. mnioides*, see Frisvoll 1978c). The taxonomic relationship between *T. mnioides* and *T. urceolatus* is not clarified; the latter hardly occurs on Svalbard. But the compact plants with short capsules called *T. mnioides* var. *cavifolius* need further studies.

*Tetrodontium ovatum* (Funck) Schwaegr.

The report of this species from Svalbard by Duell (1984) was an error (Duell 1992: *Sb* denoting Svalbard is stated to be a misprint for *Sv* denoting Sweden).

*Timmia megapolitana* Hedw.

Reported from Bellsund S (Karczmarz & Świąś 1988, 1990b; Świąś & Karczmarz 1993) and Chamberlindalen in Recherche fjorden (Świąś & Karczmarz 1991b). There is also a subfossil report by Schimper (1870). See also Arnell & Mårtensson (1959, in comment on *T. bavarica*). We assume that the name is used in a collective sense, and that it refers to the rather widespread *T. bavarica*, which some authors treat as a subspecies of *T. megapolitana*.

*Tortella arctica* (H. Arn.) Crundw. & Nyh.

Listed erroneously from Svalbard by Duell (1984); his report refers to *Trichostomum arcticum* (Duell pers. comm.). The species has been looked for in the field, but so far all possible specimens have proved to belong to *T. tortuosa*. It ought to be found there (see Crundwell & Nyholm 1963: Figure 6).

*Tortula lanceola* Zand.

Reported from Nordaustlandet by Dixon (1924)

and hence listed by Podpera (1954), and from Bellsund S by Świąś & Karczmarz (1991a), all as *Pottia lanceolata*. In Fennoscandia this is a southern lowland plant (Nyholm 1989, as *P. lanceolata*).

### *Tortula muralis* Hedw.

Reported by Vahl in Lindblom (1840). "It is difficult to know to what Lindblom was referring." (Kuc 1973a). We think he referred to *T. leucostoma* (see that). See also °*Grimmia pulvinata*.

### *Trichostomum nordenskiöldii* Schimp.

Described from subfossil material (Schimper 1870). It may belong to *Didymodon* because of the following information in the diagnosis: "Differt a *Trich.* [= *Didymodon*] *tophaceo* proximo foliorum costa triplo latiore."

### *Warnstorfia trichophylla* (Warnst.) Tuom. & T. Kop.

Reported from near Sveagruva and lower Reindalen (Stormyra) by Eurola (1971a, as *Drepanocladus*), in the latter locality also as subfossil, and from Kvadehuken west of Ny-Ålesund by Frahm (1977, as *Drepanocladus*). Three specimens (OULU) collected by Eurola belong to *W. exannulata*. The specimen cited by Frahm (1977, as *Drepanocladus*, herb. Frahm) has also been renamed *W. exannulata* by us.

### *Weissia* sp.

This name is used by Livesay (1870: 338) about material from Tusenøyane. It may refer to *Dicranoweisia crispula*.

## Jan Mayen species reported from 'Svalbard'

Duell (1983, 1984, 1985) included Jan Mayen in Svalbard. This unfortunate decision led to bryogeographical obscurity. We therefore give a list of 12 Jan Mayen species reported by him but

actually never reported from Svalbard proper. See also Watson (1964) and Frisvoll (1983a). Duell (1992) treated Jan Mayen with Iceland and made some corrections, but there are still some errors in the paper.

*Atrichum undulatum* (Hedw.) P. Beauv.  
*Campylium sommerfeltii* (Myr.) J. Lange (Rejected from Jan Mayen by Watson (1964)).  
*Diphyscium foliosum* (Hedw.) Mohr  
*Ditrichum heteromallum* (Hedw.) Britt.  
*Funaria hygrometrica* Hedw.  
*Heterocladium dimorphum* (Brid.) Schimp.  
*Lescurea patens* (Lindb.) H. Arn. & C. Jens.  
*Lescurea radicata* (Mitt.) Mönk.  
*Philonotis seriata* Mitt.  
*Plagiothecium cavifolium* (Brid.) Iwats.  
*Pohlia andalusica* (Höhnelt) Broth.  
*Schistidium agassizii* Sull. & Lesq.

## List of selected synonyms

*Amblystegium jungermannioides* A.J.E. Sm. =  
*Platydictya jungermannioides*  
*Amblystegium longicuspis* Lindb. & H. Arn. =  
*Campylium longicuspis*  
*Andreaea papillosa* Lindb. = *A. sparsifolia*  
*Anoetangium tenuinerve* (Limpr.) Par. =  
*Molendia tenuinervis*  
*Anomobryum julaceum* (Gaertn. et al.)  
 Schimp. = *A. filiforme*  
*Bartramia breviseta* Lindb. = *B. ithyphylla*  
*Brachythecium groenlandicum* (C. Jens.)  
 Schljak. = *B. coruscum*  
*Bryum crispulum* Hampe = *B. pseudotriquetrum*  
*Bryum inclinatum* auct. = *B. amblyodon*  
*Bryum kaurinianum* Warnst. = *B. amblyodon*  
*Bryum ovatum* Jur. = *B. subneodamense*  
*Bryum pauperidens* Dix. ex Jones = *B. algovicum*  
*Bryum stenotrichum* C. Müll. = *B. amblyodon*  
*Bryum subglobosum* Schlieph. = *B. pallescens*  
*Bryum subrotundum* Brid. = *B. pallescens*  
*Bryum teres* Lindb. = *B. pallescens*  
*Calliergon obtusifolium* Karcz. = *C. richardsonii*  
*Calliergon sarmentosum* (Wahlenb.) Kindb. =  
*Warnstorfia sarmentosa*  
*Calliergon stramineum* (Brid.) Kindb. = *Straminergon stramineum*

- Calliergon trifarium* (Web. & Mohr) Kindb. = *Pseudocalliergon trifarium*  
*Campylium adscendens* (Lindb.) Perss. = *Herzogiella adscendens*  
*Cratoneuron arcticum* Steere = *Pseudoleskea chilensis*  
*Cratoneuron decipiens* (De Not.) Loeske = *Palustriella decipiens*  
*Cratoneuron falcatum* (Brid.) Roth = *Palustriella falcata*  
*Cratoneuron filicinum* (Hedw.) Spruce var. *curvicaule* (Jur.) Moenk. = *Callialaria curvicaulis*  
*Desmatodon cernuus* (Hüb.) Bruch & Schimp. = *Tortula cernua*  
*Desmatodon heimii* (Hedw.) Mitt. = *Hennediella heimii*  
*Desmatodon latifolius* (Hedw.) Brid. = *Tortula euryphylla*  
*Desmatodon laureri* (K.F. Schultz) Bruch & Schimp. = *Tortula laureri*  
*Desmatodon leucostoma* (R. Brown) Berggr. = *Tortula leucostoma*  
*Desmatodon systylius* Schimp. = *Tortula systylia*  
*Didymodon spitzbergensis* Dix. = *D. asperifolius*  
*Drepanocladus badius* (Hartm.) G. Roth. = *Loeskypnum badium*  
*Drepanocladus brevifolius* (Lindb.) Warnst. = *Pseudocalliergon brevifolium*  
*Drepanocladus cossonii* (Schimp.) Loeske = *Scorpidium cossonii*  
*Drepanocladus exannulatus* (Schimp.) G. Roth = *Warnstorfia exannulata*  
*Drepanocladus fluitans* (Hedw.) Warnst. = *Warnstorfia fluitans*  
*Drepanocladus lapponicus* (Norrl.) Z. Smirn. = *Hamatocaulis lapponicus*  
*Drepanocladus latifolius* (Lindb. & H. Arn.) Warnst. = *Pseudocalliergon brevifolium*  
*Drepanocladus lycopodioides* (Brid.) Warnst. = *Pseudocalliergon lycopodioides*  
*Drepanocladus pseudostramineus* (C. Müll.) G. Roth = *Warnstorfia pseudostraminea*  
*Drepanocladus revolvens* (Anon.) Warnst. = *Scorpidium revolvens*  
*Drepanocladus trichophyllus* (Warnst.) Podp. = *Warnstorfia trichophylla*  
*Drepanocladus tundrae* H. Arn. = *Warnstorfia tundrae*  
*Drepanocladus uncinatus* (Hedw.) Warnst. = *Sanionia uncinata*  
*Drepanocladus vernicosus* (Lindb.) Warnst. = *Hamatocaulis vernicosus*  
*Homalothecium niten* (Hedw.) Robins. = *Tomentypnum nitens*  
*Hypnum pratense* Spruce = *Breidleria pratensis*  
*Isopterygium pulchellum* (Hedw.) Jaeg. = *Isopterygiopsis pulchella*  
*Lophozia groenlandica* (Nees) Macoun = *L. wenzelii*  
*Lophozia incisa* (Schrad.) Dum. ssp. *opacifolia* (Culm.) Schust. & Damsh. = *L. opacifolia*  
*Lophozia kiaeri* Jørg. = *L. excisa*  
*Plagiopus oederi* (Brid.) Limpr. = *P. oederiana*  
*Pleurocladula islandica* (Nees) Grolle = *P. albes-cens*  
*Polytrichum* p.p. = *Polytrichastrum*  
*Pottia lanceolata* (Hedw.) C. Müll. = *Tortula lanceola*  
*Pseudoleskea incurvata* (Hedw.) Loeske = *Lescurea incurvata*  
*Pseudoleskeella sibirica* (H. Arn.) P. Wils. & Norris = *P. rupestris*  
*Ptychodium plicatum* (Web. & Mohr) Schimp. = *Lescurea plicata*  
*Scapania praetervisa* Meyl. = *S. mucronata*  
*Schistidium pulvinatum* auct. = *S. flaccidum*  
*Scorpidium turgescens* (C. Jens.) Loeske = *Pseudocalliergon turgescens*  
*Thuidium abietinum* (Hedw.) Schimp. = *Abietinella abietina*  
*Tortula norvegica* (Web.) Lindb. = *Syntrichia norvegica*  
*Tortula ruralis* (Hedw.) Gaertn. et al. = *Syntrichia ruralis*

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## Appendix 1. Bryophytes with type material from Svalbard

Basionym and accepted synonym. The list includes 29 species, 3 subspecies, 70 varieties (including 12 nomina nuda) and 11 forms, in all 113 names (97 mosses, 16 hepatics). Basionyms of 18 names of recognised species are printed in bold. \* = not validly published or illegitimate name.

## Musci

*Amblystegium boreale* Dix., Bryologist 36: 4. a–d. 1933.

*Andreaea obovata* var. *acuminata* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 557. 1867. (= *A. sparsifolia*)

*Andreaea papillosa* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 557. 1867. (= *A. sparsifolia*)

*Andreaea papillosa* var. *brevifolia* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 93. 1875.

*Andreaea papillosa* var. *gracilis* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 558. 1867. (= *A. sparsifolia*)

*Andreaea papillosa* var. *latifolia* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 93. 1875.

*Aulacomnium palustre* var. *auriculatum* Thér., Rev. Bryol. 34: 36. 1907.

*Aulacomnium palustre* f. *gracile* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 70. 1875 ('*gracilis*').

*Aulacomnium turgidum* f. *\*filiforme* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 28. 1875 *nom. nud.*

*Aulacomnium turgidum* f. *tenuis* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 70. 1875 ('*tenuis*').

*Bartramia oederi* f. *microcarpa* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 71. 1875.

*Brachythecium salebrosum* var. *arcticum* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 79. 1875. (= *B. turgidum*)

*Brachythecium turgidum* f. *hamatum* Kuc, Fragm. Flor. Geobot. 9: 354. 1963.

*Bryum elegans* var. *sanguineum* H. Arn., Öfv. K. Vet.–Ak. Förh. 57: 118. 1900. (= *B. rutilans*)

*Bryum globosum* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 546. 1867. (= *B. wrightii*)

*Bryum globosum* var. *ruberrimum* Dix., Bryol. 25: 88. 1922. (= *B. wrightii*)

*Bryum inclinatum* var. *gracile* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 547. 1867.

***Bryum nitidulum*** Lindb., Öfv. K. Vet.–Ak. Förh. 23: 545. 1867.

*Bryum nutans* var. *rufescens* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 547. 1867.

***Bryum obtusifolium*** Lindb., Öfv. K. Vet.–Ak. Förh. 23: 544. 1867. (= ***B. cryophilum*** *nom. nov.*)

*Bryum pauperidens* Dix. ex Jones, Rev. Bryol. Lich. 20: 123. 2. 1951. (= *B. algovicum*)

*Bryum spitsbergense* H. Arn., Öfv. K. Vet.–Ak. Förh. 57: 119. 1900.

*Bryum teres* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 545. 1867.

*Bryum ventricosum* var. *synoicum* H. Arn., Öfv. K. Vet.–Ak. Förh. 57: 116. 1900.

*Calliergon obtusifolium* Karcz., Rev. Bryol. Lich. 34: 762. 1966. (= *C. richardsonii*)

*Calliergon richardsonii* f. *spitsbergense* Kuc, Fragm. Flor. Geobot. 9: 349. 28. 1963 ('*spitsbergensis*'). (= *C. richardsonii*)

*Ceratodon purpureus* ssp. *arcticus* Kindb., Eur. N. Am. Bryin. 2: 269. 1897. (= *C. antarcticus*)

*Ceratodon purpureus* var. *rotundifolius* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 44. 1875. (= *C. heterophyllus*)

*Cinclidium arcticum* ssp. *polare* Kindb., Eur. N. Am. Bryin. 2: 322. 1897. (= *C. arcticum*)

*Cinclidium arcticum* f. *gracillimum* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 68. 1875 ('*gracillima*').

*Cynodontium virens* var. *arcticum* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 35. 1875.

*Cynodontium virens* var. *fragile* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 35. 1875. (= *Trichostomum arcticum*)

*Desmatodon laureri* f. *minor* Kuc, Fragm. Flor. Geobot. 9: 324. 1963.

*Desmatodon obliquus* var. *apiculatus* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 553. 1867.

*Desmatodon obliquus* var. *muticus* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 553. 1867.

*Desmatodon obliquus* var. *\*pilifer* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 537. 1867 *nom. nud.*

*Dicranella varia* var. *obtusifolia* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 36. 1875.

*Dicranum scoparium* var. *integrifolium* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 555. 1867. (= *D. laevidens*)

*Didymodon spitsbergensis* Dix. ex Jones, Rev. Bryol. Lich. 20: 123. 1. 1951. (= *D. asperifolius*)

*Encalyptia rhaptocharpa* var. *leptodon* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 549. 1867.

***Funaria hygrometrica*** var. ***arctica*** Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 57. 1875. (= *F. arctica*)

*Funaria hygrometrica* var. *\*glacialis* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 12. 1875 *nom. nud.* (= *F. arctica*)

*Grimmia apocarpa* var. *filiformis* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 552. 1867. (= *Schistidium tenerum*)

*Grimmia jacquinii* var. *subimberbis* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 552. 1867. (= *G. subsulcata*)

*Grimmia spitsbergensis* Biz. & Thér., Bull. Sc. Bourgogne 5: 70. 71. 1936. (= *Trichostomum arcticum*)

***Hypnum brevifolium*** Lindb., Öfv. K. Vet.–Ak. Förh. 23: 541. 1867. (= *Pseudocalliergon brevifolium*)

*Hypnum brevifolium* f. *gracile* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 84. 1875 ('*gracilis*'). – *H. brevifolium* var. *gracile* (Berggr.) Summerh. & Elton c.nov., J. Ecol. 11: 227. 1923 ('*gracilis*').

*Hypnum catenulatum* var. *\*angustifolium* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 539. 1867 *nom. nud.* (*Leskea rupestris* Berggr.). (= *Pseudoleskeella rupestris*)

- Hypnum commutatum* var. *sulcatum* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 540. 1867 (*H. sulcatum* Schimp. 1860 *hom. illeg.*).
- Hypnum filicinum* var. *\*filiforme* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 87. 1875 *hom. illeg.*
- Hypnum filicinum* var. *tenue* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 87. 1875.
- Hypnum intermedium* var. *robustum* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 537. 1867 (*H. sendtneri* Schimp. 1866).
- Hypnum intermedium* var. *wilsonii* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 540. 1867 (*H. wilsonii* Schimp. 1865 *nom. nud.*).
- Hypnum kneiffii* var. *filiforme* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 83. 1875.
- Hypnum kneiffii* var. *strictum* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 82. 1875.
- Hypnum lycopodioides* var. *brevifolium* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 83. 1875. (= *Pseudocalliergon brevifolium* Lindb.)
- Hypnum* (*Limnobium*) *nordenskioeldii* Schimp. in Heer, Fl. Foss. Arct. 2(3): 89. XVI: 72–75. 1870 ('*Norden-skiöldi*'). [subfossil]
- Hypnum polare*** Lindb., Öfv. K. Vet.-Ak. Förh. 23: 540. 1867. (= *Hygrohypnum polare*)
- Hypnum polare* var. *pseudo-stramineum* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 540. 1867.
- Hypnum polygamum* var. *brevifolium* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 540. 1867.
- Hypnum rutabulum* var. *cavifolium* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 539. 1867. (= *Brachythecium turgidum* s.l.)
- Hypnum stramineum* var. *\*angustifolium* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 539. 1867 *nom. nud.* = *H. stramineum* var. *angustifolium* Lindb. ex Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 91. 1875.
- Hypnum stramineum* var. *\*brevifolium* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 539. 1867 *nom. nud.* = *H. stramineum* var. *brevifolium* Lindb. ex Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 91. 1875.
- Hypnum turgescens* var. *tenue* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 91. 1875. (= *Pseudocalliergon turgescens*)
- Hypnum turgescens* var. *uliginosum* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 539. 1867. (= *Pseudocalliergon turgescens*)
- Hypnum uncinatum* var. *faenum* I. Hag., Trans. Proc. Bot. Soc. Edinburgh 23: 329. 1908 ('*faenum*'). (= *Sanionia orthothecioides* ?)
- Hypnum uncinatum* var. *gracillimum* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 86. 1875. (= *Sanionia uncinata*)
- Hypnum uncinatum*** ssp. *orthothecioides* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 540. 1867. (= *Sanionia orthothecioides*)
- Leptotrichum flexicaule* var. *brevifolium* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 45. 1875. (= *Ditrichum flexicaule*)
- Leskea chrysea* var. *cochlearifolia* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 543. 1867 ('*cochlearifolium*'). (= *Orthothecium chryseon*)
- Mnium affine* var. *\*integrifolium* Wils. ex Lindb., Öfv. K. Vet.-Ak. Förh. 23: 543. 1867 *nom. nud.* = *Mnium cuspidatum* Lindb. *hom. illeg.* var. *integrifolium* Lindb., Not. Sällsk. F. Fl. Fenn. Förh. 9: 65. 1868. (= *Plagiomnium ellipticum*)
- Mnium medium* var. *integrifolium* Lindb., Not. Sällsk. F. Fl. Fenn. Förh. 9: 62. 1868. (= *Plagiomnium curvatum*)
- Muscites berggrenii* Heer, K. Svensk. Vet.-Ak. Handl. N.F. 8(7): 31. I: 16. 1870 ('*-greni*'). [fossil]
- Orthotrichum pellucidum*** Lindb., Öfv. K. Vet.-Ak. Förh. 23: 549. 1867.
- Orthotrichum polare* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 537. 1867. (= *O. pallens*)
- Plagiothecium berggrenianum*** Frisv., Lindbergia 7: 96. 2a–i. 1981.
- Plagiothecium denticulatum* var. *\*auriculatum* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 27. 1875 *nom. nud.*
- Plagiothecium svalbardense*** Frisv., Norsk Polarinst. Skr. 198: 101. 1996.
- Polytrichum alpinum* var. *\*edentatum* E. Jörg. ex A. Hag., Norsk Polarinst. Medd. 70: 7. 1952 *nom. nud.*
- Polytrichum alpinum* var. *\*subdentatum* E. Jörg. ex A. Hag., Norsk Polarinst. Medd. 70: 7. 1952 *nom. nud.*
- Polytrichum alpinum* var. *\*sublaeve* E. Jörg. ex A. Hag., Norsk Polarinst. Medd. 70: 7. 1952 *nom. nud.*
- Polytrichum piliferum* var. *gracile* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 548. 1867.
- Polytrichum strictum* var. *\*hyperboraceum* C. Müll. in Cremer, Ein Ausflug nach Spitzbergen 72. 1892 *nom. nud.*
- Pottia heimii* var. *arctica* Lindb., Öfv. K. Vet.-Ak. Förh. 23: 551. 1867.
- Racomitrium canescens* var. *\*latifolium* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 24. 1875 *nom. nud.* non J. Lange & C. Jens., Medd. Grøn. 3(2): 345. 1887.
- Scorpidium turgescens* f. *cuspidatum* Kuc, Fragm. Flor. Geobot. 9: 351. 1963.
- Seligeria polaris*** Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 41. 1875.
- Sphagnum arcticum*** Flatb. & Frisv., Bryologist 87: 143. 1984.
- Sphagnum olafii*** Flatb., J. Bryol. 17: 613. 1993.
- Sphagnum teres* var. *concinnum* Berggr., K. Svensk. Vet.-Ak. Handl. 13(7): 94. 1875. (= *S. fimbriatum* ssp. *concinnum*)
- Sphagnum tundrae*** Flatb., Lindbergia 19: 3. 1994.

- Thuidium abietinum* f. *arcticum* Kuc, Fragm. Flor. Geobot. 9: 341. 1963.  
*Timmia arctica* Kindb., Bot. Not. 1893: 258. 1893. (= *T. austriaca*)  
*Timmia austriaca* var. \**papillosa* Philippi, Moosfl. Moosveg. Freeman–Sund–Gebietes 19. 1973 *hom. illeg.* (= *T. austriaca*)  
*Trichodon oblongus* Lindb., Öfv. K. Vet.–Ak. Förh. 21: 226. 1864 *et* Om de europeiska Trichostomeæ 15. Oct. 26, 1864. (= *Ditrichum cylindricum*)  
*Trichostomum arcticum* Kaal., Bot. Not. 1900: 257. 1900.  
*Trichostomum nordenskiöldii* Schimp. in Heer, Fl. Foss. Arct. 2(3): 88. XVI: 76–79. 1870 ('Nordenskiöldi'). [subfossil]  
*Webera ludwigii* var. *subcarnosa* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 59. 1875.

## Hepaticae

- Clevea hyalina* f. *rufescens* S. Arn., Ark. Bot. 4: 123. 1959.  
*Gymnomitrium corallioides* var. *minutum* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 559. 1867.  
*Jungermannia attenuata* var. *laxifolia* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 560. 1867.  
*Jungermannia divaricata* var. *incurva* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 560. 1867. (= *Cephaloziella arctica*)  
*Jungermannia inflata* var. *rigidiuscula* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 98. 1875.  
*Jungermannia lycopodioides* var. *cavifolia* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 99. 1875. (= *Barbilophozia hatcheri*)  
*Jungermannia plicata* var. *gracilis* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 98. 1875. (= *Barbilophozia kunzeana*)  
*Jungermannia polaris* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 560. 1867.  
*Martinellia spitsbergensis* Lindb. in Lindb. & H. Arn., K. Svensk. Vet.–Ak. Handl. 23(5): 31. 1889. (= *Scapania spitsbergensis*)  
*Preissia commutata* var. *minor-arctica* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 102. 1875. (= *P. quadrata* s.l.)  
*Sarcoscyphus ehrhartii* var. \**incurvus* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 13. 1875 *nom. nud.* ('*incurva*') (= *Marsupella arctica*)  
*Sarcoscyphus ehrhartii* var. \**arcticus* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 11. 1875 *nom. nud. err. pro S. emarginatus* var. *arcticus*. (= *Marsupella arctica*)  
*Sarcoscyphus emarginatus* var. *arcticus* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 96. 1875. (= *Marsupella arctica*)  
*Sarcoscyphus obcordatus* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 96. 1875. (= *Scapania obcordata*)  
*Scapania barlingii* var. *elongata* Lindb., Öfv. K. Vet.–Ak. Förh. 23: 559. 1867. (= *S. cuspiduligera*)  
*Sphagnoecetis communis* var. *tessellata* Berggr., K. Svensk. Vet.–Ak. Handl. 13(7): 101. 1875. (= *Odontoschisma macounii*)

## Appendix 2. Bryophyte Exsiccatae from Svalbard

Sven Berggren, 1874. *Musci Spetsbergenses Exsiccati* or *Plantae in itineribus Suecorum polaribus collectae*

The names and numbers are given by Berggren (1875); the first title is used in the paper, but the second on the specimen labels. The list has never been printed separately before. Sayre (1971) gives some details about labelling, occurrence and publishing date (viz. 1874, taken from a reference in *Index muscorum* 2: 12 (Wijk et al. 1962: “*Desmatodon leucostoma* (R. Brown) Berggr., Musci Spetsb. n. 34. 1874”)) which may need verification. She states that it is found in herb. FH, K, PC and UPS, but specimens are certainly present also in many other herbaria, and we have seen some from LD and O. The type of *Ceratodon purpureus* var. *rotundifolius* was stated to occur in LD, BM, GB, H, L and MICH (Burley & Pritchard 1990). The specimens originate from many different places, but most of them come from the NW and N part of the archipelago, i.e. from Isfjorden northwards. Some come from Bjørnøya. There are 199 numbers, but due to twenty-one *b* (15), *c* (5) or *d* (1) numbers, there are 220 specimens (36 hepatic and 184 moss specimens). When there is more than one taxon with the same figure, the first usually includes no letter, the second is called *b*, etc.; exceptions are 126a and 136a. The number of *Hypnum uncinatum* var. *gracillimum* is given as 134c, but all specimens have the number 134b (Hedenäs 1989a: 408). Below, all letters are kept as in the publication.

Below are two lists with the nomenclature and taxonomy of the present paper. The first is in numerical order which is identical to Berggren's systematical order: “In folgende Verzeichnisse der Arten habe ich in Bezug auf die Anordnung und Nomenklatur mit wenigen Ausnahmen Schimper's [1860] *Synopsis* und *Synopsis Hepaticarum* [Gottsche et al. 1844–1847] benutzt.” (Berggren 1875: 32). The other list is in alphabetical order. The original name according to Berggren (1875) is always given in the numerical list, but sometimes the exsiccate labels are slightly different (No. 161 *Sphagnum recurvum* var. *riparium* is labelled *S. riparium*; No. 162 *S. fimbriatum* var. *strictum* is labelled *S. fimbriatum*, cf. Flatberg & Frisvoll 1984a). The known identities of material referring to excluded names and of the erroneously identified material of accepted names are given in the alphabetical list (as →). Some comments on exsiccate specimens are found in the literature; the *Sphagnum* specimens have been revised by Flatberg & Frisvoll (1984a). But so far only a minor part of the exsiccate specimens has been checked, and most of the below decisions are therefore based on nomenclatural considerations only. Valid names of taxa not accepted from Svalbard are in *italics*.

Berggren (1875) includes no index to taxa, and his systematical order is out of date and difficult to know or remember. In the alphabetical list we have therefore provided a reference to the actual page in his paper; his original name can be found in the numerical list at the actual number. In addition to the taxa collected by himself and distributed in the exsiccate, he listed and accepted 26 other species. Of these, all except one were reported by Lindberg (1867), and Berggren (1875) brings no new information. The new species not included in his exsiccate is *Sphagnum aongstroemii* (treated on p. 94), which was collected by Malmgren in 1864.

## Numerical order

## Musci

- 1 Voitia hyperborea
- 2 Hymenostylium recurvirostrum (as Gymnostomum curvirostrum)
- 3 Dicranoweisia crispula (as Weissia)
- 3b Dicranoweisia crispula var. atrata (as Weissia)
- 4 Cynodontium polycarpon
- 5 Oncophorus virens (as Cynodontium)
- 5b Trichostomum arcticum (as Cynodontium virens var. fragile n. var.)
- 6 Oncophorus wahlenbergii (as Cynodontium)
- 7 Dichodontium pellucidum
- 8 Dicranella crispa
- 9 Dicranella varia var. obtusifolia n. var.
- 10 Dicranella subulata
- 11 Arctoa fulvella (as Dicranum)
- 12 Kiaeria starkei (as Dicranum Starkii)
- 13 Kiaeria blyttii (as Dicranum)
- 14 Kiaeria glacialis (as Dicranum arcticum)
- 15 Dicranum elongatum
- 16 Dicranum fuscescens
- 17 Dicranum muehlenbeckii
- 18 Dicranum scoparium var. integrifolium



- 19 *Dicranum bonjeanii* (as *D. palustre* var. *juniperifolium*)
- 20 *Fissidens incurvus*
- 21 *Fissidens exilis*
- 22 *Fissidens osmundoides*
- 23 *Blindia acuta*
- 24 *Seligeria polaris* n. sp.
- 25 *Hennediella heimii* var. *arctica* (as *Pottia*)
- 26 *Stegonia latifolia* (as *Pottia*)
- 27 *Bryoerythrophyllum recurvirostrum* (as *Didymodon rubellus*)
- 28 *Distichium capillaceum*
- 29 *Distichium inclinatum*
- 30 *Ceratodon purpureus*
- 30b *Ceratodon heterophyllus* (as *C. purpureus* var. *rotundifolius*)
- 31 *Ditrichum flexicaule* (as *Leptotrichum*)
- 32 *Tortula euryphylla* (as *Desmatodon latifolius*)
- 33 *Tortula laureri* (as *Desmatodon*)
- 34 *Tortula leucostoma* (as *Desmatodon*)
- 35 *Aloina brevirostris* (as *Tortula*)
- 36 *Tortella fragilis* (as *Tortula*)
- 37 *Syntrichia norvegica* (as *Tortula*)
- 38 *Tortula mucronifolia*
- 39 *Syntrichia ruralis* (as *Tortula*)
- 40 *Schistidium maritimum* (as *Grimmia*)
- 41 *Schistidium apocarpum* (as *Grimmia*)
- 41b *Schistidium tenerum* (as *Grimmia apocarpa* var. *filiformis*)
- 41c *Schistidium rivulare* (as *Grimmia apocarpa* var. *latifolia*)
- 41d *Schistidium rivulare* (as *Grimmia apocarpa* var. *alpicola*)
- 42 *Grimmia incurva* (as *G. contorta*)
- 43 *Grimmia torquata*
- 44 *Racomitrium sudeticum*
- 45 *Racomitrium microcarpon*
- 46 *Racomitrium fasciculare*
- 47 *Racomitrium lanuginosum* (as *R. hypnoides*)
- 48 *Racomitrium canescens*
- 49 *Amphidium lapponicum* (as *Amphoridium*)
- 50 *Orthotrichum alpestre*
- 51 *Orthotrichum pylaisii* (as *O. breutelii*)
- 52 *Encalypta alpina* (as *E. commutata*)
- 53 *Encalypta rhabdocarpa* (as *E. rhabdocarpa*)
- 54 *Encalypta procera*
- 55 *Tetraplodon mnioides*
- 56 *Aplopon wormskioldii* (as *Splachnum wormskioldii*)
- 57 *Splachnum vasculosum*
- 58 *Funaria arctica* (as *F. hygrometrica* var. *arctica* n. var.)
- 59 *Leptobryum pyriforme*
- 60 *Pohlia nutans* (as *Webera*)
- 60b *Pohlia nutans* var. *bicolor* (as *Webera*)
- 60c *Pohlia nutans* var. *rufescens* (as *Webera*)
- 61 *Pohlia obtusifolia* (as *Webera cucullata*)
- 62 *Pohlia cruda* (as *Webera*)
- 63 *Pohlia nutans* ssp. *schimperi* (as *Webera schimperi*)
- 64 *Pohlia annotina* (as *Webera*)
- 65 *Pohlia ludwigii* (as *Webera*)
- 65b *Pohlia ludwigii* var. (as *Webera ludwigii* var. *subcarnosa* n. var.)
- 66 *Pohlia wahlenbergii* (as *Webera albicans* var. *glacialis*)
- 67 *Bryum arcticum*
- 68 *Bryum rutilans* (as *B. æneum*)
- 69 *Bryum algovicum* (as *B. pendulum*)

- 70 *Bryum archangelicum*
- 71 *Bryum amblyodon* var. (as *Bryum inclinatum* var. *gracile*)
- 72 *Bryum knowltonii* (as *B. lacustre*)
- 73 *Bryum calophyllum*
- 74 *Bryum mamillatum*
- 74b *Bryum wrightii* (as *B. mamillatum* var. *globosum*)
- 75 *Bryum pallescens* var. *contextum*
- 76 *Bryum nitidulum*
- 76b *Bryum nitidulum* ssp. *teres*
- 77 *Bryum argenteum*
- 78 *Bryum pseudotriquetrum*
- 79 *Bryum cryophilum* (as *B. obtusifolium*)
- 80 *Bryum schleicheri* var. *latifolium* (as *B. turbinatum* var. *latifolium*)
- 81 *Plagiobryum zieri* (as *Zieria julacea*)
- 82 *Plagiomnium ellipticum* (as *Mnium affine* var. *integrifolium*)
- 83 *Mnium thomsonii* (as *M. orthorrhynchum*)
- 84 *Mnium blyttii*
- 85 *Cyrtomnium hymenophyllum* (as *Mnium*)
- 86 *Cinclidium arcticum*
- 87 *Catoscopium nigrum*
- 88 *Meesia uliginosa* var. *minor*
- 89 *Meesia triquetra*
- 90 *Paludella squarrosa*
- 91 *Aulacomnium palustre*
- 92 *Aulacomnium turgidum*
- 93 *Bartramia ithyphylla*
- 94 *Plagiopus oederiana* (as *Bartramia oederi*)
- 95 *Conostomum tetragonum* (as *C. boreale*)
- 96 *Philonotis fontana*
- 97 *Timmia austriaca*
- 98 *Timmia norvegica* (as *T. megapolitana* var.)
- 99 *Psilopilum laevigatum* (as *Oligotrichum*)
- 100 *Polytrichastrum alpinum* (as *Pogonatum*)
- 101 *Polytrichastrum sexangulare* (as *Polytrichum*)
- 102 *Polytrichum piliferum*
- 103 *Polytrichum strictum* (as *P. juniperinum* var.)
- 104 *Polytrichum commune*
- 105 *Myurella julacea*
- 106 *Myurella tenerrima* (as *M. apiculata*)
- 107 *Lescuraea incurvata* (as *Pseudoleskea atrovirens*)
- 108 *Pseudoleskeella catenulata* (as *Pseudoleskea*)
- 109 *Pseudoleskeella tectorum* (as *Pseudoleskea*)
- 110 *Abietinella abietina* (as *Thuidium*)
- 111 *Pterigynandrum filiforme*
- 112 *Orthothecium strictum*
- 113 *Orthothecium chryseum* (as *O. chryseum*)
- 114 *Lescuraea plicata* (as *Ptychodium*)
- 115 *Tomentypnum nitens* (as *Camptothecium*)
- 116 *Brachythecium salebrosum*
- 116b *Brachythecium turgidum* (as *B. salebrosum* var. *arcticum* n. var.)
- 117 *Brachythecium trachypodium*
- 118 *Brachythecium glaciale*
- 119 *Brachythecium rivulare*
- 120 *Eurhynchium pulchellum* (as *E. diversifolium*)
- 121 *Isopterygiopsis pulchella* (as *Plagiothecium nitidulum* var. *suberectum*)
- 122 *Plagiothecium denticulatum*
- 123 *Platydictya jungermannioides* (as *Amblystegium sprucei*)
- 124 *Campylium stellatum* (as *Hypnum*)

- 125 *Campylium polygamum* (as *Hypnum*)
- 126a *Drepanocladus aduncus* var. (as *Hypnum kneiffii* var. *strictum* n. var.)
- 126b *Drepanocladus aduncus* var. (as *Hypnum kneiffii* var. *filiforme* n. var.)
- 127 *Pseudocalliergon brevifolium* (as *Hypnum lycopodioides* var. *brevifolium* n. var.)
- 128 *Pseudocalliergon brevifolium* (as *Hypnum*)
- 129 *Hamatocaulis vernicosus* (as *Hypnum*)
- 130 *Scorpidium cossonii* (as *Hypnum intermedium*)
- 131 *Scorpidium revolvens* (as *Hypnum*)
- 132 *Warnstorfia exannulata* (as *Hypnum*)
- 133 *Warnstorfia fluitans* (as *Hypnum*)
- 134 *Sanionia uncinata* (as *Hypnum*)
- 134b *Sanionia orthothecioides* (as *Hypnum uncinatum* var.)
- 134c *Sanionia uncinata* (as *Hypnum uncinatum* var. *gracillimum* n. var.)
- 135 *Palustriella falcata* var. *sulcata* (as *Hypnum commutatum* var.)
- 136a *Callialaria curvicaulis* (as *Hypnum filicinum* var. *curvicaule*)
- 136b *Cratoneuron filicinum* var. (as *Hypnum filicinum* var. *filiforme* n. var.)
- 136c *Cratoneuron filicinum* var. (as *Hypnum filicinum* var. *tenue* n. var.)
- 137 *Hypnum callichroum*
- 138 *Hypnum bambergeri*
- 139 *Hypnum revolutum*
- 140 *Hypnum vaucheri*
- 141 *Hygrohypnum molle* (as *Hypnum*)
- 142 *Hygrohypnum alpestre* (as *Hypnum*)
- 143 *Hygrohypnum ochraceum* (as *Hypnum*)
- 144 *Hygrohypnum polare* (as *Hypnum*)
- 145 *Calliergon cordifolium* (as *Hypnum*)
- 146 *Calliergon giganteum* (as *Hypnum*)
- 147 *Warnstorfia sarmentosa* (as *Hypnum*)
- 148 *Pleurozium schreberi* (as *Hypnum*)
- 149 *Straminergon stramineum* (as *Hypnum*)
- 150 *Pseudocalliergon trifarium* (as *Hypnum*)
- 151 *Pseudocalliergon turgescens* (as *Hypnum*)
- 151b *Pseudocalliergon turgescens* (as *Hypnum turgescens* var. *tenue* n. var.)
- 152 *Loeskypnum badium* (as *Hypnum*)
- 153 *Scorpidium scorpioides* (as *Hypnum*)
- 154 *Hylocomium splendens*
- 155 *Andreaea sparsifolia* (as *A. papillosa*)
- 155b *Andreaea sparsifolia* var. (as *A. papillosa* var. *latifolia* n. var.)
- 155c *Andreaea sparsifolia* var. (as *A. papillosa* var. *brevifolia* n. var.)
- 156 *Andreaea obovata*
- 157 *Andreaea blyttii*
- 158 *Sphagnum squarrosum*
- 159 *Sphagnum teres*
- 159b *Sphagnum fimbriatum* ssp. *concinnum* (as *S. teres* var. *concinnum* n. var.)
- 160 *Sphagnum capillifolium* (as *S. acutifolium*)
- 161 *Sphagnum riparium* (as *S. recurvum* var. *riparium*)
- 162 *Sphagnum girgensohnii* (as *S. fimbriatum* var. *strictum*)
- 163 *Sphagnum lindbergii*

#### Hepaticae

- 164 *Gymnomitrium concinnatum* (as *Gymnomitrium*)
- 165 *Gymnomitrium corallioides* (as *Gymnomitrium*)
- 166 *Marsupella condensata* (as *Gymnomitrium*)
- 167 *Marsupella arctica* (as *Sarcoscyphus emarginatus* var. *arcticus* n. var.)
- 168 *Scapania obcordata* (as *Sarcoscyphus*)
- 169 *Arnellia fennica* (as *Southbya*)
- 170 *Scapania nemorea* (as *S. nemorosa*)
- 171 *Scapania undulata*

- 172 *Scapania cuspiduligera* (as *S. bartlingii*)  
 173 *Scapania curta*  
 174 *Diplophyllum albicans* (as *Jungermannia*)  
 175 *Diplophyllum taxifolium* (as *Jungermannia*)  
 176 *Jungermannia polaris* (as *J. pumila* ssp.)  
 177 *Jungermannia subelliptica* (as *J. genthiana*)  
 178 *●**dontoschisma macounii* (as *Sphagnoecetis communis* var. *tessellata* n. var.)  
 179 *Barbilophozia kunzeana* (as *Jungermannia plicata* var. *gracilis* n. var.)  
 180 *Gymnocolea inflata* var. (as *Jungermannia inflata* var. *rigidiuscula* n. var.)  
 181 *Lophozia sudetica* (as *Jungermannia alpestris*)  
 182 *Anastrophyllum minutum* (as *Jungermannia*)  
 183 *Barbilophozia lycopodioides* (as *Jungermannia*)  
 184 *Tritomaria quinquedentata* (as *Jungermannia*)  
 185 *Barbilophozia floerkei* (as *Jungermannia Flörkii*)  
 186 *Barbilophozia attenuata* (as *Jungermannia*)  
 187 *Tetralophozia setiformis* (as *Jungermannia*)  
 188 *Tritomaria polita* (as *Jungermannia*)  
 189 *Anthelia julacea* (as *Jungermannia*)  
 190 *Blepharostoma trichophyllum* (as *Jungermannia*)  
 191 *Pleurocladula albens* (as *Jungermannia islandica*)  
 192 *Cephaloziella arctica* (as *Jungermannia divaricata* var. *incurva*)  
 193 *Cephalozia bicuspidata* (as *Jungermannia*)  
 194 *Ptilidium ciliare*  
 195 *Aneura pinguis*  
 196 *Marchantia polymorpha*  
 197 *Preissia quadrata* (as *P. commutata* var. *minor-arctica*)  
 198 *Mannia pilosa* (as *Duvalia*)  
 199 *Athalamia hyalina* (as *Clevea*)

#### *Alphabetical order*

##### Musci

- (p. 76) 110 *Abietinella abietina*  
 (p. 47) 35 *Aloina brevirostris*  
 (p. 52) 49 *Amphidium lapponicum*  
 (p. 93) 157 *Andreaea blyttii*  
 (p. 93) 156 *Andreaea obovata*  
 (p. 92) 155 *Andreaea sparsifolia*  
 (p. 93) 155c *Andreaea sparsifolia* var.  
 (p. 93) 155b *Andreaea sparsifolia* var.  
 (p. 56) 56 *Apodan wormskioldii*  
 (p. 37) 11 *Arctoa fulvella*  
 (p. 70) 91 *Aulacomnium palustre*  
 (p. 70) 92 *Aulacomnium turgidum*  
 (p. 71) 93 *Bartramia ithyphylla*  
 (p. 41) 23 *Blindia acuta*  
 (p. 80) 118 *Brachythecium glaciale*  
 (p. 81) 119 *Brachythecium rivulare* (→ *B. turgidum*)  
 (p. 79) 116 *Brachythecium salebrosum* (→ *B. turgidum*)  
 (p. 80) 117 *Brachythecium trachypodium*  
 (p. 79) 116b *Brachythecium turgidum*  
 (p. 43) 27 *Bryoerythrophyllum recurvirostrum*  
 (p. 62) 69 *Bryum algovicum*  
 (p. 63) 71 *Bryum amblyodon* var.  
 (p. 62) 70 *Bryum archangelicum*  
 (p. 60) 67 *Bryum arcticum*  
 (p. 65) 77 *Bryum argenteum*  
 (p. 63) 73 *Bryum calophyllum*  
 (p. 65) 79 *Bryum cryophilum*

- (p. 63) 72 *Bryum knowltonii*  
 (p. 63) 74 *Bryum mamillatum*  
 (p. 64) 76 *Bryum nitidulum*  
 (p. 64) 76b *Bryum nitidulum* ssp. *teres*  
 (p. 63) 75 *Bryum pallescens* var. *contextum*  
 (p. 65) 78 *Bryum pseudotriquetrum*  
 (p. 61) 68 *Bryum rutilans*  
 (p. 66) 80 *Bryum schleicheri* var. *latifolium*  
 (p. 63) 74b *Bryum wrightii*  
 (p. 86) 136a *Callialaria curvicaulis*  
 (p. 90) 145 *Calliergon cordifolium* (→ *C. richardsonii*)  
 (p. 90) 146 *Calliergon giganteum* (→ *C. richardsonii*)  
 (p. 82) 125 *Campylium polygamum*  
 (p. 82) 124 *Campylium stellatum*  
 (p. 68) 87 *Catoscopium nigrum*  
 (p. 44) 30b *Ceratodon heterophyllus*  
 (p. 44) 30 *Ceratodon purpureus*  
 (p. 68) 86 *Cinclidium arcticum*  
 (p. 71) 95 *Conostomum tetragonum*  
 (p. 87) 136b *Cratoneuron filicinum* var.  
 (p. 87) 136c *Cratoneuron filicinum* var.  
 (p. 34) 4 *Cynodontium polycarpon* (→ *C. tenellum*)  
 (p. 68) 85 *Cyrtomnium hymenophyllum*  
 (p. 35) 7 *Dichodontium pellucidum*  
 (p. 36) 8 *Dicranella crispa*  
 (p. 37) 10 *Dicranella subulata*  
 (p. 36) 9 *Dicranella varia* var. *obtusifolia* n. var.  
 (p. 33) 3 *Dicranoweisia crispula*  
 (p. 34) 3b *Dicranoweisia crispula* var. *atrata*  
 (p. 40) 19 *Dicranum bonjeanii* (→ *D. laevidens*)  
 (p. 38) 15 *Dicranum elongatum*  
 (p. 39) 16 *Dicranum fuscescens*  
 (p. 39) 17 *Dicranum muehlenbeckii* (→ *D. acutifolium*, *D. spadiceum*)  
 (p. 39) 18 *Dicranum scoparium* var. *integrifolium*  
 (p. 43) 28 *Distichium capillaceum*  
 (p. 43) 29 *Distichium inclinatum*  
 (p. 45) 31 *Ditrichum flexicaule*  
 (p. 82) 126a *Drepanocladus aduncus* var.  
 (p. 83) 126b *Drepanocladus aduncus* var.  
 (p. 54) 52 *Encalypta alpina*  
 (p. 54) 54 *Encalypta procera*  
 (p. 54) 53 *Encalypta rhaptocarpa*  
 (p. 81) 120 *Eurhynchium pulchellum*  
 (p. 40) 21 *Fissidens exilis* (→ *F. arcticus/viridulus*)  
 (p. 40) 20 *Fissidens incurvus* (→ *F. arcticus/viridulus*)  
 (p. 40) 22 *Fissidens osmundoides*  
 (p. 57) 58 *Funaria arctica*  
 (p. 49) 42 *Grimmia incurva*  
 (p. 49) 43 *Grimmia torquata*  
 (p. 84) 129 *Hamatocaulis vernicosus* (→ *Scorpidium cossonii*?)  
 (p. 42) 25 *Hennediella heimii* var. *arctica*  
 (p. 88) 142 *Hygrohypnum alpestre*  
 (p. 88) 141 *Hygrohypnum molle* (→ *H. cochlearifolium*)  
 (p. 89) 143 *Hygrohypnum ochraceum*  
 (p. 89) 144 *Hygrohypnum polare*  
 (p. 92) 154 *Hylocomium splendens*  
 (p. 33) 2 *Hymenostylium recurvirostrum*  
 (p. 87) 138 *Hypnum bambergeri*

(p. 87)	137	<i>Hypnum callichroum</i>
(p. 88)	139	<i>Hypnum revolutum</i>
(p. 88)	140	<i>Hypnum vaucheri</i>
(p. 81)	121	<i>Isopterygiopsis pulchella</i>
(p. 37)	13	<i>Kiaeria blyttii</i>
(p. 38)	14	<i>Kiaeria glacialis</i>
(p. 37)	12	<i>Kiaeria starkei</i> (+ <i>K. falcata</i> )
(p. 57)	59	<i>Leptobryum pyriforme</i>
(p. 75)	107	<i>Lescuraea incurvata</i>
(p. 78)	114	<i>Lescuraea plicata</i>
(p. 91)	152	<i>Loeskypnum badium</i>
(p. 69)	89	<i>Meesia triquetra</i>
(p. 69)	88	<i>Meesia uliginosa</i> var. <i>minor</i>
(p. 67)	84	<i>Mnium blyttii</i>
(p. 67)	83	<i>Mnium thomsonii</i>
(p. 75)	105	<i>Myurella julacea</i>
(p. 75)	106	<i>Myurella tenerima</i>
(p. 34)	5	<i>Oncophorus virens</i>
(p. 35)	6	<i>Oncophorus wahlenbergii</i>
(p. 77)	113	<i>Orthothecium chryseon</i>
(p. 77)	112	<i>Orthothecium strictum</i>
(p. 52)	50	<i>Orthotrichum alpestre</i>
(p. 53)	51	<i>Orthotrichum pylaisii</i>
(p. 69)	90	<i>Paludella squarrosa</i>
(p. 86)	135	<i>Palustriella falcata</i> var. <i>sulcata</i>
(p. 71)	96	<i>Philonotis fontana</i> (→ <i>P. tomentella</i> )
(p. 67)	81	<i>Plagiobryum zieri</i>
(p. 67)	82	<i>Plagiomnium ellipticum</i>
(p. 71)	94	<i>Plagiopus oederiana</i>
(p. 81)	122	<i>Plagiothecium denticulatum</i> (+ <i>P. berggrenianum</i> , <i>P. svalbardense</i> )
(p. 82)	123	<i>Platydictya jungermannioides</i>
(p. 90)	148	<i>Pleurozium schreberi</i>
(p. 59)	64	<i>Pohlia annotina</i> (→ <i>P. andrewsii</i> )
(p. 58)	62	<i>Pohlia cruda</i>
(p. 59)	65	<i>Pohlia ludwigii</i>
(p. 59)	65b	<i>Pohlia ludwigii</i> var. (→ <i>P. wahlenbergii</i> , <i>P. nutans</i> )
(p. 58)	60	<i>Pohlia nutans</i>
(p. 58)	60b	<i>Pohlia nutans</i> var. <i>bicolor</i>
(p. 58)	60c	<i>Pohlia nutans</i> var. <i>rufescens</i>
(p. 59)	63	<i>Pohlia nutans</i> ssp. <i>schimperi</i>
(p. 58)	61	<i>Pohlia obtusifolia</i>
(p. 60)	66	<i>Pohlia wahlenbergii</i>
(p. 73)	100	<i>Polytrichastrum alpinum</i>
(p. 74)	101	<i>Polytrichastrum sexangulare</i>
(p. 75)	104	<i>Polytrichum commune</i> (→ <i>P. jensenii</i> )
(p. 74)	102	<i>Polytrichum piliferum</i>
(p. 74)	103	<i>Polytrichum strictum</i>
(p. 84)	128	<i>Pseudocalliergon brevifolium</i>
(p. 83)	127	<i>Pseudocalliergon brevifolium</i>
(p. 91)	150	<i>Pseudocalliergon trifarium</i>
(p. 91)	151	<i>Pseudocalliergon turgescens</i>
(p. 91)	151b	<i>Pseudocalliergon turgescens</i>
(p. 75)	108	<i>Pseudoleskeella catenulata</i> (→ <i>P. rupestris</i> , <i>P. tectorum</i> ?)
(p. 76)	109	<i>Pseudoleskeella tectorum</i>
(p. 73)	99	<i>Psilopilum laevigatum</i>
(p. 76)	111	<i>Pterigynandrum filiforme</i>
(p. 51)	48	<i>Racomitrium canescens</i>
(p. 50)	46	<i>Racomitrium fasciculare</i>

(p. 50)	47	<i>Racomitrium lanuginosum</i>
(p. 50)	45	<i>Racomitrium microcarpon</i> (→ <i>R. fasciculare</i> )
(p. 50)	44	<i>Racomitrium sudeticum</i>
(p. 85)	134b	<i>Sanionia orthothecioides</i>
(p. 85)	134	<i>Sanionia uncinata</i>
(p. 86)	134c	<i>Sanionia uncinata</i>
(p. 48)	41	<i>Schistidium apocarpum</i> (→ <i>Schistidium</i> spp.)
(p. 48)	40	<i>Schistidium maritimum</i>
(p. 49)	41a	<i>Schistidium rivulare</i>
(p. 48)	41c	<i>Schistidium rivulare</i>
(p. 48)	41b	<i>Schistidium tenerum</i>
(p. 84)	130	<i>Scorpidium cossonii</i>
(p. 84)	131	<i>Scorpidium revolvens</i>
(p. 92)	153	<i>Scorpidium scorpioides</i>
(p. 41)	24	<i>Seligeria polaris</i> n. sp.
(p. 95)	160	<i>Sphagnum capillifolium</i> (→ <i>S. warnstorffii</i> )
(p. 94)	159b	<i>Sphagnum fimbriatum</i> ssp. <i>concinnum</i> (+ <i>S. teres</i> )
(p. 95)	162	<i>Sphagnum girgensohnii</i> (→ <i>S. teres</i> )
(p. 95)	163	<i>Sphagnum lindbergii</i>
(p. 95)	161	<i>Sphagnum riparium</i> (→ <i>S. obtusum</i> )
(p. 94)	158	<i>Sphagnum squarrosum</i>
(p. 94)	159	<i>Sphagnum teres</i> (+ <i>S. fimbriatum</i> ssp. <i>concinnum</i> )
(p. 56)	57	<i>Splachnum vasculosum</i>
(p. 43)	26	<i>Stegonia latifolia</i>
(p. 90)	149	<i>Straminergon stramineum</i>
(p. 47)	37	<i>Syntrichia norvegica</i>
(p. 48)	39	<i>Syntrichia ruralis</i>
(p. 55)	55	<i>Tetraplodon mnioides</i>
(p. 72)	97	<i>Timmia austriaca</i>
(p. 72)	98	<i>Timmia norvegica</i>
(p. 78)	115	<i>Tomentypnum nitens</i>
(p. 47)	36	<i>Tortella fragilis</i>
(p. 46)	32	<i>Tortula euryphylla</i>
(p. 46)	33	<i>Tortula laureri</i>
(p. 46)	34	<i>Tortula leucostoma</i>
(p. 47)	38	<i>Tortula mucronifolia</i>
(p. 35)	5b	<i>Trichostomum arcticum</i>
(p. 33)	1	<i>Voitia hyperborea</i>
(p. 85)	132	<i>Warnstorfia exannulata</i>
(p. 85)	133	<i>Warnstorfia fluitans</i>
(p. 90)	147	<i>Warnstorfia sarmentosa</i>

## Hepaticae

(p. 99)	182	<i>Anastrophyllum minutum</i>
(p. 102)	195	<i>Aneura pinguis</i>
(p. 100)	189	<i>Anthelia julacea</i> (→ <i>A. juratzkana</i> )
(p. 97)	169	<i>Arnellia fennica</i>
(p. 103)	199	<i>Athalamia hyalina</i> (→ <i>Sauteria alpina</i> )
(p. 99)	186	<i>Barbilophozia attenuata</i>
(p. 99)	185	<i>Barbilophozia floerkei</i> (→ <i>B. hatcheri</i> , <i>Tritiomaria quinquedentata</i> )
(p. 98)	179	<i>Barbilophozia kunzeana</i>
(p. 99)	183	<i>Barbilophozia lycopodioides</i>
(p. 100)	190	<i>Blepharostoma trichophyllum</i>
(p. 101)	193	<i>Cephalozia bicuspidata</i> (→ <i>C. ambigua</i> )
(p. 100)	192	<i>Cephaloziella arctica</i>
(p. 97)	174	<i>Diplophyllum albicans</i>
(p. 97)	175	<i>Diplophyllum taxifolium</i>
(p. 98)	180	<i>Gymnocolea inflata</i> var.

(p. 96)	164	<i>Gymnomitrium concinnum</i>
(p. 96)	165	<i>Gymnomitrium corallioides</i>
(p. 98)	176	<i>Jungermannia polaris</i>
(p. 98)	177	<i>Jungermannia subelliptica</i>
(p. 98)	181	<i>Lophozia sudetica</i>
(p. 102)	198	<i>Mannia pilosa</i> (→ <i>Athalamia hyalina</i> )
(p. 102)	196	<i>Marchantia polymorpha</i>
(p. 96)	167	<i>Marsupella arctica</i>
(p. 96)	166	<i>Marsupella condensata</i>
(p. 101)	178	<i>Odontoschisma macounii</i>
(p. 100)	191	<i>Pleurocladula albescens</i>
(p. 102)	197	<i>Preissia quadrata</i>
(p. 102)	194	<i>Ptilidium ciliare</i>
(p. 97)	173	<i>Scapania curta</i>
(p. 97)	172	<i>Scapania cuspiduligera</i>
(p. 97)	170	<i>Scapania nemorea</i> (→ <i>S. spitsbergensis</i> )
(p. 96)	168	<i>Scapania obcordata</i>
(p. 97)	171	<i>Scapania undulata</i> (→ <i>S. hyperborea</i> , <i>S. tundrae</i> )
(p. 99)	187	<i>Tetralophozia setiformis</i>
(p. 100)	188	<i>Tritomaria polita</i>
(p. 99)	184	<i>Tritomaria quinqueidentata</i>

*Halina Bednarek-Ochyra, Barbara Godzik and Krystyna Grodzinska, 1987. Bryophyta Svalbardensia Exsiccata*

The content of the exsiccate is presented in four booklets with copies of specimen labels (Bednarek-Ochyra et al. 1987). It includes 80 numbers but only 51 different names. The specimens originate from Hornsund, Bellsund and Grønfjorden, but most of them come from the north side of the Hornsund fjord. Below are two lists with the nomenclature and taxonomy of the present paper, one in numerical and one in alphabetical order. Taxonomical revisions in the TRH set of the exsiccate are given in parentheses in the alphabetical list. Seven specimens are erroneously labelled as follows: *Bryum subneodamense*, *Cinclidium latifolium*, *Dicranum elongatum*, *Ditrichum flexicaule*, *Orthothecium rufescens*, *Polytrichastrum alpinum* and *Schistidium apocarpum*. Eight species occur but are named differently: *Cinclidium subrotundum*, *Dicranum fuscescens*, *D. spadiceum*, *Didymodon asperifolius*, *Orthothecium chryseon*, *Polytrichum jensenii*, *Racomitrium canescens* and *Scorpidium cossonii*. This makes a total of 52 species.

*Numerical order*

- 1 *Paludella squarrosa*
- 2 *Sanionia uncinata*
- 3 *Aulacomnium turgidum*
- 4 *Climacium dendroides*
- 5 *Aulacomnium palustre*
- 6 *Pohlia cruda*
- 7 *Hylocomium splendens*
- 8 *Syntrichia ruralis* (as *Tortula*)
- 9 *Hypnum revolutum*
- 10 *Orthotrichum pylaisii*
- 11 *Aplodon wormskioldii*
- 12 *Warnstorfia sarmentosa* (as *Calliergon*)
- 13 *Racomitrium lanuginosum*
- 14 *Andreaea rupestris*
- 15 *Racomitrium panschii*
- 16 *Polytrichastrum alpinum*
- 17 *Tetralophozia setiformis*
- 18 *Bryum cryophilum*
- 19 *Bryum weigeli*
- 20 *Dicranoweisia crispula*
- 21 *Tomentypnum nitens*



- 22 *Plagiomnium ellipticum*
- 23 *Straminergon stramineum* (as *Calliergon*)
- 24 *Oncophorus virens*
- 25 *Distichium capillaceum*
- 26 *Bryum pseudotriquetrum*
- 27 *Hygrohypnum polare*
- 28 *Dicranum elongatum*
- 29 *Ditrichum flexicaule*
- 30 *Polytrichum strictum*
- 31 *Cinclidium latifolium*
- 32 *Schistidium apocarpum*
- 33 *Gymnomitrium corallioides*
- 34 *Scorpidium scorpioides*
- 35 *Hylocomium splendens*
- 36 *Andreaea sparsifolia* (as *A. obovata* var. *papillosa*)
- 37 *Hypnum vaucheri*
- 38 *Aulacomnium turgidum*
- 39 *Warnstorfia sarmentosa* (as *Calliergon*)
- 40 *Hypnum revolutum*
- 41 *Climacium dendroides*
- 42 *Distichium capillaceum*
- 43 *Timmia austriaca*
- 44 *Aulacomnium palustre*
- 45 *Pohlia cruda*
- 46 *Philonotis tomentella*
- 47 *Syntrichia ruralis* (as *Tortula*)
- 48 *Warnstorfia sarmentosa* (as *Calliergon*)
- 49 *Sanionia uncinata*
- 50 *Calliergon richardsonii*
- 51 *Pseudocalliergon turgescens* (as *Scorpidium*)
- 52 *Racomitrium lanuginosum*
- 53 *Hylocomium splendens*
- 54 *Oncophorus wahlenbergii*
- 55 *Gymnocola inflata*
- 56 *Sphagnum squarrosum*
- 57 *Dicranoweisia crispula*
- 58 *Trichostomum arcticum*
- 59 *Bryum cryophilum*
- 60 *Polytrichastrum longisetum*
- 61 *Warnstorfia sarmentosa* (as *Calliergon*)
- 62 *Syntrichia ruralis* (as *Tortula*)
- 63 *Timmia bavarica*
- 64 *Philonotis tomentella*
- 65 *Calliergon richardsonii*
- 66 *Bryum subneodamense*
- 67 *Plagiomnium ellipticum*
- 68 *Oncophorus wahlenbergii*
- 69 *Sphagnum squarrosum*
- 70 *Polytrichastrum alpinum*
- 71 *Andreaea rupestris*
- 72 *Racomitrium ericoides*
- 73 *Sanionia uncinata*
- 74 *Dicranella palustris*
- 75 *Timmia comata* (as *T. norvegica* var. *excurrens*)
- 76 *Aulacomnium turgidum*
- 77 *Splachnum vasculosum*
- 78 *Bryum pseudotriquetrum*
- 79 *Racomitrium panschii*

80 *Orthothecium rufescens**Alphabetical order*

- 14 *Andreaea rupestris* (TRH = *A. sparsifolia*)
- 71 *Andreaea rupestris* (TRH = *A. sparsifolia*)
- 36 *Andreaea sparsifolia* (TRH = *A. rupestris*)
- 11 *Aplodon wormskioldii*
- 5 *Aulacomnium palustre*
- 44 *Aulacomnium palustre*
- 3 *Aulacomnium turgidum*
- 38 *Aulacomnium turgidum*
- 76 *Aulacomnium turgidum*
- 18 *Bryum cryophilum*
- 59 *Bryum cryophilum*
- 26 *Bryum pseudotriquetrum* (TRH = *Bryum* sp. non *B. pseudotriquetrum*)
- 78 *Bryum pseudotriquetrum*
- 66 *Bryum subneodamense* (TRH = *B. cryophilum*)
- 19 *Bryum weigelii*
- 50 *Calliergon richardsonii*
- 65 *Calliergon richardsonii*
- 31 *Cinclidium latifolium* (TRH = *C. subrotundum*)
- 4 *Climacium dendroides*
- 41 *Climacium dendroides*
- 74 *Dicranella palustris*
- 20 *Dicranoweisia crispula*
- 57 *Dicranoweisia crispula*
- 28 *Dicranum elongatum* (TRH = *D. spadiceum*)
- 25 *Distichium capillaceum*
- 42 *Distichium capillaceum*
- 29 *Ditrichum flexicaule* (TRH = *Dicranum fuscescens*)
- 55 *Gymnocolea inflata*
- 33 *Gymnomitrium corallioides* (TRH = ! + *Prasanthus suecicus*)
- 27 *Hygrohypnum polare*
- 7 *Hylocomium splendens*
- 35 *Hylocomium splendens*
- 53 *Hylocomium splendens*
- 9 *Hypnum revolutum*
- 40 *Hypnum revolutum*
- 37 *Hypnum vaucheri*
- 24 *Oncophorus virens*
- 54 *Oncophorus wahlenbergii*
- 68 *Oncophorus wahlenbergii*
- 80 *Orthothecium rufescens* (TRH = *O. chryseon*)
- 10 *Orthotrichum pylaisii*
- 1 *Paludella squarrosa*
- 46 *Philonotis tomentella*
- 64 *Philonotis tomentella*
- 22 *Plagiomnium ellipticum*
- 67 *Plagiomnium ellipticum*
- 6 *Pohlia cruda*
- 45 *Pohlia cruda*
- 16 *Polytrichastrum alpinum* (TRH = *Polytrichum jensenii*)
- 70 *Polytrichastrum alpinum* (TRH = *Polytrichum jensenii*)
- 60 *Polytrichastrum longisetum*
- 30 *Polytrichum strictum*
- 51 *Pseudocalliergon turgescens*
- 72 *Racomitrium ericoides*
- 13 *Racomitrium lanuginosum*

- 52 *Racomitrium lanuginosum*
- 15 *Racomitrium panschii* (TRH = *R. canescens*)
- 79 *Racomitrium panschii*
- 2 *Sanionia uncinata*
- 49 *Sanionia uncinata*
- 73 *Sanionia uncinata* (TRH = *Scorpidium cossonii*)
- 32 *Schistidium apocarpum* (TRH = *Didymodon asperifolius*)
- 34 *Scorpidium scorpioides*
- 56 *Sphagnum squarrosum*
- 69 *Sphagnum squarrosum*
- 77 *Splachnum vasculosum*
- 23 *Straminergon stramineum*
- 8 *Syntrichia ruralis*
- 47 *Syntrichia ruralis*
- 62 *Syntrichia ruralis*
- 17 *Tetralophozia setiformis*
- 43 *Timmia austriaca*
- 63 *Timmia bavarica*
- 75 *Timmia comata* (TRH = *T. austriaca*)
- 21 *Tomentypnum nitens*
- 58 *Trichostomum arcticum*
- 12 *Warnstorfia sarmentosa*
- 39 *Warnstorfia sarmentosa*
- 48 *Warnstorfia sarmentosa*
- 61 *Warnstorfia sarmentosa*

### Appendix 3. Bryophyte vegetation types described from Svalbard

The first description of bryophyte vegetation from Svalbard is presented by Keilhau (1831: 165f.; also quoted by Sommerfelt 1833); the following passage considers what was later called Grunnlinesletta at Edgeøya SW, which was visited 11–19 September 1827 (Frivoll, transl.):

Large stretches of the moist landscape of the plain . . . were overgrown by a dense and soft, swelling bryophyte cover, whose thickness in places approached 6 to 8 inches. This was namely the considerable height of a moss (*Hypnum cuspidatum*) especially associated with such places, which together with another (*Mnium turgidum*) almost entirely constituted the whole – with regard to quantity – not insignificant vegetation in places where the water had absolutely no outlet. The colour of these plants had to a great extent that yellowish and reddish tinge, which gives the moss-stretches of Svalbard and Bjørnøya the unpleasant glaring light, . . . Where the moisture is able to drain somewhat away from these plains, there is at once a little more variation in the vegetation; here one may even find a few vascular plants protruding from among the bryophytes. And if the water finally converges to form real brooks and streams, then the bryophytes are still less important, and the grasses, sedges and *Saxifraga* species become the prevailing. (*Hypnum cuspidatum* = ? *Calliergon richardsonii*, *Mnium turgidum* = *Aulacomnium* t.).

Philippi (1973) described bryophyte vegetation from Edgeøya NW, and the above types belong to his “Moosgesellschaften nasser bis feuchter Standorte” (probably the *Calliergon giganteum*–*Drepanocladus*–Gesellschaft) and “Moostundren” (especially the *Tomenthypnum*–Tundra).

Many authors have later written about bryophyte vegetation types from Svalbard in the same manner, without giving them adequate names. Berggren's (1875) work includes comprehensive descriptions of synecological conditions of bryophytes, and is well worth scrutinizing with regard to this subject. He visited Svalbard in 1868, and in a lecture given 31 April 1873 he presented interesting general results regarding the moss vegetation of the Archipelago. We have only the secretary's report entitled (Frivoll, transl.): “Senior lecturer S. Berggren gave an account of the moss vegetation of Svalbard based on the collections made in 1868” (Berggren 1873). The apparently long and interesting lecture dealt with different topics, such as the ice age and the similarity between the alpine and arctic floras. “The lecturer further spoke about . . . the differences in the moss vegetation between the north-west granite area and the western limestone and slate areas. . . .” We are not told what he said then, but it was probably much the same as in a later written account (Berggren 1875: 11f):

Vergleichen wir näher die Kalk- und Schiefergegenden von Spitzbergen mit den Granit- und Gneisgegenden in Bezug auf ihre Vegetation, so ist es gleich in die Augen fallend, dass in jenen die Artenzahl verhältnissmässig gross ist, in diesen gering. Die Zahl der Arten ist hier kaum die Hälfte der dortigen. . . . Als Beispiel dieser Verschiedenheit will ich nur das Flachland, das die Mitte von Danish Island zwischen der Kobbøe Bai und der Smeerenburg Bai durchzieht, im Vergleich mit jenem am Eisfjorde anführen. Hier *Orthothecia*, *Hypnum*, *Brya* mit einander verflochten, den Boden gleichförmiger deckend, dort eine geringere Zahl von *Racomitrium*, *Arctoa fulvella*, *Polytrichum*, *Sarcoscyphus Ehrharti* var. *arcticus* und *Jungermannia divaricata* var. *incurva*, eine jede Art ihren Platz ausschliesslich einnehmend. . . . Der Schiefer und Kalkboden mit seinen fein zermalnten Bestandtheilen trägt die hauptsächlichliche Menge der akrokarpischen Moose von Spitzbergen. . . . Hierher gehören mehrere fruchttragende Bryen z. [B.] *B. pendulum* und *intermedium*, ferner die die arktische Zone auszeichnenden *Brya*, *B. arcticum*, *oeneum*, *nitidulum*, *calophyllum*, *Distichia*, *Desmatodon leucostomus*, *Pottia Heimii*, *Anacalypta latifolia*, *Barbula brevirostris*, *Dicranella varia*, *Funaria hygrometrica* var. *glacialis* und andere.” (*Sarcoscyphus* = *Marsupella arctica*, *Jungermannia* = *Cephaloziella arctica*, *Bryum pendulum* = *B. algovicum*, *B. oeneum* = *B. rutilans*, *Desmatodon* = *Tortula*, *Pottia* = *Hennediella*, *Anacalypta* = *Stegonia*, *Barbula* = *Aloina*, *Funaria* = *F. arctica*.)

Berggren (1875: 22–31) deals especially with the bryophytes and bryophyte vegetation of six areas in the north and northwest [Parrøya, Nordkapp (at Chermisideøya), Castrénøya, Brennevinsfjorden (Nordaustlandet NW, mainly at Depotodden, cf. Scholander 1934: 8), Danskøya (particularly the Kobbefjorden area), and Amsterdamøya (the Smeerenburg area)]. Sometimes he presents lists which are not far from being equivalent to vegetation tables (Berggren 1875: 28): “An der Südseite der Kobbøe Bai auf den einige Quadratklaffer [10 × 10 m] weiten Feldern mit kleinen Hügel unter der Gebirgsvand besteht die Hauptvegetation aus folgenden Arten: . . .” Then follow the names of 28 bryophytes (22 mosses and 6 liverworts). He even described epilithic moss vegetation (by giving species lists from such sites, see especially Brandewijne Bai, p. 25); the epilithic moss vegetation of Svalbard is still not classified. Many of the vegetation types of Svalbard are mentioned for the first time by Berggren. The main vegetation type of Castrénøya is described as follows (Berggren 1875: 24): “Die Hauptvegetation bilden *Racomitrium lanuginosum*, welche Art an trockenen, steinigen, windigen Stellen vorherrschend ist, *Jungermannia alpestris*, einige Weberen (*Ludwigii*, *annotina*, *cruda* mit dünnen Stengeln in dichten tiefen spangrünen rasen), und an feuchten stellen die genannten *Racomitria*.” (*Jungermannia* = *Lophozia sudetica*, *Webera* = *Pohlia*.) This is, *inter alia*, the Moss-lichen or *Racomitrium* heath of Summerhayes & Elton (1928: 231f, who refer back to

Berggren), the *Racomitrium lanuginosi spitsbergense* of Hadač (1946) and the corresponding community of many later authors, see below.

27 August 1868 Berggren (1875: 29) walked across Danskøya from Kobbefjorden to Smeerenburgfjorden: "Der Sommer war schon vorüber und der Winter gab sich durch gefrorne Süßwassersammlungen und gefrorenen Erdboden zu erkennen." He specifies the composition of the bryophyte vegetation in many habitats along this route, including irrigated, moist and dry soil; moist and dry rocks, boulders and stones; lake shores; dry and waterfilled brooks from snowfields, etc. He certainly was an excellent field bryologist.

Also Summerhayes & Elton's (1923, 1928) papers are interesting from a bryo-sociological point of view, as they include moss lists from almost every community type they described. They were actually the first to classify and name a majority of the vegetation types of Bjørnøya and Spitsbergen, and to give the bryophytes the attention they deserve in the plant sociology of the Arctic. However, their types are often somewhat collectively treated. But nobody should study bryophyte vegetation on Svalbard without consulting Summerhayes & Elton's (1923, 1928) treatment. They include many bryophyte lists from habitats frequently left out from general classifications, as skua hummocks (Summerhayes & Elton 1923: 223, 1928: 241–243), communities of rock and boulder crevices and cavities between boulders (1923: 225f, 252; 1928: 230f), erratic boulders (1928: 220f), polygon rims (1923: 243, 1928: 222), wet ravines (1923: 248), zonation at margin of beach pond (1923: 260), streamside communities (1923: 228, 279; 1928: 237), and zones around a tarn (1928: 225). Their few community names referring to mosses are listed below.

The bryophyte vegetation types appear to have much in common throughout the Arctic. Holmen (1955) described 21 bryophyte communities from Peary Land, northernmost Greenland. Brassard (1971a) presented a key to and described 18 communities from northern Ellesmere Island, Canada. See also Steere's (1976) comments on these papers, and his own lists of typical mosses in 20 "tundra associations" or "special habitats". "Bryologically, the relatively well watered tundra of northernmost Alaska comes off very favorably in comparison with the polar deserts of northern Ellesmere Island and, especially, northernmost Greenland, in numbers of species, complexity of wet tundra bryological communities, and importance in vegetation cover." (Steere 1976: 59). In this connection, Svalbard has evidently more in common with Arctic Alaska than with Ellesmere Island or Peary Land. Relatively much work has been done on Svalbard bryophyte vegetation. Elvebakk (1994) has arranged the vegetation types of Svalbard in 17 alliances, and many of the below types are placed in this system.

Only plant communities whose name is based on or include bryophytes, and mainly with relevé data (synoptical tables, before 1979 also lists according to recommendations by Barkman et al. 1986) published in internationally available journals or books, are included here. The most thorough study of bryophyte vegetation on Svalbard is presented by Philippi (1973).

#### **Summerhayes & Elton (1923):**

Moss heath (at Bjørnøya)

Moss-mat

Moss-bog

Moss-*Salix* bog

#### **Summerhayes & Elton (1928):**

Moss-lichen heath = *Racomitrium* heath

#### **Hadač (1946):**

*Bryo-Dupontietum fisheri* Hadač

*Philonotidetum caespitosae* ass. prov.

*Racomitrietum lanuginosi spitsbergense* Hadač

*Gymnomitrietum corallifoloidis* ass. prov.

*Drepanoclado-Poetum alpinae* ass. nov.

*Distichio-Polygonetum vivipari* ass. prov.

*Tortuleto-Salicetum polaris* ass. prov.

*Tomentohypnetum involuti* ass. nov.

#### **Hofmann (1968):**

*Tomenthypnum* tundra (*Tomenthypnetum nitentis* Hadač)

*Bryum cryophilum* community (*Calliergo-Bryetum cryophili* ass. nov.)

*Racomitrium* (lanuginosum) lichen heath (*Sphaerophoro-Racomitrietum lanuginosi* nom. nov. = *Racomitrietum lanuginosi* Hadač)

*Racomitrium canescens* community

*Drepanocladus uncinatus* snow-bed community

**Eurola (1968):**

Trockene Moosheiden

Frische Moosheiden

**Eurola (1971a):***Ranunculus hyperboreus*–*R. spitsbergensis*–*Calliergon sarmentosum* type of spring fen*Eriophorum scheuchzeri*–*Aulacomnium turgidum* type of spring fen*Saxifraga*–*Dicranum*–*Sphagnum* type of tundra heath mire**Philippi (1973;** all subdivisions include a main type not listed here, which is called the typical subass. or var.):1 Communities of moist to wet habitats [*Ranunculo (hyperborei)*–*Drepanocladion (revolventis)* all. prov.]*Bryum cryophilum* communitySubass. with *Splachnum vasculosum*Subass. with *Cratoneuron arcticum*Subass. with *Cyrtomnium hymenophyllum*Subass. with *Orthothecium chryseum**Meesia triquetra* communitySubass. with *Paludella squarrosa**Calliergon giganteum*–*Drepanocladus (revolvens)* communityVar. with *Calliergon sarmentosum**Scorpidium turgescens* communitySubass. with *Schistidium apocarpum**Hygrohypnum polare* community*Catoscopium nigrum* communityVar. with *Oncophorus virens**Orthothecium chryseum* communitySubass. with *Calliergon giganteum*Subass. with *Racomitrium canescens*

## 2 Moss tundra

*Tomenthypnum* tundraVar. with *Dicranum angustum*Subass. with *Hypnum revolutum*Subass. with *Paludella squarrosa*Subass. with *Calliergon stramineum*Subass. with *Racomitrium canescens**Dicranum angustum* tundraSubass. with *Calliergon stramineum**Racomitrium canescens* communityVar. with *Hylocomium splendens*Stand with *Dicranoweisia crispula**Drepanocladus uncinatus* snow-bed community3 *Racomitrium lanuginosum* communitySubass. with *Barbilophozia hatcheri*

## 4 Pioneer vegetation on soil

*Kiaeria starkei*–*Psilopilum cavifolium* community*Gymnomitrium corallioides* communityVar. with *Anthelia juratzkana*Var. with *Racomitrium lanuginosum*Stand with *Psilopilum laevigatum**Anthelia juratzkana* community*Pohlia drummondii* snow-bed community*Barbilophozia quadriloba* communityVar. with *Bryum cryophilum*, *Orthothecium chryseum* and *Calliergon giganteum*5 *Sphenolobus minutus* community6 *Aplodon wormskioldii* community7 *Hygrohypnum alpestre* water moss community

**Thannheiser & Hofmann (1977):**

*Puccinellietum phryganodis* Hadač

Subass. *typicum*

Var. with *Drepanocladus uncinatus*

Subass. with *Bryum salinum*

Var. with *Drepanocladus uncinatus*

**Eurola & Hakala (1977)**

*Chrysosplenium tetrandrum*–*Plagiomnium* moist bird cliff meadows

*Oxyria digyna*–*Polytrichum* dry bird cliff meadows

**Thannheiser (1979):**

*Arctophiletum fulvae* Lambert

Subass. with *Scorpidium scorpioides*

**Heinemeijer (1979):**

*Racomitrium lanuginosum* vegetation

*Dicranum elongatum* vegetation

*Tomenthypnum nitens*–*Drepanocladus uncinatus* vegetation

*Orthothecium chryseum*–*Tomenthypnum* vegetation

*Salix*–*Polygonum*–*Aulacomnium turgidum* vegetation

*Cardamine bellidifolia*–*Saxifraga foliolosa*–*Paludella* vegetation

*Bryum cryophilum*–*Poa alpigena* vegetation

*Papaver*–*Phippisia algida*–*Racomitrium canescens* vegetation

*Drepanocladus uncinatus*–*Calliergon* vegetation

**Hartmann (1980):**

Moss tundra communities (Moostundra–Gesellschaften)

Dry community with *Sphagnum squarrosum* and *Hypnum revolutum*

Moist community with *Drepanocladus revolvens* and *Deschampsia alpina*

High arctic vegetation of stone rings (*Draba micropetala*–*Gymnomitrium corallioides* community)

*Racomitrium lanuginosum* community

**Hjelmstad (1981):**

*Saxifraga oppositifolia*–*Drepanocladus uncinatus* vegetation

**Gugnacka-Fiedor & Noryskiewicz (1982):**

Dry moss tundra

Fresh moss tundra

**Elvebakk (1984):**

*Dicranoweision crispulae* all. prov.

**Brossard et al. (1984):**

*Hypnum revolutum* community type

*Drepanocladus badius* community type

*Aneura pinguis* community type

**Brattbakk (1981, 1984, 1985a, b, c):**

Heigråmose–lavhei (*Racomitrietum lanuginosi spitsbergense* Hadač 1946)

Bergsotmose–snøleie (*Andraea rupestris*–samfunn)

Polarvierhei (*Salix polaris*–*Polytrichum hyperboreum*–samfunn)

Mosetundra med grassigd og myrfiltmose (*Dicranum angustum*–*Aulacomnium palustre*–*Saxifraga hyperborea*–samfunn)

Gullmose–mosetundra (*Tomenthypnetum nitentis* Hofmann 1968)

Gullmose–mosetundra i svakt hellende [gently sloping] terreng

Gullmose–mosetundra i talusskråninger

Klomose–blodmose–våtmark (*Drepanocladus revolvens*–*Calliergon sarmentosum*–samfunn)

Safranlav-snøleie (*Solorina crocea*-*Polytrichum alpinum*-samfunn)  
 Krypsnøse-snøgras-snøleie (*Anihelia juratzkana*-*Phippsia algida*-samfunn)

**Elvebakk (1985):**

*Racomitrium lanuginosi*-*Luzuletum arcuatae* association  
*Gymnomitrium coralloidis*-*Luzuletum arcuatae* association  
*Sauteria alpina* communities  
*Polytrichion norvegici* Gjærevoll

**Dubiel & Olech (1985):**

Community with *Racomitrium lanuginosum*  
 Community with *Calliergon stramineum* – *Ranunculus hyperboreus*  
 Community with *Calliergon richardsonii*  
 Community with *Tetraplodon mnioides*

**Engelskjøn (1986, Bjørnøya):**

Nearly non-vascular *Racomitrium lanuginosum* community, montane  
 Nearly non-vascular *Drepanocladus exannulatus* community  
 Late thawing or temporarily flooded bryophyte turf snowbeds, nearly non-vascular

**Barkman (1987):**

*Dryas*-*Hypnum revolutum* tundra  
*Tomenthypnum*-*Drepanocladus* tundra  
*Calliergon*-*Ranunculus hyperboreus* tundra

**Hadač (1989):**

*Bryo-Dupontietum pelligerae* Hadač 1946 corr. 1989  
*Drepanoclado-Ranunculetum hyperborei* Hadač 1989  
*Alopecurus alpinus*-*Aulacomnium palustre* community  
*Saxifraga cernua*-*Philonotis tomentella* community  
*Pediculari hirsutae*-*Gymnomitrietum corall[i]oidis* Hadač 1989  
*Cerastium arcticum*-*Anihelia juratzkana* community  
*Sphaerophoro-Racomitrietum lanuginosi* (Hadač 1946) Hofmann 1968

**Dubiel & Olech (1990):**

*Racomitrium lanuginosum* community  
*Gymnomitrium corall[i]oides* community  
*Calliergon sarmentosum* community  
*Tetraplodon mnioides* community

**Elven et al. (1990):**

Early snowbeds  
*Homalotheicum nitens*-*Dryas* type  
 Moss tundra  
*Homalotheicum nitens*-*Salix polaris*-*Alopecurus alpinus* type  
*Homalotheicum nitens*-*Salix polaris*-*Dipontia pelligera* type  
 Wet moss tundra  
*Homalotheicum nitens*-*Carex subspathecea* type  
 Sedimentation flats  
*Homalotheicum nitens*-*Salix polaris*-*Equisetum arvense* type

**Karczmarz & Świąs (1990a):**

Mesophilous mixed tundra  
 Herb-moss tundra  
 Moss-herb tundra  
 Moss tundra on snowbeds  
 Tundra of humid moss bogs



**Kobayashi et al. (1990):**

*Anthelietum juratzkanae* Kobayashi ass. prov.  
 Subass. of *Oncophorus wahlenbergii*  
 Subass. of *Tritomaria scitula*  
*Saxifragetum caespitosae* Kobayashi ass. prov.  
 Subass. of *Oncophorus wahlenbergii*  
*Hylocomietum splendidis* Kobayashi ass. prov.  
*Polytrichum commune* community

**Świąś & Karczmarz (1991a):**

Dry lichen–moss tundra  
 Dry mossy tundra with *Racomitrium lanuginosum*  
 Form of typical tundra with *Luzula* sp. and bryophytes  
 Dry grass–moss tundra on seaside sands  
 Dense tundra of mesophilous moss bog on sea terraces  
 Nitrophilous (coprophilous) tundra of dense mossy bog on slopes  
 Boggy, moss–grass tundra with *Deschampsia alpina*  
 Dense, emerged [actually immersed?] moss tundra  
 Moss tundra of water flows  
 Moss tundra of lake shores

**Świąś & Karczmarz (1991b):**

Dry lichen–moss tundra  
 Moss tundra with *Racomitrium lanuginosum*  
 Mesophilous moss tundra  
 Moss tundra on muddy–stony drifts  
 Moss tundra on gravelly–stony drifts  
 Boggy moss–grass tundra with *Deschampsia alpina*  
 Tundra of flooded morasses  
 Moss tundra on stony river overflow–arms  
 Moss tundra on muddy–gravelly lake shores

**Dubiel & Olech (1992):**

*Tetraplodon mnioides*–*Aplodon wormskioldii* community

**Świąś & Karczmarz (1993):**

Dry lichen–moss tundra  
 Mossy tundra with *Racomitrium lanuginosum*  
 Lichen–moss tundra  
 Moss tundra  
 Wet moss tundra of snow beds  
 Marshy, moss–grass tundra with *Deschampsia alpina*

**Thannheiser (1992, 1994); Eberle et al. (1993):**

*Salix polaris*–*Drepanocladus uncinatus*–Gesellschaft  
*Tomenthypnum nitens*–*Orthothecium chryseum*–Gesellschaft  
*Bryum*–Gesellschaft  
*Luzula confusa*–*Racomitrium lanuginosum*–Gesellschaft  
*Festuca rubra*–*Dicranum elongatum*–Gesellschaft

**Thannheiser (1995):**

*Salix polaris*–*Drepanocladus uncinatus*–Gesellschaftkomplex  
*Salix polaris*–*Drepanocladus uncinatus*–Gesellschaft  
*Tomenthypnum nitens*–*Mnium hymenophyllum*–*Paludella squarrosa*–Gesellschaftkomplex  
*Tomenthypnum nitens*–*Mnium hymenophyllum*–*Paludella squarrosa*–Gesellschaften

Barkman (1987) paid attention to some aspects of Svalbard's bryophyte vegetation not previously studied. He recognized six tundra types at Kapp Lee (Edgeøya NW), viz. nitrophilous, dry, intermediate, moist, wet,

and mountain tundra. "Acrocarpous mosses are most abundant here [in the nitrophilous tundra] (contrary to pleurocarps), and least abundant in the dry and the mountain tundra." (p. 127). He distinguished between two leaf size classes of bryophytes, ". . . (bryophyllus under 4 mm<sup>2</sup> and leptophyllus between 4 and 20 mm<sup>2</sup>),. . ." (p. 122): "As to the mosses it is evident . . . that high proportions of large leaved (leptophyllous) mosses occur only in the nitrophilous and in the wet tundra." (p. 130). Leaf inclination was measured, and species were attributed to inclination classes. "The most striking difference with temperate vegetation is the absence in the tundra of Edgeøya (. . . of all strongly bent) leaves in the herb layer, whereas in the moss layer these categories play a much bigger role than in our climate. . . . So far I have no hypothesis that could explain this difference." (p. 129). In the six tundra types he distinguished the following growth forms among the bryophytes:

**Marchantiids.** Foliose hepatics with large rosettes and broad lobes. Only in intermediate tundra (*Preissia quadrata*).

**Sphagnids.** Large acrocarpous mosses, growing in tall turfs with many short branches, especially at the stem tip.

Only in intermediate tundra (*Sphagnum squarrosum*).

**Polytrichids.** Large acrocarpous mosses, stem erect, not or sympodially branching, in 3–15 cm tall turfs. In all types, most common in nitrophilous and wet tundra (e.g. *Bryum pseudotriquetrum*, *Aulacomnium turgidum*).

**Bryids.** Ditto, but smaller: 0.2–3 cm. In all types, most common in nitrophilous tundra (e.g. *Tortula* [= *Syntrichia*] *ruralis*, *Splachnum vasculosum*).

**Anomodontids.** Pleurocarpous mosses with creeping main stems and erect branches. In all types except nitrophilous tundra (e.g. *Tomentypnum nitens*, *Campylium stellatum*).

**Amblystegiids.** Prostrate, appressed pleurocarpous mosses in low dense mats. Almost only in dry tundra (*Hypnum revolutum*).

**Pleuroziids.** Prostrate to ascending pleurocarps, branching monopodially, but irregularly. In loose mats. Very rare in moist tundra (no example, but *Pleurozium schreberi* apparently belongs here).

**Thuidiids.** Ditto, but regularly pinnate or bipinnate. Almost only in nitrophilous and wet tundra (*Hylocomium alaskanum*).

A. Elvebakk & P. Prestrud (eds.)

## A catalogue of Svalbard plants, fungi, algae and cyanobacteria

### Part 3. Fungi I. Basidiomycota: Agaricales, Gasteromycetales, Aphyllophorales, Exobasidiales, Dacrymycetales and Tremellales

GRO GULDEN and ANNA-ELISE TORKELSEN



Gulden, G. & Torkelsen, A.-E. 1996: Part 3. Fungi I. Basidiomycota: Agaricales, Gasteromycetales, Aphyllophorales, Exobasidiales, Dacrymycetales and Tremellales. Pp. 173–206 in Elvebakk, A. & Prestrud, P. (eds.): A catalogue of Svalbard plants, fungi, algae and cyanobacteria. *Norsk Polarinstitutt Skrifter* 198.

All taxa of higher basidiomycetes known to occur on Svalbard are enumerated. This amounts to 175 species belonging to the orders of Agaricales (145), Gasteromycetales (10), Aphyllophorales (13), Exobasidiales (3), Dacrymycetales (2) and Tremellales (2). The list includes a critical selection of pertinent literature records, but it is for the main part based on material collected and/or identified by the authors themselves. Forty-six species are recorded for the first time from Svalbard and one new name (*Agaricus aristocratus*) is introduced. Lists of synonyms used in the literature and rejected names are appended. There are short comments on taxonomy, preferred habitats, occurrence, distribution etc. for nearly all the taxa.

In accordance with the general scope of the publication, "Ecosystem Component Values" are given for each taxon, but in view of the early stage of the mycological exploration of the archipelago, these values are vaguely based. Edible species for human beings are indicated.

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## Introduction

This part of the catalogue includes 175 species of macromycetes belonging to the Basidiomycota, i.e. 145 species of Agaricales, 10 Gasteromycetales, 13 Aphyllophorales, 3 Exobasidiales, 2 Dacrymycetales, and 2 Tremellales. The material is based on published records, material collected mainly by the authors, and to some extent on collections in the University of Oslo Botanical

Museum herbarium (O). Important collections from Svalbard are deposited in many other herbaria, but identification of these is outside the scope of this work. G. Gulden has prepared the Agaricales part, A.-E. Torkelsen the other groups.

The first to publish on macromycetes from Svalbard was S.C. Sommerfelt (1833), who recorded four agarics collected by M. Keilhau on the Svalbard mainland (Spitsbergen) and Bjørnøya. Later Lindblom (1841) recorded seven macromycetes collected by J. E. Vahl. Karsten (1872) included nineteen species of Agaricales and Gasteromycetales in his enumeration of fungi from Svalbard ("Spetsbergen" and "Beeren Eiland"). These included previously recorded species and in addition records of material collected by Th. M. Fries, identified by E. Fries. Reviews of this initial period of macromycete investigations on Svalbard are found in Dobbs (1942) and Hagen (1950). Up to that time collections of macromycetes were made by non-specialists who

brought scientific material of all kinds back from arctic expeditions.

From the 1960s there has been more regular exploration of the macromycete flora of Svalbard mainly by Nordic and Japanese mycological expeditions. The investigation of the macromycete flora of Svalbard up to the end of the 1960s has been reviewed by Ohenoja (1971). Her paper contains several new records of Svalbard macromycetes and a map showing the places where collecting had taken place up to then.

From the later part of the 1970s through the 1980s a growing mycological activity was evidenced on Svalbard. Several species new to Svalbard were recorded by Huhtinen (1987) and Gulden (1988). British naturalist expeditions brought home macromycete collections which further increased the list of known species (Reid 1979; Watling 1983; Watling & Watling 1988). The first monographs concerning macromycete genera on Svalbard appeared: the genus *Galerina* by Gulden (1987), *Russula* and *Cortinarius* subgenus *Dermocybe* from Bjørnøya by Skifte (1989) and Skifte & Høiland (1993), and the gasteromycete genera *Bovista* and *Calvatia* by Lange (1987, 1990). More general observations on the mycoflora of Svalbard were published by Skifte (1979) and Jalink & Nauta (1989). Volume 2 of the series "Arctic and Alpine Fungi" by Gulden & Jenssen (1988) was devoted to agarics of Svalbard. This volume as well as vol. 1 and 3 of the series contain full descriptions and colour photographs of agarics from arctic and alpine habitats.

The growing interest in the mycoflora of Svalbard temporarily culminated with the Third International Symposium of Arctic and Alpine Fungi (ISAM III), which took place on Svalbard in 1988 and gathered 21 mycologists from 10 countries. On this occasion a preliminary flora to the agarics of Svalbard was distributed to the participants (Gulden unpubl.). Many agaric species still remain to be identified on Svalbard, especially in the two ectomycorrhizal genera *Cortinarius* and *Inocybe*. Also the genus *Entoloma* has many unidentified species. There is rich material in the Oslo herbarium (O) of these and other genera which awaits identification.

Woldmar, who visited Svalbard in 1967 and 1968, was the first to collect aphyllophoraceous fungi on Svalbard. He listed three species (Woldmar 1969). Later Arvidsson (1978), Huhtinen (1987) and Jalink & Nauta (1989) each reported

one new species of Aphyllophorales from Svalbard. Hence, by 1989 a total of six Aphyllophorales were known from Svalbard. The Aphyllophorales group is probably poor in species due to the limited number of small-sized woody plants. The same holds for the group of tremellaceous fungi (jelly-fungi), also mainly growing on wood. The very first collections in this group, two in all, were made as late as 1986. During ISAM III in 1988, a total of 18 collections of jelly-fungi was made. The aphyllophoraceous and tremellaceous fungi on Svalbard are mainly found on woody remnants from the mining industry or remnants from other constructions, or on driftwood. Of the three hitherto known jelly-fungi on Svalbard, two are lignicolous, and the third is fungicolous. Also the Gasteromycetes, especially the genus *Lycoperdon*, has many unidentified species; however, it is likely that many records of *Lycoperdon* species belong rather in the genus *Calvatia* (Ohenoja 1971).

In this catalogue 46 basidiomycetes are recorded as new to Svalbard, 37 species belonging to the order Agaricales, 6 to Aphyllophorales, 2 to Dacrymycetales, and 1 to Tremellales.

Names used in early publications for macromycetes from Svalbard are sometimes impossible to interpret; this is true, for example, with *Galera hypnorum*, which could be almost any one of the many muscicolous *Galerina* species growing there. In other cases it is fairly clear which species is meant. Sometimes names of species belonging to the temperate region have been used for what today is considered distinct, arctic-alpine taxa. For example the small, brightly coloured *Lactarius lanceolatus* of section *Russularia*, originally described as late as in 1973, was previously recorded as *L. mitissimus*, *L. subdulcis*, or *L. thejogalus*, all temperate species. In many cases, however, it is disputable whether the fungi occurring on Svalbard represent modifications of temperate species or independent taxa. Following the Comments section there is a list of names (synonyms) used for Svalbard collections in older literature. A list of excluded taxa is appended. The nomenclature of the Agaricales follows that of Hansen & Knudsen (1992): "Nordic Macromycetes", Vol. 2.

## Ecosystem Component Values

Each species in the list has been assigned "Eco-

system Component Values", which in most cases are tentative. The definitions given below apply to all groups of organisms treated in the catalogue. The list includes vernacular Norwegian names according to "Norske Soppnavn" (1996).

Due to the fragmentary knowledge of the mycoflora of Svalbard, the Ecosystem Component Value R (ECV R) will certainly change for most species in the future. The value 3 has probably been applied much too often. For the phytogeographic importance (ECV P) the value 2 is assigned to a large group of macromycetes which is more or less confined to arctic and alpine habitats, and which probably has a circumpolar distribution. A few species are hitherto recorded in the arctic region only and have been assigned the value 3, but more investigations in alpine regions may show their presence there also, as has lately been shown for the two "northern" species *Clitocybe paxillus* and *Lepista multiformis* also occurring in the Alps (Gulden, unpubl.). Occurring on Svalbard is also an element of mainly temperate species still able to endure the cold climate on Svalbard. These species have generally been given the value 1, or 3 if they are highly disjunct.

For the indicator value (ECV E) we have only seldom used the value 3. This reflects that very few species appear to be stenoic or specialised, such as for example *Marasmius epidryas* which occurs only on old parts of *Dryas*. Ectomycorrhizal species are usually not associated with one single autotrophic plant or genus; however, some such as *Leccinum rotundifoliae* apparently are. Too little systematic observation has been done on Svalbard to single out mycorrhizal partners. Apparently both *Salix polaris* and *Dryas octopetala* have very high numbers of agaric partners, the former probably more than 100 (Jalink & Nauta 1989). Even some herbaceous plants, such as *Bistorta* (*Polygonum*) *vivipara*, *Saxifraga oppositifolia* and species of *Kobresia* and *Pedicularis*, form ectomycorrhizal symbioses under arctic conditions (Hesselman 1900; Kohn & Stasovski 1990; Väre et al. 1992). Jalink & Nauta (1989) reported that 80% of the agaric fruitbodies on Edgeøya are ectomycorrhizal. Several of the agarics are muscicolous. None of them, however, seem to be confined to a single moss species or genus. Terricolous macromycetes, with their main body (thallus) growing in or in intimate contact with the soil, tend to be sensitive indicators of soil qualities, and we have used the value 2 for most

species to indicate this. For local abundance (ECV A) we have used the value 2 for species growing gregariously, i.e., with many fruitbodies in one site. The concept of "dominance" has no meaning for macromycete fruitbodies.

It is well known that the reindeer on Svalbard eat mushrooms; which species, however, is largely unknown. We have used the ECV I to indicate species which are edible and worth collecting for human beings.

Since no flora to the macromycetes of Svalbard yet exists, we have made some indications in the Comments section on the distribution on Svalbard. The more common species are treated with summaric statements only. The preferred type of habitat(s) is indicated for a few species. Some very preliminary distribution maps have been printed in Jalink & Nauta (1989). Distribution outside Svalbard is generally not commented on, but can to some degree be understood from the ECV section.

## Definitions

### R *Rarity on Svalbard*

- 3 = Very rare
- 2 = Rare, 3–15 localities known at present
- 1 = Scattered or common, at least locally

### P *Phytogeographical importance*

- 3 = Strongly disjunct or described from Svalbard and not yet known elsewhere
- 2 = Belonging to a phytogeographical element of special interest on Svalbard
- 1 = More or less widespread

### E *Ecological indicator value*

- 3 = Very high (specialised, stenoic)
- 2 = Intermediate
- 1 = Low, euryoic

### A *Local abundance*

- 3 = Dominant, in places more than 50% cover in its habitats
- 2 = Subdominant, 20–50% cover
- 1 = Sparse

### I *Importance to vertebrate animals*

- 3 = Important as a highly preferred fodder plant, or in the marine environment a habitat-forming species
- 2 = Of secondary importance
- 1 = Of no importance

## List of species

Scientific and Norwegian names	Ecosystem Component Values					
	R	P	E	A	I	(* = comments)
<b>Agaricales</b>						
<i>Agaricus aristocratus</i> Gulden	3	3	3	1	3	*
<i>A. bitorquis</i> (Quél.) Sacc. aff. – Bysjampinjong	3	3	2	1	3	*
<i>A. comptulus</i> Fr. – Dvergssjampinjong	3	3	2	1	3	*
<i>A. macrosporus</i> (F.H. Møller & J. Schäff.) Pilát – Kjempesjampinjong	3	3	2	1	3	*
<i>Agrocybe praecox</i> (Pers. : Fr.) Fayod – Våråkersopp	3	1	1	1	1	*
<i>Arrhenia acerosa</i> (Fr. : Fr.) Kühner var. <i>latispora</i> Favre – Stilmosekantarell	2	2	2	1	1	*
<i>A. acerosa</i> (Fr. : Fr.) Kühner var. <i>tenella</i> (Kühner) Aronsen – Stilmosekantarell	3	2	2	1	1	*
<i>A. auriscalpium</i> (Fr.) Fr. – Ørehatt	2	2	2	1	1	*
<i>A. littoralis</i> (Høiland) Gulden – Fjæremosekantarell	3	2	3	1	1	*
<i>A. lobata</i> (Pers. : Fr.) Redhead – Stor mosekantarell	1	2	2	2	1	*
<i>A. retiruga</i> (Bull. : Fr.) Redhead – Småmosekantarell	3	3	2	1	1	*
<i>Bolbitius variicolor</i> Atk.	3	3	2	1	1	*
<i>Calocybe onychina</i> (Fr.) Donk – Gulskeivfagerhatt	3	3	2	1	1	*
<i>Clitocybe ditopus</i> (Fr. : Fr.) Gillet – Meltraktsopp	3	3	2	1	1	*
<i>C. dryadicola</i> (Favre) Harmaja – Polartraktsopp	2	2	2	1	1	*
<i>C. favrei</i> Kühner & Romagn. – Grå vårtraktsopp	3	3	2	1	1	*
<i>C. festiva</i> Favre – Reinrosetraktsopp	2	2	2	1	1	*
<i>C. inornata</i> (Sow. : Fr.) Gillet – Ribbetraktsopp	2	3	2	1	1	*
<i>C. lateritia</i> Favre – Tegltraktsopp	2	2	2	1	1	*
<i>C. mortuosa</i> (Fr.) Gillet	3	3	2	1	1	*
<i>C. paxillus</i> Gulden – Kjöttrosa traktsopp	3	3	2	1	1	*
<i>Collybia alkalivirens</i> Sing. – Fjellflathatt	2	2	2	1	1	*
<i>Conocybe blattaria</i> (Fr. : Fr.) Kühner ss. Watling – Tosporet ringkjeglesopp	3	3	2	1	1	*
<i>C. magnicapitata</i> P.D. Orton	3	3	2	1	1	*
<i>Coprinus cordisporus</i> Gibbs	3	1	3	1	1	*
<i>C. martinii</i> P.D. Orton – Fjellblekksopp	2	2	3	1	1	*
<i>C. nudiceps</i> P.D. Orton	3	3	2	1	1	*
<i>Cortinarius alpinus</i> Boud. – Fjellslørsopp	1	2	2	2	1	*
<i>Cortinarius anomalus</i> (Fr. : Fr.) Fr. – Bjørkeslørsopp	2	3	2	1	1	*
<i>C. cinnamomeoluteus</i> P.D. Orton – Vierslørsopp	3	2	2	1	1	*
<i>C. delibutus</i> (Pers. : Fr.) Fr. – Gul slørsopp	2	3	2	1	1	*
<i>C. glandicolor</i> Fr. var. <i>exilis</i> Favre	3	2	2	1	1	*
<i>C. helobius</i> – Snøleieslørsopp	2	2	2	1	1	*
<i>C. hinnuleus</i> (With.) Fr. – Hjorteslørsopp	3	2	2	1	1	*
<i>C. norvegicus</i> Høiland – Rabbeslørsopp	3	2	2	1	1	*
<i>C. pauperculus</i> Favre	3	2	2	1	1	*
<i>C. percausus</i> Favre	3	2	2	1	1	*
<i>C. phaeopygmaeus</i> Favre	3	2	2	1	1	*
<i>C. polaris</i> Høiland – Polarslørsopp	1	2	2	2	1	*
<i>C. pusillus</i> F.H. Møller – Mørk snøleieslørsopp	3	2	2	1	1	*
<i>C. subtorvus</i> Lamoure – Reinroseslørsopp	1	2	2	2	1	*
<i>Cystoderma adnatifolium</i> (Peck) Harmaja – Oransjebrun grynhatt	3	3	2	1	1	*
<i>C. arcticum</i> Harmaja – Polargrynhatt	2	3	2	1	1	*
<i>Entoloma alpicola</i> (Favre) Noordel. – Fjellrødskivesopp	3	2	2	1	1	*
<i>E. fuscotomentosum</i> F.H. Møller	3	2	2	1	1	*
<i>E. juncinum</i> (Kühner & Romagn.) Noordel. – Striperødskivesopp	3	2	2	1	1	*

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(* = comments)				
<i>E. rhodocylix</i> (Lasch) Moser – Stubberødsdivesopp	–	–	–	–	–
<i>E. sericeum</i> (Bull.) Quél. – Beiterødsdivesopp	2	1	2	1	1
<i>Fayodia arctica</i> Gulden – Polartussehatt	2	3	3	1	1
<i>Flagelloscypha kavinae</i> (Pilát) W.B. Cooke	3	3	3	1	1
<i>Galerina antheliae</i> Gulden – Snøkløkkehatt	3	2	3	1	1
<i>G. arctica</i> (Sing.) Nezdójm.	1	2	2	2	1
<i>G. calyptrata</i> P.D. Orton	3	2	2	1	1
<i>G. clavata</i> (Velen.) Kühner – Kølleklokkehatt	1	1	2	2	1
<i>G. embolus</i> (Fr.) P.D. Orton	3	2	2	1	1
<i>G. hypnorum</i> (Schrank : Fr.) Kühner – Mosekløkkehatt	3	3	2	1	1
<i>G. mniophila</i> (Lasch) Kühner – Gråbrun klokkehatt	2	3	2	1	1
<i>G. pseudocerina</i> A.H. Smith & Sing. – Kalkkløkkehatt	2	2	2	1	1
<i>G. pseudomniophila</i> Kühner	3	3	2	1	1
<i>G. pseudomycenopsis</i> Pilát – Fjellkløkkehatt	1	2	2	1	1
<i>G. pumila</i> (Pers. : Fr.) Sing. – Honningkløkkehatt	3	2	2	1	1
<i>G. stagnina</i> (Fr.) Kühner – Brun myrkløkkehatt	3	3	2	1	1
<i>G. stordalii</i> A.H. Smith – Liten torvmosekløkkehatt	3	3	2	1	1
<i>G. terrestris</i> Wells & Kempton	3	2	2	1	1
<i>G. vittiformis</i> (Fr.) Sing. var. <i>vittiformis</i> f. <i>tetraspora</i> A.H. Smith & Sing. – Melet mosekløkkehatt	3	3	2	1	1
<i>Hebeloma alpinum</i> (Favre) Bruchet – Fjellreddiksopp	2	2	2	1	1
<i>H. kuehneri</i> Bruchet – Slank vierreddiksopp	3	2	2	1	1
<i>H. marginatum</i> (Favre) Bruchet – Bremreddiksopp	3	2	2	1	1
<i>H. minus</i> Bruchet – Musørereddiksopp	3	3	2	1	1
<i>H. polare</i> Vesterholt – Polarreddiksopp	2	2	2	2	1
<i>Hohenbuehelia longipes</i> (Boud.) Moser – Stilkgelémusling	3	3	2	1	1
<i>Hydropus scabripes</i> (Murr.) Sing. – Mørk fnuggchette	2	3	2	1	1
<i>Hygrocybe citrinopallida</i> (A.H. Smith & Hesler) Kobayasi – Eggegul vokssopp	3	2	2	1	1
<i>H. punicea</i> (Fr.) P. Kumm. – Skarlagenvokssopp	3	3	2	1	3
<i>Hypholoma elongatipes</i> (Peck) A.H. Smith – Gul myrsvovelsopp	3	2	2	1	1
<i>H. myosotis</i> (Fr.) Moser – Olivensvovelsopp	3	2	2	1	1
<i>Inocybe calamistrata</i> (Fr.) Gillet – Grønnfottrevlesopp	3	2	2	1	1
<i>I. dulcamara</i> (Pers.) P. Kumm. – Gulbrun trevlesopp	1	2	2	2	1
<i>I. fuscomarginata</i> Kühner	3	3	2	1	1
<i>I. geophylla</i> (Fr. : Fr.) P. Kumm. – Silketrevlesopp	3	3	2	1	1
<i>I. giacomii</i> Favre	2	2	2	1	1
<i>I. lacera</i> (Fr.) P. Kumm. var. <i>heterosperma</i> Favre – Sandtrevlesopp	3	3	2	1	1
<i>I. leucoblema</i> Kühner – Stor trevlesopp	2	2	2	1	1
<i>I. malençonii</i> Heim	3	3	2	1	1
<i>I. praetervisa</i> Quél. – Vanlig knolltrevlesopp	3	2	2	1	1
<i>I. rimosa</i> (Bull. : Fr.) P. Kumm. – Spisstrevlesopp	2	2	2	1	1
<i>I. salicis-herbaceae</i> Kühner	2	2	2	1	1
<i>Laccaria laccata</i> (Scop. : Fr.) Berk. & Broome – Vanlig lakssopp	1	1	1	2	1
<i>L. montana</i> Sing.	2	2	2	2	1
<i>L. pumila</i> Fayod – Fjellakssopp	1	2	1	1	1
<i>Lactarius dryadophilus</i> Kühner – Reinroseriske	2	2	2	1	1
<i>L. glyciosmus</i> (Fr. : Fr.) Fr. – Kokosriske	2	2	1	1	1
<i>L. lanceolatus</i> Miller & Laursen	2	2	2	2	1
<i>L. nanus</i> Favre – Fjellmoriske	2	2	2	1	1
<i>L. pseudoviduus</i> Kühner – Brun vierriske	2	2	2	1	1
<i>L. robertianus</i> Bon	2	2	2	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(* = comments)				
<i>Leccinum rotundifoliae</i> (Sing.) A.H. Smith, Thiers & Watling – Fjellskrubb	3	2	3	1	3 *
<i>Lepista multififormis</i> (Romell) Gulden – Fjellridderhatt	2	2	2	2	3 *
<i>Lyophyllum atratum</i> (Fr. : Fr.) Sing. – Eggsporet blågråhatt	3	2	3	1	1 *
<i>L. connatum</i> (Schum. : Fr.) Sing. – Hvit knippesopp	2	2	2	1	1 *
<i>Marasmius epidryas</i> Kühner – Reinroseseigsopp	1	2	3	2	1 *
<i>M. kallioneus</i> Huhtinen	2	2	2	1	1 *
<i>Melanoleuca cognata</i> (Fr.) Konr. & Maubl. – Vårmunkehatt	2	3	2	1	1 *
<i>Mycena chlorinella</i> (Lange) Sing. – Liten luthette	3	2	2	1	1 *
<i>M. cinerella</i> (P. Karst.) P. Karst. – Melhette	3	3	2	1	1 *
<i>M. citrinomarginata</i> Gillet – Gulhette	3	3	2	1	1 *
<i>M. filopes</i> (Bull. : Fr.) P. Kumm. – Stripehette	3	2	2	1	1 *
<i>M. hyemalis</i> (Retz.) Quél. – Blek barkhette	3	3	2	1	1 *
<i>M. olivaceomarginata</i> (Massee) Massee – Brunkanthette	3	2	2	1	1 *
<i>M. pura</i> (Pers. : Fr.) P. Kumm. – Reddikhette	3	2	2	1	1 *
<i>M. septentrionalis</i> Maas G. – Blåbærhette	3	3	2	1	1 *
<i>Mycenella bryophila</i> (Voglino) Sing.	3	3	2	1	1 *
<i>M. salicina</i> (Velen.) Sing. – Glattsporet frøkenhette	2	2	2	1	1 *
<i>Naucoria tantilla</i> Favre – Fjellbrunhatt	2	2	2	1	1 *
<i>Omphaliaster asterosporus</i> (Lange) Lamoure – Liten stjernenavlesopp	3	3	2	1	1 *
<i>Omphalina chionophila</i> Lamoure	3	3	2	1	1 *
<i>O. ericetorum</i> (Fr.) M. Lange – Torvnavlesopp	2	1	2	2	1 *
<i>O. galericolor</i> (Romagn.) Bon – Okernavlesopp	3	3	2	1	1 *
<i>O. hudsoniana</i> (H.S. Jenn.) H.E. Bigelow – Lavnavlesopp	3	3	2	1	1 *
<i>O. kuehneri</i> Lamoure	3	3	2	1	1 *
<i>O. luteovitellina</i> (Pilát & Nannf.) M. Lange – Kantarellnavlesopp	2	2	2	2	1 *
<i>O. obatra</i> (Favre) P.D. Orton	2	2	2	1	1 *
<i>O. obscurata</i> Reid	2	1	2	2	1 *
<i>O. oniscus</i> (Fr. : Fr.) Quél. – Sotnavlesopp	3	3	2	1	1 *
<i>O. rivulicola</i> Lamoure – Bekkenavlesopp	2	2	2	2	1 *
<i>O. velutina</i> (Quél.) Quél. – Dvergnavlesopp	2	2	2	2	1 *
<i>O. velutipes</i> P.D. Orton	2	2	2	1	1 *
<i>Panaeolus fimicola</i> Fr. – Grå flekkskivesopp	3	1	3	1	1 *
<i>P. semiovatus</i> (Sow. : Fr.) S. Lundell & Nannf. – Gjødseiringsopp	3	2	3	1	1 *
<i>Psathyrella prona</i> (Fr.) Gillet – Glimmersprøssopp	3	1	2	1	1 *
<i>Psilocybe merdaria</i> (Fr.) Ricken – Stor møkkfleinsopp	3	1	3	1	1 *
<i>P. subcoprophila</i> (Britz.) Sacc. – Liten møkkfleinsopp	3	1	3	1	1 *
<i>P. magnivelaris</i> (Peck) Høiland – Jonsokfleinsopp	3	2	2	1	1 *
<i>Rhodocybe caelata</i> (Fr.) Maire – Væpnerhatt	3	3	2	1	1 *
<i>Rickenella fibula</i> (Bull. : Fr.) Raitelh. – Gul nålehatt	3	3	2	1	1 *
<i>R. swartzii</i> (Fr. : Fr.) Kuyper – Fiolett nålehatt	3	3	2	1	1 *
<i>Russula altaica</i> (Sing.) Sing. – Fjelltårekremle	3	2	2	1	1 *
<i>R. chamiteae</i> Kühner – Snøleiesildekremle	2	2	2	2	3 *
<i>R. delica</i> Fr. – Traktkremle	2	2	2	1	1 *
<i>R. maculata</i> Quél. ssp. <i>alpina</i> Knudsen & Borgen – Flekkkremle	3	2	2	1	1 *
<i>R. nana</i> Killerm. – Fjellkremle	1	2	2	2	1 *
<i>R. norvegica</i> Reid – Skarp vierkremle	2	2	2	1	1 *
<i>R. saliceticola</i> (Sing.) Kühner ex Knudsen & Borgen – Mild vierkremle	3	2	2	1	1 *
<i>Stropharia semiglobata</i> (Batsch : Fr.) Quél. – Sitronkragesopp	3	1	3	1	1 *
<i>Tubaria furfuracea</i> (Pers. : Fr.) Gillet – Pinnehatt	3	3	1	1	1 *
Gasteromycetales					
<i>Bovista tomentosa</i> (Vitt.) Quél. – Kalkrøyskopp	3	2	3	1	1 *



Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
	(* = comments)				
<i>Calvatia arctica</i> Ferdinandsen & Winge	2	2	–	1	1 *
<i>C. bellii</i> (Peck) M. Lange	2	2	–	1	1 *
<i>C. cretacea</i> (Berk.) C. Lloyd – Polarrøyksopp	1	2	3	1	1 *
<i>C. horrida</i> M. Lange	3	3	–	1	1 *
<i>C. septentrionalis</i> M. Lange	1	3	2	1	1 *
<i>C. turneri</i> (Ellis & Everh.) Demoulin & M. Lange	1	2	1	1	1 *
<i>Crucibulum laeve</i> (Huds.) Kambly – Vanlig brødkorgsopp	2	1	2	1	1 *
<i>Lycoperdon molle</i> Pers. – Brun røyksopp	3	1	–	1	1 *
<i>Sphaerobolus stellatus</i> Pers. – Slyngball	3	1	3	1	1 *
<b>Aphylophorales</b>					
<i>Antrodia serialis</i> (Fr.) Donk – Rekkekjuke	3	1	3	1	1 *
<i>Columnocystis abietina</i> (Fr.) Pouzar	3	1	3	1	1 *
<i>Cylindrobasidium evolvens</i> (Fr.) Jülich – Favnvedsopp	3	1	3	1	1 *
<i>Dacryobolus sudans</i> (Fr.) Fr.	3	1	3	1	1 *
<i>Gloeophyllum sepiarium</i> (Fr.) P. Karst. – Vedmusling	3	1	3	1	1 *
<i>Hyphoderma setigerum</i> (Fr.) Donk	3	1	3	1	1 *
<i>Litschauerella abietis</i> (Bourd. & Galz.) Oberw.	3	1	3	1	1 *
<i>Peniophora pithya</i> (Pers.) J. Erikss. – Tjærebarksopp	3	1	3	1	1 *
<i>Ramaria ochraceovirens</i> (Jungh.) Donk – Grøntuppkorallsopp	3	1	3	1	1 *
<i>Sistotrema coroniferum</i> (Höhn. & Litsch.) Donk	3	1	3	1	1 *
<i>Stereum sanguinolentum</i> (Alb. & Schw. : Fr.) Fr. – Toppråtesopp	3	1	3	1	1 *
<i>Thelephora caryophyllea</i> Schaeff. : Fr. – Traktfrynsesopp	2	1	2	1	1 *
<i>Typhula culmigena</i> (Mont. & Fr.) Berthier	3	1	3	1	1 *
<b>Exobasidiales</b>					
<i>Arcticomycetes warmingii</i> (Rostr.) Savile – Sildreklumpblad	1	2	3	1	1 *
<i>Exobasidium cassiopes</i> Peck	1	2	3	1	1 *
<i>E. hypogenum</i> Nannf.	1	2	3	1	1 *
<b>Dacrymycetales</b>					
<i>Dacrymyces stillatus</i> Nees : Fr. – Vanlig tåresopp	2	1	2	1	1 *
<i>Ditiola radicata</i> Fr. – Rottåre	2	1	3	1	1 *
<b>Tremellales</b>					
<i>Tremella obscura</i> (Olive) M.P. Christ. – Tåresoppsnylter	2	1	3	1	1 *
<i>Tremella</i> sp.	3	3	3	1	1 *

## Comments

Jenssen "Arctic and alpine fungi 2", p. 42. 1988, non *Agaricus arcticus* Sommerf. 1826 p. 262.

## BASIDIOMYCOTA: Agaricales

*Agaricus aristocratus* Gulden nom. nov.

Syn.: *Agaricus arcticus* Gulden, Gulden &

Only known from the type locality, near the air-field at Longyearbyen (Hotellneset, Adventfjorden), where it was growing in large fairy rings on soil mixed with remnants of coal heaps. *Agaricus arcticus* Gulden, the original name for the species, is a later homonym of *Agaricus arcticus* Sommerf. (= *Panellus (Panus) ringens* (Fr.) Romagn. fide

Blytt (1905 p. 114) or *Panellus (Pleurotus) violaceofulvus* (Batsch : Fr.) Sing. *fide* Pilát (1936, p. 180) and a new name is hence proposed. *Agaricus aristocratus* belongs in the *A. campestre* complex, but is larger and more fleshy, and has broader spores. A description and a colour photograph is found in Gulden & Jenssen (1988 sub *A. arcticus*).

Already in 1868, an *Agaricus* species identified as *A. campestre* was found in this area (Adventbay) (Karsten 1872) and there are several later records of fairy rings of an *Agaricus* species in this area (cf. Ohenoja 1971 and Skifte 1979). *Agaricus aristocratus* was collected at Hotellneset also in 1960 (leg. J. Stordal, O), growing in fairy rings. Hagen (1950) recorded a find of *A. arvensis* from Hotellneset, which probably represents the same species. Fairy rings of a large species of *Agaricus* have been observed several times at the airfield (pers. comm., several persons). Very probably all these records and observations relate to *A. aristocratus*.

*Agaricus bitorquis* (Quél.) Sacc. aff.

New to Svalbard. Known only from a single find beneath the bird cliff Fuglenibba in Adventfjorden. The spores are larger than in *A. bitorquis*, viz., 7–8 x 6–7.5  $\mu\text{m}$ .

*Agaricus comptulus* Fr.

Recorded from Hotellneset near Longyearbyen by Woldmar (1969); identification uncertain.

*Agaricus macrosporus* (F.H. Møller & J. Schäff.) Pilát

Recorded from the Austfjord area among *Dryas* on dry soil by Watling (1983).

*Agrocybe praecox* (Pers. : Fr.) Fay●d

Recorded from Longyearbyen by Ohenoja (1971).

*Arrhenia acerosa* (Fr. : Fr.) Kühner var. *latispora* Favre

New to Svalbard. This is one of two 4-spored varieties of *A. acerosa*. It has been raised to the

rank of species by Bon & Courtecuisse (1987): *A. latispora* (Favre) Bon. The specimens were found on almost naked mineral soil as well as on plant debris. Collections are from Adventdalen, Hotellneset, Bjørndalen in the Isfjorden area, and from Gludneset and Ossian Sarsfjellet in the Kongsfjorden area.

*Arrhenia acerosa* (Fr. : Fr.) Kühner var. *tenella* (Kühner) Aronsen

Recorded from Ny-Ålesund by Gulden & Jenssen (1988) as *Phaeotellus acerosus* (Fr.) Gulden var. *tenellus* (Kühner) Gulden. This is a 2-spored variety of the species. By mistake the new combinations in the genus *Phaeotellus* announced in the abstract by Gulden (1988) were never printed in the main text of the paper.

*Arrhenia auriscalpium* (Fr.) Fr.

This tiny agaric was firstly recorded from Svalbard (Ny-Ålesund) by Kobayasi et al. (1968). Later records are by Ohenoja (1971), Høiland (1976), Gulden & Jenssen (1988), and Jalink & Nauta (1989). There is a map in the latter paper showing its presence in the Bellsund, Isfjorden and Kongsfjorden areas, and on Edgeøya. The species is probably not rare but very easy to overlook.

*Arrhenia littoralis* (Høiland) Gulden

The species was originally described as *Leptoglossum littoralis* (a later homonym of the ascomycete *Leptoglossum littorale* Rostrup), from North Norway (Finnmark) by Høiland (1976). Recorded from Svalbard by Skifte (1979) as *Leptoglossum littoralis* and by Gulden & Jenssen (1988) and Jalink & Nauta (1989) as *Arrhenia salina* (Høiland) Gulden. The latter combination, first time accomplished by Bon & Courtecuisse (1987), is however, incorrect, since the epithet *littorale* has priority in all other genera than *Leptoglossum* and hence must be used. The combination in *Arrhenia* was finally made in Senn-Irlet et al. (1990, p. 3). Up to now the species has only been recorded from North Atlantic coastal areas and from Alaska. The species grows on pleurocarpic mosses in wet places, generally in coastal marsh vegetation influenced by brackish water. There is a description and colour photo in Gulden & Jenssen (1988). Material in O is from

Longyearbyen, Kongressfjellet (600 m alt.), Ny-Ålesund, Van Mijenfjorden, and from the small, northwestern island Moffen.

*Arrhenia lobata* (Pers. : Fr.) Redhead

Recorded from Svalbard by several authors, firstly by Sommerfelt (1833) from Bjørnøya. A characteristic species of the arctic wet tundra and one of the most frequently collected and recorded agarics from Svalbard. Muscicolous, growing in wet habitats, probably in all parts of the archipelago. Found up to 600 m alt. at Kapp Wijk. The records of *Dictyolus muscigenus* from Edgeøya by Micheltore (1934) and from Longyearbyen by Dobbs (1942) probably refer to this species.

*Arrhenia retiruga* (Bull. : Fr.) Redhead

First time recorded, as *Cantharellus retirugis* (Bull.) Fr., by Karsten (1872), from Bjørnøya growing on wet mosses, later by Summerhayes & Elton (1923), and Hagen (1950) from the northernmost parts of Svalbard (as *Dictyolus r.* and *Leptopus r.*). These early records are doubtful. The only collection of this fungus in O is from Ny-Ålesund (cf. Gulden & Jenssen 1988).

*Arrhenia retiruga* is a tiny species, 1–10 mm wide, generally whitish to pale grey brown, growing in mesic to moist habitats (Høiland 1976; Redhead 1984; Gulden & Jenssen 1988). The descriptions of the early Svalbard records, particularly that of Hagen, indicate a greyish species up to 2.5 cm wide growing in wet or boggy habitats. The species is generally found in the temperate forest zone, but is known also from the Alps. See also Høiland (1976).

*Bolbitius variicolor* Atk.

Recorded from Longyearbyen by Huhtinen (1987), identification uncertain. A dull yellowish species found among grass on manured ground. Closely related to the bright egg yellow *B. titubans* (Bull. : Fr.) Fr. (= *B. vitellinus* (Pers. : Fr.) Fr.).

*Calocybe onychina* (Fr.) Donk

Recorded by Gulden & Jenssen (1988). Known only from inner Kongsfjorden (Ossian Sarsfjellet), growing in mats of moss in luxurious veg-

etation in a bird cliff. The species is otherwise known from boreal and montane coniferous forests.

*Clitocybe dryadicola* (Favre) Harmaja

Recorded by Gulden & Jenssen (1988). A species of open pioneer vegetation on calcareous ground, quite common in *Dryas-Carex rupestris* heaths. Known from Sassendalen and a few localities in the Kongsfjorden area, but probably widespread.

*Clitocybe ditopus* (Fr. : Fr.) Gillet

New to Svalbard. A temperate species, which has been collected in Endalen near Adventdalen (Gulden, unpubl.).

*Clitocybe favrei* Kühner & Romagn.

New to Svalbard. Known from a few localities in inner Isfjorden and in the Kongsfjorden area. This is a species of subgen. *Pseudolyophyllum* with greyish, slightly decurrent gills, non-striate, hygrophanous cap, and without particular smell.

*Clitocybe festiva* Favre

Recorded from Svalbard by Gulden & Jenssen (1988). The tentative record by Kobayasi et al. (1968) may rather belong to *C. inornata*, considering the large spores. Material in O from the Isfjorden area: Bjørndalen, Hotellneset, Longyearbyen and Adventdalen, and from Stuphallet, Brandalspynten, Hamnebotnen, Ny-Ålesund, Blomstrandhalvøya, and Ossian Sarsfjellet in the Kongsfjorden area; probably rather common on Svalbard.

*Clitocybe inornata* (Sow. : Fr.) Gillet

Recorded by Gulden & Jenssen (1988). Collected at Sassendalen, Ny-Ålesund, Blomstrandhalvøya, Ossian Sarsfjellet, Inner Lovénbreen and Bohemanfiya. The species typically grows on unstable, periodically wet soils on calcareous ground and often forms rows or circles. This is a temperate species, distinguished by particular spores and a characteristic smell. The smell was not noticed in the Svalbard material, and the

fruitbody colour was darker than usual, particularly on the gills.

### *Clitocybe lateritia* Favre

Recorded from Svalbard by Gulden & Jenssen (1988), also mentioned by Jalink & Nauta (1989). A species typical of *Dryas* heaths. There is material in O from Sassendalen and five localities in the Kongsfjorden area.

### *Clitocybe mortuosa* (Fr.) Gillet

The species recorded by Gulden & Jenssen (1988) from a single locality on Blomstrandhalvøya in Kongsfjorden, was referred to *C. mortuosa* because of a strong resemblance with the specimens illustrated and described by Favre (1955) from the Swiss Alps. Gulden has later examined the material of Favre (coll. 13642 in herb. G), which turned out to belong to *Rhodocybe caelata* (Fr.) Maire. There is no material or modern description of the Friesian species *C. mortuosa* with which to compare our material; identification hence uncertain. The material does not agree with any well known species of *Clitocybe*.

### *Clitocybe paxillus* Gulden

Originally described from Svalbard (Gulden 1988) and presented with colour picture in Gulden & Jenssen (1988). Known from the type locality at Hotellneset, from Adventdalen, and from Ossian Sarsfjellet. Recently collected in the Tyrolian Alps (Gulden, unpubl.).

### *Collybia alkalivirens* Sing.

Recorded from Woodfjorden by Reid (1979) as *C. cf. obscura* Favre. Also collected at Hotellneset (leg. J. Stordal) and in a few places in inner Kongsfjorden (leg. Gulden). The species is recognised by its dark, more or less purplish brown lamellae, and pigments which turn green in alkaline solutions. The material in O is very heterogeneous with regard to size of spores and cystidia.

### *Conocybe blattaria* (Fr. : Fr.) Kühner ss. Watling

New to Svalbard. Collected at Kapp Thordsen, growing among *Festuca* sp. (Gulden, unpubl.).

### *Conocybe magnicapitata* P.D. Orton

Recorded from Longyearbyen by Huhtinen (1987), growing on clayey ground among grass.

### *Coprinus cordisporus* Gibbs

One collection recorded from Svalbard by Uljé & Noordeloos (1993) without locality designation. Also found in Longyearbyen, growing on geese dung, by H. Dissing and S. Sivertsen (S.S., pers. comm.). The species grows on dung of several kinds of animals and is widespread in temperate regions. The closely resembling *Coprinus angulatus* Peck, as recorded by Zabawski (1976) in peatland in the Hornsund area, probably belongs to *C. cordisporus* and not to the carbonicolous *C. angulatus*.

### *Coprinus martinii* P.D. Orton

Recorded from Van Mijenfjorden and from Sassendalen growing in *Dupontia*-meadows by Øvstedal & Schwenke (1987) and pictured by Jalink & Nauta (1989). Also collected in Bjørndalen by T. Borgen and in Gipsvika by G. Gulden. The species grows in wet sites, on basal parts of species of *Carex*, *Juncus*, *Scirpus*, and *Dupontia*. Probably not rare on Svalbard.

### *Coprinus nudiceps* P.D. Orton

New to Svalbard; identification uncertain. A coprophilous species collected on dung together with the moss *Tayloria lingulata* in Bjørndalen by M. Lange (recognised in the field as *C. miser*). The material has distinctly larger spores than *C. miser*, (10-)12-15 × 7-8.4 × 12-14 µm, well in accordance with those of *C. nudipes*, but they have a somewhat eccentric germ pore, not a symmetric one, as indicated for the latter (Orton & Watling 1979).

### The genus *Cortinarius* (Fr.) Fr.

The genus has numerous representatives on Svalbard, and many of them appear to be extremely

common. They play a very important role in the arctic terrestrial ecosystem as ectomycorrhizal partners with *Salix polaris*, *Dryas octopetala*, and probably with some herbaceous plants. Unfortunately the taxa are not well known, and only a small part of them has been identified up to now. Many of the older records are treated here as excluded species, since their identity and relation to the many recently described species of *Cortinarius* from arctic-alpine habitats are uncertain. There are representatives of the subgenera *Dermocybe*, *Myxadium*, *Sericeocybe*, and *Telamonia*, and the latter is by far the most common, with regard to number of species as well as to number of fruitbodies.

### *Cortinarius alpinus* Boud.

The species is very common on Svalbard, and exhibits a wide variation in colours and size. Two very similar species have been distinguished, one relatively small spored, *C. favrei* D.M. Hend., and one large spored, *C. alpinus*, the latter known only from a few sites in the Alps and Alps Maritimes (Moser & McKnight 1987; Trimbach 1978). As shown by Gumińska et al. (1991) the spore variation in this complex on Svalbard covers the full range from *C. favrei* to *C. alpinus*. The existence of two distinct species as described is doubted and the material (records) treated as one variable species. This has been recorded by most authors, either as *C. alpinus* Boud. or as *C. favrei*, and probably occurs in all parts of the archipelago. There is a distribution map in Jalink & Nauta (1989) showing parts of its known localities in Isfjorden, Kongsfjorden and on Edgeøya. In addition it is known from the Hornsund district (Skirgiełło 1961, 1968; Gumińska et al. 1991), and there is material in O from Kong Karls Land (Svenskøya and Kongsøya, leg. J. Markussen). It grows together with *Salix polaris* and *Dryas* and appears to have a fairly wide pH amplitude. A larger and paler form, probably identical with forma *pallida* Moser & McKnight (1987) described from North America, has been collected at Hotellneset (Gulden, unpubl.).

### *Cortinarius anomalus* (Fr. : Fr.) Fr.

New to Svalbard. The species is known as a temperate species growing together with *Betula*. The

specimens growing on Svalbard independently of *Betula* correspond to the form *calcialpinus* Bon described from the Alps. Collected a few places in *Dryas* heaths in the Kongsfjorden area: Blomstrandhalvøya, Gluudneset, and Ossian Sarsfjellet. Also collected in the alpine belt (at Finse) in mainland Norway (Gulden, unpubl.).

### *Cortinarius cinnamomeoluteus* P.D. Orton

Recorded from Blendadalen by Ohenoja (1971), Isfjorden by Høiland (1984), and Bjørnøya by Skifte & Høiland (1993).

### *Cortinarius delibutus* (Pers. : Fr.) Fr.

Recorded from Svalbard by Watling & Watling (1988) without reference to locality. Collected in a few localities in the Kongsfjorden district (Blomstrandhalvøya and Ossian Sarsfjellet) growing among *Dryas* in the *Cassiope* zone (Gulden, unpubl.).

### *Cortinarius glandicolor* Fr. var. *exilis* Favre

Recorded by Kobayasi et al. (1968) from Longyearbyen and tentatively from Bockfjorden by Watling (1983). The main variety has been recorded by Dobbs (1942) from the Billefjord area, identification doubtful. The small brown *Telamonia* species are difficult to identify even for specialists on the group, and the identifications must be taken with reservation.

### *Cortinarius helobius* Romagn.

The complex of *C. helobius* is discussed by Bendiksen et al. (1993) in relation to such species as *C. pauperculus* Favre, *C. scotoides* Favre, and *C. minutulus* Favre. *C. helobius* is considered as one of the most important species of *Salix herbacea* snow-beds in "the arctic and alpine zones of Scandinavia". It appears shortly after snow melting.

### *Cortinarius hinnuleus* (With.) Fr.

Recorded by Skifte (1979) from Longyearbyen; identification uncertain. This temperate species is known to occur also in alpine habitats and Favre

(1955) has described two alpine varieties of the species.

*Cortinarius norvegicus* Høiland

Recorded from Sergeijevfjellet of NW Sørkapp Land by Gumińska et al. (1991).

*Cortinarius pauperculus* Favre

Recorded from Ny-Ålesund by Gulden & Jenssen (1988) and from NW Sørkapp Land by Gumińska et al. (1991). Collected a few more places in the Kongsfjorden area, and probably not rare. See also below *C. helobius*.

*Cortinarius percavus* Favre

New to Svalbard. Collected on Blomstrandhalvøya (Gulden, unpubl.).

*Cortinarius phaeopygmaeus* Favre

Recorded from the Kongsfjorden area by Gulden & Jenssen (1988).

*Cortinarius polaris* Høiland

Originally described on the basis of material from Norway, Svalbard and Alaska (Høiland 1984). A common species in the Kongsfjorden area. Also recorded from Svalbard by Gulden et al. (1985) and by Jalink & Nauta (1989), in the latter paper with a distribution map showing some of its known localities between Bellsund and Kongsfjorden. Skifte & Høiland (1993) record it from Bjørnøya. Grows together with *Salix polaris*, *S. reticulata*, and *Dryas* on calcareous ground, often gregariously.

*Cortinarius pusillus* F.H. Møller

New to Svalbard; collected near Ny-Ålesund (Gulden, unpubl.). This little *Telamonia*, better known as *C. inops* Favre, is rather easily recognised on its blackish brown, smooth cap and the cheilocystidia, a rare feature in *Cortinarius*.

*Cortinarius subtorvus* Lamoure

Recorded from Svalbard by Gulden et al. (1985).

Records of *C. cinereoviolascens* from Longyearbyen and Ny-Ålesund by Kobayasi et al. (1968), and from Ny-Ålesund by Watling (1983), and of *C. simulatus* from Isfjordflya, Linnévatnet, and Ny-Ålesund by Ohenoja (1971) most probably refer to *C. subtorvus*. This is an arctic-alpine species, common in the western fiord districts of Spitsbergen. Grows in heaths with *Salix polaris* and *Dryas*, on calcareous ground.

*Cystoderma adnatifolium* (Peck) Harmaja

Recorded from calcareous ground in Longyearbyen by Harmaja (1984), cf. Huhtinen (1987). Also collected by M. Lange in Bjørndalen (Isfjorden area). The record of *Lepiota granulosa* (Batsch) Fr. from Edgeøya by Michelmores (1934) probably relates to *C. adnatifolium*.

*Cystoderma arcticum* Harmaja

The species was recently described on material from Longyearbyen (Harmaja 1984). Later recorded from Adventdalen by Gulden et al. (1985) and found in Colesbukta (leg. M. Lange) and near Ny-Ålesund (leg. G. Gulden). Grows in dry calcareous heaths. Probably a true arctic-alpine species, also known from mainland Norway, Greenland, and Alaska.

The genus *Entoloma* (Fr.) P. Kumm.

The many species of *Entoloma* on Svalbard are mainly dull coloured, small, and easily overlooked. Noordeloos & Gulden (1989) have described 23 species of *Entoloma* growing in alpine habitats in Norway, and further given a key to the *Entoloma* species growing in alpine and arctic habitats in Northern Europe and Greenland. Many of these species occur on Svalbard, but only few have been identified as yet.

*Entoloma alpicola* (Favre) Noordel.

Recorded from Svalbard by Noordeloos (1984) and Gulden et al. (1985). A common species in alpine habitats in mainland Norway, but to our experience rare on Svalbard, at least in the calcareous districts.

*Entoloma fuscotomentosum* F.H. Møller

Recorded from Svalbard by Noordelos (1984).

*Entoloma juncinum* (Kühner & Romagn.) Noordel.

Recorded as *Rhodophyllus junceus* (Fr.) Quél. from Longyearbyen, from wet tundra, by Kobayasi et al. (1968).

*Entoloma rhodocylix* (Lasch) Moser

Recorded from Hornsund by Skirgiello (1961, 1968), found in a flower pot inside the station building of the Polish Spitsbergen Expedition.

*Entoloma sericeum* (Bull.) Quél.

Recorded from Ny-Ålesund by Kobayasi et al. (1968), from Isfjordflya, Griegfjellet, Kongressdalen, Blendadalen, Festningen, and Longyearbyen by Ohenoja (1971), and by Watling & Watling (1988). Also found in inner Kongsfjorden (Ossian Sarsfjellet), Gulden (unpubl.).

*Fayodia arctica* Gulden

Originally described on material from Svalbard (Gulden 1988). The species was found among lichens and mosses near Hotellneset and in inner Kongsfjorden (Ossian Sarsfjellet).

The fruitbodies were in all cases associated with moribund thalli of the lichen genus *Peltigera*, often hidden among herbs and mosses and easy to overlook.

There is a colour picture of the species in Gulden & Jenssen (1988). *Fayodia arctica* is also recorded from Edgeøya, where it is said to be more common than on the mainland (Jalink & Nauta 1989) and from Bertilryggen and Bohe-manflya (Watling & Watling 1988, determination verified, R. Watling, pers. comm.). Collected also in Bjørndalen and on Vardåsen, and Branzatoppen in Grønfjorden by E. Ohenoja (det. G. Gulden, unpubl., material in TUR).

*Flagelloscypha kavinae* (Pilát) W.B. Cooke

Recorded from Blomsterdalen by Huhtinen (1987), growing on leaves of *Salix polaris*.

*Galerina antheliae* Gulden

A species described from the alpine belt in Norway (Gulden 1980), growing in oligotrophic, late melting *Salix herbacea* snow-beds on thalli of the liverwort *Anthelia juratzkana*. A single find on Svalbard (Longyearbyen) reported by Gulden (1987).

*Galerina arctica* (Sing.) Nezdójm.

A common species on Svalbard, growing gregariously on living mosses in wet sites, for instance on *Calliergon* spp. and *Drepanocladus* s.l. in the arctic wet tundra. Known from several places on the west coast between Bellsund and Norskeøyene, from the western fjord districts, and from Kong Karls Land (Gulden 1987; Gulden & Jenssen 1988). Recorded also from Edgeøya (Jalink & Nauta 1989).

*Galerina calyptrata* P.D. Orton

Specimens with distinctly calyptrate spores collected on *Sphagnum* in Colesdalen (Gulden 1987).

*Galerina clavata* (Velen.) Kühner

Recorded from Svalbard by Gulden (1987) and Gumińska et al. (1991). A common species on Svalbard, in wet, mossy sites. Morphologically and ecologically quite similar to *G. arctica*. They are both described and illustrated from Svalbard in Gulden & Jenssen (1988). Known from several places on the west coast of Spitsbergen and from the fjord districts between Hornsund and Reinsdyrflya.

*Galerina embolus* (Fr.) P.D. Orton

Recorded from Bjørnøya by Karsten (1872), later tentatively by Gulden (1987) from Hotellneset, where the specimens were growing on *Polypodium*.

*Galerina hypnorum* (Schrank : Fr.)

Kühner, not ss. A.H. Smith & Sing.

There are collections of this species from the Isfjorden area (Nordenskiöldfjell), the Kongs-

fjorden area (Gerdøya), and from the north-western Raufjorden in the Norwegian herbaria (Gulden 1987). Older records of *Galera hypnorum* (Lindblom 1841; Karsten 1872; Michelmores 1934; Dobbs 1942) may represent several of the small, muscicolous *Galerina* species so common on Svalbard.

### *Galerina mniophila* (Lasch) Kühner

Recorded from Edgeøya by Michelmores (1934). Recent records are by Reid (1979) and Gulden (1987). Known from a few localities in the Isfjorden area (Colesbukta, Longyearbyen, Hotellneset, Bjørndalen), from Kong Karls Land (Kükenthalfjell on Svenskøya), and from Edgeøya. A muscicolous species mainly found on *Polytrichum* spp. in oligotrophic vegetation types on Svalbard.

### *Galerina pseudocerina* Smith & Sing.

Recorded by Reid (1979), Gulden (1987), Gulden & Jenssen (1988), and Gumińska et al. (1991) from scattered localities on the western coast between Hornsund and Norskeøyene, and eastwards in Isfjorden to Sassendalen. Grows on moss on calcareous ground, generally in dryer habitats than usual for *Galerina* species; at Kapp Wijk found at 600 m alt.

### *Galerina pseudomniophila* Kühner

A species collected on Nordenskiöldfjellet (400–500 m alt.) on *Dicranum* (Gulden 1987). Also recorded by Watling & Watling (1988). The record of *G. pseudombrophila* Kühner (a name not existing) from Trygghamna by Watling (1983), later cited by Huhtinen (1987), probably represents this species.

### *Galerina pseudomycenopsis* Pilát

The largest *Galerina* species on Svalbard. Recorded by Skirgiełło (1961, 1968) as *Pholiota pumila* Fr., by Kankainen et al. (1967) as *Galerina pumila*, by Reid (1979) and Watling (1983) as *G. pseudopumila* P.D. Orton, by Ohenoja (1971) as *G. moelleri* Bas, and finally by Gulden et al. (1985), Gulden (1987), Jalink & Nauta (1989), and Watling & Watling (1988) as *G. pseudo-*

*mycenopsis*. Probably the most common *Galerina* species on Svalbard, found in all investigated parts of the archipelago. There is a distribution map in Jalink & Nauta (1989). Grows in moist, mossy sites, e.g., in arctic wet tundra, littoral marshes, and meadows, generally gregariously or in fairy rings and sometimes seen to cause discoloration of the moss (parasitic?), as for instance reported by Ohenoja (1971).

### *Galerina pumila* (Pers. : Fr.) Sing.

Another small, muscicolous species. Recorded by Reid (1979) from the Woodfjorden area and by Gulden (1987) from Blomsterdalen near Longyearbyen. Records of *Pholiota pumila* Fr. by Skirgiełło (1961, 1968) refer to *G. pseudomycenopsis* Pilát.

### *Galerina stagnina* (Fr.) Kühner

Recorded from Colesbukta and St. Jonsfjorden (Gulden 1987), also collected in Adventdalen (Gulden, unpubl.). A description and illustration is given by Gulden et al. (1985). A rare species on Svalbard, growing on mosses in oligotrophic, wet sites.

### *Galerina stordalii* A.H. Smith

Recorded from Breinesflya, NW Sørkapp Land, by Gumińska et al. (1991), growing among the mosses *Calliergon richardsonii*, *Drepanocladus revolvens*, and *Campylium polygamum*. In the alpine belt of Norway this species typically grows on *Sphagnum* (Gulden et al. 1985).

### *Galerina terrestris* Wells & Kempton

Recorded from Kulmrabben, NW Sørkapp Land by Gumińska et al. (1991). The described material seems hardly different from the material recorded as *G. vittiformis* (see below).

### *Galerina vittiformis* (Fr.) Sing. var. *vittiformis* f. *tetraspora* A.H. Smith & Sing.

Recorded from Breinesflya, NW Sørkapp Land by Gumińska et al. (1991). The *vittiformis* group is surprisingly rare on Svalbard. Of the more than



300 *Galerina* collections examined, Gulden (1987) found only one tiny specimen belonging to stirps *Vittiformis* (which could not be identified).

The genus *Hebeloma* (Fr.) P. Kumm.

*Hebeloma* species are very abundant on Svalbard and play an important role as ectomycorrhizal partners with *Salix* species and probably also with *Dryas*. However, the *Hebeloma* species have been difficult to identify and only few have yet been recorded. Recent monographs of the genus (e.g., Bruchet 1970; Vesterholt 1989), partly dealing with arctic and alpine taxa, will probably soon arise a much better insight in the genus on Svalbard.

### *Hebeloma alpinum* (Favre) Bruchet

Mentioned from Svalbard by Ohenoja (1971), as *H. cf. crustuliniforme* var. *alpinum* Favre from Braganzatoppen, Ny-Ålesund, and Blomstrandhalvøya, and by Senn-Irlet et al. (1990). The species has also been collected in Longyearbyen, Ny-Ålesund, and at Lovénbreen (Gulden, unpubl.).

### *Hebeloma kuehneri* Bruchet

New to Svalbard. Collections are from Ny-Ålesund and Gluudneset in the Kongsfjorden area (Gulden, unpubl.).

### *Hebeloma marginatulum* (Favre) Bruchet

Recorded from Ny-Ålesund, associated with *Salix*, by Watling (1983) and from Dicksonfjorden by Watling & Watling (1988). Collected also in inner Kongsfjorden (Gulden, unpubl.).

### *Hebeloma minus* Bruchet

The species, belonging to the section *Denudata*, has been tentatively recorded by Watling & Watling (1988) from Ekmanfjorden and Bohemanflya.

### *Hebeloma polare* Vesterholt

Originally described on material from Long-

yearbyen and Isfjorden radio (Vesterholt 1989). Collected also at Barentsburg, Hotellneset, Gipsvika, Ny-Ålesund and inner Kongsfjorden (Gulden, unpubl.). The species belongs in section *Indusiata*, and is close to *H. marginatulum* (Favre) Bruchet. Probably the material recorded from the Krossfjorden area by Watling (1983) as *H. versipelle* belongs in *H. polare*.

### *Hohenbuehelia longipes* (Boud.) Moser

Recorded for the first time in the Arctic by Watling & Watling (1988), from a single locality: Bohemanflya on Dickson Land (determination verified by S. Elborne, Copenhagen). It was found growing in the moss *Tomenthypnum nitens* and together with *●mphalina oniscus*. The species is rare everywhere and grows in mountainous peat bogs. Probably it is nematophagous like most other species in the genus.

### *Hydropus scabripes* (Murr.) Sing.

New to Svalbard. Collected a few places among moss in heath vegetation: Hotellneset near Longyearbyen, Ossian Sarsfjellet, Stuphallet, and Bayelva in the Kongsfjorden area.

### *Hygrocybe citrinopallida* (Smith & Hesler) Kobayasi

Recorded from Rotjesfjellet in the Hornsund area, growing on dead moss, by Skirgieřto (1961, 1968), as *Hygrophorus vitellinus* Fr. sensu Møller. According to Boertmann (1990) the arctic-alpine *Hygrocybe* taxon in this group, with relatively large, but slender spores, is *H. citrinopallida*. The species has also been collected in inner Kongsfjorden (Ossian Sarsfjellet), growing in a thick carpet of *Racomitrium* (Gulden, unpubl.).

### *Hygrocybe punicea* (Fr.) P. Kumm.

Found on Svalbard (Spitsbergen) by J. Vahl according to Lindblom (1841), Karsten (1872), and Ohenoja (1971). There are no recent records. The species, which typically grows in pastures, is easily recognised, and I am not aware of any other species on Svalbard with which it could be confused.

*Hypholoma elongatipes* (Peck) Smith

Recorded by Ohenoja (1971) from Longyearbyen and Festningen, and by Skifte (1979). Known also from Adventdalen (leg. M. Lange and K.M. Jenssen). It grows on mosses in wet, oligotrophic sites.

*Hypholoma myosotis* (Fr.) Moser

New to Svalbard. Collected by K.M. Jenssen in Adventdalen. The species typically grows in peaty soils, boggy sites and in oligotrophic heath communities. *Hypholoma lapponicum* (Fr.) Moser, originally described from Swedish Lappland by Laestadius (1860) as *Agaricus eximius* Laest. is probably identical. *Hypholoma myosotis* is mainly a temperate species occurring also in alpine habitats, for instance in mainland Norway and in the Alps. It is known also from the subantarctic region (Horak 1982).

*The genus Inocybe* (Fr.) Fr.

The genus has many species on Svalbard and as an ectomycorrhizal genus it plays an important role in the terrestrial ecosystem. Only a small part of our collections has been identified.

*Inocybe calamistrata* (Fr.) Gillet

New to Svalbard. Known from Longyearbyen (leg. J. Stordal) and from Blomstrandhalvøya (leg. K.M. Jenssen).

*Inocybe dulcamara* (Pers.) P. Kumm.

A common species on Svalbard and a taxon with many forms in arctic and alpine habitats which are often considered as individual taxa. Recorded from Grumantbyen by Lange (1957), from Ny-Ålesund by Kobayasi et al. (1968), from Woodfjorden by Reid (1979), from Bockfjorden by Watling (1983), from Ekmanfjorden by Watling & Watling (1988), and by Skifte (1979). It is often growing gregariously in heaths among *Salix polaris* and *Dryas*.

*Inocybe fuscomarginata* Kühner

A species in the *dulcamara* complex, tentatively

recorded by Watling (1983) from Bockfjorden. The species has also been collected at Bayelva near Ny-Ålesund (Gulden, unpubl.).

*Inocybe geophylla* (Fr. : Fr.) P. Kumm.

Recorded from Adventbukta by Karsten (1872), from Billefjorden by Dobbs (1942), and from Isfjordfløya by Ohenoja (1971).

*Inocybe giacomii* Favre

Found on Svalbard by K.M. Jenssen as recorded by Senn-Irlet et al. (1990). *Inocybe borealis* M. Lange originally described from Greenland (Lange 1957) is the same species.

*Inocybe lacera* (Fr.) P. Kumm. var. *heterosperma* Favre

Recorded from Ekmanfjorden by Watling & Watling (1988).

*Inocybe leucoblema* Kühner

Recorded from the airfield area (Hotellneset) by Huhtinen (1987). There is rich material of the species from inner Kongsfjorden, Ossian Sarsfjeldet in O (Gulden, unpubl.).

*Inocybe malençonii* Heim

Tentatively recorded by Reid (1979) from NW Spitsbergen and by Watling & Watling (1988) from Ekmanfjorden.

*Inocybe praetervisa* Quél.

Recorded from the airfield (Hotellneset) by Huhtinen (1987).

*Inocybe rimosa* (Bull. : Fr.) P. Kumm.

The species has two forms on Svalbard, f. *alpina* Heim and f. *alpestre* Heim. Recorded from Billefjorden by Dobbs (1942), from Longyearbyen by Kobayasi et al. (1968), from Braganzatoppen and Forlandsundet by Ohenoja (1971), and from Ekmanfjorden by Watling & Watling (1988), mainly as *I. fastigiata*. There are several col-

lections from the Isfjorden and Kongsfjorden areas in O (Gulden, unpubl.).

### *Inocybe salicis-herbacea* Kühner

Recorded as *I. praetervisa* f. *rufofusca* Favre from Kongressdalen by Ohenoja (1971). The taxon has been collected in several places in the Isfjorden and Kongsfjorden area by K.M. Jenssen (pers. comm.).

The genus *Laccaria* Berk. & Br.

*Laccaria* species are very common on Svalbard. The fruitbodies are extremely variable, especially with regard to colours, and have either 2 or 4 spores on the basidia. After a preliminary revision of a large material from Svalbard, only two taxa were recognised by E. Vellinga (pers. comm.): *L. laccata* (4-spored) and *L. pumila* (2-spored).

### *Laccaria laccata* (Scop. : Fr.) Cooke

Recorded by most of the authors dealing with the mycoflora of Svalbard. Extremely common and very variable on Svalbard; probably present in all parts of the archipelago.

### *Laccaria montana* Sing.

Recorded by Väre et al. (1992) by citing "Gulden (1988)", a preliminary flora to the macromycetes of Svalbard which has not yet been published (see introduction). Mueller (1992) considers at least some of the records of *L. tetraspora* from arctic areas to belong to *L. montana*.

### *Laccaria pumila* Fayod

Like the preceding species, this is extremely common and variable on Svalbard. Recorded by Kobayasi et al. (1968) and Ohenoja (1971) as *L. tortilis* (Bolton) Cooke, by Skifte (1979) as *L. altaica*, and by Reid (1979) as *L. striatula* (Peck) Peck. *Laccaria ohiensis* (Mont.) Sing., as recorded by Watling & Watling (1988), probably refers to *L. pumila* as well, since Singer in his later publications used this name for a two-spored species (Mueller & Vellinga 1986, p. 32; Mueller 1992).

According to Sivertsen (1993) there are two

*Laccaria* species with two-spored basidia in arctic-alpine regions: *L. pumila* Fayod and *L. altaica* Sing. They can be distinguished on spore shape and ornamentation. Whether both, or only the apparently most common one in the northern regions, *L. altaica*, are present on Svalbard, has not yet been examined.

### *Lactarius dryadophilus* Kühner

New to Svalbard. Only known from few localities: Longyearbyen, Blomsterdalen, and Ossian Sarsfjellet (Gulden, unpubl.). The species grows in oligotrophic and eutrophic heath vegetation, and can be locally abundant. The violet discoloring of the initially white milk is generally slow and sometimes very weak or absent. An old name, *L. groenlandicus* Terkelsen, has been used for *L. dryadophilus*, but the type of *L. groenlandicus* is another species (Knudsen & Lamoure 1993).

### *Lactarius glyciosmus* (Fr. : Fr.) Fr.

Recorded by Ohenoja (1971) from Longyearbyen. The smell was absent in one of the collections. This possibly belongs in *L. nanus* Favre, which is very similar, but lacks the characteristic coconut smell. Also mentioned from Svalbard by Skifte (1979).

### *Lactarius lanceolatus* Miller & Laursen

Recorded from Svalbard by Gulden & Jenssen (1988). Probably a fairly common species on Svalbard in dry, calcareous heaths with *Salix polaris* and *Dryas*. It grows gregariously and often in fairy rings. Material in O is from: Hotellneset, Blomsterdalen, Nordenskiöldfjellet, Larsbreen, Adventdalen, Endalen in the Isfjorden area and from Ny-Ålesund, Bayelva, Gluudneset, and Ossian Sarsfjellet in the Kongsfjorden area. The species was described from Alaska by Miller et al. (1973) and is up to now only recorded from arctic-subarctic regions. Previous records from Svalbard of *L. mitissimus*, *L. subdulcis*, *L. thejogalus* (see excluded species), and of the *Lactarius* sp. described by Ohenoja (1971), probably relate to the present species.

*Lactarius nanus* Favre

Recorded from Longyearbyen by Skifte (1979) and by Gulden et al. (1985). An arctic-alpine species, typically growing in open *Dryas* and *Salix polaris* heaths, known from Barentsburg, Bjørndalen, Blomsterdalen, Longyearbyen and Adventdalen in the Isfjorden area, from St. Jonsfjorden, and from Ny-Ålesund (Gulden, unpubl.). Records of inodorous specimens of *L. glyciosmus* Fr. by Ohenoja (1971) from Longyearbyen probably refers to this species.

*Lactarius pseudouvidus* Kühner

Recorded from Svalbard by Jalink & Nauta (1989). This arctic-alpine species typically grows in moist to wet habitats, on Svalbard together with *Salix polaris* and mosses, gregariously or subfasciculate. Collections in O are from: Hotellneset, Blomsterdalen, Kapp Thorsen, Kapp Wijk, St. Jonsfjorden, Ny-Ålesund, Voltelva, Bayelva, Gluudneset, and Ossian Sarsfjellet.

*Lactarius robertianus* Bon

New to Svalbard. Material in O is from Kapp Thorsen, Hotellneset, Blomsterdalen, Longyearbyen, and Ossian Sarsfjellet. The species has a violet staining milk, but is darker, more red-brown and dryer than *L. uvidus*. The species was originally described on material from the French Alps (cf. Bon 1985). The distinction towards the little known *L. violascens* (Otto : Fr.) Fr. is unclear. *Lactarius robertianus* appears to prefer oligotrophic heath vegetation. The records of *L. uvidus* from Linnévatnet, Braganzatoppen, Longyearbyen, and Ny-Ålesund by Ohenoja (1971) probably relate to this species.

*Leccinum rotundifoliae* (Sing.) A.H. Smith, Thiers & Watling

The species has *Betula nana* as ectomycorrhizal partner. An early record of *Boletus scaber* Fr., growing together with *Betula nana* at Colesbukta (Kolesbay) by Hesselman (1900), probably refers to *L. rotundifoliae*. The species has later been collected in a few places: Nordhallet on the West side of Colesbukta, in lower part of Adventdalen (leg. T. Engelskjøn and S. Spjelkavik, Aug.

1986), and in Endalen (leg. G. Mathiassen July 1986, N. Lundquist, Aug. 1988). *Betula nana* is very rare and often dwarfish on Svalbard, and well-developed specimens of the fungus may be almost as tall as the shrub, and much more conspicuous. Mentioned from Svalbard and illustrated in Gulden et al. (1985).

*Lepista multififormis* (Romell) Gulden

Recorded from Svalbard by Gulden (1984), Gulden et al. (1985), and Jalink & Nauta (1989). A common species on disturbed ground on Svalbard, often seen along roads, in wheel tracks, construction sites, etc. In natural vegetation it grows on unstable soils such as solifluction lobes, often forming large fairy rings. Known localities: Adventdalen, Endalen, Blomsterdalen, Dicksonfjorden, Kapp Thorsen, Kapp Wijk, St. Jonsfjorden, Ny-Ålesund, Blomstrandhalvøya, and Ossian Sarsfjellet. It is an excellent edible fungus.

*Lyophyllum atratum* (Fr. : Fr.) Sing.

Recorded from Sørhamna on Bjørnøya by Karsten (1872) as *Ag. (Collybia) atratus* Fr. Without any material it can not be verified whether the record refers to this species or to *L. anthracophilum* (Lasch) Lange & Sivertsen, or to one of the small dark *Fayodia* species growing on burnt ground.

*Lyophyllum connatum* (Schum. : Fr.) Sing.

New to Svalbard. Grows in grassy, often somewhat disturbed sites. Material from Adventdalen, Endalen, Ny-Ålesund, and Blomstrandhalvøya in O.

*Marasmius epidryas* Kühner

Recorded from Kongressdalen, Braganzatoppen, Longyearbyen, and Ny-Ålesund by Ohenoja (1971) and by Gulden et al. (1985). Also mentioned by Skifte (1979) and Jalink & Nauta (1989). The species was collected at Hotellneset by Vogts Spitsbergenexpedition in 1928 (material in O). There are collections also from Sassendalen, Kapp Wijk, St. Jonsfjorden, Blomstrandhalvøya,

Gluudneset, Reinsdyrflya, and Bockfjorden in O. The species grows on dead parts of *Dryas*. It is probably common on Svalbard, but small and not easily seen.

*Marasmius kallioneus* Huhtinen

The original description of this species is based on material from Greenland and Svalbard (Huhtinen 1985). It is recorded by him from Kongressdalen and Blomsterdalen at Longyearbyen (Huhtinen 1985, 1987). This two-spored *Marasmius* is easily recognised by an onion-like smell. Collected by J. Stordal in Longyearbyen in 1960 (O, det. G. Gulden). The material recorded as *Marasmius* sp. by Ohenoja (1971) belongs to this species. The species has also been collected in Tyrol, Austria (leg. T. Schumacher, det. Gulden) and could hence be regarded as an arctic-alpine species.

*Melanoleuca cognata* (Fr.) Konr. & Maubl.

Recorded from the airfield (Hotellneset) by Huhtinen (1987). Also found in Adventdalen and Ossian Sarsfjellet (Gulden, unpubl.).

*The genus Mycena* (Pers. : Fr.) Roussel

There are surprisingly many *Mycena* species growing on Svalbard, but very few have been recorded. They are tiny and easily overlooked, however. None of the *Mycena*-species found on Svalbard are strictly arctic-alpine; they have a wide and mainly temperate-boreal distribution.

*Mycena chlorinella* (Lange) Sing.

New to Svalbard. Found in Endalen in the Isfjorden area and at Blomstrandhalvøya and Gluudneset in the Kongsfjorden area, growing in deep moss carpet. The species appears to be fairly common in alpine, arctic and subarctic regions (Gulden & Jenssen 1982).

*Mycena cinerella* (P. Karst.) P. Karst.

New to Svalbard. Found at Hotellneset, on the bank of a small brook in the *Cassiope* belt. This temperate-boreal species has also been found in

alpine habitats in mainland Norway (Gulden & Jenssen 1982, p. 194).

*Mycena citrinomarginata* Gillet

Recorded from Blomstrandhalvøya in the Kongsfjorden area by Gulden & Jenssen (1988). Later collected also in Endalen in the Isfjorden area (Gulden, unpubl.). The species appears to be fairly common in alpine, arctic and subarctic regions (Gulden & Jenssen 1982).

*Mycena filopes* (Bull. : Fr.) P. Kumm.

New to Svalbard. Found at Hotellneset, on the bank of a small brook; 2-spored material. The species also occurs in alpine sites in mainland Norway (Gulden & Jenssen 1982).

*Mycena hyemalis* (Retz.) Quél.

New to Svalbard. Found in heath vegetation at Bayelva (leg. T. Borgen), Blomstrandhalvøya, and Ossian Sarsfjellet (leg. G. Gulden) in the Kongsfjorden area.

*Mycena olivaceomarginata* (Masse) Massee

New to Svalbard. Collected at Hotellneset, in the same type of habitat as *M. citrinomarginata*. It is questionable if the two species are really different. The material referred to *M. olivaceomarginata*, is 4-spored and darker, more olivaceous, than the 2-spored collection referred to *M. citrinomarginata*. The latter species may, however, also have 4-spored basidia in arctic and alpine habitats (Gulden & Jenssen 1982). An alkaline smell is characteristic of *M. olivaceomarginata*. Collected also by Stordal at Hotellneset in 1960 and in Adventdalen by M. Lange (O).

*Mycena pura* (Pers. : Fr.) P. Kumm.

New to Svalbard. Found at Ossian Sarsfjellet in inner Kongsfjorden, growing in deep moss. The species appears to be fairly common in arctic-alpine habitats (Gulden & Jenssen 1982).

*Mycena septentrionalis* Maas G.

New to Svalbard. Found among small mosses and dead leaves on bank of a small brook at Hotellneset. This appears to be the first record of this boreal species from arctic-alpine regions, leg. G. Gulden and K.M. Jenssen.

*Mycenella bryophila* (Voglino) Sing.

New to Svalbard. Found on Blomstrandhalvøya in the Kongsfjorden area, growing in moist site with *Dryas*, leg. G. Gulden and K.M. Jenssen.

*Mycenella salicina* (Velen.) Sing.

New to Svalbard. Collected in Bolterdalen in the Isfjorden area and at Bayelva and Ossian Sarsfjellet in the Kongsfjorden area, leg. G. Gulden and K.M. Jenssen.

*Naucoria tantilla* Favre

Recorded from Svalbard by Gulden & Jenssen (1988) as *Alnicola tantilla*. Found in Sassendalen (Isfjorden area) and at Stuphallet, Bayelva, Ny-Ålesund, and Blomstrandhalvøya in the Kongsfjorden area. Kühner (1981) has described a very similar species, *N. chamiteae* (Kühner), having shorter and more almond-shaped spores. Our material has not been sufficiently examined for possible presence of this species. The record of *Naucoria* cf. *sphagneti* from Bohemanfya by Watling & Watling (1988) possibly relates to *N. tantilla*, as it is said to have the typical slender, nettlehair-shaped cystidia found in *N. tantilla* and also larger spores than *N. sphagneti*.

The identity of the *Naucoria* sp., possibly *N. hamadryas* Fr., recorded by Micheltore (1934) from Edgeøya is doubtful. The same holds for a *Naucoria* belonging in sect. Submelinoideae recorded by Kobayasi et al. (1968) from Ny-Ålesund, and the two collections of a *Naucoria* sp. mentioned by Hagen (1950).

*Omphaliaster asterosporus* (Lange)

Lamoure

New to Svalbard. Found in *Rhacomitrium* mat on Blomstrandhalvøya (Gulden unpubl.).

*Omphalina chionophila* Lamoure

New to Svalbard. Collected by D. Lamoure (pers. comm.).

*Omphalina ericetorum* (Fr.) M. Lange

Found already in 1838–39 by J. Vahl (Lindblom 1841; Karsten 1872) and later recorded by most authors dealing with macromycetes from Svalbard, often as *O. umbellifera* (L.: Fr.) Quéf. Known from many localities between Hornsund and Kongsfjorden and recorded from Bjørnøya by Karsten (1872, as *A. (Omphalea) umbelliferus* L. var. *nivalis* M. Vahl). Grows in mossy habitats, often moist, on peaty soil and on turf. The dark green, granulose lichen thallus traditionally known as *Botrydina vulgaris* may be very scanty around the stipe base, especially when the fruit-body grows on mosses; sometimes it is only seen under a high magnification lens.

The fruitbody colour is variable, ranging from rather dark red-brown to milky white and cream yellow. Also the nuclear conditions and the number of spores per basidium vary. Several attempts have been made to distinguish more species or subordinate taxa (Møller 1945; Lamoure 1968; Watling 1977; P.D. Orton 1984). Høiland (1987) found two chemotypes of the species, both occurring on Svalbard.

*Omphalina galericolor* (Romagn.) Bon

New to Svalbard. Found in Sassendalen growing on moss in arctic wet tundra and at Stuphallet in Kongsfjorden growing on *Aulacomnium palustre* (leg. G. Gulden). Two similar, orange to ochre *Omphalina* species have been recognised: *O. galericolor* and *O. favrei* Watling (syn. *Omphalia brownii* Berk. & Broome ss. Favre = *Gerronema favrei* (Watling) Cléménçon). Only *O. favrei* has been recorded from alpine habitats (Favre 1955; Watling 1977). In my opinion there is only one, variable species, and much of the variation follows from ageing of the fruitbodies. The epithet *galericolor* has priority. The collection recorded as *Omphalina (Gerronema)* sp. by Ohenoja (1971) probably belongs to *O. galericolor*.

*Omphalina hudsoniana* (H.S. Jenn.) H.E. Bigelow

This basidiolichen, forming the pale green thallus

scales known as *Coriscium viride*, seems to be rare on Svalbard. Elvebakk (1984) as the first, recorded finds of the lichen thallus only from Bockfjorden. Later Høiland (1987) recorded finds of fruitbodies from St. Jonsfjorden and inner Kongsfjorden. G. Gulden and K.M. Jenssen collected fruitbodies of the species in an oligotrophic lichen heath at the top of Ossian Sarsfjellet.

### *Omphalina kuehneri* Lamoure

New to Svalbard. Collected by D. Lamoure (pers. comm.).

### *Omphalina luteovitellina* (Pilát & Nannf.) M. Lange

Recorded for the first time from Svalbard by Heikkilä & Kallio (1969), who also discussed its basidiolichen nature. The phycobiont forms a thin, dark green, granulose thallus around the stipe of the basidiocarp; this part is traditionally known as *Botrydina vulgaris*. The species appears to prefer acidic soils, and occurs mainly as a pioneer, for instance at rocky outcrops and in soil polygons. Fruitbodies are produced early in the agaric season and can be locally abundant. There are records and material from more than 15 localities in the western fiord district between Hornsund and Kongsfjorden. According to Jalink & Nauta (1989) it probably occurs in all parts of Svalbard.

The suggestion by Ohenoja (1971) that the species recorded by Skirgiełło (1961, 1968) as *Hygrophorus vitellinus* belongs here, is doubted, because the presence of a yellow *Hygrocybe* species on Svalbard later has been established (see *H. citrinopallida*). There is no reference to *Botrydina* in the papers by Skirgiełło (1961, 1968), as indicated by Ohenoja.

### *Omphalina obatra* (Favre) P.D. Orton

There are several dark, blackish brown species of *Omphalina* in arctic and alpine regions, and most of them can not be correctly identified without microscopic examination of spores, preferably from spore deposits, and of cystidial hairs on the stipe (see Lamoure 1975; Cléménçon 1982). The group is well represented on Svalbard, often with species growing gregariously on more or less

naked soil or silt among small mosses, and often fairly moist.

Some collections in O from Kapp Wijk and Ny-Ålesund probably belong to *O. obatra*. Also the material recorded as *O. rustica* by Ohenoja (1971), from six localities in the Isfjorden and the Kongsfjorden areas, may belong to this species.

### *Omphalina obscurata* Reid

Recorded from Svalbard by Skirgiełło (1961, 1968) and Kobayasi et al. (1968), but the material has been scanty and a correct identification is doubtful. There is material of this species from Sassendalen, Nordenskiöldfjellet, and Ny-Ålesund in O, but only very few of the many collections of dark *Omphalina* species have yet been identified. *O. obscurata* appears to be one of the more common of the dark *Omphalina* species on Svalbard.

### *Omphalina oniscus* (Fr. : Fr.) Quél.

Recorded from Svalbard by Watling & Watling (1988). There is no indication of locality in the paper, but the collection of *Hohenbuehelia longipes* from Bohemanfiya was growing together with *O. oniscus* (indicated on the envelope).

### *Omphalina rivulicola* Lamoure

Recorded from Blomstrandhalvøya in Central Kongsfjorden by Gulden & Jenssen (1988). Records of *O. pyxidata*, a similar species with somewhat different spores, by Hagen (1950), Kobayasi et al. (1968), Ohenoja (1971), and Skifte (1979) probably relate to *O. rivulicola*. *Omphalina rivulicola* is known from many places between Isfjorden and Magdalenefjorden on the western coast of Spitsbergen and from Svenskøya on Kong Karls Land. Grows on various mosses, typically in moist to wet habitats in eutrophic sites.

### *Omphalina velutina* (Quél.) Quél.

Recorded by Heikkilä & Kallio (1969) from a few places in and near Longyearbyen, from Kongressdalen and from Ny-Ålesund, also by Skifte (1979), Gulden & Jenssen (1988, from Blomsterdalen), and by Jalink & Nauta (1989). This

is another basidiolichen which forms *Botrydina vulgaris*. A typical pioneer, growing on mineral soils, often moist and unstable, apparently acidophilic. Known also from Adventdalen, Endalen, Bjørndalen in the Isfjorden area, Bayelva at Ny-Ålesund, and Svenskøya on Kong Karls Land (Gulden, unpubl.).

*Omphalina velutipes* P.D. Orton

New to Svalbard. Collected a number of places near Ny-Ålesund by G. Gulden and K.M. Jenssen, growing in moist sites with tiny mosses.

*Panaeolus fimicola* Fr.

New to Svalbard. Collected in Longyearbyen and in Ny-Ålesund, in grassy habitats (leg. G. Gulden and K.M. Jenssen).

*Panaeolus semiovatus* (Sow. : Fr.) S. Lundell & Nannf.

Recorded by Skifte (1979), from dung from cattle in Ny-Ålesund. Found also at Longyearbyen (Sverdrupsbyen) by J. Stordal (O).

*Psathyrella prona* (Fr.) Gillet

New to Svalbard. Found among *Mnium* and other mosses on the bird cliff Stuphallet in Kongsfjorden by G. Gulden and K.M. Jenssen.

*Psilocybe merdaria* (Fr.) Ricken

New to Svalbard. Found in a grassy field with sewage from the Ny-Ålesund community, leg. K.M. Jenssen.

*Psilocybe subcoprophila* (Britz.) Sacc.

New to Svalbard. Found on reindeer dung at Hotellneset (Gulden unpubl.).

*Psilocybe magnivelaris* (Peck) Høiland

New to Svalbard. Found in Barentsburg in 1988 growing on grass turf of *Alopecurus alpinus* newly deposited among the buildings in the town. The place of origin of the turf is unknown. The record

of *Pholiota* cf. *squarrosa* by Dobbs (1942), growing on a grassy stream bank in Longyearbyen, probably relates to *P. magnivelaris*.

*Rhodocybe caelata* (Fr.) Maire

New to Svalbard. Collected in Bjørndalen on *Polytrichum* by H. Knudsen, det. G. Gulden (O).

*Rickenella fibula* (Bull. : Fr.) Raitelth.

Recorded from the airfield (Hotellneset) by Huhtinen (1987), growing on a somewhat clayey brook bank with small mosses. Collected again by S. Huhtinen in Endalen in 1988.

*Rickenella swartzii* (Fr. : Fr.) Kuyper

New to Svalbard. Collected near Longyearbyen and in Bolterdalen by E. Ohenoja, K.M. Jenssen, and A.-E. Torkelsen in 1988.

*Russula altaica* (Sing.) Sing.

Recorded from Ny-Ålesund by Kobayasi et al. (1968) and from Bjørnøya by Skifte (1989).

*Russula chamiteae* Kühner

Recorded from Bjørnøya by Skifte (1989). Further localities are Hotellneset and Ossian Sarsfjellet (leg. G. Gulden and K.M. Jenssen).

*Russula delica* Fr.

Recorded by Kobayasi et al. (1968) and Ohenoja (1971) from Longyearbyen and mentioned by Jalink & Nauta (1989). Skifte (1989) recorded it from Bjørnøya and Bockfjorden. It has also been found at Hotellneset near Longyearbyen and at Stuphallet and Ny-Ålesund in the Kongsfjord area by G. Gulden and K.M. Jenssen.

*Russula maculata* Qué. ssp. *alpina* (Sing.) Knudsen & Borgen

Recorded from Bjørndalen by Knudsen & Borgen (1992). Fellner and Landa (1993) have raised the taxon to specific rank under the name *R. dryadicola*.



*Russula nana* Killerm.

There are several records of this conspicuous little fungus from Svalbard: From Longyearbyen by Dobbs (1941, as *Russula* resembling *emetica*) and by Kobayasi et al. (1968, as *R. alpina*), from Kongsfjorden and Ebeltoftodden by Watling (1983, as *R. alpina*), from seven localities in the Isfjorden and Kongsfjorden areas by Ohenoja (1971, as *R. alpina*), and from several localities on the northern part of Bjørnøya by Skifte (1989). The species is fairly common in heath vegetation, often growing together with *Salix polaris* and *Dryas octopetala*, but it has also been observed where none of these plants were growing (Gulden unpubl.). An association between *R. nana* and the omnipresent herb *Bistorta* (*Polygonum*) *viviparum* probably exists (Knudsen & Borgen 1982).

*Russula norvegica* Reid

Recorded from Svalbard by Jalink & Nauta (1989) with a distribution map showing its presence in the Bellsund and Isfjorden areas, Edgeøya, and Barentsøya. Skifte (1989) recorded it from several localities on Bjørnøya. It has been collected in many places in the Kongsfjorden area by G. Gulden and K.M. Jenssen.

*Russula saliceticola* (Sing.) Kühner ex Knudsen & Borgen

Recorded from two sites on the northern part of Bjørnøya by Skifte (1989). Collected by J. Stordal at Longyearbyen (unpubl., material in O).

*Stropharia semiglobata* (Batsch : Fr.) Quél.

New to Svalbard. Collected by J. Stordal in Longyearbyen (unpubl., material in O).

*Tubaria furfuracea* (Pers. : Fr.) Gillet

Recorded by Dobbs (1942) from Brucebyen (Billefjorden) on borders of pools.

## BASIDIOMYCOTA: Gasteromycetales

*Bovista tomentosa* (Vitt.) Quél.

Recently collected once near Longyear Airport on Svalbard on coal silt (Lange 1987). It seems to be a rare species on Svalbard. It is a species of continental calcareous soils and is an interesting addition to the mycoflora of Svalbard.

*Calvatia arctica* Ferdinandsen & Winge

An arctic species recorded from Blomstrandhalvøya by Lange (1990). The distribution of this species points to an east-arctic distribution. Old records of this species (Kobayasi et al. 1968) are in need of confirmation, as well as all published records from Svalbard of *Bovista* and *Calvatia* that have not been revised by Lange (1987, 1990).

*Calvatia bellii* (Peck) M. Lange

A widely distributed arctic species and Lange (1990) indicated four collections from Svalbard.

*Calvatia cretacea* (Berk.) C. Lloyd

Recorded from Svalbard by numerous authors (Ohenoja 1971), and recorded as the most common *Calvatia* at Sassendalen by Lange (1990). *Calvatia cretacea* is typically confined to sunny, exposed habitats on calcareous soils in the Arctic. Lange (1990) recorded about 25 collections from Svalbard and Gumińska et. al. (1991) reported this species also from the Hornsund area. The species was mentioned by Fries (1914) as *C. borealis*.

*Calvatia horrida* M. Lange

This species was recently described as a new species known from two localities on Greenland and two on Svalbard: Adventdalen and Bolterdalen (type locality). The species is intermediate between *C. cretacea* and an undescribed high arctic *Lycoperdon* species (Lange 1990).

*Calvatia septentrionalis* M. Lange

A newly described arctic species close to *C. arctica* (Lange 1990). It has been found on sandstone, basalt and calcareous rocks and has been collected on numerous occasions by M. Lange in the Sas-

sendalen-Adventdalen area, and it is also known from Greenland and Iceland.

*Calvatia turneri* (Ellis & Everh.) Demoulin & Lange

This is the most common *Calvatia* (earlier described as *C. tatrensis*) in many arctic areas including Svalbard (Lange 1990). It has earlier been reported by Ohenoja (1971), as *C. tatrensis*. The species is most common on basalt or on sandstone and does not seem to be so common as *C. cretacea* on limestone substrates.

*Crucibulum laeve* (Huds.) Kambly

Recorded from Bjørnøya by Karsten (1872) and it is also known from the Isfjorden area (Skifte 1979).

*Lycoperdon molle* (Pers.) Pers.

Only recorded once near Ny-Ålesund and identified by Demoulin (Ohenoja 1971). Several *Lycoperdon* species reported from Svalbard (see excluded species) call for a revision (Ohenoja op. cit.).

*Sphaerobolus stellatus* Pers.

Recorded from Bjørnøya by Skifte (1994). The species was collected on a board from an old cow-stable constructed around 1920.

BASIDIOMYCOTA: Aphyllophorales

*Antrodia serialis* (Fr.) Donk

New to Svalbard. Collected once in Ny-Ålesund, on old wooden constructions by K.M. Jenssen. According to Ryvarden (1976) this is the most common resupinate polypore met on gymnosperms in mainland Norway.

*Columnocystis abietina* (Fr.) Pouz.

New to Svalbard. Collected once in Ny-Ålesund, on old wooden material, remnants from the pits (leg. K.M. Jenssen). The species is rather common in spruce forests of Northern Europe,

belonging to the taiga-element according to Eriksson & Ryvarden (1973).

*Cylindrobasidium evolvens* (Fr.) Jülich

New to Svalbard. Collected once by J. Stordal in Kapp Wijk on a barrel-lid of deciduous wood (the substrate identified by Torkelsen). The species is common in northern Europe, growing on deciduous trees of all kinds, but also occurring on manufactured coniferous wood (Eriksson & Ryvarden 1976).

*Dacryobolus sudans* (Fr.) Fr.

New to Svalbard. Collected once in Ny-Ålesund by K.M. Jenssen, growing on old wooden material, remnants from the pits. Nowhere a frequent species, but scattered throughout the conifer region. It mainly grows on *Pinus sylvestris*, and has also been found on manufactured wood (Eriksson & Ryvarden 1975).

*Gloeophyllum sepiarium* (Fr.) Karst.

New to Svalbard. Collected once by A.-E. Torkelsen, near Bayelva in Kongsfjorden district, on old manufactured wood of *Picea*. This species is common in mainland Norway, known from both angiosperm and gymnosperm wood (Ryvarden 1976).

*Hyphoderma setigerum* (Fr.) Donk

New to Svalbard. Collected twice by K.M. Jenssen in Ny-Ålesund, on old manufactured wood. According to Eriksson & Ryvarden (1975) the species grows on deciduous trees, less often on conifers. Humid, deciduous forests seem to be the most suitable biotope for this species. It is more frequent in southern parts of Europe, but is regularly met within the middle boreal zone in North Scandinavia.

*Litschauerella abietis* (Bourd. & Galz.) Oberw.

Recorded from Longyearbyen by Woldmar (1969) as *Litschauerella* (sic!) *abietis* growing on old wooden material. Arvidsson (1978) used the name *Litschauerella clematidis* for the same speci-

men. However, according to Eriksson & Ryvar-  
den (1976) it is not clear if these two names are  
synonymous.

*Peniophora pithya* (Pers.) J. Erikss.

Recorded from Ossian Sarsfjellet by Arvidsson  
(1978), growing on an old planed board of *Picea*  
*abies*. *Peniophora pithya* has also been collected  
in Longyearbyen by J. Stordal (O). The species  
is very common in spruce forests in northern  
Scandinavia. The collection by Arvidsson has  
fairly large spores according to Eriksson & Ryvar-  
den (1978).

*Ramaria ochraceovirens* (Jungb.) Donk

Reported from Bjørnøya on a moss carpet by  
Skifte (1994).

*Sistotrema coroniferum* (Höhn. & Litsch.)  
Donk

Recorded from Longyearbyen by Woldmar  
(1969) growing on old wooden material. Accord-  
ing to Eriksson & Ryvar- den (1984) this species is  
not known from mainland Norway. It is not a  
common species, but occurs in all parts of North-  
ern Europe.

*Stereum sanguinolentum* (Alb. &  
Schw. : Fr.) Fr.

Recorded from Longyearbyen by Woldmar  
(1969) growing on old wooden material. Accord-  
ing to Eriksson & Ryvar- den (1984) the species  
grows on coniferous wood. It is especially com-  
mon on newly dead logs and stumps of *Picea*, but  
occurs also on living trees. Old wooden material  
is an unusual kind of substrate for this species.

*Thelephora caryophyllea* Schaeff. : Fr.

Jalink & Nauta (1989) recorded this species from  
"Vestspitsbergen" without indication of place. At  
O, there are four specimens from Svalbard, col-  
lected by K.M. Jenssen and G. Gulden in the  
Ossian Sarsfjellet and in Thiisbukta (Ny-Ålesund)  
in 1986 and one collection from Ny-Ålesund by  
A.-E. Torkelsen.

*Typhula culmigena* (Mont. & Fr.) Berthier

Recorded from Longyearbyen on culms of  
pseudoviviparous *Poa pratensis* ssp. *alpigena*  
(Huhtinen 1987). This is an extraordinary dis-  
covery of a southern species that has never been  
found in the Arctic before.

BASIDIOMYCOTA: Exobasidiales

*Arcticomyces warmingii* (Rostr.) Savile

Recorded as *Exobasidium warmingii* from several  
localities on Svalbard by Hagen (1941). This  
species is a parasite on *Saxifraga oppositifolia*.

*Exobasidium cassiopes* Peck

A common parasite on *Cassiope tetragona* on  
Svalbard (Nannfeldt 1981) earlier reported as *E.*  
*vaccinii-myrtilli* f. *amphigena* (Lind 1928; Hagen  
1941, 1950).

*Exobasidium hypogenum* Nannf.

Also a common parasite on *Cassiope tetragona*  
(Nannfeldt 1981), and this is the more con-  
spicuous of the two *Exobasidium* species on *Cas-*  
*siope tetragona*.

BASIDIOMYCOTA: Dacrymycetales

*Dacrymyces stillatus* Nees : Fr.

New to Svalbard. A single collection of *D. stillatus*  
was made in Ny-Ålesund in 1986 by K.M. Jenssen  
and brought to Oslo for identification. Later, in  
1988, 11 collections were made, found in Ny-  
Ålesund, Longyearbyen and Gipsvika. Both the  
red-orange, soft anamorph and the gelatinous  
often firmer teleomorph were found. Different  
from temperate specimens, the Svalbard material  
shows altogether smaller fruitbodies, seldom  
exceeding 3 mm in diameter, and often with a  
pale yellow colour. *Dacrymyces stillatus* is the  
most common *Dacrymyces* species, known from  
all parts in mainland Norway. It generally grows  
on coniferous wood and causes a brown rot.  
Recently, it has also been shown to cause damage  
on panels of wooden houses in mainland Norway.

The Svalbard collections were growing on remnants from the pits (Ny-Ålesund) and on remnants from the pit cable (Adventdalen) or on driftwood (Gipsvika). The substrate shows always every sign of being worn out.

*Ditiola radicata* (Alb. & Schw. : Fr.) Fr.

New to Svalbard. *D. radicata* was found for the first time in Ny-Ålesund in 1986 by K.M. Jenssen and rediscovered by him on the same wooden staircase in 1988. In addition the species has been found in two more places in Ny-Ålesund by A.-E. Torkelsen. This species generally grows on coniferous wood and causes a brown rot. There is a distinct smell of xeroform from the substratum. The species is known from all parts in mainland Norway.

**BASIDIOMYCOTA: Tremellales**

*Tremella obscura* (Olive) M.P. Christ.

New to Svalbard. This species is fungicolous and parasitic within *Dacrymyces* species. It was found in 5 of the 11 specimens of *D. stillatus* collected in 1988 by A.-E. Torkelsen. It is very surprising that this species, which is known to be rare elsewhere in the world, is so frequent in the Svalbard material of *D. stillatus*, with a ratio of 5:11 compared to 1:10 in mainland Norway. *Tremella obscura* was found both in Longyearbyen and Ny-Ålesund, but not in Gipsvika.

*Tremella* sp.

According to Skytte Christiansen (1993) a tiny, immature specimen of a *Tremella* species is recorded from Hohenloheskardet. The species is parasitic on the podetia of *Cladonia gracilis*.

**Excluded species**

**Agaricales**

*Agaricus arvensis* Schaeff.

Applied to material probably belonging to *A. aristocratus* Gulden.

*Agaricus (Psalliota) campestris* L. : Fr.

Applied to material probably belonging to *A. aristocratus* Gulden.

*Agaricus (Hebeloma) fastibilis* Fr.

Recorded by Lindblom (1841) and Karsten (1872). There are no recent records or material in O from Svalbard of this species. The epithet *fastibile* has been used for widely different species. *Hebeloma fastibile* (Pers. : Fr.) P. Kumm. sensu Fries is a veiled species as clearly shown in the illustration in Fries (1877–84), otherwise rather similar to *H. alpina*. In the sense of Persoon it is a non-veiled species (Kuyper & Vesterholt 1990).

*Agaricus (Hebeloma) firmus* Pers.

Found by J.E. Vahl on Svalbard (Karsten 1872); identity of Persoon's species uncertain.

*Coprinus angulatus* Peck

Recorded by Zabawski (1976) from peat bogs in the Hornsund region, but further documentation is needed. True enough, *C. angulatus* is known to occur in arctic and alpine regions, for instance on Greenland (Lange 1955), but the habitat cited does not suggest a carbonicolous species, rather a coprophilous species like *C. cordisporus*.

*Coprinus plicatilis* (Fr.) Fr.

Recorded by Karsten (1872) from goose dung on Bjørnøya. However, *Coprinus plicatilis* is not a coprophilous species.

*Cortinarius alboviolaceus* (Pers. : Fr.) Fr.

Recorded by Dobbs (1942) from the Billefjorden area. The species grows with *Betula nana* in the alpine belt in Fennoscandia (Hansen & Knudsen 1992), however, this shrub is not known from Billefjorden. Except for an uncertain identification by Ohenoja (1971), there are to our knowledge no recent records of this species from Svalbard. The identification is doubted.

*Cortinarius brunneus* (Pers. : Fr.) Fr.—See *C. rigidus*.

*Cortinarius cinereoviolaceus* (Fr.) Lange

The records by Kobayasi et al. (1968) and Watling (1983) most probably refer to the common arctic-alpine species *C. subtorvus* Lamoure, described as late as in 1969.

*Cortinarius cinnamomeus* (L. : Fr.) S.F. Gray

Recorded by Karsten (1872), Hagen (1950), and Skifte (1979). The name was formerly used for the whole *C. (Dermocybe) cinnamomeus* complex, and can not be strictly interpreted. The record by Ohenoja (1971) from Isfjorden has spores in the upper range for *C. cinnamomeus*. Very probably it belongs to *C. polaris*, which is common in many places on Svalbard. Høiland (1984), revising the subgenus *Dermocybe* in the Nordic countries, gave no records of *C. cinnamomeus* from Svalbard, neither of the very similar *C. croceus* (Schaeff.) S.F. Gray. Both are, however, known from Greenland, the latter from low arctic sites (Høiland 1988).

*Cortinarius glandicolor* Fr.

Recorded by Dobbs (1942); correct identification doubted.

*Cortinarius mucosus* (Bull. : Fr.) Kickx

Recorded by Kobayasi et al. (1968) and mentioned by Skifte (1979). The material of Kobayasi may very well belong to *C. favrei* f. *pallida* Moser & McKnight.

*Cortinarius* cf. *rigidus* (Scop.) Fr. or *C. brunneus* (Pers. : Fr.) Fr.

Recorded by Micheltore (1934) from Edgeøya. This could be any one of the many small, dark brown *Telamonia* species occurring on Svalbard.

*Cortinarius simulatus* P.D. Orton

Recorded by Ohenoja (1971) with reference to descriptions of *C. cinereoviolaceus* by J. Lange (1938) and Kobayasi et al. (1968). The material appears to belong in *C. subtorvus* Lamoure (cp. *C. cinereoviolaceus* above).

*Cortinarius subpurpurascens* Fr.

Mentioned by Kankainen et al. (1967) from the Isfjorden area, but later tentatively named *C. alboviolaceus* (Ohenoja 1971).

*Cystoderma amianthinum* (Scop.) Konr. & Maubl.

Mentioned by Skifte (1979) as one of "the more central" agarics on Svalbard. The most common *Cystoderma* appears to be *C. arcticum*. There are no other records of *C. amianthinum* from Svalbard, neither any material in O.

*Cystoderma granulosum* (Batsch : Fr.) Kühner

Recorded by Micheltore (1934). The recorded material probably belongs in *C. adnatifolium* (Peck) Harmaja (= *C. granulosum* var. *adnatifolium* (Peck) A.H. Smith & Sing.).

*Dictyolus muscigenus* (Bull.) Quél.

Recorded by Micheltore (1934) and Dobbs (1942). Probably *Arrhenia lobata* (cf. Ohenoja 1971; Høiland 1976).

*Entoloma pascuum* (Pers. : Fr.) Donk

Recorded by Hariot (1893). The name has been used for at least three different species, among them *E. sericeum* (Noordeloos 1987, p. 381).

*Galera hypnorum* (Schrank) Fr.

Records by Karsten (1872), Micheltore (1934), and Dobbs (1942) may represent a number of different, small, muscicolous *Galerina* species.

*Galera sparteae* (Fr.) Quél. cf.

Recorded by Micheltore (1934) from Edgeøya (det. E.H.J. Corner). The name probably refers to a *Conocybe* species in stirps *Mesospora* (cf. Watling 1982), but the identity of this species probably will remain uncertain.

*Galerina pseudombrophila* Kühner

Recorded by Watling (1983, and referred to by

Huhtinen 1987). Probably an error for *G. pseudomniophila* Kühner.

*Hebeloma fastibile* (Pers. : Fr.) P. Kumm.

See *Agaricus fastibilis* above.

*Hebeloma firmus* Pers.

See *Agaricus firmus* above.

*Hebeloma mesophaeum* (Pers.) Quél.

Recorded by Lange (1957) from Eidenbukta, by Kobayasi et al. (1968) from Ny-Ålesund, by Ohenoja (1971) from Isfjorden, and by Watling (1983) from Bockfjorden. Representatives of the *mesophaeum* complex is very abundant on Svalbard, but it is doubtful whether the real *H. mesophaeum* grows in arctic-alpine habitats (cf. Vesterholt 1989). Kobayasi et al. (1968) indicates that their material may belong to *H. versipelle* var. *marginatulum* (= *H. marginatulum*). The newly described *H. polare* Vesterholt is another possibility.

*Hebeloma pusillum* J. Lange

Recorded by Skirgieľo (1961, 1968) from Hornsund and by Kobayasi et al. (1968) from Ny-Ålesund. *Hebeloma pusillum* was originally described from Denmark and belongs in section Denudatae. Both authors record smooth spores in their material; correct identifications are doubted. The collection recorded by Ohenoja (1971) from Festningen, Isfjorden seems to match *H. kuehneri* Bruchet.

*Hebeloma versipelle* (Fr.) Gillet ss.  
Romagnesi 1965

Recorded by Watling (1983) and tentatively by Watling & Watling (1988). Vesterholt (1989) suggests that *H. versipelle* should be regarded a *nomen confusum*, due to the lack of type material and the many different interpretations of the name. Probably the material of Watling belongs in *H. polare* Vesterholt.

*Inocybe rufoalba*

Mentioned by Väre et al. (1992). Seems to be a mistake for *I. praetervisa* f. *rufofusca* Favre recorded by Ohenoja (1971). See *I. salicis-herbaceae*.

*Laccaria amethystina* Cooke

Recorded from Hotellneset by Woldmar (1969). This is a temperate-boreal species which is unknown in arctic and alpine habitats (Mueller 1992). Its northern limit in Norway is in Central Norway (Nord-Trøndelag). The colour range of *Laccaria* species on Svalbard is very large. Both *L. laccata* and *L. pumila* have been found in very bright and very deep red shades. The identification is doubted.

*Laccaria ohienensis* (Mont.) Sing.

The record by Watling & Watling (1988) probably refers to *L. pumila* Fayod. *L. ohienensis* is a four-spored species which mainly occurs in tropical to south temperate regions (Mueller 1992). The epithet *ohienensis* was used by Singer in his later publications for a two-spored species (Mueller & Vellinga 1986, p. 32) which makes a misapplication for *L. pumila* understandable.

*Laccaria tortilis* (Bolton) Cooke

Recorded by Kobayasi et al. (1968) and Ohenoja (1971). The given spore characteristics indicate that the material belongs in *L. pumila* Fayod (cf. also Mueller 1992, p. 45).

*Lactarius groenlandicus* Terkelsen

Recorded by Väre et al. (1992) citing "Gulden 1988" (unpubl.). The name has been misapplied for *L. dryadophilus* Kühner.

*Lactarius mitissimus* (Fr. : Fr.) Fr.

Recorded by Skifte (1979). The material probably belongs in *L. lanceolatus* Miller & Laursen, which appears to be the only representative of the small, fulvous to orange brown *Lactarius* species on Svalbard.

*Lactarius subdulcis* (Pers. : Fr.) S.F. Gray

Recorded by Karsten (1872) from Adventfjorden and by Hagen (1950) from Lomfjordbotnen; probably belonging in *L. lanceolatus* Miller & Laursen, see above.

*Lactarius thejogalus* (Bull.: Fr.) S.F. Gray

Recorded by Kobayasi et al. (1968) and Watling (1983) from Ny-Ålesund; probably belonging in *L. lanceolatus* Miller & Laursen, see above.

*Lactarius uvidus* (Fr. : Fr.) Fr.

Recorded by Ohenoja (1971) from Linnévatnet, Braganzatoppen and Longyearbyen in the Isfjord area and from near Ny-Ålesund in the Kongsfjordarea. Also mentioned by Skifte (1979). The material probably belongs in *L. robertianus* Bon, a darker and dryer species, or in *L. pseudouvidus* Kühner which has a viscid cap like *L. uvidus*, but with yellowish flesh more or less giving colour to cap and gills.

*Leccinum scabrum* (Bull. : Fr.) S.F. Gray

Recorded by Hesselman (1900) from Colesbukta (Kolebay) growing together with *Betula nana*. The material probably belongs in *L. rotundifoliae*.

*Lepista pseudoelectra* (M. Lange) Gulden

Recorded from Svalbard by Gulden (1984). The species was distinguished from *L. multiformis* on account of smaller spores and non-incrusting pigments. Having later seen fresh material agreeing with *L. multiformis* in all respects but the spores (which were small), the distinction between the two species is doubted. Also with regard to the pigment, there appear to be transitions.

*Naucoria hamadryas* cf.

Recorded by Michelmor (1934), doubtful species.

*Nolanea pascua* Fr.—see *Entoloma pascuum*.*Omphalina cupulatoidea* P.D. Orton

Record based on poor material, examined in dry condition (Reid 1979).

*Omphalina pseudomuralis* Lamoure

Tentatively determined on dry material by Reid (1979).

*Omphalina pyxidata* (Pers. : Fr.) Quél.

Recorded from Svalbard by Hagen (1950), Kobayasi et al. (1968), and Ohenoja (1971). There is no record of this species from Svalbard after Lamoure had recognised Favre's variety *rivulicola* of *O. pyxidata* as a separate species (Lamoure 1974).

*Omphalina rustica* (Fr.) Quél. ss. J.E.

Lange and M. Lange

Recorded by Ohenoja (1971). According to her description, the material belongs in the group of the small, dark *Omphalina* species, and has spores in the range of *O. obatra* (Favre) P.D. Orton.

*Pholiota squarrosa* (Weig. : Fr.) P.

Kumm. cf.

Recorded by Dobbs (1942). We are not aware of any other record of this species from arctic or alpine habitats. The similar *Psilocybe magnivelaris*, however, belongs to cold regions and has been found on Svalbard.

*Psalliota arvensis* (Schaeff.) Fr.—see *Agaricus arvensis*.*Psalliota campestris*—see *Agaricus campestris*.*Russula integra* (L.) Fr.

Recorded by Karsten (1872) from Adventbukta, as fairly common. The species does not belong to the arctic or alpine flora and the name probably refers to another fungus.

*Russula nitida* (Pers. : Fr.) Fr.

Recorded from Blomstrandbreen by Reid (1979). The identification is uncertain, based on inadequately annotated, dry material. As *R. nitida* is regularly associated with *Betula*, which is unknown in this area, the identification is doubted.

*Russula ochroleuca* Pers.

Recorded from Longyearbyen by Dobbs (1942), from river margin. Not refound in recent times. The material may belong in *R. claroflava* var. *viridis*, recently described by Knudsen & Borgen (1992).

*Russula oreina* Sing.

Mentioned by Väre et al. (1992, table 3) with reference to Ohenoja (1971) who recorded a collection of small specimens under the name of *R. xerampelina*. The collection was later referred to by Knudsen & Borgen (1992) as possibly belonging in *R. oreina*. The species probably occurs on Svalbard, but reliably identified material is still lacking.

*Russula xerampelina* (Schaeff.) Fr.

Recorded by Ohenoja (1971) from Braganzatoppen and Longyearbyen. The only member of the *xerampelina* group yet identified from Svalbard is *R. chamiteae*. Probably the material studied by Ohenoja belongs to this species, however, more species in the *xerampelina* complex may well be present on Svalbard.

## Gasteromycetales

*Bovista plumbea* Pers.

Reported by Karsten (1872) and probably is a *Calvatia* species.

*Lycoperdon bovista* (Linn.) Fr.

Collected by J.E. Vahl and reported by Lindblom (1841) and probably is a *Calvatia* species.

*L. caelatum* Bull.

Published by Karsten (1872) as *L. coelatum* (sic!) and Michelmores (1934). This is probably a *Calvatia* species.

*L. echinatum* Pers.

Reported by Hariot (1893) and is doubtful.

*L. furfuraceum* Schaeff.

Reported by Pax (1893) and probably is a *Calvatia* species.

*L. giganteum* (Batsch) Pers.

Recorded by Dobbs (1942) and refers to *L. bovista* as recorded by Lindblom (1841), see above.

*L. cf. niveum* Kreisel

Reported from Svalbard by Ohenoja (1971). Seems to be a doubtful record based on scanty material.

*L. umbrinum* Pers.

Reported by Hagen (1950) and Kobayasi et al. (1968). According to Ohenoja (1971) there is uncertainty about these records.

*Scleroderma aurantiacum* Pers.

Recorded from Svalbard by Michelmores (1934) and Dobbs (1942). This is a doubtful record and according to Ohenoja (1971) probably a *Calvatia* species.

## List of synonyms

## Agaricales

*Agaricus arcticus* Gulden = *A. aristocratus* Gulden

*Alnicola tantilla* (Favre) Gulden = *Naucoria tantilla* Favre



- Anellaria semiovata* (Sow. : Fr.) Pears. & Dennis = *Panaeolus semiovatus* (Sow. : Fr.) S. Lundell & Nannf.
- Arrhenia salina* (Høiland) Bon (and *A. salina* (Høiland) Gulden) = *A. littoralis* (Høiland) Gulden
- Cantharellus lobatus* (Pers.) Fr. = *Arrhenia lobata* (Pers.: Fr.) Redhead
- Cantharellus retirugis* (Bull.) Fr. = *Arrhenia retiruga* (Bull. : Fr.) Redhead
- Clitocybe candicans* (Pers. : Fr.) P. Kumm. var. *dryadicola* (Favre) Lamoure = *C. dryadicola* (Favre) Harmaja
- Collybia atratus* Fr. = *Lyophyllum atratum* (Fr. : Fr.) Sing.
- Collybia obscura* Favre = *C. alkalivirens* Sing.
- Cortinarius cinereoviolaceus* Lange = *C. simulatus* P.D. Orton, cp. *C. subtorvus*
- Cortinarius inops* Favre = *C. pusillus* F. H. Møller
- Dermocybe polaris* (Høiland) Arnold = *Cortinarius polaris* Høiland
- Dictyolus retirugus* (Bull. : Fr.) Quél. = *Arrhenia retiruga* (Bull. : Fr.) Redhead
- Galerina moelleri* Bas = *G. pseudomycenopsis* Pilát
- Galerina pseudopumila* P.D. Orton = *G. pseudomycenopsis* Pilát
- Galerina pumila* (Pers. : Fr.) Sing. ss. Kankainen et al. 1967 = *G. pseudomycenopsis* Pilát according to Ohenoja (1971).
- Gerronema ericetorum* (Pers. : Fr.) Sing. = *Omphalina ericetorum* (Pers. : Fr.) M. Lange
- Gerronema favrei* (Watling) Cléménçon = *Omphalina galericolor* (Romagn.) Bon
- Gerronema luteovitellinum* (Pilát & Nannf.) Sing. = *O. luteovitellina*
- Gerronema luteolilacinum* (Favre) Sing. = *O. hudsoniana* (H.S. Jenn.) H.E. Bigelow
- Hebeloma crustuliniforme* var. *alpinum* Favre = *H. alpinum* (Favre) Bruchet
- Hygrophorus puniceus* Fr. = *Hygrocybe punicea* (Fr.) P. Kumm.
- Hygrophorus vitellinus* Fr. ss. F.H. Møller = *Hygrocybe citrinopallida* (Hesler & Smith) Kobayasi
- Inocybe borealis* M. Lange = *I. giacomii* Favre
- Inocybe fastigiata* (Schaeff.) Quél. = *I. rimosa* (Bull. : Fr.) P. Kumm.
- Laccaria altaica* Sing. = *L. pumila* Fayod
- Laccaria striatula* (Peck) Peck ss. auct. = *L. pumila* Fayod (cf. Mueller 1992)
- Laccaria tetraspora* Sing. = *L. laccata* (Scop. : Fr.) Cooke (cf. Mueller & Vellinga 1986).
- Mueller (1992) treats *L. tetraspora* as a synonym of *L. ohiensis*, but in the Arctic the name has probably been applied for *L. laccata* or *L. montana* (cf. Mueller 1992, p 43).
- Leptoglossum acerosum* (Fr. : Fr.) Moser = *Arrhenia acerosa* (Fr. : Fr.) Kühner
- Leptoglossum lobatum* (Pers. : Fr.) Ricken = *Arrhenia lobata* (Pers. : Fr.) Redhead
- Leptoglossum littorale* Høiland = *Arrhenia littoralis* (Høiland) Gulden
- Leptoglossum retirugum* (Bull. : Fr.) Ricken = *Arrhenia retiruga* (Bull. : Fr.) Redhead
- Leptotus retirugis* (Bull. : Fr.) P. Karst. = *Arrhenia retiruga* (Bull. : Fr.) Redhead
- Mycena atroalboides* (Peck) Sacc. = *M. septentrionalis* Maas G.
- Mycena avenacea* (Fr.) Quél. ss. auct. = *M. olivaceomarginata* (Masse) Massee
- Mycena leptcephala* (Pers. : Fr.) Gillet = *Mycena chlorinella* (Lange) Sing.
- Mycena swartzii* (Fr.) A.H. Smith = *Rickenella swartzii* (Fr.) Raithehl.
- Nolanea sericea* (Bull.) P.D. Orton = *Entoloma sericeum* (Bull.) Quél.
- Omphalina alpina* (Britz.) Bresinsky & Stangl and ss. Gulden et al. (1985) = *luteovitellina* (Pilát & Nannf.) M. Lange
- Omphalina brownii* (Berk. & Broome) P.D. Orton ss. Favre = *O. favrei* Watling = *O. galericolor* (Romagn.) Bon
- Omphalina favrei* Watling = *O. galericolor* (Romagn.) Bon
- Omphalina fibula* (Bull. : Fr.) Quél. = *Rickenella fibula* (Bull. : Fr.) Raithehl.
- Omphalina flava* (Cooke) M. Lange = *O. luteovitellina* (Pilát & Nannf.) M. Lange
- Omphalina grisella* (Weinm.) Moser = *O. velutina* (Quél.) Quél.
- Omphalina luteolilacina* (Favre) D.M. Hend. = *O. hudsoniana* (H.S. Jenn.) H.E. Bigelow
- Omphalina pseudoandrosaceus* (Bull.) Moser ss. F.H. Møller et auct. = *O. ericetorum* (Pers. : Fr.) M. Lange
- Omphalina setipes* (Fr. : Fr.) Quél. = *Rickenella swartzii* (Fr. : Fr.) Kuyper
- Omphalina umbellifera* (L. : Fr.) Quél. ss. auct. = *O. ericetorum* (Pers. : Fr.) M. Lange
- Omphalina umbratilis* (Fr.) Quél. ss. Cléménçon & Sing. p.p. = *O. velutipes* P.D. Orton
- Omphalina umbratilis* var. *minor* (Fr.) Quél. ss. Møller, Favre = *O. velutipes* P.D. Orton

- Phaeotellus acerosus* (Fr. : Fr.) Konr. & Maubl. = *Arrhenia acerosa* (Fr. : Fr.) Kühner  
*Pholiota pumila* Fr. ss. auct. = *Galerina pseudomycenopsis* Pilát  
*Rhodophyllus junceus* (Fr.) Quél. = *Entoloma juncina* (Kühner & Romagn.) Noordel.  
*Rhodophyllus sericeus* Quél. = *Entoloma sericeum* Quél.  
*Russula alpina* (A. Blytt) F.H. Møller & J. Schöff. = *R. nana* Killerm.  
*Russula dryadicola* Fellner & Landa = *R. maculata* Quél. ssp. *alpina* Knudsen & Borgen.  
*Stropharia magnivelaris* Peck = *Psilocybe magnivelaris* (Peck) Høiland

### Gasteromycetales

- Calvatia borealis* Th.C.E. Fries = *C. cretacea* (Berk.) C. Lloyd  
*Calvatia tatrensis* Hollós = *C. turneri* (Ellis & Everh.) Demoulin & Lange

### Aphyllophorales

- Haematostereum sanguinolentum* (Alb. & Schw. ex Fr.) Pouz. = *Stereum sanguinolentum* (Alb. & Schw. : Fr.) Fr.  
*Litschauerella clematitis* (Bourd. & Galz.) J. Erikss. & Ryv. ss. Arvidsson 1978 = *Litschauerella abietis* (Bourd. & Galz.) Oßberger.

### Exobasidiales

- Exobasidium vaccinii-myrrilli* (Fuck.) Juel f. *amphigena* Juel = *Exobasidium cassiopes* Peck  
*Exobasidium warmingii* Rostr. = *Arcticomyces warmingii* (Rostr.) Savile

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A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae and cyanobacteria

## Part 4. Fungi II. Myxomycota, Oomycota, Chytridiomycota, Zygomycota, Ascomycota, Deuteromycota, Basidiomycota: Uredinales and Ustilaginales

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The Svalbard species of Myxomycota, Oomycota, Chytridiomycota, Zygomycota, Ascomycota (excluding lichenised and lichenicolous species), Deuteromycota and the Uredinales and Ustilaginales within Basidiomycota are reviewed and include 389 accepted species, whereas 57 species are rejected. The mycological exploration of Svalbard is very incomplete, and the real number of species is much larger. Information on distribution, rarity, ecology, and taxonomy is included, and the intention has been to cover the Svalbard literature completely. The following eight species are reported here as new to Svalbard: *Fuligo intermedia*, *Ascobolus albidus*, *Cheilymenia pseudohumarioides*, *Lasiobolus diversisporus*, *Neottiella aphanodictyon*, *Onygena corvina*, *Taphrina carnea*, and *Thelebolus crustaceus*.

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## Introduction

The mycological exploration of Svalbard began with the studies of Karsten (1872), although a few species had been collected before. Karsten reported nine discomycetes, six smuts and rust fungi, and no less than 28 pyrenomycetes/loculoascomycetes in addition to homobasidiomycetes. Important papers on microfungi include

those by Lind (1928, 1934), Hagen (1941, 1950), Kobayasi et al. (1968), and Zabawski (1976). As a result of these papers the microfungi on Svalbard remained better known than the macrofungi for a very long period. Discomycetes and other macrofungi were studied by Kobayasi et al. (1968), Ohenoja (1971) and Huhtinen (1987), and all these authors included reviews of at least parts of the Svalbard mycological literature. Recently, monographs have appeared for the Svalbard species of *Lamprospora* (Schumacher 1993) and *Pleospora* s.l. (Holm & Holm 1993b), and Holm & Holm (1993a) studied ascomycetes growing on *Dryas* on Svalbard. Holm & Holm (1994) presented an annotated checklist of Svalbard pyrenomycetes and loculoascomycetes (the latter treated as bitunicate pyrenomycetes). This study included 31 species new to Svalbard (determined to species level with certainty) and also indicated erroneous or doubtful species among those reported by Lind (1928). These recent studies were mostly based on collections from a 1988 International Symposium on Arctic and Alpine

Mycology in Svalbard, the third in a series of symposia dealing with arctic and alpine fungi. A number of important contributions are also found in studies not focusing on Svalbard.

Some of the groups of fungi were reported very late from the Svalbard archipelago. The first myxomycete was reported in a thesis by Elvebakk (1979), and the first zygomycetes and the first hemiascomycete by Kobayasi et al. (1968). Other groups are published for the first time from Svalbard in Part 3 of this Catalogue.

The mycoflora of Svalbard has only been fragmentarily studied and the list of species of the groups treated here only represent a very limited part of the real mycoflora. As an example, it can be mentioned that field work specifically on Pezizales by Dissing and Sivertsen in Svalbard has resulted in material of about 85 species. This contrasts with the 34 species included in this catalogue, and many of the remaining unpublished species are evidently new to science. Among these species Dissing & Sivertsen (1988) indicated the presence of the genera *Marcelleina* and *Parascutellinia* on Svalbard. Huhtinen (1993) also reported on the presence of unnamed Svalbard species of the genera *Cistella* and *Pezizella*, Holm & Holm (1993a) on an unnamed species of the genus *Stictis*, and Holm & Holm (1994) on unnamed species within the genera *Capronia*, *Clathrospora*, *Didymosphaeria*, *Mycosphaerella*, *Schizothyrium*, *Selenophoma*, *Trichothyria*, and *Venturia*. These taxa are not further commented in this catalogue.

Kobayasi et al. (1968) and Zabawski (1976, 1981, 1982a, b) listed a number of soil fungi (mainly zygomycetes and hyphomycetes) that were isolated from soil samples experimentally. Soil flora is maybe the least studied aspect of arctic biology, and an important missing link in our understanding of arctic ecosystems. Only brief comments are included on the species here. Material only determined to genus by Kobayasi et al. (1968) (*Beauveria*, *Catinula*, *Cryptococcus*, *Cylindrocarpon*, *Hysteropezizella*, and *Saprolegnia*) and Zabawski (1976) (40 species within 30 genera) has not been included in the list. Most of the species reported by Zabawski (1976) were republished later (Zabawski 1982b), including *Mucorales*, in two additional papers (Zabawski 1981, 1982a), but only the first report is cited in this study. Some material determined only to generic level in a recent study on Svalbard mykorrhiza (Väre et al. 1992) has also been

omitted here. Thor (1930) described resting spores of 9 species of unicellular parasites on mites (Acarina) in Svalbard. One of these has later been recombined within a zygomycete genus, whereas the others remain as species in genera of dubious systematic position (Hawsworth et al. 1983), and they have been listed here among the rejected species.

The species of fungi previously called Fungi Imperfecti have been treated here as Deuteromycota with the classes Coelomycetes, Hyphomycetes and Agonomycetes (indicated by letter symbols) as far as their anamorphs (asexual stages) are concerned. Some of these anamorph species have been related to teleomorphs (sexual stages). These species have been removed from the Deuteromycota and listed as their teleomorph name among the ascomycetes, even when the only reference in the Svalbard literature is of an anamorph. A reference list of anamorphs listed with their corresponding teleomorphs is included. The list of Ascomycota also has abbreviations indicating discomycetes, hemiascomycetes, loculoascomycetes and pyrenomycetes. Some authors (e.g. Eriksson 1992 and Holm & Holm 1994) treat the loculoascomycetes among the pyrenomycetes.

A list of rejected taxa and a list of synonyms is included, although we suspect that there are also misidentifications among the accepted species. Common Norwegian names have been included for species where such names have been published (Eckblad 1985).

This part of the catalogue includes 389 accepted species. Eight species are reported here as new to Svalbard: *Fuligo intermedia*, *Ascobolus albidus*, *Cheilymenia pseudohumarioides*, *Lasiobolus diversisporus*, *Neottiella aphanodictyon*, *Onygena corvina*, *Taphrina carnea*, and *Thelebolus crustaceus*. A separate section treats 57 species as rejected.

All species are first listed in a List of Species table and commented in the following section. As a synopsis most species are given Ecosystem Component Values in the table. These are values on a 1 to 3 scale according to "Rarity", "Phytogeographical Importance", and "Ecological Indicator Value" as defined below. As values on "Local Abundance" and "Importance to Vertebrates" which are used in some other parts of the Catalogue are impossible to assess or not very meaningful, they have been omitted here. It should be underlined that the values used here

are very tentatively set in most cases, and because of the low degree of mycological exploration of Svalbard many will change. No values are added for the soil fungi.

Based on their known distribution, a large proportion of the species are at present considered to be very rare, although their frequency and Ecosystem Component Value R in most cases will certainly change with increased mycological exploration. Because of their present rarity status on Svalbard, their phytogeography is also of interest, resulting in a high value of Ecosystem Component P. As knowledge of Svalbard fungi improves in the future, these values will probably also generally decrease. Many of the species are stenochorous, growing on dung and on specific host plants etc., and as a rule the Ecological Indicator Values are also high.

Many fungi have wider distribution areas than vascular plants. This is especially the case with soil microfungi where most of the determined species are cosmopolitan or widely distributed species. Ascomycetes that grow on soil can have wide distribution patterns. To be identified, time-consuming studies are often required of material from very large geographical areas, even from the Southern Hemisphere. Coprophilous species (growing on dung) and plant saprophytes and parasites, on the other hand, generally have more limited distribution patterns; these groups include many exclusively arctic species.

A number of lichenicolous fungi, primarily ascomycetes but also a few hyphomycetes and coelomycetes, have been reported from Svalbard. Although these fungi systematically belong to this part of the Catalogue, they have in many cases been included in checklists of lichens. We have chosen to treat the lichenicolous fungi in a separate part of this Catalogue.

Most author names have been abbreviated according to Kirk & Ansell (1992). Handbooks such as Sutton (1980), Ellis & Ellis (1985), Cannon et al. (1985), Farr et al. (1989) and Eriksson

(1992) and the recent Svalbard pyrenomycete monograph by Holm & Holm (1994) have been consulted to bring systematics and nomenclature up to date as much as possible. However, as many arctic species have not been included in the reference books which cover areas further to the south, it has not been possible to trace all important sources on nomenclature and taxonomy. Some species may, therefore, have deserved a more modern name than we have been able to find in the literature. In addition, some literature has certainly been overlooked. We welcome all comments which can be included in a possible future supplement to the catalogue. This part of the Catalogue represents a state-of-the-art overview of these groups on Svalbard, and the information given here will undoubtedly be outdated earlier than for the other groups covered by the Catalogue. Nevertheless, it is our intention that this paper will facilitate orientation among the present literature and stimulate further mycological exploration of Svalbard.

## Ecosystem Indicator Values

### Definitions

#### R *Rarity*

- 3 = Very rare, 1–2 localities known at present
- 2 = Rare, 2–15 localities known at present
- 1 = Scattered or common, at least locally

#### P *Phytogeographical Importance*

- 3 = Only known from Svalbard/endemic or highly disjunct
- 2 = Belonging to a phytogeographical element of special interest on Svalbard
- 1 = More or less widespread

#### E *Ecological Indicator Value*

- 3 = Very high (specialised, stenochorous)
- 2 = Intermediate
- 1 = Low (eurychorous)

## List of Species

Scientific and Norwegian names	Ecosystem Component Values		
	R	P	E
<b>Myxomycota</b>			
<i>Diderma trevelyani</i> (Grev.) Fr.	3	3	–
<i>Fuligo intermedia</i> T. Macbr.	3	3	–
<i>Lycogala epidendron</i> (P. Micheli) Fr. – Ulvemjolk	3	3	1
<b>Oomycota</b>			
<i>Peronospora alsinearum</i> Casp.	2	1	3
<i>P. parasiitica</i> (Pers.:Fr.) Fr.	2	1	3
<b>Chytridiomycota</b>			
<i>Olpidium brassicae</i> (Woronin) P.A. Dang.	–	–	–
<i>Synchytrium groenlandicum</i> Allesch.	2	2	3
<i>S. potentillae</i> (J. Schröt.) Lagerh.	3	3	3
<b>Zygomycota</b>			
<i>Absidia glauca</i> Hagem	–	–	–
<i>Haplosporangium bisporale</i> Thaxt.	–	–	–
<i>Mortierella alpina</i> Peyronel	–	–	–
<i>M. antarctica</i> Linnem.	–	–	–
<i>M. humicola</i> Oudem.	–	–	–
<i>M. humilis</i> Linnem. ex W. Gams	–	–	–
<i>M. hyalina</i> (Harz) W. Gams	–	–	–
<i>M. hygrophila</i> Linnem.	–	–	–
<i>M. jenkinsii</i> (A.L. Sm.) Naumov	–	–	–
<i>M. minutissima</i> Tiegh.	–	–	–
<i>M. parvispora</i> Linnem.	–	–	–
<i>M. pulchella</i> Linnem.	–	–	–
<i>M. spinosa</i> Linnem.	–	–	–
<i>M. turficola</i> Y. Ling	–	–	–
<i>M. verticillata</i> Linnem.	–	–	–
<i>Mucor abundans</i> Povah	–	–	–
<i>M. circinelloides</i> Tiegh.	–	–	–
<i>M. fragilis</i> Bainier	–	–	–
<i>M. griseo-cyanus</i> Hagem	–	–	–
<i>M. hiemalis</i> Wehmer	–	–	–
<i>M. microsporus</i> Namysl.	–	–	–
<i>M. mucedo</i> P. Micheli ex St.-Amans	–	–	–
<i>M. plumbeus</i> Bonord.	–	–	–
<i>M. saturninus</i> Hagem	–	–	–
<i>Spinalia tenuis</i> (Thaxt.) Zycha	–	–	–
<i>Syncephalis nodosa</i> Tiegh.	–	–	–
<i>Tarichium svalbardense</i> (Thor) Bałazy & Wiśniewski	–	–	–
<i>Zygorhynchus moelleri</i> Vuill.	–	–	–
<b>Ascomycota</b>			
(D = Discomycetes, H = Hemiascomycetes, L = Loculoascomycetes, P = Pyrenomycetes)			
<i>Acrosporum erikssonii</i> Nogrased	3	3	2
<i>Anthostoma polaris</i> K. & L. Holm	3	3	3
			L
			P



Scientific and Norwegian names	Ecosystem Component Values			
	R	P	E	
<i>Arachnopeziza monoseptata</i> (Galán & Raitv.) Huhtinen	3	3	3	D
<i>Arwidssonina empetri</i> (Rehm) B. Erikss.	2	3	3	P
<i>Ascobolus albidus</i> Crouan	3	3	3	D
<i>A. brantophilus</i> Dissing	1	3	3	D
<i>A. furfuraceus</i> Pers.:Fr. – Gulgrønt prikkbeger	3	3	3	D
<i>A. groenlandicus</i> Dissing	2	3	3	D
<i>Atopospora betulina</i> (Fr.:Fr) Petr.	2	3	3	L
<i>Blumeria graminis</i> (DC.) Speer	2	1	2	P
<i>Botryotinia fuckeliana</i> (de Bary) Whetzel	2	2	1	D
<i>Bricookea sepalarum</i> (Vleugel) Barr	3	3	–	L
<i>Bryochiton microscopicus</i> Döbbeler & Poelt	2	2	3	L
<i>B. monascus</i> Döbbeler & Poelt	3	3	2	L
<i>B. perpusillus</i> Döbbeler	2	2	2	L
<i>Bryoglossum gracile</i> (P. Karst.) Redhead – Moseklubbemorkel	2	2	2	D
<i>Cainiella borealis</i> Barr	–	3	3	P
<i>C. johansonii</i> (Rehm) E. Müll.	3	3	3	P
<i>Capronia pilosella</i> (P. Karst.) E. Müll. et al.	3	3	3	L
<i>Capronia setosa</i> (Barr) E. Müll. et al.	3	3	3	L
<i>Chaetomium crispatum</i> Fuckel	–	–	–	P
<i>C. elatum</i> J. C. Schmidt & Kunze: Fr.	–	–	–	P
<i>C. globosum</i> Kunze: Fr.	–	–	–	P
<i>Chamaeascus arcticus</i> L. Holm, K. Holm & M. Barr	–	3	3	P
<i>Cheilymenia coprinaria</i> (Pers.) Boud.	2	–	3	D
<i>C. liskae</i> J. Moravec, Fellner & Landa	3	3	3	D
<i>C. pseudohumarioides</i> Dissing, J. Moravec & Sivertsen	1	3	3	D
<i>Ciboria aschersoniana</i> (Henn. & Plötn. in Henn.) Whetzel	3	3	3	D
<i>C. polygoni-vivipari</i> Eckblad – Harerugbeger	2	3	3	D
<i>Ciborinia ciborium</i> (Vahl:Fr.) T. Schumach. & Kohn	1	2	3	D
<i>Cilioplea coronata</i> (Niessl) Munk	2	1	1	L
<i>Clathrospora deflectens</i> (P. Karst.) O.E. Erikss.	1	1	1	L
<i>C. heterospora</i> (De Not.) Wehm.	2	2	2	L
<i>C. planispora</i> (Ellis) Berl.	3	3	3	L
<i>C. verruculosa</i> O.E. Erikss.	3	3	3	L
<i>Coniochaeta ligniaria</i> (Grev.) Cooke	–	–	–	P
<i>Crocicreas culmicola</i> (Desm.) S.E. Carp.	3	3	3	D
<i>C. cyathoideum</i> (Bull.:Fr) S.E. Carp.	3	3	3	D
<i>C. gramineum</i> (Fr.:Fr.) Fr.	1	1	3	D
<i>Cudoniella clavus</i> (Alb. & Schwein. ex Fr.) Dennis – Vassklubbe	3	3	3	D
<i>Didymella glacialis</i> Rehm	3	3	3	L
<i>Didymosphaeria futilis</i> (Berk. & Broome) Rehm	2	2	1	L
<i>Diplocarpon polygoni</i> E. Müll.	3	3	3	D
<i>Diplonaevia circinata</i> (Lib.) Hein	2	2	3	D
<i>D. hyperborea</i> Nannf.	2	2	3	D
<i>D. savilei</i> Nannf.	1	1	3	D
<i>Dipodascus aggregatus</i> Francke-Grosm.	3	3	–	H
<i>Discostroma hyperborea</i> (P. Karst.) O.E. Erikss.	1	2	3	P
<i>Duplicaria empetri</i> (Wrangel ex Fr.) Fuckel	2	2	3	D
<i>Durella macrospora</i> Fuckel	3	3	1	D
<i>Epibryon diaphanum</i> Döbbeler	3	3	3	L
<i>E. polysporum</i> Döbbeler	3	3	3	L
<i>Epipolaeum absconditum</i> (Johanson) L. Holm	2	2	1	L
<i>Geopora arenosa</i> (Fuckel) Ahmad – Sandbeger	2	2	1	D

Scientific and Norwegian names	Ecosystem Component Values			
	R	P	E	
<i>Gibbera barriæ</i> L. & K. Holm	3	3	3	L
<i>G. latispora</i> (Barr) L. Holm	–	–	–	L
<i>Glomerella amentis</i> (Rostr.) Arx & E. Müll.	2	3	3	P
<i>Gnomonia dryadis</i> Auersw.	3	3	3	P
<i>Gnomoniella hyparctica</i> (Lind) Barr	2	3	3	P
<i>G. vagans</i> Johanson	3	3	–	P
<i>Graphyllum pentamerum</i> (P. Karst.) Barr	1	1	1	L
<i>Guignardia graminicola</i> (Rostr.) P. Larsen	3	3	2	L
<i>Hamatocanthoscypha unipila</i> (Le Gal) Huhtinen	3	3	1	D
<i>Helvella aestivalis</i> (R. Heim & Remy) Dissing & Raitv.	3	3	3	D
<i>H. arctoalpina</i> Harmaja	3	3	–	D
<i>H. corium</i> (Weberb.) Mass. – Svart begermorkel	1	2	2	D
<i>H. dryadophila</i> Harmaja	3	3	–	D
<i>H. lacunosa</i> Afzel.:Fr. – Mørk haustmorkel	3	3	1	D
<i>H. pocillum</i> Harmaja	3	3	3	D
<i>Hyaloscypha albobyalina</i> (P. Karst.) Boud.	2	2	2	D
<i>H. aureliella</i> (Nyl.) Huhtinen	1	1	3	D
<i>H. britannica</i> Huhtinen	3	3	2	D
<i>Hymenoscyphus herbarum</i> (Pers.) Dennis	2	1	2	D
<i>H. rhodoleucus</i> (Fr.) W. Phillips	2	2	3	D
<i>Hypocopra aviaria</i> P. Karst.	3	3	3	P
<i>Hypoderma degenerans</i> (P. Karst.) Nannf.	3	3	3	D
<i>Hysteronaevia advena</i> (P. Karst.) Nannf.	2	2	3	D
<i>H. clavulifera</i> Nannf.	3	3	3	D
<i>H. kobayasii</i> Nannf.	2	3	3	D
<i>H. luzulicola</i> Nannf.	1	2	3	D
<i>H. lyngei</i> (Lind) Nannf.	3	3	3	D
<i>Hysteropezizella diminuens</i> (P. Karst.) Nannf.	1	2	2	D
<i>H. fuscella</i> P. Karst.	2	–	2	D
<i>Isothea rhytismoides</i> (Bab. ex Berk.) Fr.	2	1	3	P
<i>Kalmusia coniothyrium</i> (Fuckel) L. Hunndorf	3	3	2	P
<i>Lachnellula calyciformis</i> (Willd.: Fr.) Dharne	3	–	–	D
<i>Lachnum palearum</i> (Desm.) Korf	3	3	2	D
<i>Laetinaevia erythrostigma</i> (Rehm) Nannf. ex B. Hein	1	–	3	D
<i>L. stellariae</i> (Rostr.) Lind	2	–	3	D
<i>Lamprospora carbonicola</i> Boud.	3	3	3	D
<i>L. hanffii</i> Benkert	3	3	3	D
<i>L. miniata</i> De Not.	2	–	–	D
<i>L. minuta</i> (Velen.) Svrček	3	–	–	D
<i>L. norvegica</i> Benkert, Aas & Kristiansen	3	3	3	D
<i>L. rugensis</i> Benkert	1	1	3	D
<i>L. seaveri</i> Benkert	3	–	2	D
<i>L. spitsbergensis</i> T. Schumach.	3	3	3	D
<i>Lasiobolus diversisporus</i> (Fuckel) Sacc.	3	3	3	D
<i>Lathraeodiscus arcticus</i> Dissing & Sivertsen	2	3	2	D
<i>Leptosphaeria brachyasca</i> Rostr.	3	3	–	L
<i>L. monotis</i> Rehm	3	3	3	L
<i>Leptotrochila cerastiorum</i> (Wallr.) Schüepp	3	3	3	D
<i>Leucoscypha hetieri</i> (Boud.) Rifai	3	3	–	D
<i>Lophiostoma winteri</i> (Sacc.) G. Winter	1	1	1	L
<i>Lophiotrema vagabundum</i> (Sacc.) Sacc.	3	3	3	L
<i>Lophodermium caricinum</i> (Rob. ex Desm.) Duby	3	3	3	D
<i>L. culmigenum</i> (Fr.:Fr.) De Not.	1	1	2	D

Scientific and Norwegian names	Ecosystem Component Values			
	R	P	E	
<i>L. svalbardense</i> Lind	3	3	3	D
<i>Massarina balnei-ursi</i> (Rehm) K. & L. Holm	2	–	–	L
<i>Massariopsis wulffii</i> (Lind) Lind	2	–	–	L
<i>Melanomma dryadis</i> Johanson	1	–	3	L
<i>Melaspilea hyparctica</i> K. & L. Holm	2	3	3	L
<i>M. lecideopsida</i> (Rehm) K. & L. Holm	2	2	2	L
<i>Microthyrium holmiae</i> Nograsek	3	3	3	L
<i>M. microscopicum</i> Desm.	3	3	3	L
<i>Mollisia graminis</i> (Desm.) P. Karst.	2	–	2	D
<i>Montagnula spinosella</i> (Rehm) Crivelli	2	–	2	L
<i>Mycosphaerella arthopyrenoides</i> (Auersw.) Lindau	3	3	–	L
<i>M. cassiopes</i> Barr	1	2	3	L
<i>M. confinis</i> (P. Karst.) Dearn.	2	–	2	L
<i>M. densa</i> (Rostr.) Lind	1	–	2	L
<i>M. equiseti</i> (Fuckel) J. Schröt.	3	3	3	L
<i>M. equiseticola</i> Bond.-Mont.	3	3	3	L
<i>M. halophila</i> (J. Bommer., Roussel & Sacc.) O.E. Erikss.	3	3	3	L
<i>M. lycopodii</i> (Peck) House	3	3	3	L
<i>M. maculiformis</i> J. Schröt.	3	3	1	L
<i>M. minor</i> (P. Karst.) Johanson	1	1	1	L
<i>M. octopetalae</i> (Oudem.) Lind	1	3	1	L
<i>M. pachyasca</i> (Rostr.) Vestergr.	3	3	2	L
<i>M. pedicularidis</i> (P. Karst.) Lind	1	–	3	L
<i>M. perexigua</i> (P. Karst.) Johanson	3	2	2	L
<i>M. polaris</i> (P. Karst.) Lindau	2	–	3	L
<i>M. pusilla</i> (Auersw.) Johanson	2	2	3	L
<i>M. ranunculi</i> (P. Karst.) Lind	1	1	3	L
<i>M. reculita</i> (Fr.) Johanson	1	1	1	L
<i>M. salicicola</i> (Fr.) Johanson ex Oudem.	3	2	3	L
<i>M. taraxaci</i> (P. Karst.) Lind	1	–	2	L
<i>M. tassiana</i> (De Not.) Johanson	1	2	1	L
<i>M. vivipari</i> (G. Winter) Lind	1	–	3	L
<i>Naemacyclus lambertii</i> Rehm	1	1	–	D
<i>Naeviopsis primulae</i> (Rehm) B. Hein	3	3	–	D
<i>Neottiella aphanodictyon</i> (Kobayasi) Dissing, Korf & Sivertsen	1	2	2	D
<i>Nimbomollisia eriophori</i> (Kirchn.) Nannf.	2	–	2	D
<i>Octospora melina</i> (Velen.) Dennis & Itzerott	3	3	3	D
<i>O. moravecii</i> K.B. Khare	3	3	3	D
<i>Odontotrema cassiopes</i> (Rostr.) L. Holm	3	3	3	D
<i>Onygena corvina</i> Alb. & Schwein.: Fr.	3	3	3	D
<i>Othia dryadis</i> K. Holm, L. Holm & Nograsek	2	2	–	L
<i>Phacidium polygoni</i> Rostr.	2	2	3	D
<i>Phaeosphaeria caricinella</i> (P. Karst.) O.E. Erikss.	2	2	2	L
<i>P. consobrina</i> (P. Karst.) O.E. Erikss.	2	2	3	L
<i>P. culmorum</i> (Auersw.) Leuchtm.	3	3	3	L
<i>P. equiseti</i> (P. Karst.) L. & K. Holm	3	3	3	L
<i>P. herpotrichoides</i> (De Not.) L. Holm	2	2	2	L
<i>P. insignis</i> (P. Karst.) L. Holm	1	2	2	L
<i>P. juncina</i> (Auersw.) L. Holm	3	3	3	L
<i>P. lindii</i> (L. & K. Holm) Leuchtm.	2	2	1	L
<i>P. marcyensis</i> (Peck) L. & K. Holm	3	3	3	L
<i>P. microscopica</i> (P. Karst.) O.E. Erikss.	1	1	2	L
<i>P. nigrans</i> (Roberge ex Desm.) L. Holm	3	3	3	L

Scientific and Norwegian names	Ecosystem Component Values			
	R	P	E	
<i>P. silenes-<del>a</del>caulis</i> (De Not.) L. Holm	3	1	2	L
<i>P. stellariae</i> (Rostr.) Leuchtm.	2	2	3	L
<i>P. vagans</i> (Niessl) O.E. Erikss.	3	2	2	L
<i>P. weberi</i> (Oudem.) L. & K. Holm	2	2	3	L
<i>Phomatospora dinemasporium</i> J. Webster	3	3	2	P
<i>Phyllachora junci</i> (Fr.:Fr.) Fuckel	3	3	3	P
<i>Physalospora alpestris</i> Niessl	3	3	3	P
<i>P. empetri</i> Rostr.	2	3	3	P
<i>P. hyperborea</i> Bäumler	1	2	3	P
<i>Pleospora androsaces</i> Fuckel	—	—	3	L
<i>P. arctica</i> P. Karst.	1	1	2	L
<i>P. ascodedicata</i> K. Holm, L. Holm & Nogrased	3	3	3	L
<i>P. comata</i> Niessl	—	—	2	L
<i>P. glacialis</i> Niessl ex Rehm	1	2	2	L
<i>P. helvetica</i> Niessl	1	1	2	L
<i>P. herbarum</i> (Pers.:Fr.) Rabenh.	—	—	3	L
<i>P. penicillus</i> (Schmidt: Fr.) Fuckel	1	1	2	L
<i>P. spetsbergensis</i> K. Holm & L. Holm	2	3	3	L
<i>P. wulfii</i> Lind	3	3	3	L
<i>Pleuroceras helveticum</i> (Rehm) Barr	1	2	3	P
<i>Podospora vesticola</i> (Berk. & Broome) Mirza & Cain	—	—	—	P
<i>Polaroscyphus spetsbergianus</i> Huht.	3	3	3	D
<i>Potriphila navicularis</i> Döbeler	2	1	3	D
<i>Pseudomassaria inconspicua</i> (Johanson) Barr	2	2	1	P
<i>Pseudopeziza drabae</i> (Nannf.) Nannf.	2	3	3	D
<i>P. svalbardensis</i> (Lind) Nannf.	2	3	3	D
<i>Pseudorhizisma bistortae</i> (Lib.) Juel	2	—	3	D
<i>Psilachnum acutum</i> (Velen.) Svrček	3	3	3	D
<i>P. inquilinum</i> (P. Karst.) Dennis	3	3	3	D
<i>Psilocistella obsoleta</i> (Velen.) Svrček	3	—	1	D
<i>Pyrenopeziza atrata</i> (Pers.) Fuckel	1	2	3	D
<i>Pyrenophora raetica</i> (Müller) Crivelli	2	2	2	L
<i>P. schroeteri</i> Barr	3	3	3	L
<i>P. subalpina</i> (Müller) Crivelli	1	1	2	L
<i>Rhizisma salicina</i> Fr.	1	1	3	D
<i>Ronnigeria arctica</i> (Oudem.) Petr.	3	3	3	L
<i>Saccobolus chenocopriscus</i> Dissing	3	3	3	D
<i>S. quadrisporus</i> Mass. & E.S. Salmon	3	3	—	D
<i>Scleroplella hyperborea</i> (Fuckel) L. Holm	1	—	3	L
<i>Scutellinia hyperborea</i> T. Schumacher	—	—	—	D
<i>S. minor</i> (Velen.) Svrček	2	3	2	D
<i>Sphaerotheca erigeronis-canadensis</i> (Schltld.: Fr.) L. Junell	2	3	3	P
<i>Sporormiella americana</i> (Griffiths) S. Ahmed & Cain	3	3	3	L
<i>S. heptamera</i> (Auersw.) S. Ahmed & Cain	3	3	3	L
<i>S. polymera</i> (Cain) S. Ahmed & Cain	—	—	—	L
<i>S. teretispora</i> S. Ahmed & Cain	—	—	—	L
<i>Stomiopeltis dryadis</i> (Rehm) L. Holm	1	1	3	L
<i>Sydowiella dryadis</i> Lar. N. Vassiljeva	2	2	3	P
<i>Taphrina carnea</i> Johanson	3	3	3	H
<i>Taphrophila argyllensis</i> Scheuer	3	3	3	L
<i>Tarsetia cupularis</i> (L.) Lambotte	3	3	—	D
<i>Thelebolus crustaceus</i> (Fuckel) Kimbr.	3	3	3	D
<i>Trichopezizella nidulus</i> (Schmidt & Kuntze ex Fr.) Raitv.	3	3	3	D

Scientific and Norwegian names	Ecosystem Component Values			
	R	P	E	
<i>Trichothyria salicis</i> J.P. Ellis	3	3	3	L
<i>Venturia oxyriae</i> (Rostr.) Sacc.	2	2	3	L
<i>V. polygoni-vivipari</i> Arx	1	1	3	L
<i>V. potentillae</i> (Wallr.:Fr.) Cooke	2	2	3	L
<i>V. subcutanea</i> Dearn.	1	1	3	L
<i>Wentomyces dryadis</i> K. & L. Holm	3	3	3	L
<i>Wettsteinina distincta</i> (P. Karst.) L. & K. Holm	1	—	3	L
<i>W. dryadis</i> (Rostr.) Petr.	2	2	3	L
<i>W. eucarpa</i> (P. Karst.) E. Müll. & Arx	1	1	2	L
<i>W. junci</i> Shoemaker & C.E. Bab.	3	3	3	L
<i>W. macrotheca</i> (Rostr.) E. Müll.	2	2	—	L
<i>W. salicicola</i> Nogrask	3	3	3	L
<i>W. savilei</i> Shoemaker & C.E. Bab.	3	3	3	L
Deuteromycota				
(C = Coelomycetes, H = Hyphomycetes, A = Agonomycetes)				
<i>Arthrimum puccinioides</i> (DC.) Kunze	3	—	2	H
<i>Ascochyta arctica</i> (Lind) Punith.	2	2	2	C
<i>A. dianthi</i> (Alb. & Schwein.) Lib.	3	3	—	C
<i>A. graminicola</i> Sacc.	2	2	—	C
<i>Aspergillus ochraceus</i> K. Wilh.	—	—	—	H
<i>A. oryzae</i> (Ahlb.) Cohn	—	—	—	H
<i>A. sulphureus</i> (Fresen.) Wehmer	—	—	—	H
<i>A. ustus</i> (Bainier) Thom & Church	—	—	—	H
<i>A. versicolor</i> (Vuill.) Tirab.	—	—	—	H
<i>Asteroma cacaliae</i> Desm.	3	3	—	C
<i>Cephalosporium mycophilum</i> (Corda) Tubaki	—	—	—	H
<i>Chrysosporium pannorum</i> (Link) Hughes	—	—	—	H
<i>Cladosporium cladosporioides</i> (Fresen.) de Vries	—	—	—	H
<i>Cryptococcus albidus</i> (Saito) Skinner	—	—	—	H
<i>C. diffluens</i> (Zach) Lodder & Kreger	—	—	—	H
<i>C. laurentii</i> (Kuff.) Skinner	—	—	—	H
<i>Dendryphon fumosum</i> Fr.	3	3	—	H
<i>Diplodia bessimanyii</i> Lind	3	3	—	C
<i>D. simmonsii</i> Rostr.	3	3	—	C
<i>Diplodina euphrasiae</i> (Oudem.) Allesch.	3	3	—	C
<i>D. papaveris</i> (Oudem.) Lind	1	1	2	C
<i>D. pedicularidis</i> (Fuckel) Lind	3	3	3	C
<i>Doratomyces microsporus</i> (Sacc.) Morton & Smith	—	—	—	H
<i>D. nanus</i> Ehrenb. ex Link	—	—	—	H
<i>Eriospora leucostoma</i> Berk. & Br.	3	3	—	C
<i>Gloeosporium roaldii</i> Lind	3	3	3	C
<i>Hendersonia arabis</i> Rostr.	2	2	3	C
<i>H. arundinacea</i> (Desm.) Sacc.	1	1	2	C
<i>H. gigantea</i> Lind	2	3	2	C
<i>H. rostrupii</i> Lind	2	2	2	C
<i>H. stefansonii</i> Rostr.	3	3	—	C
<i>Heteropatella umbilicata</i> (Pers.) Jaap	2	2	1	C
<i>Leptothyrium arcticum</i> (Fuckel) Lind	1	2	3	C
<i>L. palustre</i> Fautrey	3	3	—	C
<i>Marssonina obscura</i> (Romell) Magn.	2	2	3	C
<i>Mastigiosporium album</i> Riess	2	2	—	H
<i>Microdiplodia perpusilla</i> (Desm.) Allesch.	3	3	—	C

Scientific and Norwegian names	Ecosystem Component Values			
	R	P	E	
<i>Microdochium bolleyi</i> (R. Sprague) de Hoog & Herm.-Nijh.	–	–	–	H
<i>Microsphaeropsis olivacea</i> (Bonord.) Höhn.	3	3	–	C
<i>Oidiodendron cerealis</i> (Thüm.) G.L. Barron	–	–	–	H
<i>Pachybasium hamatum</i> Sacc.	–	–	–	H
<i>Penicillium brevicompactum</i> Dierckx	–	–	–	H
<i>P. chrysogenum</i> Thom	–	–	–	H
<i>P. claviforme</i> Bainier	–	–	–	H
<i>P. crustosum</i> Thom	–	–	–	H
<i>P. cyanofulvum</i> Biourge	–	–	–	H
<i>P. diversum</i> Raper & Fennell	–	–	–	H
<i>P. fellutanum</i> Biourge	–	–	–	H
<i>P. funiculosum</i> Thom	–	–	–	H
<i>P. glabrum</i> (Wehmer) Westling	–	–	–	H
<i>P. granulatum</i> Bainier	–	–	–	H
<i>P. herquei</i> Bainier & Sartori	–	–	–	H
<i>P. islandicum</i> Sopp	–	–	–	H
<i>P. janthinellum</i> Biourge	–	–	–	H
<i>P. lanoso-coeruleum</i> Thom	–	–	–	H
<i>P. lividum</i> Westling	–	–	–	H
<i>P. puberulum</i> Bainier	–	–	–	H
<i>P. roquefortii</i> Thom	–	–	–	H
<i>P. thomii</i> Maire	–	–	–	H
<i>P. viridicatum</i> Westling	–	–	–	H
<i>P. waksmanii</i> Zalesky	–	–	–	H
<i>Phaeoseptoria rostrupii</i> (Lind) Jørst.	–	–	–	C
<i>Phialophora cinerescens</i> (Wollenw.) J.F.H. Beyma	–	–	–	H
<i>P. fastigiata</i> (Lagerb. & Melin) Conant	–	–	–	H
<i>P. lagerbergii</i> (Melin & Nannf.) Conant	–	–	–	H
<i>P. verrucosa</i> Medlar	–	–	–	H
<i>Phoma alpina</i> Speg.	1	1	2	C
<i>P. caricis</i> (Fr.) Sacc.	3	3	3	C
<i>P. complanata</i> (Tode: Fr.) Desm.	3	3	–	C
<i>P. graminis</i> Westend.	3	3	3	C
<i>P. herbarum</i> Westend.	1	1	1	C
<i>P. nebula</i> (Pers.: Fr.) Berk.	3	2	2	C
<i>P. oudemansii</i> Berl. & Voglino	3	3	3	C
<i>P. ranunculi</i> P. Karst.	2	2	3	C
<i>P. sceptri</i> P. Karst.	3	3	–	C
<i>Phyllosticta saxifragarum</i> Allesch.	3	–	–	C
<i>Plenodomus svalbardensis</i> Lind	3	3	3	C
<i>Ramularia alborosella</i> (Desm.) Gjærum	1	1	3	H
<i>Rhabdospora campanulae</i> Fautrey	3	3	3	C
<i>R. pleosporoides</i> Sacc.	1	–	–	C
<i>Rhizoctonia solani</i> J.G. Kühn	–	–	–	A
<i>Rhodotorula rubra</i> (Demme) Lodder	–	–	–	H
<i>Sclerotium fulvum</i> Fr.	3	3	–	A
<i>Scopulariopsis brevicaulis</i> (Sacc.) Bainier	–	–	–	H
<i>Seimatosporium cassiopes</i> (Rostr.) B. Sutton	3	3	3	C
<i>Selenophoma drabae</i> (Fuckel) Petr.	1	1	1	C
<i>Septoria caudata</i> P. Karst.	3	3	–	C
<i>S. eriophori</i> Oudem.	2	2	3	C
<i>S. lychnidis</i> Desm.	3	3	2	C
<i>S. polaris</i> P. Karst.	3	3	3	C

Scientific and Norwegian names	Ecosystem Component Values			
	R	P	E	
<i>S. punctoidea</i> P. Karst.	1	1	2	C
<i>S. saxifragae</i> Pass.	3	3	3	C
<i>Sphaeronaema foliicolum</i> (Fuckel) Lind	3	3	–	C
<i>Spicaria cephalospora</i> Kamyschko	–	–	–	H
<i>Stachybotrys chartarum</i> (Ehrenb.) S. Hughes	–	–	–	H
<i>Stagonospora culmicola</i> (Sacc.) E. Castell. & Germano	2	1	2	C
<i>S. eriophorella</i> (Sacc.) Lind	3	3	2	C
<i>Trichocladium asperum</i> Harz	–	–	–	H
<i>Trichoderma album</i> Preuss	–	–	–	H
<i>T. inflatum</i> Gams	–	–	–	H
<i>T. koningi</i> Oudem.	–	–	–	H
<i>T. polysporum</i> (Link ex Pers.) Rifai	–	–	–	H
Basidiomycota: Uredinales and Ustilaginales				
(Us = Ustilaginales)				
<i>Anthracoidea altera</i> Nannf.	3	3	3	Us
<i>A. elyinae</i> (Syd.) Kukkonen	3	3	3	Us
<i>A. lindebergiae</i> (Kukkonen) Kukkonen	3	3	3	Us
<i>A. misandrae</i> Kukkonen	–	–	3	Us
<i>Entyloma dactylidis</i> (Pass.) Cif. – Flekksot	1	1	3	Us
<i>Melampsora epitea</i> Thüm.	1	1	3	
<i>Puccinia arenariae</i> (Schumach.) G. Wint.	3	3	3	
<i>P. bistortae</i> (F. Strauss) DC.	1	1	3	
<i>P. cruciferarum</i> F. Rudolphi	2	2	3	
<i>P. drabae</i> F. Rudolphi	2	2	3	
<i>P. eutremae</i> Lindr.	2	2	3	
<i>P. gibberulosa</i> J. Schröt.	3	3	3	
<i>P. heucherae</i> (Schwein.) Dietel	1	1	3	
<i>P. hieracii</i> (Röhl.) Mart.	3	3	3	
<i>P. oxyriae</i> Fuckel	3	3	3	
<i>P. pazschkei</i> Dietel	3	3	3	
<i>Schizonella melanogramma</i> (DC.) J. Schröt.	3	3	3	Us
<i>Tolyposporium junci</i> (J. Schröt.) Woronin	3	3	3	Us
<i>Ustilago bistortarum</i> (DC.) Körn.	1	1	3	Us
<i>U. hyperborea</i> A. Blytt	3	3	3	Us
<i>U. nivalis</i> Liro	2	2	3	Us
<i>U. picacea</i> Lagerh. & Liro	3	3	3	Us
<i>U. striiformis</i> (Westend.) Niessl – Stråsot	3	3	3	Us
<i>U. vinosa</i> Tul. & C. Tul.	1	1	3	Us
<i>U. violacea</i> (Pers.:Pers.) Roussel – Nelliksot	1	1	3	Us

## Comments

(Elvebakk 1979). The material was very scarce and was found among mosses in moss tundra below a bird cliff.

## MYXOMYCOTA

*Diderma trevelyani* (Grev.) Fr.

● Only recorded once from the Ny-Ålesund area

*Fuligo intermedia* T. Macbr.

New to Svalbard. Collected in a *Dryas* community at Fredheim in the lower part of Sassendalen in

Aug. 1986 by U. Söchting and determined by H. Göttsche (Söchting pers. comm.).

*Lycogala epidendron* (Mich.) Fr.

This cosmopolite has been found only once growing on the isolation material near the basis of a wall of the famous house Svenskhuset in Dickson Land, central Isfjorden (Elvebakk 1981). This house is more than hundred years old and is the oldest building on Spitsbergen.

## OOMYCOTA

*Peronospora alsinearum* Casp.

Reported on *Cerastium alpinum* aggr. from several localities on central Spitsbergen by Hagen (1941). The species is critical and restricted to host genera within Caryophyllaceae (Farr et al. 1989).

*Peronospora parasitica* (Pers.:Fr.) Fr.

Reported on *Cochlearia groenlandica* L. from several localities at Bellsund and Isfjorden by Hagen (1941). The species is cosmopolitan on members of Brassicaceae.

## CHYTRIDIOMYCOTA

*Olpidium brassicae* (Woronin) P.A. Dang.

Reported as an endophytic fungus from roots of *Saxifraga* by Väre et al. (1992).

*Synchytrium groenlandicum* Allesch.

Reported on *Saxifraga cernua* from Colesbukta and *S. rivularis* from Sørkapp Land (Lind 1928). The species is circumpolar (Lind 1934).

*Synchytrium potentillae* (J. Schröt.) Lagerh.

Only reported from Moskusshavn at Adventfjorden by Hagen (1941). Farr et al. (1989) only listed *Potentilla* as host.

## ZYGOMYCOTA

*Absidia glauca* Hagem

Reported from peat at Hornsund by Zabawski (1982b).

*Haplosporangium bisporale* Thaxt.

Reported from peat at Hornsund by Zabawski (1982a).

*Mortierella alpina* Peyronel

Cultivated experimentally in Japan by Kobayasi et al. (1968) based on soil samples brought from Svalbard. The same is the case with the other zygomycetes reported by these authors. This species was also reported from many peat samples from Hornsund by Zabawski (1976) like most of the other soil fungi published by Zabawski (1981, 1982a, b).

*Mortierella antarctica* Linnem.

Reported from peat at Hornsund by Zabawski (1982b).

*Mortierella humicola* Oudem.

Reported from peat at Hornsund by Zabawski (1982b).

*Mortierella humilis* Linnem. ex W. Gams

Reported from Hornsund by Zabawski (1976).

*Mortierella hyalina* (Harz) W. Gams

Reported by Zabawski (1976), but not included by Zabawski (1982a, b).

*Mortierella hygrophila* Linnem.

Reported by Kobayasi et al. (1968).

*Mortierella jenkinsii* (A.L. Sm.) Naumov

Reported by Zabawski (1976).



*Mortierella minutissima* Tiegh.

Reported by Kobayasi et al. (1968) and Zabawski (1976).

*Mortierella parvispora* Linnem.

Reported by Zabawski (1976).

*Mortierella pulchella* Linnem.

Reported by Zabawski (1976).

*Mortierella spinosa* Linnem.

Reported by Kobayasi et al. (1968) and Zabawski (1976).

*Mortierella turficola* Y. Ling

Reported by Zabawski (1976).

*Mortierella verticillata* Linnem.

Reported as *M. marburgensis* by Zabawski (1976).

*Mucor abundans* Povah

Reported by Kobayasi et al. (1968).

*Mucor circinellioides* Tiegh.

A cosmopolite reported from Hornsund by Zabawski (1976).

*Mucor fragilis* Bainier

Reported by Zabawski (1976).

*Mucor griseo-cyanus* Hagem

Reported by Zabawski (1976).

*Mucor hiemalis* Wehmer

Reported by Kobayasi et al. (1968) and Zabawski (1976).

*Mucor microsporus* Namysl.

Reported by Kobayasi et al. (1968).

*Mucor mucedo* P. Micheli ex St.-Amans

A cosmopolite reported from Hornsund by Zabawski (1976).

*Mucor plumbeus* Bonord.

Reported from Hornsund as *M. spinosus* by Zabawski (1976) and as *M. spinosus* and *plumbeus* by Zabawski (1982b).

*Mucor saturninus* Hagem

Reported from peat at Hornsund by Zabawski (1976).

*Spinalia tenuis* (Thaxter) Zycha

Reported from peat at Hornsund by Zabawski (1976) as *Syncephalis tenuis* and by Zabawski (1982b) as *Spinalia tenuis*.

*Syncephalis nodosa* Tiegh.

Reported from peat at Hornsund by Zabawski (1982a, b).

*Tarichium svalbardense* (Thor) Bałazy & Wiśniewski

Described as a parasite on the mite *Ragidia gelida* at Adventfjorden as *Rhagidiasporium svalbardense* Thor by Thor (1930). Later shown to be resting spores of a widely defined zygomycete species of the genus *Tarichium* (Bałazy & Wiśniewski 1978).

*Zygorhynchus moelleri* Vuill.

Reported from peat at Hornsund by Zabawski (1976).

## ASCOMYCOTA

*Acrospermum erikssonii* Nograsek

Reported from dead leaves and stems of *Papaver*

*dahlia* from Adventdalen (Holm & Holm 1994). The species is elsewhere only known from Austria.

*Anthostoma polaris* K. & L. Holm

Described by Holm & Holm (1993a) from northernmost Sweden and from three localities on Svalbard (Ny-Ålesund and two localities near Longyearbyen). The species grows on *Dryas octopetala*.

*Arachnopeziza monoseptata* (Galán & Raitv.) Huhtinen

Reported from an old coniferous board from an old mining area in the vicinity of Ny-Ålesund (Huhtinen 1993). The species is only known with four collections, from North Norway and North Finland, both on boards, and from Spain, on coniferous wood.

*Arwidssonsonia empetri* (Rehm) B. Erikss.

Reported on dead leaves of *Empetrum hermaphroditum* from Bellsund, Grønfjorden and Colesbukta as *Sphaeropeziza empetri* by Lind (1928).

*Ascobolus albidus* Crouan

New to Svalbard. Collected in moss tundra on reindeer dung at Kærstranda near Ny-Ålesund by D.O. Øvstedal in 1981 and determined by O. Aas (Øvstedal pers. comm.).

*Ascobolus brantophilus* Dissing

This species was recently described from Greenland by Dissing (1989) who also included localities from Svalbard and Ellesmere Island, arctic Canada. This small (0.4–1 mm) arctic species grows on goose dung, and was reported to be very common on dung of barnacle goose on Svalbard. It was collected at Adventdalen, Gipsdalen and near Ny-Ålesund.

*Ascobolus furfuraceus* Pers.: Fr.

Collected from reindeer dung at Kongressdalen

near Grønfjorden (Ohenoja 1971) and reported from peat at Hornsund as *Ascobolus stercorarius* by Zabawski (1976).

*Ascobolus groenlandicus* Dissing

This species was also recently described from Greenland by Dissing (1989). On Greenland it was collected on musk ox dung, and on Svalbard it was collected twice from Adventdalen, and the species may, according to Dissing (1989), be common on dung of reindeer on Svalbard. It has also been found on sheep dung in the Dovre mountains, central Norway.

*Atopospora betulina* (Fr.: Fr.) Petr.

Recorded from Svalbard as *Dothidella betulina* on *Betula nana* at Colesbukta and Adventdalen (Lind 1928). The dark spots on the leaves makes this species easy to discover also by non-mycologists. The species is common and widely distributed on *Betula* species.

*Blumeria graminis* (DC.) Speer

Reported on *Poa* and *Phippsia algida* from three localities at Isfjorden and from Wijdefjorden by Lind (1928), and from Longyearbyen by Hagen (1952).

*Botryotinia fuckeliana* (de Bary) Whetzel

Reported as its anamorph *Botrytis cinerea* Pers. by Lind (1928) from Raudfjorden and Adventfjorden on dead stems of *Papaver dahlia* and *Saxifraga foliolosa*.

*Bricookea sepalarum* (Vleugel) Barr

Only reported as *Metasphaeria sepalarum* from Gråhøken on *Luzula arctica* by Lind (1928), who also first described its anamorph *Phoma sepalarum* from Raudfjorden. Only found on the glumes and listed by Lind (1934) from Svalbard, Sweden and Iceland with *Juncus* species as its most common hosts.

*Bryochiton microscopicus* Döbbeler & Poelt

This species was described by Döbbeler (1978).

It grows on hepatics of the genus *Gymnomitrium* and is widespread. Döbbeler (1978) reported four localities from Svalbard: Amsterdamøya, Barentsøya, Edgeøya and Kvalhovden (eastern Spitsbergen). The hosts included *G. corallioides* and *concinatum*.

*Bryochiton monascus* Döbbeler & Poelt

A widespread muscicolous species described by Döbbeler (1978). The only collection reported from Svalbard is from Amsterdamøya on *Racomitrium lanuginosum*.

*Bryochiton perpusillus* Döbbeler

A widely distributed species on musci and hepatics recorded by Döbbeler (1978) with four collections from Amsterdamøya and Longyearbyen. The hosts were *Polytrichastrum alpinum*, *Polytrichum hyperboreum* and *Ptilidium ciliare*. These bryophyte genera are the most frequent hosts also elsewhere.

*Bryoglossum gracile* (P. Karst.) Redhead

First reported from Hornsund by Skirgielło (1961, 1968) as *Gymnomitrula gracilis* P. Karst., although Eckblad (1963) was of the opinion that the illustration might indicate another species. However, Kankainen (1969) confirmed the reports by Skirgielło (1961, 1968), and added seven more collections from the area east of Isfjord Radio. Guminska et al. (1991) reported the species from Sørkapp Land. Later collected at Ny-Ålesund by Elvebakk (unpubl.). The species was transferred from *Mitrula* by Redhead (1977). The species grows on peat forming mosses such as *Drepanocladus* s.l., *Calliergon*, *Aulacomnium*, *Scorpidium*, and *Tomenthypnum nitens*, and has not been observed on *Paludella squarrosa* which is the most common host further south. It forms nice small fairy rings on dead mosses which was illustrated from Svalbard by Kankainen et al. (1967). The species is northern, and was not mapped from southern Fennoscandia by Kankainen (1969).

*Cainiella borealis* Barr

A small species growing on *Cassiope tetragona*. It

has been published from arctic Canada, northernmost Sweden, where it is rather common, and from Longyearbyen (Holm 1975). Holm & Holm (1994) added Kongsfjorden and stated that the species may not be uncommon on Svalbard.

*Cainiella johansonii* (Rehm) E. Müll.

The species is one of the most common and conspicuous microfungi on *Dryas* in Fennoscandia according to Holm (1979) who listed one locality from Grønfjorden on Svalbard. Holm & Holm (1993a) added one locality near Longyearbyen.

*Capronia pilosella* (P. Karst.) E. Müll. et al.

Reported from Grønsteinfjellet west of Sassendalen by Holm & Holm (1993a). The species was collected on *Dryas*.

*Capronia setosa* (Barr) E. Müll. et al.

Previously only known from arctic Canada, and reported from the Ny-Ålesund area by Holm & Holm (1994). The species is only known from *Saxifraga oppositifolia*.

*Chaetomium crispatum* Fuckel

Reported from peat at Hornsund as *C. crispatoideum* by Zabawski (1976).

*Chaetomium elatum* J. C. Schmidt & Kunze: Fr.

Reported from peat at Hornsund by Zabawski (1976).

*Chaetomium globosum* Kunze: Fr.

Reported from peat at Hornsund by Zabawski (1976).

*Chamaeascus arcticus* L. Holm, K. Holm & M. Barr

Described as a new species and a new genus from Svalbard and arctic Canada (Holm & Holm 1993c). The species is only known from leaves of

*Carex misandra* and *C. rupestris* and was listed with four collections from the Kongsfjorden area, two from Gipsvika and two from arctic Canada. According to Holm & Holm (1994) it is "probably widespread but easily overlooked on Svalbard".

*Cheilymenia coprinarina* (Cooke) Boud.

First reported from reindeer dung at Reinsdyrflya on Svalbard by Summerhayes & Elton (1928). Also collected near Ny-Ålesund by Øvstedal in 1981 (Herb. BG).

*Cheilymenia liskae* J. Moravec, R. Fellner & Landa

This species was recently described from Svalbard and is at present only known from the type locality (Moravec 1989). The species was collected on dung (probably reindeer) in 1988 by Liska and Soldán at "Kongress" on western Spitsbergen, which probably corresponds to Kongressdalen near Grønfjorden.

*Cheilymenia pseudohumarioides* Dissing, J. Moravec & Sivertsen

New to Svalbard. This is the most common orange discomycete on goose dung and has been observed all over Svalbard on areas visited by us. It has earlier been reported erroneously as *C. ciliata* (= *C. stercorea*) by Karsten (1872) and Lind (1928) and as *C. rubra* by Dobbs (1942). *Cheilymenia rubra* is a non-arctic taxon on plant debris and not recorded from goose dung (Moravec 1989). *Cheilymenia ciliata*, which is not known from Svalbard, is a species from dung of musk ox, sheep, reindeer, cow, etc. and not known from goose dung so far. *Cheilymenia pseudohumarioides* has recently been described from Greenland (Moravec 1989), but has not yet been reported from other arctic areas.

*Ciboria aschersoniana* (Henn. & Plötn. in Henn.) Whetzel

Recorded from fruits of *Carex subspathacea* at Kapp Wijk, Svalbard by Schumacher & Kohn (1985). The species is a parasite on *Carex* fruits.

*Ciboria polygoni-vivipari* Eckblad

First reported from Svalbard by Elvebakk & Spjelkavik (1981) based on an occurrence near the hot springs at Bockfjorden. Later it was found to be common near the airport at Longyearbyen (Huhtinen 1987). This very small species grows on bulbils of *Bistorta vivipara* that have been deposited in soil. It was described from mainland Norway (Eckblad 1969) and has a northern distribution. It has definitely been overlooked both on Svalbard and in other arctic areas, and it has been collected by us both at Adventdalen and Sassendalen (Elvebakk, Sivertsen unpubl.).

*Ciborinia ciborium* (Vahl:Fr.) T. Schumacher & L.M. Kohn

First erroneously reported as *Sclerotinia tuberosa* (a parasite on *Anemone nemorosa*) by Skirgiełło (1961, 1968) from Hornsund. Later reported from Van Mijenfjorden by Ohenoja (1971), from Bockfjorden by Elvebakk & Spjelkavik (1981), and from Brøggerhalvøya by Schumacher & Kohn (1985) who changed its name from *Myriosclerotinia vahliana*. It has later been observed as a common spring species on *Eriophorum*, especially *E. scheuchzeri*, in practically all areas visited on Svalbard (Elvebakk unpubl.). It is also known from *E. angustifolium* ssp. *triste* on Svalbard and has on a few occasions been reported from *Carex aquatilis* s.l. on Greenland and in Canada.

*Cilioplea coronata* (Niessl) Munk

Reported with seven collections from scattered localities on Spitsbergen and from four different host species (Holm & Holm 1993b).

*Clathrospora deflectens* (P. Karst.) O.E. Erikss.

Reported from two localities at Liefdefjorden by Karsten (1872) on *Poa pratensis* and *Trisetum spicatum*. The collection on *Poa* is the type specimen and a variety described by Karsten (1872) was reduced to synonymy by Eriksson (1967b). Lind (1928) recorded it from 14 host species from many localities on Svalbard, but his reports from dicotyledonous hosts probably refer to another species (Holm & Holm 1994). In Fennoscandia it

is only known from high mountains in northern Sweden (Eriksson 1967b, 1992).

*Clathrospora heterospora* (De Not.) Wehm.

Reported by Karsten (1872), Lind (1928), as *C. elynae* Rabenh., and by Holm & Holm (1994) especially on *Carex nardina* as frequent, but also recorded from other graminoids.

*Clathrospora planispora* (Ellis) Berl.

Reported on *Puccinellia angustata* and *Eriophorum scheuchzeri* from Gipsvika by Holm & Holm (1994). The spores were remarkably variable, and characters were partly overlapping with *C. arctica* Shoemaker & C.E. Babc.

*Clathrospora verruculosa* O.E. Erikss.

Described by Eriksson (1967b) who listed two localities from Fennoscandia and one from Svalbard. The Svalbard locality was at Billefjorden on *Poa glauca*, and the material was part of a collection labelled *C. pentamera* by Lind (1928).

*Coniochaeta ligniaria* (Grev.) Cooke

Reported from peat at Hornsund by Zabawski (1976).

*Crocicreas culmicola* (Desm.) S.E. Carp.

Reported (as *Belonioscypha vexata*) as new to the Arctic based on a collection from *Carex saxatilis* near Adventfjorden by Lind (1928). Recently reported from grass culms at Longyearbyen by Huhtinen (1987).

*Crocicreas cyathoideum* (Bull.:Fr.) S.F. Carp.

Reported as var. *cacaliae* (Pers.) Carpenter from culms of pseudoviviparous *Poa pratensis* ssp. *alpigena* at Longyearbyen by Huhtinen (1987). The species is cosmopolitan (Farr et al. 1989).

*Crocicreas gramineum* (Fr.) Fr.

Recorded from leaves and culms of *Poa* species from Grønfjorden, from several places on north-western Spitsbergen, from Brennevinsfjorden on Nordaustlandet and even from the northernmost Sjuøyane archipelago (80° N) (Karsten 1872) as *Crumenula pusiola* Karst. Lind (1928) confirmed that it is very common on Svalbard, especially on *Poa arctica*. Carpenter (1981) recorded it as *Crocicreas gramineum* var. *gramineum* and included localities from Adventdalen and Reindalen. It has a northern circumpolar distribution (Lind 1934).

*Cudoniella clavus* (Alb. & Schwein. ex Fr.) Dennis

Found three places near Longyearbyen on wet *Carex* litter (Huhtinen 1987). The genus is in need of a monographical treatment.

*Didymella glacialis* Rehm

Only reported from Billefjorden on a *Poa* species (probably erroneously determined as *P. alpigena* × *alpina*) by Lind (1928). An arctic-alpine species (Lind 1934).

*Didymiosphaeria futilis* (Berk. & Broome) Rehm

A polyphagous cosmopolitan species reported on *Dryas* from Blomstrandhalvøya at Kongsfjorden and Grønsteinfjellet W of Sassendalen (Holm & Holm 1993a).

*Diplocarpon polygoni* E. Müll.

Reported as its anamorph stage *Bostrichonema polygoni* (Unger) J. Schröt. from leaves of *Bistorta vivipara* at Isfjorden by Lind (1928).

*Diplonaevia circinata* (Lib.) Hein

Reported on *Juncus biglumis* from Bellsund as *Belonidium juncisedum* (Lind 1928). The species was treated by Nannfeldt (1984b).

*Diplonaevia hyperborea* Nannf.

Listed from four localities by Nannfeldt (1984b), including reports by Lind (1928) from Sørkapp Land (as *Naevia pusilla*) and Longyeardalen (as *Belonidium juncisedum*). The latter collection was from *Juncus castaneus*, the others from *J. biglumis*.

*Diplonaevia savilei* Nannf.

Reported on *Luzula arctica* from Grønfjorden and Bellsund by Nannfeldt (1984b). Although only two localities were cited from Svalbard by Nannfeldt (1984b), he noted that the species "seems to attack *L. arctica* only but to be rather common on it and to follow it everywhere."

*Dipodascus aggregatus* Francke-Grosch.

Isolated in Japan from a soil sample taken at Ny-Ålesund by using small pieces of dried cuttlefish as bait (Kobayasi et al. 1968). This cultivated fungus was described as a new variety, var. *spitsbergensis* Kobayasi. It was the first hemiascomycete reported from Svalbard.

*Discostroma hyperborea* (P. Karst.) O.E. Erikss.

First described on *Cassiope tetragona* from Grønfjorden by Karsten (1872) as *Sphaeria hyperborea*. Later published from several places at Isfjorden as *Didymella hyperborea* by Lind (1928), and it was treated as *Griphosphaeria hyperborea* by Holm (1975). Holm & Holm (1994) reported it as probably common from the Kongsfjorden and Longyearbyen areas.

*Duplicaria empetri* (Wrangel ex Fr.) Fuckel

Reported from dry *Empetrum* leaves from Grønfjorden by Karsten (1872) and Lind (1928). Lind (1928) searched in vain for this fungus on other *Empetrum* collections from Svalbard, but reported its anamorph stage (*Melasmia empetri* P. Magn. = *Hysterodiscula empetri* (White) Petr.) from Colesbukta and Bohemanneset. It has been reported from scattered localities in Europe with the highest frequency in northernmost parts of Fennoscandia (Lind 1934).

*Durella macrospora* Fuckel

Only collected on driftwood at Bjørnøya (Lind 1928). This collection was made by Th.M. Fries in 1868. Lynge (1926) also mentioned a *Durella* species (*D. lecideola* (Fr.) Rehm var. *coeruleo-viridis* Keissl.) collected on driftwood on Bjørnøya by Th.M. Fries in 1868 (cfr. Hagen 1950). This record was not cited by Lind (1928), but it is here considered to be based on the same material, and only *D. macrospora* is included here.

*Epibryon diaphanum* Döbbeler

Described as a new species (Döbbeler 1979) of a new genus (Döbbeler 1978). The species is widespread, and is known from a number of bryophytes. On Svalbard it was reported from Amsterdamøya on *Ptilidium ciliare*.

*Epibryon polysporum* Döbbeler

Described as a new species based on one collection from northernmost Sweden (typus) and one from Amsterdamøya, Svalbard (Döbbeler 1978). The species was found twice on *Ptilidium ciliare* and in both cases associated with *Bryochiton perpusillus*.

*Epipolaeum absconditum* (Johanson) L. Holm

Reported on *Dryas* leaves from Ny-Ålesund and Carolinedalen N of Adventfjorden by Holm & Holm (1993a). According to Holm & Holm (1994) "probably rather frequent but easily overlooked".

*Geopora arenosa* (Fuckel) Ahmad

Recorded from Braganzatoppen at Isfjorden and Blomstrandhalvøya near Ny-Ålesund by Ohenoja (1971). Some own *Geopora* collections have not been determined to species.

*Gibbera barriarum* L. & K. Holm

A small parasitic fungus on *Cassiope hypnoides* described by Holm & Holm (1980). The species is very easily overlooked and it is probably not very rare although at present it is only known from Fennoscandia, Novaja Zemlja, Greenland

and Svalbard. The type locality is from Grønfjorden, Svalbard, and this is the only known Svalbard locality. The host is a rare coastal species on Svalbard (Elvebakk 1989).

*Gibbera latispora* (Barr) L. Holm

Collected from one *Dryas* leaf at Ny-Ålesund (Holm & Holm 1993a). Also reported on *Cassiope tetragona* from the Ny-Ålesund and Longyearbyen areas (Holm & Holm 1994).

*Glomerella amenti* (Rostr.) Arx & E. Müll.

A striking species reported on catkins of *Salix polaris* from Longyeardalen and Kapp Thorsden (Lind 1928), and from Endalen near Longyearbyen by Holm & Holm (1994).

*Gnomonia dryadis* Auersw.

Reported from *Dryas octopetala* at Blomstrandhalvøya near Ny-Ålesund by Holm & Holm (1993a), and from Endalen near Longyearbyen by Holm & Holm (1994).

*Gnomoniella hyparctica* (Lind) Barr

A fungus with a very specialised ecology as it has only been found on dead sepals and peduncles of *Cassiope tetragona*. It is known from Greenland, Canada and Svalbard and has been looked for in vain on Scandinavian *Cassiope* (Holm 1975). Lind (1928) reported on two collections from Grønfjorden and Skansbukta, Holm (1975) on another one from Grønfjorden and one from Isfjorden without further geographical information, and Holm & Holm (1994) reported on one collection from Gludneset near Ny-Ålesund.

*Gnomoniella vagans* Johanson

Reported on peduncles of *Dryas octopetala* from Blomstrandhalvøya and Endalen near Longyearbyen by Holm & Holm (1993a).

*Graphyllum pentamerum* (P. Karst.) Barr

Described from Svalbard as *Pleospora pentamera*

by Karsten (1872) who listed collections from several graminoid species from several localities. Lind (1928) identified no less than 190 collections on more than 50 host species from Svalbard of this distinct species. The type collection is from Adventdalen (Eriksson 1967b), and the species is arctic-alpine (Lind 1934). Holm & Holm (1993a) added *Dryas* as host on Svalbard which is the first report of a wooden host species for *G. pentamerum*. Holm & Holm (1994) confirmed that it is very common on monocotyledons.

*Guignardia graminicola* (Rostr.) P. Larsen

Reported as rather common on various grasses from Kongsfjorden, Gipsvika and the Longyearbyen area by Holm & Holm (1994).

*Hamatocanthoscypha unicipila* (Le Gal) Huhtinen

Reported from coniferous construction timber at Longyearbyen by Huhtinen (1990). The species has possibly been introduced.

*Helvella aestivalis* (R. Heim & L. Remy) Dissing & Raitv.

A species of dry calcareous habitats, often associated with *Dryas octopetala*, and reported from alpine/subalpine localities in mainland Norway, Asia and Switzerland and from arctic localities in Canada, Greenland and Svalbard (Dissing 1983). The Svalbard locality (coll. by Heikkilä in 1966) is represented by the Blomstrandhalvøya collection earlier published as *H. acetabulum* by Ohenoja (1971).

*Helvella arctoalpina* Harmaja

Reported from Bockfjorden by Harmaja (1977) who described it as a new species known from Norway and Sweden. This collection had earlier been published as *H. acetabulum* (Dissing 1966).

*Helvella corium* (B. Weberb.) Mass.

Already reported by Karsten (1872) from Adventdalen as *Helvella pezizoides* Afz. which later was revised to *H. arctica* by Nannfeldt (1937). Dissing (1966) added one locality from

Bockfjorden, Kankainen et al. (1967) and Kobayashi et al. (1968) reported it from the Ny-Ålesund area, and Ohenoja (1971) added seven collections from the Ny-Ålesund area and from the area between Grønfjorden and Isfjord Radio. Reid (1979) also included collections of this species from the southern tip of Woodfjorden, with reindeer dung as an unexpected substrate.

### *Helvella dryadophila* Harmaja

Harmaja (1977) revised the *Helvella acetabulum* group into *H. acetabulum* s. str., *H. arctoalpina* and a third new species, *H. dryadophila*. Of the two Skifte collections of *H. acetabulum* s. l. from Bockfjorden (Dissing 1966) one was revised as *H. arctoalpina* and one as *H. dryadophila*.

### *Helvella lacunosa* Afzel.:Fr.

A widespread species reported once from Svalbard from the area between Hotellneset and Longyearbyen (Dissing 1966).

### *Helvella pocillum* Harmaja

Reported from Blomstrandhalvøya near Ny-Ålesund by Huhtinen (1987). This is the third collection of this species, which earlier was described by Harmaja (1976) from its type locality in northernmost Sweden and later added from Oppland in Norway (Harmaja 1977). The relationship between this taxon and *H. aestivalis* needs further studies.

### *Hyaloscypha albohyalina* (P. Karst.) Boud.

Reported as rare on imported coniferous wood, both as var. *albohyalina* (at Ny-Ålesund and Longyearbyen) and var. *spiralis* (Vel.) Huhtinen (at Ny-Ålesund) (Huhtinen 1990).

### *Hyaloscypha aureliella* (Nyl.) Huhtinen

Reported as common on old boards and other mining timber at Longyearbyen and Ny-Ålesund (Huhtinen 1990, 1993).

### *Hyaloscypha britannica* Huhtinen

Huhtinen (1990) described *H. britannica* from Western Europe and a new var. *roseoguttata* Huht. only known from the type locality at Longyearbyen where it was collected from the underside of a wooden box lying on the tundra.

### *Hymenoscyphus herbarum* (Pers.) Dennis

Reported from four localities on different hosts (Lind 1928).

### *Hymenoscyphus rhodoleucus* (Fr.) W. Phillips

Reported from Bohemanflya on *Equisetum variegatum* and from Longyeardalen on *Equisetum arvense* as *Phialea rhodoleuca* (Fr.) Sacc. (Lind 1928). The identity of this fungus is uncertain, and collections on *Equisetum* spp. might belong to the genus *Stammaria* (Carpenter 1981).

### *Hypocopra aviaria* P. Karst.

Described as a new species by Karsten (1872) based on material collected on goose dung at Bjørnøya. The spores are different from the closely related species *H. stercoraria*. The species was not included by Krug & Cain (1974) in their study on *Hypocopra*, and the taxon is best considered as critical. As far as we know this species has only been reported from its type locality.

### *Hypoderma degenerans* (P. Karst.) Nannf.

Only collected on the rare *Vaccinium uliginosum* at Colesbukta and published as *Pseudophacidium degenerans* (Lind 1928), but later transferred to *Hypoderma* (Nannfeldt 1932; Lind 1934). The species seems to belong to a southern mycoflora element on Svalbard and is widely distributed in northern and alpine parts of Europe (Lind 1934).

### *Hysteronaevia advena* (P. Karst.) Nannf.

First described as a new species (*Mollisia advena*) by Karsten (1872) based on collections from leaves of *Eriophorum angustifolium* spp. *triste*, *Luzula arctica* and *L. arcuata* ssp. *confusa* at Adventdalen and Ekmanfjorden. Reported as



*Niptera advena* on *Eriophorum angustifolium* spp. *triste* from Isfjorden and on *Festuca rubra* from Krossfjorden by Lind (1928). Nannfeldt (1984a) transferred the species to a new genus, but only listed *Eriophorum* as host plants. The species has a northern boreal to arctic distribution (Nannfeldt 1984a).

*Hysteronaevia clavulifera* Nannf.

This is a recently described arctic-alpine species on *Juncus* spp. (Nannfeldt 1984a). On Svalbard it has been collected once at Sassendalen on *Juncus biglumis* by Asplund in 1915 (Nannfeldt 1984a).

*Hysteronaevia kobayasii* Nannf.

This is also a recently described species with a high arctic distribution pattern (Nannfeldt 1984a). According to Nannfeldt (1984a) it grows on *Eriophorum* species, but it was published from several hosts on Svalbard as *Mollisia graminea* by Lind (1928), and from Ny-Ålesund as *Hysteropezizella* sp. by Kobayasi et al. (1968). Nannfeldt (1984a) added one collection from Wijdefjorden from 1861 in addition to one confirmed Lind collection from Sassendalen.

*Hysteronaevia luzulicola* Nannf.

Another *Hysteronaevia* species described by Nannfeldt (1984a). It grows on *Luzula arcuata* s.l. and is only known from arctic Canada and northernmost Sweden, both with only one collection, in addition to Svalbard and Novaja Zemlja where it is more common. The type locality is on Svalbard, where it has been published as *Naevia pusilla* by Lind (1928).

*Hysteronaevia lyngei* (Lind) Nannf.

Known as *Hysteronaevia lyngei* from Sørkapp Land on Svalbard (on *Festuca rubra*), Novaja Zemlja, northern Fennoscandia and arctic Canada, altogether on three different grass species (Nannfeldt 1984a). Also reported as *Hysteropezizella lyngei* (Lind) Nannf. from Kapp Thorsden (Nannfeldt 1932), from Varanger, North Norway, and northernmost parts of Russia by Lind (1934), from Greenland (Dennis 1981), and from the British Isles (Cannon et al. 1985).

*Hysteropezizella diminuens* (P. Karst.) Nannf.

Reported as *Trochila diminuens* from Adventdalen, Grønfjorden and Liefdefjorden by Karsten (1872). The species was growing on dead remains of *Carex glareosa*, *C. lachenalii*, *C. ursina*, *Hierochloë alpina*, and *Luzula arcuata* ssp. *confusa* and with somewhat different paraphyses on leaves of *Alopecurus alpinus* and *Phippsia algida*. Lind (1928) reported the species as *Naevia diminuens* from many hosts from different localities and treated the deviating form described by Karsten (1872) as *N. diminuens* f. *prominens*. *Stegia subvelata* reported from many localities on different *Carex* species by Lind (1928) also corresponds to *H. diminuens* (Lind 1934). Nannfeldt (1984) reported this species to be common on *Luzula arcuata* s.l. in Fennoscandia, but rare on this host on Svalbard, while the opposite is the case with *Hysteronaevia luzulicola*. The species is arctic-alpine according to Lind (1934).

*Hysteropezizella fuscella* (P. Karst.) Nannf.

Reported on *Festuca rubra* from Sørkapp Land and Edgeøya and on *Luzula arctica* from Kvaldehuken near Ny-Ålesund as *Naevia fuscella* (Lind 1928), but later transferred to *Hysteropezizella* (Nannfeldt 1932). A widespread northern species according to Lind (1934).

*Isothea rhytismoides* (Bab. ex Berk.) Fr.

Reported from Svalbard by Karsten (1872) without information on locality, from Wijdefjorden by Wulff (1902), and reported as *Hypospila rhytismoides* from Bellsund and Isfjorden by Lind (1928). Lid (1967) included a locality from Adventdalen. Holm (1979) described it as the most conspicuous species on *Dryas* leaves where it forms shining black spots, and as common and widespread and probably coextensive with *Dryas* hosts. Holm & Holm (1993a) reported it from four localities and considered it to be probably common on Svalbard.

*Kalmusia coniothyrium* (Fuckel) L. Hunndorf

A cosmopolitan species only reported from Sassendalen on leaves of *Salix polaris* (Lind 1928).

*Lachnellula calyciformis* (Willd. :Fr.)  
Dharne

Reported from a corticated conifer trunk near Longyearbyen by Huhtinen (1993), who discussed problems in defining boundaries to neighbouring species and treated it in a collective sense.

*Lachnum palearum* (Desm.) Korf

Reported as *Lachnum patens* by Lind (1928) on *Phippsia algida* from the polar desert island Hopen.

*Laetinaevia erythrostigma* (Rehm) Nannf.  
ex B. Hein

Reported on *Cerastium* spp. from many localities on Svalbard as *Helotiella erythrostigma* (Lind 1928, Hagen 1941). The species was treated as *Laetinaevia erythrostigmoides* by Nannfeldt (1932). The species is arctic-alpine (Lind 1934).

*Laetinaevia stellariae* (Rostr.) Lind

Reported on *Stellaria longipes* s. l. from Bellsund, Colesbukta and Adventfjorden by Lind (1928) as *Naevia stellariae*, but later transferred to *Laetinaevia* (Lind 1934). A circumpolar species according to Lind (1934).

*Lamprospora carbonicola* Boud.

Reported from Ny-Ålesund where it was found associated with bryophytes in a burnt place (Schumacher 1993). This is the first record from the Arctic.

*Lamprospora hanffii* Benkert

Reported from Longyearbyen growing on soil associated with *Pohlia* mosses on two sites (Schumacher 1993). The species was described from German and French mountains by Benkert (1987).

*Lamprospora miniata* De Not.

Reported from Longyearbyen with three collections associated with *Pohlia* and *Bryum* mosses (Schumacher 1993).

*Lamprospora minuta* (Velen.) Svrček

Reported from Barentsburg associated with bryophytes (Schumacher 1993).

*Lamprospora norvegica* Benkert, Aas & Kristiansen

Reported from Adventdalen by Schumacher (1993) growing in association with bryophytes. The species was described by Benkert et al. (1991).

*Lamprospora rugensis* Benkert

Reported with two collections from Longyearbyen where it was associated with *Pohlia* bryophytes by Schumacher (1993), who stated that the species is common both in Norwegian mountains and on Svalbard.

*Lamprospora seaveri* Benkert

Reported from Ny-Ålesund and Longyearbyen (two collections) by Schumacher (1993). The species has been found associated with several moss species. This and the preceding species were described by Benkert (1987).

*Lamprospora spitsbergensis* T. Schumach.

Described by Schumacher (1993) based on one collection from Longyearbyen and another from nearby Endalen. The species was growing associated with *Pohlia* in a seashore estuary of a large glacial river, and it will be interesting to see whether future collections will also be on saline soils.

*Lasiobolus diversisporus* (Fuckel) Sacc.

New to Svalbard. Collected on dung of reindeer at Kiærstranda near Ny-Ålesund by D.O. Øvstedal and determined by O. Aas.

*Lathraeodiscus arcticus* Dissing & Sivertsen

This species was recently described as a species in a new genus by Dissing & Sivertsen (1988). It is a soil inhabiting fungus known from Svalbard

and Greenland. The type locality is at Adventdalen, where one additional collection has been made in addition to two collections from Gipsdalen and one from Ny-Ålesund.

*Leptosphaeria brachyasca* Rostr.

Only reported from Bjørnøya on *Saxifraga oppositifolia* (Lind 1928), and only known from Dovre, mainland Norway and Greenland, on *Saxifraga* (Lind 1934).

*Leptosphaeria monotis* Rehm

Described on *Saxifraga* leaves from the Alps, and probably not reported from elsewhere, except from the Ny-Ålesund area where it apparently is not rare on *Saxifraga oppositifolia* (Holm & Holm 1994).

*Leptotrochila cerastiorum* (Wallr.) Schüepp

Only collected on *Cerastium* (probably *arcticum*) at Adventfjorden and published as *Fabraea cerastiorum* (Lind 1928).

*Leucoscypha hetieri* (Boud.) Rifai

Collected near Longyear Airport by Huhtinen (1987) at an old fireplace. This is probably the first report of this species from the Arctic. The species may belong to a different genus.

*Lophiostoma winteri* (Sacc.) G. Winter

Reported as common and discovered on most samples of *Dryas* on Svalbard by Holm & Holm (1993a).

*Lophiotrema vagabundum* (Sacc.) Sacc.

Reported on *Luzula arcuata* ssp. *confusa* at Ny-Ålesund and *Deschampsia alpina* from Blomstrandhalvøya, both at Kongsfjorden (Holm & Holm 1994).

*Lophodermium caricinum* (Rob. ex Desm.) Duby

Reported twice from Svalbard, on *Eriophorum*

*scheuchzeri* and *E. angustifolium* spp. *triste*, both collections from the Adventdalen area; the latter as its anamorph *Leptostroma henningsi* (Lind 1928). Lind (1934) reported scattered occurrences from northern Europe and one locality in Canada.

*Lophodermium culmigenum* (Fr.) De Not.

Recorded from a large number of grasses all over Svalbard by Karsten (1872) and Lind (1928). According to Lind (1934) the species has a wide northern distribution. Lind (1928) treated *L. arundinaceum* as a synonym of *L. culmigenum*, but they have been treated as different species by Cannon et al. (1985).

*Lophodermium svalbardense* Lind

Described as a new species on dead peduncles of *Papaver dahlianum* from Sassendalen (Lind 1928). It should be expected from other arctic areas, but has as far as we know not been reported outside Svalbard yet.

*Massarina balnei-ursi* (Rehm) K. & L. Holm

Reported on *Dryas* from Ny-Ålesund, Gipsvika and two localities west of Sassendalen by Holm & Holm (1993a).

*Massariopsis wulfii* (Lind) Lind

Reported on grasses from Ekmanfjorden, Brøggerhalvøya and Krossfjorden by Lind (1928). We have not been able to find any other references to this species, but the genus has been placed in *Amphisphaeria*. Holm & Holm (1994) stated that the species has a doubtful taxonomic position.

*Melanomma dryadis* Johanson

Reported from several collecting sites at Kongsfjorden and in the Longyearbyen area by Holm & Holm (1993a). The species grows on fruits and remaining parts of the previous years' flowers of *Dryas*.

*Melaspilea hyparctica* K. & L. Holm

Described from Svalbard on dead wood of *Dryas octopetala* by Holm & Holm (1993a). The type locality is from Gipsvika, and the species was also reported from Ny-Ålesund, Endalen near Longyearbyen and Grønsteinfjellet west of Sassendalen. The affiliation to *Melaspilea* is uncertain, but no better alternative was found by Holm & Holm (1993a).

*Melaspilea lecideopsida* (Rehm) K. & L. Holm

Reported from old *Dryas* wood from Ny-Ålesund, Blomstrandhalvøya and Longyearbyen by Holm & Holm (1993a).

*Microthyrium holmiae* Nograsedk

A recently described species that was collected from old persistent leaf bases of *Dryas* at Ny-Ålesund (Holm & Holm 1993a).

*Microthyrium microscopicum* Desm.

Reported as ssp. *arctoalpinum* Nograsedk on *Carex misandra* at Gludneset near Ny-Ålesund (Holm & Holm 1992).

*Mollisia graminis* (Desm.) P. Karst.

Reported on four grass species from Bellsund, Grønfjorden and Bohemannesset by Lind (1928).

*Montagnula spinosella* (Rehm) Crivelli

Reported with a few collections on graminoids from the Ny-Ålesund area by Holm & Holm (1993b), and from Endalen near Longyearbyen on *Deschampsia cespitosa* (a host species determination that needs to be confirmed) by Holm & Holm (1994). Holm & Holm (1993b) considered it "hardly common" on Svalbard. See also notes below the rejected species *Pleospora junci* Pass. & Beltr.

*Mycosphaerella arthopyrenoides* (Auersw.) Lindau

Recorded from the Longyearbyen area on *Papa-*

*ver dahlianum* as probably widespread (Holm & Holm 1994).

*Mycosphaerella cassiopes* Barr

This is the most common microfungus on *Cassiope tetragona*, constantly infesting overwintered peduncles and flowers, according to Holm (1975) who also recorded it on Svalbard from dead leaves. Lind (1928) recorded the species (as *M. inconspicua*) from three Svalbard localities (Tempelfjorden, Kapp Thorsden and Colesbukta).

*Mycosphaerella confinis* (P. Karst.) Dearn.

Recognised from Krossfjorden, Kongsfjorden, Adventfjorden, and Wijdefjorden by Holm & Holm (1994), but only from hosts within Brassicaceae as opposed to a wider concept used by Lind (1928). According to Farr et al. (1989) *M. confinis* is included in the omnivorous *M. tassiana*.

*Mycosphaerella densa* (Rostr.) Lind

Reported by Lind (1928) from many localities on Svalbard on four different herbaceous host species, and Hagen (1941) added one locality from the mountains near Sassendalen. This circumpolar arctic species is a true parasite as compared with most other *Mycosphaerella* species which are saprophytic (Lind 1934; Eriksson 1992). Frequent on *Arenaria pseudofrigida* and perhaps confined to this species according to Holm & Holm (1994).

*Mycosphaerella equiseti* (Fuckel) J. Schröt.

Reported on *Equisetum scirpoides* from Endalen near Longyearbyen (Holm & Holm 1994).

*Mycosphaerella equiseticola* Bond.-Mont.

Also reported on *Equisetum scirpoides* from Endalen near Longyearbyen (Holm & Holm 1994).

*Mycosphaerella halophila* (J. Bommer, Roussel & Sacc.) O.E. Erikss.

Reported from an old Nathorst collection of

*Honkenya peploides* (Holm & Holm 1994). The species has most often been included in *M. tassiana*.

*Mycosphaerella lycopodii* (Peck) House

Reported on *Huperzia selago* from Ny-Ålesund and Longyearbyen (Holm & Holm 1994).

*Mycosphaerella maculiformis* (Pers.:Fr.) J. Schröt.

Reported by Lind (1928) as *M. maculiformis* on dead leaves of *Betula nana* from Colesbukta. The species was included in the cosmopolitan *M. punctiformis* (Pers.) Starbäck by Farr et al. (1989).

*Mycosphaerella minor* (P. Karst.) Johanson

Reported from several places at Isfjorden and from Bellsund and Bjørnøya by Lind (1928). An arctic-alpine species according to Lind (1934), but it is now known to be widely distributed in Sweden (Eriksson 1992). Reported as *M. cf. minor* to be common on old naked *Dryas* wood by Holm & Holm (1993a), and as a frequent species on many dicotyledons (Holm & Holm 1994).

*Mycosphaerella octopetalae* (Oudem.) Lind

Found everywhere on old *Dryas* leaves (Holm & Holm 1993a).

*Mycosphaerella pachyasca* (Rostr.) Vestergr.

Only reported on *Eutrema edwardsii* from Wijdefjorden by Wulff (1902).

*Mycosphaerella pedicularidis* (P. Karst.) Lind

First described by Karsten (1872) from Grønfjorden on *Pedicularis hirsuta*, later reported by Lind (1928) to be very common on *P. hirsuta*, but only collected once (Saurieberget) on *P. lanata* ssp. *dasyantha*. An arctic-subarctic species according to Lind (1934).

*Mycosphaerella perexigua* (P. Karst.) Johanson

First described from Svalbard by Karsten (1872) as *Sphaeria perexigua*. The species was reported from dry leaves of *Juncus biglumis* at Adventdalen and Ekmanfjorden (=“Nordfjorden”), and the latter is the type locality. Lind (1928) reported it from all over Svalbard on *Juncus* and *Luzula* species and with a single occurrence on *Carex misandra*. It has now been confirmed to be a common and widespread species on *Juncus*, *Luzula* and Cyperaceae by Holm & Holm (1987), who examined one Svalbard collection, and Holm & Holm (1994) stated that it is very common on *Juncus biglumis* on Svalbard.

*Mycosphaerella polaris* (P. Karst.) Lindau

Reported by Karsten (1872) from Lomfjorden and by Lind (1928) from Bellsund, Wijdefjorden and Sørkapp Land on *Salix polaris* and *S. polaris* × *herbacea*. Holm & Holm (1994) reported it from the Longyearbyen area “sensu auct. non sensu orig.”, and stated that the taxonomic confusion will be dealt with in a separate publication.

*Mycosphaerella pusilla* (Auersw.) Johanson

Reported from three *Carex* species at Isfjorden by Lind (1928). The species is poorly known and, according to Holm & Holm (1994), it may have been confused with *M. recutita* (Fr.) Johanson.

*Mycosphaerella ranunculi* (P. Karst.) Lind

First reported from Svalbard by Karsten (1872) and later by Lind (1928). Found throughout Svalbard on five *Ranunculus* species (Lind 1928).

*Mycosphaerella salicicola* (Fr.) Johanson ex Oudem.

Only reported as its anamorph *Septoria salicicola* on *Salix polaris* at Wijdefjorden and Sorgfjorden by Wulff (1902). Its anamorph-teleomorph relationship is not quite understood yet (Eriksson 1992).

*Mycosphaerella taraxaci* (P. Karst.) Lind

Described from Svalbard by Karsten (1872) as *Sphaerella taraxaci* based on collections on dead leaves of *Taraxacum arcticum* from Lomfjorden and Kongsfjorden. Lind (1928) reported it as common on *T. arcticum* and *Petasites frigidus* all over the areas visited on Svalbard, and Holm & Holm (1994) found it on most herbarium specimens of *Taraxacum arcticum* which still had attached dead leaves. It is a widely distributed northern species (Lind 1934).

*Mycosphaerella tassiana* (De Not) Johanson

Reported from Svalbard by Karsten (1872) on dead leaves of no less than 32 different vascular species. Lind (1928) reported it from another 41 vascular species on Svalbard and stated that it is the most common of all fungi on Svalbard. It seems to attack all species except dwarf shrubs and *Equisetum variegatum* and *E. scirpoides*, and is hardly ever absent from *Poa*, *Carex*, *Cerastium*, *Papaver*, *Silene*, and *Stellaria* species (Lind 1928). Lind (1934) reported a wide circumpolar distribution in northern areas. Karsten (1884), Lind (1928), Kobayasi et al. (1968), and Zabawski (1976) also reported its anamorph *Cladosporium herbarum*.

*Mycosphaerella vivipari* (G. Winter) Lind

Reported from dead leaves of *Bistorta vivipara* along most of the western coast of Spitsbergen by Lind (1928). According to Holm & Holm (1994) it is hardly common as they did not observe it in the field on Svalbard, but it was confirmed from two herbarium (UPS) samples from the Isfjorden area.

*Mycosphaerella recutita* (Fr.) Johanson

Reported from 12 graminoid host species all over Svalbard by Lind (1928), as *M. wichuriana* (J. Schröt.) Johanson. Frequent on various monocotyledons according to Holm & Holm (1994), who indicated that it may be identical to *M. minor* (P. Karst.) Johanson on dicotyledons.

*Naemacyclus lambertii* Rehm

Reported with numerous localities from Svalbard by Holm & Holm (1993a) as var. *dryadis* L. & K. Holm on *Dryas octopetala*.

*Naeviopsis primulae* (Rehm) B. Hein

Only reported from Grønfjorden on *Taraxacum arcticum* (Lind 1928). A critical species.

*Neottiella aphanodictyon* (Kobayasi) Dissing, Korf & Sivertsen

New to Svalbard. This is a very common fungus on Svalbard which grows associated with bryophytes of the family Polytrichaceae, and it has been recorded from Alaska, Greenland and mainland Norway (Dissing & Sivertsen 1983). *Humaria semi-immersa* reported by Dobbs (1942) evidently refers to this species.

*Nimbomollisia eriophori* (Kirchn.) Nannf.

Reported as *Niptera phaea* from Kongsfjorden on *Carex misandra* and from Adventpynten and Bellsund on *C. subspathacea* (Lind 1928).

*Octospora melina* (Velen.) Dennis & Itzerott

A northern species reported from Longyearbyen (two collections) by Huhtinen (1987). The species seems to be a parasite on members of the moss family Bryaceae.

*Octospora moravecii* K.B. Khare

A rare northern or alpine species reported from Longyearbyen (two collections) by Huhtinen (1987) as associated with the moss genus *Pohlia*.

*Odontotrema cassiopes* (Rostr.) L. Holm

Recorded by Lind (1928) as *Metasphaeria cassiopes* from Mimerdalen and Longyeardalen. Holm (1975) stated that this identification is doubtful. The species is northern and restricted to *Cassiope tetragona*.

*Onygena corvina* Alb. & Schwein.: Fr.

New to Svalbard (Herb. TRH). Collected by I. Brattbakk in 1973 on old remains of a felt shoe near a trapper's cabin at Kapp Smith. This is the first record from the Arctic, at least from northern parts.

*Othia dryadis* K. Holm, L. Holm & Nogrased

Reported from old *Dryas* wood from five localities in the Ny-Ålesund and Adventdalen areas by Holm & Holm (1993a), and Holm & Holm (1994) considered it to be scanty and obviously not common.

*Phacidium polygoni* Rostr.

Reported from dead leaves of *Bistorta vivipara* from four localities at Isfjorden (Lind 1928).

*Phaeosphaeria caricinella* (P. Karst.) O.E. Erikss.

According to Lind (1928) and with some uncertainty affirmed by Eriksson (1967c) this species was published by Karsten (1872) from Svalbard as three species (*Leptosphaeria caricinella*, *L. junciseda* and *L. vagans*). Lind (1928) reported it as common and widespread, but the only Svalbard localities accepted by Shoemaker & Babcock (1989) were two Th.M. Fries collections of *Leptosphaeria vagans* P. Karst. from Ekmanfjorden and Adventfjorden and further studies should reveal whether this is a widespread species or not. Holm & Holm (1994) reported it from two localities in the Kongsfjorden area.

*Phaeosphaeria consobrina* (P. Karst.) O.E. Erikss.

Reported from Ekmanfjorden by Karsten (1872) and from several localities in Isfjorden by Lind (1928) as *Leptosphaeria consobrina* on *Carex saxatilis* and *C. parallela*. Leuchtmann (1984) treated *L. consobrina* as a synonym of *Phaeosphaeria juncina*, but this was not accepted by Shoemaker & Babcock (1989) who mentioned only one locality from Svalbard (Ekmanfjorden, Th.M. Fries on *Carex saxatilis*, which is the type locality). Eriksson (1967c, 1992) showed that *P. juncina* is

a southern species in Sweden confined to *Juncus effusus* and *conglomeratus*, whereas *P. consobrina* is the correct identity of the northern species on *Carex*. Holm & Holm (1994) collected it on *Carex parallela* at Kongsfjorden: Blomstrandhalvøya.

*Phaeosphaeria culmorum* (Auersw.) Leuchtm.

Reported on '*Luzula* cf. *confusa*' from Ny-Ålesund by Holm & Holm (1994), who stated that their determination was tentative.

*Phaeosphaeria equiseti* (P. Karst.) L. & K. Holm

*Leptosphaeria equiseti* was first described from Liefdefjorden (type locality) by Karsten (1872), and later reported from several localities by Lind (1928). Holm & Holm (1981) treated it as a *Phaeosphaeria* and described a new var. *lindii* L. & K. Holm from Iceland and Svalbard, and Leuchtmann (1984) treated it as *P. lindii*. With one exception it is not clear whether the reports cited by Lind (1928) belong to *P. equiseti* or *P. lindii*, but Holm & Holm (1994) reported it on *Equisetum arvense* at Ny-Ålesund and on *E. scirpoides* at Longyearbyen: Endalen.

*Phaeosphaeria herpotrichoides* (De Not.) L. Holm

Recorded from Billefjorden and Dicksonfjorden as *Leptosphaeria culmifraga* by Lind (1928) on graminoids. A species with a very wide distribution (Lind 1934). Reported from Kongsfjorden (Ny-Ålesund and Blomstrandhalvøya, two samples from the latter), Gipsvika, and Longyearbyen (Holm & Holm 1994). Two of the samples correspond to *P. ovei* Shoemaker and C.E. Babcock, which was not accepted as a separate species by Holm & Holm (1994).

*Phaeosphaeria insignis* (P. Karst.) L. Holm

Reported from Svalbard by Karsten (1872), Lind (1928), Holm (1957) and Eriksson (1967c). It is a common species on a variety of grasses on Svalbard, but it is a predominantly arctic species, with the type locality at Ny-Ålesund and with only

three localities known from northern Fennoscandia (Eriksson 1967c).

*Phaeosphaeria juncina* (Auersw.) L. Holm

Reported on *Luzula arcuata* ssp. *confusa* from Ny-Ålesund by Holm & Holm (1994).

*Phaeosphaeria lindii* (L. & K. Holm) Leuchtm.

See below *P. equiseti*. One report of *P. equiseti* from Bellsund is *P. lindii* (Holm & Holm 1981). Holm & Holm (1993a) reported a few ascomata on old fruits of *Dryas* from the Longyearbyen area; a remarkable host. Holm & Holm (1994) collected the species on *Equisetum arvense* from Ny-Ålesund and *E. scirpoides* from Longyearbyen.

*Phaeosphaeria marcyensis* (Peck) L. & K. Holm

Reported on leaves of *Huperzia selago* from Ny-Ålesund and Longyearbyen by Holm & Holm (1994).

*Phaeosphaeria microscopica* (P. Karst.) O.E. Erikss.

Reported by Karsten (1872), Lind (1928), Holm (1957), Eriksson (1967c), and Leuchtmann (1984) from Svalbard. Lind (1928) recorded it (as *Leptosphaeria microscopica*) from all the localities visited on Spitsbergen growing on a wide range of grasses as hosts. Lind (1928) also reported *Leptosphaeria algida* Rostr. on *Phippsia* from some localities, but later (Lind 1934) indicated that it may be included in *P. microscopica*. *Phaeosphaeria microscopica* is a widespread species both in the Arctic and further to the south (Lind 1934).

*Phaeosphaeria nigrans* (Roberge ex Desm.) L. Holm

Reported from Billefjorden, on *Festuca*, and Dicksonfjorden, on *Carex parallela*, by Lind (1928), as *Leptosphaeria culmicola*. Holm & Holm (1992) could not find any voucher material in C, but considered the reports to be probable.

*Phaeosphaeria silenes-acaulis* (De Not.) L. Holm

First recorded by Karsten (1872) from *Silene acaulis* at Grønfjorden. Later recorded as common by Lind (1928), who also noted *Stellaria humifusa* and *S. longipes* s.l. as hosts, and reported on *Silene acaulis* from Ny-Ålesund by Holm & Holm (1994). The species is probably coextensive with *Silene acaulis* (Eriksson 1992) and is also frequent on *Stellaria longipes*.

*Phaeosphaeria stellariae* (Rostr.) Leuchtm.

Probably common on *Stellaria longipes* s.l. and reported from two localities in the Longyearbyen area by Holm & Holm (1994). Not separated from *P. silenes-acaulis* by Lind (1928).

*Phaeosphaeria vagans* (Niessl) O.E. Erikss.

Reported by Berlese (1888) but with erroneous geographical information (Eriksson 1967b). The species was also reported by Lind (1928) from *Phippsia algida* at Brennevinsfjorden, and by Holm & Holm (1994) from Gipsvika on *Dupontia fisheri* and *Eriophorum scheuchzeri*. *Phaeosphaeria vagans* is a very common species in Fennoscandia, mainly on grasses, but occasionally also on other plants.

*Phaeosphaeria weberi* (Oudem.) L. & K. Holm

Reported on *Ranunculus pygmaeus* from Sørkapp Land, Kapp Thordsen and Bohemannset by Lind (1928). Holm & Holm (1994) added a locality from Grønfjorden on *R. sulphureus* and another from Endalen near Longyearbyen on *R. pygmaeus*, and cited collections otherwise only from Novaja Zemlja, from where it was described as *Leptosphaeria weberi*, and from arctic Canada.

*Phomatospora dinemasporium* J. Webster

Reported on *Deschampsia alpina* from Blomstrandhalvøya, Kongsfjorden by Holm & Holm (1994).



*Phyllachora junci* (Fr.: Fr.) Fuckel

Only reported from Dickson Land on *Juncus arcticus* (Lind 1928). The host is very rare on Svalbard. *Phyllachora junci* is widespread further south and is reported to be the most common fungus on dead stems and leaves of large *Juncus* species like *J. conglomeratus* and *J. effusus* (Ellis & Ellis 1985), while Eriksson (1992) reported it from scattered provinces throughout Sweden.

*Physalospora alpestris* Niessl

Reported on *Carex misandra* from Krossfjorden (Lind 1928), and on *C. misandra* and *C. parallela* from Kongsfjorden (Holm & Holm 1994). The species is arctic-alpine (Lind 1934, Eriksson 1992).

*Physalospora empetri* Rostr.

Reported on *Empetrum nigrum* ssp. *hermaphroditum* from the climatically most favourable parts of Svalbard (Colesbukta and Mimerdalen) by Lind (1928). A widespread species on *Empetrum* (Lind 1934).

*Physalospora hyperborea* Bäumler

A common microfungus on *Cassiope tetragona* and the type collection is from Svalbard (Holm 1975; Holm & Holm 1994).

*Pleospora androsaces* Fuckel

Reported by Karsten (1883) and Lind (1928) listed it from 28 herbaceous host species from all over Svalbard. According to Holm & Holm (1993b) this is obviously not correct as the species is mainly confined to *Silene acaulis*. They listed only one occurrence from Gipsvika as *P. androsaces*, and revised five Lind determinations of Svalbard material as *P. comata*.

*Pleospora arctica* P. Karst.

According to Holm & Holm (1993b) this is the most frequent *Pleospora* on Svalbard grasses and occurs less often on other monocotyledons and on dicotyledons. It was reported from *Poa pratensis* ssp. *alpigena* from Liefdefjorden as

*Pleospora arctica* by Karsten (1872), from 17 graminoid host species from large parts of Spitsbergen by Lind (1928) (as *P. karstenii*), and on *Alopecurus borealis* from Bellsund (as *P. lutea*) by Wehmeyer (1961). It is an arctic-alpine species (Lind 1934) and it was treated as *P. arctagrostidis* by Eriksson (1967b), who did not accept this as a synonym of *P. arctica*; an opinion, however, held by Holm & Holm (1993b), who had access to better spore material.

*Pleospora ascodedicata* K. Holm, L. Holm & Nogrased

A species restricted to *Dryas* and reported from Lovénbreen and Blomstrandhalvøya at Kongsfjorden by Holm & Holm (1993a, b). The species was described by Nogrased (1990) and is elsewhere known from Scandinavia and the Alps.

*Pleospora comata* Niessl

A southern species on *Anemone* and *Pulsatilla* and the reports from Svalbard by Lind (1928) most probably do not belong to this species according to Eriksson (1992). However, Holm & Holm (1993b) reported three collections of *P. comata* from Svalbard that could not morphologically be discriminated from the southern typical form, and were treated within *P. comata* s.l.

*Pleospora glacialis* Niessl ex Rehm

Reported as *P. cerastii* from a wide range of host plants but only distributed in the Inner Fjord Zone of Spitsbergen (Lind 1928), but most of the reports probably refer to *P. helvetica* (Holm & Holm 1994). According to Lind (1934) it is a widely distributed arctic-alpine species. Holm & Holm (1993b) presented supplementary collections, also from climatically less favourable areas like Sørkapp and Ny-Ålesund.

*Pleospora helvetica* Niessl

Outside Svalbard a widely distributed species that was first reported from Svalbard by Karsten (1884) and from Wijdefjorden by Wulff (1902). Later shown to be common all over Svalbard and reported as *Pyrenophora chrysospora* from 42

host species by Lind (1928). Lind (1928) also reported it from four localities as *Pyrenophora helvetica*. Holm & Holm (1993b) reported it to be very common on dicotyledons, and only listed four collections from other habitats. Holm & Holm (1993a) listed it as probably rather common on *Dryas*. *Pleospora herbarum* has been reported to be common on Svalbard by Karsten (1872, 1884 as two other taxa) and Lind (1928), but all examined collections proved to be forms of *P. helvetica* with poorly developed setae (Holm & Holm 1993b).

*Pleospora herbarum* (Pers.:Fr) Rabenh.

The species was reported as an endophytic root fungus by Väre et al. (1992). The species has previously been considered to be common on Svalbard, but was redetermined to *P. helvetica* (see this species) by Holm & Holm (1994). It was also lacking from herbarium collections from the Alps, but it is common there as an endophyte (Holm & Holm 1993b).

*Pleospora penicillus* (Schmidt: Fr.) Fuckel

Reported by Lind (1928) as *P. media* from *Cerastium alpinum* (is most cases probably *C. arcticum*) at Bellsund and as *Pyrenophora hispida* (Niessl) Sacc. from *Silene furcata* and *uralensis* at Isfjorden (Lind 1928). *Pleospora penicillus* is widely distributed in temperate areas (Farr et al. 1989). Holm & Holm (1993b) also considered it to be very widespread on a large number of dicotyledonous herbs, but rare on monocotyledons, and Holm & Holm (1993a) reported it from *Dryas*, both as var. *penicillus* and as var. *ambigua* (Berl. & Bres.) Crivelli. Lind (1928) also reported *P. infectoria* Fuckel from 39 host species throughout Svalbard. This is now a synonym of *Lewia infectoria* (Fuckel) E. Simmons, but Holm & Holm (1993b) considered the Lind (1928) reports of *P. infectoria* to be "certainly *P. penicillus*, at least in part".

*Pleospora spetsbergensis* K. Holm & L. Holm

Described from Svalbard with the type collection from Gipsdalen by Holm & Holm (1993a). They listed seven more localities from Kongsfjorden and from areas between Sassendalen and Long-

yearbyen. The species is confined to *Dryas*. According to Holm & Holm (1993b) the species would perhaps be better accommodated in the genus *Teichospora*.

*Pleospora wulfii* Lind

Described from Svalbard on *Stellaria longipes* s.l. collected at Wijdefjorden by T. Wulff (Lind 1928). Later reported from northern Russia and Greenland by Lind (1934). The species is closely related to *P. islandica*, but was still considered to be a separate species by Holm & Holm (1993b) who listed two more collections on *Stellaria longipes* s.l. from the Longyearbyen area.

*Pleuroceras helveticum* (Rehm) Barr

Reported from *Salix* leaves in the southern and central parts of Svalbard as *Linospora insularis* (= *Pleuroceras insulare* (Johanson) M. Monod) (Lind 1928). Holm & Holm (1994) redetermined a Lind (1928) report from Kongsfjorden: Kva-dehuken to *P. helveticum* and added a record from Ny-Ålesund, and *P. insulare* was treated as a doubtful species on Svalbard.

*Podospora vesticola* (Berk. & Broome) Mirza & Cain

Reported from peat at Hornsund by Zabawski (1976) as *Sporormiella vesticola* and by Zabawski (1982b) as *Podospora vesticola*.

*Polaroscyphus spetsbergianus* Huhtinen

Recently described as a new species in a new genus based on two collections from Bjørndalen and Blomsterdalen at Longyearbyen (Huhtinen 1987). The species grows on leaves of *Salix polaris*.

*Potriphila navicularis* Döbbeler

Recently described as a new species in a new genus by Döbbeler (1996). The species grows on the moss *Polytrichastrum alpinum*, and is widely distributed, even bipolar, and is known from Spitsbergen (without further geographical information) and from Barentsøya.

*Pseudomassaria inconspicua* (Johanson) Barr

Reported on dead leaves of *Saxifraga oppositifolia* from the Ny-Ålesund area (two collections) and on *S. aizoides* from Gipsvika (Holm & Holm 1994).

*Pseudopeziza drabae* (Nannf.) Nannf.

The species was described from northern Sweden as *Pyrenopeziza drabae* by Nannfeldt (1928) and later transferred to *Pseudopeziza* (Nannfeldt 1932). It is very easily observed, since attacked leaves are fully stromatised and coaly black. Nannfeldt (1932) argued that parts of *Pseudopeziza svalbardensis*, the collections on *Draba*, belong to *P. drabae*. This refers to a collection from Bohemannesset on *Draba* lacted published as *Pyrenopeziza svalbardensis* by Lind (1928). A new collection of *P. drabae* has now been discovered on *Draba lactea* from Kongsfjorden (TRH, det. S. Sivertsen).

*Pseudopeziza svalbardensis* (Lind) Nannf.

The species was described from Svalbard by Lind (1928), but later recorded elsewhere, at least from Scotland (Cannon et al. 1985). It was collected on *Saxifraga hirculus* at Adventfjorden. The collections from *Draba* are referred to *P. drabae*, see comments below under the latter species.

*Pseudorhizisma bistortae* (Lib.) Juel

Reported on leaves of *Bistorta vivipara* from Kapp Thorsden, Dicksonfjorden and Tempelfjorden (Lind 1928), and two localities at Adventdalen were added by Hagen (1941). The species is arctic-alpine (Lind 1934).

*Psilachnum acutum* (Velen.) Svrček

Recorded from culms of *Calamagrostis stricta* at Blomsterdalen near Longyearbyen by Huhtinen (1987). This is the first report of this species from the Arctic. Later Huhtinen (1993) considered this to possibly belong to a distinct taxon, as he published a typical collection of *P. acutum* from Longyearbyen and a deviating type from Ny-Ålesund, both on grass culms.

*Psilachnum inquilinum* (P. Karst.) Dennis

Collected on *Equisetum arvense* at Bjørndalen near Longyearbyen by Huhtinen (1987).

*Psilocistella obsoleta* (Velen.) Svrček

Found on a board in a warm and sheltered habitat at Longyearbyen (Huhtinen 1987). This is an extraordinary collection of a species that has only been found at its type locality in The Czech Republic/Slovakia before and of a genus that has never been found in the Arctic before.

*Pyrenopeziza atrata* (Pers.) Fuckel

Reported as *Mollisia dehnii* by Karsten (1872) from Grønfjorden, Adventdalen and Kobbevågen on leaves and stalks of *Potentilla hyparctica* and *P. pulchella*. Lind (1928) reported it as *Mollisia atrata* and as a very common species on *Potentilla* spp., especially *P. pulchella*, from all parts of Svalbard. An arctic-alpine species (Lind 1934).

*Pyrenophora raetica* (Müller) Crivelli

Reported from several grass species from scattered Spitsbergen localities by Holm & Holm (1993b). The species is otherwise only known from the Alps.

*Pyrenophora schroeteri* Barr

Reported by Lind (1928) as *Pleospora macrospora* Schröter from *Arctophila fulva* at Sørkapp Land and *Hierochloë alpina* from Colesbukta, and Lind (1934) concluded that it is a circumpolar high arctic species, although several localities are known from northernmost Fennoscandia. The species was not found on Svalbard by Holm & Holm (1993b) who considered the Svalbard records by Lind (1928) doubtful, but it was included in the list of Svalbard pyrenomycetes presented by Holm & Holm (1994).

*Pyrenophora subalpina* (Müller) Crivelli

Reported as quite frequent on Svalbard (Eriksson 1967b; Holm & Holm 1993b), and includes also

the report of *Pleospora magnusiana* Berl. by Lind (1928), a species that has been interpreted in different ways, see below "Rejected species".

*Rhytisma salicina* (Pers.:Fr.)

Reported by Lind (1928) from all over Svalbard on *Salix polaris* and *S. herbacea* x *polaris*. It has also been reported by Hagen (1941) and Lid (1967), and it is easily observed forming black spots on *Salix* leaves. Its anamorph is *Melasmia salicina* Lév.

*Ronnigeria arctica* (Oudem.) Petr.

Only reported from Adventdalen on *Potentilla pulchella* (Lind 1928). The species was originally described from Novaja Zemlja on *P. hyparctica*, and is considered to be widespread in the Arctic and in northern Scandinavia (Holm & Holm 1977). Holm & Holm (1994) reexamined the Adventdalen collection without finding the fungus, but concluded that the species is likely to occur on Svalbard.

*Saccobolus chenocopicus* Dissing

Described recently as a new species based on material from Greenland (Dissing 1989), but a small collection from Gipsdalen on dung of barnacle goose was also listed.

*Saccobolus quadrisporus* Mass. & E.S. Salmon

A rare species on goose dung reported from Brucebyen at Billefjorden by Eckblad (1968). Dissing (1989) also indicated that *S. quadrisporus* was associated with *S. chenocopicus* at Gipsdalen.

*Scleroplella hyperborea* (Fuckel) L. Holm

Holm (1975) cited one report of this species from Svalbard, but Holm & Holm (1993a) reported it to be common on *Cassiope*. The species also grows on *Dryas*, and Holm & Holm (1993a) cited one Svalbard collection on *Dryas*. See also below under *Wettsteinina andromedae*.

*Scutellinia hyperborea* T. Schumacher.

Recently described from the Adventdalen area, mainland Norway and possibly Greenland (Schumacher 1990).

*Scutellinia minor* (Velen.) Svrček

Reported from several localities near Longyear Airport by Huhtinen (1987), on open soil or among mosses like *Splachnum ampullaceum* (the moss probably mis-identified).

*Sphaerotheca erigeronis-canadensis* (Schltdl.: Fr.) L. Junell

Reported on *Taraxacum arcticum* from Adventfjorden (Lind 1928) and from Helvetiadalen (Hagen 1941), as *S. fuliginea* (Schltdl.:Fr.) Pollacci. This species has been treated in a wide sense i.e. by Farr et al. (1989) as a cosmopolite comprising powdery mildew on Asteraceae, Cucurbitaceae, and Scrophulariaceae, whereas it has been referred to in a strict sense as a species on *Veronica* by Eriksson (1992), and evidently also by Holm & Holm (1992), who treated the Lind (1928) and Hagen (1941) records as *S. erigeronis-canadensis*.

*Sporormiella americana* (Griffiths) S. Ahmed & Cain

Recorded from Woodfjorden by Reid (1979) on dung, probably from goose.

*Sporormiella heptamera* (Auersw.) S. Ahmed & Cain

Reported from goose dung on wet sites on Bjørnøya (Karsten 1872). Both *Sporormiella* species were previously treated within the genus *Sporormia* (Ahmed & Cain 1972).

*Sporormiella polymera* (Cain) S. Ahmed & Cain

Reported from peat at Hornsund by Zabawski (1976), but it is a dung species (Ahmed & Cain 1972).

*Sporormiella teretispora* S. Ahmed & Cain

Another dung species isolated from peat from Hornsund by Zabawski (1976).

*Stomiopeltis dryadis* (Rehm) L. Holm

Reported to be probably widespread on dead leaves of *Dryas* by Holm & Holm (1993a), who cited localities from Kongsfjorden, Gipsvika, and areas east and north of Longyearbyen.

*Sydowiella dryadis* Lar. N. Vassiljeva

Reported as var. *macrospora* Nogrsek from many collecting sites on Svalbard by Holm & Holm (1993a). The species grows on *Dryas* and is otherwise known from Scandinavia, the Austrian Alps and easternmost Russia (Holm & Holm 1993a).

*Taphrina carnea* Johanson

New to Svalbard. The species was collected by T. Engelskjøn on *Betula nana* at Colesbukta in 1986 (Herb. TROM, det. H.B. Gjærum).

*Taphrophila argyllensis* Scheuer

Reported on *Deschampsia alpina* at Endalen near Longyearbyen (Holm & Holm 1994). Previously only known from the type collection on *Deschampsia cespitosa* in Scotland.

*Tarzetta cupularis* (L.) Lambotte

Reported as *Pustularia cupularis* (L.) Fuckel from Ebbadalen at Billefjorden by Dobbs (1942). The report needs confirmation as already indicated by Ohenoja (1971). The genus *Tarzetta* is not among the about 85 mostly unpublished species of Pezizales collected on Svalbard by Dissing and Sivertsen.

*Thelebolus crustaceus* (Fuckel) Kimbr.

New to Svalbard. Collected on reindeer dung at Kierstranda near Ny-Ålesund by D.O. Øvstedal and determined by O. Aas (Øvstedal pers. comm.). The species was associated with *Asco-bolus albidus*.

*Trichopezizella nidulus* (Schmidt & Kuntze ex Fr.) Raitv.

Collected on *Carex lachenalii* at Carolinedalen north of Longyearbyen by Huhtinen (1987) as var. *hystricula* (Karst.) Haines. This variety was previously only known from its type locality in Finland (Haines 1974).

*Trichothyria salicis* J.P. Ellis

Reported on *Salix reticulata* from Ny-Ålesund (Holm & Holm 1994). Previously only known from *Salix atrocinerea* in England.

*Venturia oxyriae* (Rostr.) Sacc.

Reported on *Oxyria digyna* from Ny-Ålesund and Longyearbyen (Holm & Holm 1994).

*Venturia potentillae* (Wallr.:Fr.) Cooke

Reported by Lind (1928) as *Coleroa circinans* from Bellsund, Adventdalen and Billefjorden on *Potentilla pulchella*. It was redetermined to *V. potentillae* (sensu Barr) by Holm & Holm (1994) who added a locality from Gipsvika.

*Venturia polygoni-vivipari* Arx

Reported from dead leaves of *Bistorta vivipara* from Bellsund to Magdalenefjorden by Lind (1928) as *Mycosphaerella polygonorum* (Crié) Lind. The species is obviously common on overwintered *Bistorta vivipara* on Svalbard according to Holm & Holm (1994).

*Venturia subcutanea* Dearn.

Huhtinen (1987) erroneously listed this species as being reported by Watling (1983). Holm & Holm (1994), however, reported *V. subcutanea* as common on dead leaves of *Salix polaris* and *S. reticulata*, and one collection on *Betula nana* from Longyearbyen probably also refers to this species. The same applies to a report by Lind (1928) of *Venturia ditricha* on *Betula nana* from Colesbukta.

*Wentomyces dryadis* K. & L. Holm

Described from old dead leaves on *Dryas* from

Adventdalen (type collection) and from Blomstrandhalvøya and Ny-Ålesund on *Cassiope tetragona* by Holm & Holm (1993a).

*Wettsteinina andromedae* (Auersw.) Barr

Reported by Karsten (1872) as *Sphaerella andromedae*, and as *Leptosphaeria andromedae* by Lind (1928) who considered it to be common on Svalbard, but as shown by his listed synonyms Lind (1928) did not distinguish between *Wettsteinina andromedae* (Auersw.) Barr. and *Scleroplella hyperborea* (Fuckel) L. Holm. Holm (1975) was in doubt about the taxonomical status of this northern material on *Cassiope tetragona*, but *W. andromedae* was reported as common on *Cassiope tetragona* by Holm & Holm (1994).

*Wettsteinina distincta* (P. Karst.) L. & K. Holm

Reported from Kapp Thorsden (type locality) on *Puccinellia vahliana* by Karsten (1872) as *Sphaerella distincta* and later reported from two *Phippsia* and two *Puccinellia* species from many localities by Lind (1928) (as *Lizonia distincta* P. Karst.). The species was transferred to *Didymella* by Eriksson (1967a), and to *Wettsteinina* by Holm & Holm (1994). From Fennoscandia there is only one uncertain report from Finland (Eriksson 1967a) and one from Kola Peninsula (Lind 1934).

*Wettsteinina dryadis* (Rostr.) Petr.

Reported as *Didymosphaeria dryadis* on dead leaves of *Dryas octopetala* from Bellsund, Isfjorden, Krossfjorden, and Sorgfjorden (Lind 1928), and considered to be a circumarctic species (Lind 1934). According to Holm (1979) these reports correspond to immature *Wettsteinina dryadis*, and Holm & Holm (1993a) reported it as one of the most common fungi on *Dryas*, on peduncles and leaves.

*Wettsteinina eucarpa* (P. Karst.) Müller & Arx

Recorded from Svalbard by Karsten (1872) as *Sphaerella eucarpa* and by Lind (1928) as *Massaria eucarpa*. It is a common species on Svalbard, mainly on *Bistorta vivipara*. It is an arctic-alpine

species according to Lind (1934) and Farr et al. (1989).

*Wettsteinina junci* Shoem. & C.E. Babc.

Reported on *Juncus biglumis* at Gluudneset and Blomstrandhalvøya, both near Ny-Ålesund, by Holm & Holm (1994), who stated that the species was previously known only from the type locality in Canada, where it was collected on *J. castaneus*.

*Wettsteinina macrotheca* (Rostr.) E. Müll.

Only known on *Carex saxatilis* and *C. subspathacea* from Bellsund and Kongsfjorden (Lind 1928), as *Massarina macrotheca* (Rostr.) Lind. According to Lind (1934) it has an arctic-subarctic distribution pattern.

*Wettsteinina salicicola* Nogrased

Reported on leaves of *Salix reticulata* from Ny-Ålesund, and previously only known from Swedish Lapland and Austria (Holm & Holm 1994).

*Wettsteinina savilei* Shoemaker & C.E. Babc.

Reported on *Carex misandra* and *Juncus biglumis* from three localities in the Ny-Ålesund area, and the species was previously only known from the type locality in arctic Canada (Holm & Holm 1994).

## DEUTEROMYCOTA

*Arthrimum puccinioides* (DC.) Kunze

Reported from *Juncus triglumis* and *Carex misandra* at Adventfjorden and Longyeardalen by Lind (1928).

*Ascochyta arctica* (Lind) Punith.

Reported from Olsokflyan, Grønfjorden og Krossfjorden on *Poa* and *Festuca rubra* (Lind 1928).

*Ascochyta dianthi* (Alb. & Schwein.) Lib.

Reported by Lind (1928) from Klovningen and Grønfjorden on *Stellaria humifusa*.

*Ascochyta graminicola* Sacc.

Reported by Lind (1928) from grass species (*Alopecurus borealis*, *Festuca* and *Poa arctica*) at Adventfjorden and several localities in the north-west.

*Aspergillus ochraceus* K. Wilh.

Reported from peat at Hornsund by Zabawski (1976), and by Zabawski (1981) as *Penicillium ochraceum*.

*Aspergillus oryzae* (Ahlb.) Cohn

A soil fungus determined with some uncertainty by Kobayasi et al. (1968).

*Aspergillus sulphureus* (Fresen.) Wehmer

Reported by Kobayasi et al. (1968).

*Aspergillus ustus* (Bainier) Thom & Church

Reported from peat at Hornsund by Zabawski (1976).

*Aspergillus versicolor* (Vuill.) Tirab.

Reported from peat at Hornsund by Zabawski (1976).

*Asteroma cacaliae* Desm.

Only known from dead leaves of *Petasites frigidus* at Colesbukta (Lind 1928).

*Cephalosporium mycophilum* (Corda) Tubaki

A soil fungus reported by Kobayasi et al. (1968).

*Chrysosporium pannorum* (Link) Hughes

A soil fungus reported by Kobayasi et al. (1968).

The report may refer to *C. pannorum* or the *C. pannorum* group.

*Cladosporium cladosporioides* (Fresen.) de Vries

Reported by Kobayasi et al. (1968) and Zabawski (1976).

*Cryptococcus albidus* (Saito) Skinner

Reported by Kobayasi et al. (1968).

*Cryptococcus diffluens* (Zach) Lodder & Kreger

Reported by Kobayasi et al. (1968).

*Cryptococcus laurentii* (Kuff.) Skinner

Reported by Kobayasi et al. (1968).

*Dendryphion fumosum* Fr.

Reported by Lind (1928) on *Eutrema edwardsii* from Dicksonfjorden.

*Diplodia bessimyanii* Lind

Reported from Sørkapp Land on *Poa pratensis* ssp. *alpigena* by Lind (1928).

*Diplodia simmonsii* Rostr.

Reported from Billefjorden and Bjørnøya on *Poa* and *Luzula arcuata* ssp. *confusa* by Lind (1928).

*Diplodina euphrasiae* (Oudem.) Allesch.

Reported on *Pedicularis hirsuta* from Grønfjorden by Lind (1928).

*Diplodina papaveris* (Oudem.) Lind

A widespread arctic species reported from 14 different dicotyledoneous host species on Svalbard (Lind 1928).

*Diplodina pedicularidis* (Fuckel) Lind

This is a systemic species that penetrates and deforms the whole tissue of its host (*Pedicularis hirsuta*) which no longer can produce flowers. It was first reported from the Adventfjorden area by Lind (1928) and later reported from the innermost parts of Adventdalen by Hagen (1950).

*Doratomyces microsporus* (Sacc.) Morton & Smith

Reported from peat at Hornsund by Zabawski (1976).

*Doratomyces nanus* Ehrenb. ex Link

Reported from peat at Hornsund by Zabawski (1982b). The same taxon was obviously reported as *D. fimetarius* by Zabawski (1976).

*Eriospora leucostoma* Berk. & Br.

● Only reported on *Carex misandra* from Adventfjorden by Lind (1928).

*Gloeosporium roaldii* Lind

Reported from *Polemonium boreale* at Grønfjorden and Adventfjorden by Lind (1928). von Arx (1957) regarded *G. roaldii* as a doubtful species as he was not able to find any material in the collections studied by Lind (1928).

*Hendersonia arabisidis* Rostr.

*Hendersonia arabisidis* has been reported from several *Draba* species on several places on Spitsbergen (Lind 1928). It was also reported from northern Sweden and Greenland by Lind (1934).

*Hendersonia arundinacea* (Desm.) Sacc.

A widespread fungus recorded from 15 different monocotyledonous host species by Lind (1928).

*Hendersonia gigantea* Lind

Reported by Lind (1928) from central parts of Isfjorden on *Juncus arcticus*, *Carex saxatilis* and

*C. bigelowii*, the latter probably a misidentified *C. subspathacea*.

*Hendersonia rostrupii* Lind

Reported on *Hierochloë alpina* and *Poa abbreviata* from Adventfjorden, Sassenfjorden and Billefjorden by Lind (1928). Several related *Hendersonia* species were transferred to *Stagonospora* by Castellani & Germano (1977), who did not mention *H. rostrupii*.

*Hendersonia stefansonii* Rostr.

Reported by Lind (1928) on *Carex misandra* from Kongsfjorden and Krossfjorden.

*Heteropatella umbilicata* (Pers.) Jaap

A widespread species reported on plant debris from Bjørnøya by Karsten (1872) and from several hosts on several localities on Spitsbergen by Lind (1928).

*Leptothyrium arcticum* (Fuckel) Lind

A widespread species on *Potentilla hyparctica* and *P. nivea* (Lind 1928).

*Leptothyrium palustre* Fautrey

● Only reported on *Pedicularis hirsuta* from Sørkapp Land by Lind (1928)

*Marssonina obscura* (Romell) Magn.

Reported on *Salix polaris* and *S. herbacea* × *polaris* from Sørkapp Land by Lind (1928). The generic name *Marssonina* has replaced *Marssonina* (Farr et al. 1989), but this species does not seem to have been rediscovered.

*Mastigosporium album* Riess

Reported on *Poa* from Sørkapp Land and Forlandssundet (Lind 1928).

*Microdiplodia perpusilla* (Desm.) Allesch.

Reported from dead leaves of *Draba subcapitata*



at Kongsfjorden by Lind (1928) as *Diplodia perpusilla* Desm., a synonym according to Zambettakis (1970).

*Microdochium bolleyi* (R. Sprague) de Hoog & Herm.-Nijh.

Reported as an endophytic fungus on roots by Väre et al. (1992).

*Microsphaeriopsis olivacea* (Bonord.) Höhn.

Reported on *Draba oblongata* (= probably *D. micropetala*) from the Sassenfjorden area by Lind (1928). The species is cosmopolitan (Farr et al. 1989).

● *Idiodendron cerealis* (Thüm.) G.L. Barron

A soil fungus reported by Kobayasi et al. (1968).

*Pachybasium hamatum* Sacc.

A soil fungus reported from Longyearbyen by Kobayasi et al. (1968).

*Penicillium brevicompactum* Dierckx

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium chrysogenum* Thom

Reported from peat at Hornsund as *P. notatum* by Zabawski (1976).

*Penicillium claviforme* Bainier

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium crustosum* Thom

Reported as *P. terrestre* from peat at Hornsund by Zabawski (1976).

*Penicillium cyanofulvum* Biourge

Reported by Kobayasi et al. (1968).

*Penicillium diversum* Raper & Fennell

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium fellutanum* Biourge

Reported from Hornsund by Zabawski (1981), but not included in his other studies (Zabawski 1976, 1982b) on the soil hyphomycetes of Hornsund.

*Penicillium funiculosum* Thom

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium glabrum* (Wehmer) Westling

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium granulatum* Bainier

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium herquei* Bainier & Sartory

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium islandicum* Sopp

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium janthinellum* Biourge

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium lanoso-coeruleum* Thom

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium lividum* Westling

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium puberulum* Bainier

Reported as *P. lanosum* and *P. puberulum* by Kobayasi et al. (1968) and as *P. commune* and *P. lanosum* by Zabawski (1976).

*Penicillium roquefortii* Thom

Reported from soil et Longyearbyen by Kobayasi et al. (1968).

*Penicillium thomii* Maire

Reported from peat at Hornsund by Zabawski (1976).

*Penicillium viridicatum* Westling

Reported by Kobayasi et al. (1968).

*Penicillium waksmanii* Zalesky

Reported from Hornsund by Zabawski (1981), but not included in his other papers (Zabawski 1976, 1982b) on the soil hyphomycetes of Hornsund.

*Phaeoseptoria rostrupii* (Lind) Jørst.

Jørstad (1967) cited a collection from Sassen-dalen, reported as *Hendersonia rostrupii* by Lind (1928).

*Phialophora cinerescens* (Wollenw.) J.F.H. Beyma

Reported from peat at Hornsund by Zabawski (1976).

*Phialophora fastigiata* (Lagerb. & Melin) Conant

A soil fungus reported by Kobayasi et al. (1968) and Zabawski (1976).

*Phialophora lagerbergii* (Melin & Nannf.) Conant

Reported by Kobayasi et al. (1968).

*Phialophora verrucosa* Medlar

Reported by Kobayasi et al. (1968).

*Phoma alpina* Speg.

Reported by Karsten (1872), and later by Lind (1928) from numerous localities and host species. Karsten (1884) also described the new ssp. *planiuscula* from Grønfjorden on *Saxifraga hircifolia*.

*Phoma caricis* (Fr.) Sacc.

Reported by Lind (1928) on *Carex glareosa* and *C. saxatilis* from Adventfjorden and Sassenfjorden.

*Phoma complanata* (Tode: Fr.) Desm.

● Only known from Kapp Thordsen on *Pedicularis hirsuta* (Lind 1928).

*Phoma graminis* Westend.

Reported on *Festuca* sp. and *Poa abbreviata* from Sassenfjorden (Lind 1928).

*Phoma herbarum* Westend.

Reported by Karsten (1884) as *P. herbarum* var. *thulensis* obviously from Svalbard although not explicitly stated. Later Lind (1928) reported *P. herbarum* on 16 host species from numerous localities. *Phoma herbarum* has been interpreted as the anamorph of *Pleospora herbarum*, but Simmons (1981) redefined the teleomorph-anamorph connection of *Pleospora herbarum*, and *Phoma herbarum* is now best considered as a species with unknown teleomorph.

*Phoma nebulosa* (Pers.: Fr.) Berk.

Reported by Lind (1928) from Colesbukta and Adventfjorden on *Stellaria longipes*.

*Phoma oudemansii* Berl. & Voglino

Only reported from Bellsund and Isfjorden on *Polemonium boreale* (Lind 1928).

*Phoma ranunculi* P. Karst.

Reported from three different *Ranunculus* species at Sørkapp Land, Tempelfjorden, Krossfjorden and Gråhuken by Lind (1928).

*Phoma sceptri* P. Karst.

Wulff (1902) reported this fungus on *Pedicularis hirsuta* from Sorgfjorden. Lind (1928) added *P. lanata* ssp. *dasyantha* from Dicksonfjorden.

*Phyllosticta saxifragarum* Allesch.

Reported on *Saxifraga hirculus* from Bellsund by Lind (1928).

*Plenodomus svalbardensis* Lind

Described as a new species from Magdalenefjorden on *Draba alpina* by Lind (1928). Later Lind (1934) reported it on the same host from northernmost Sweden. The genus *Plenodomus* is now considered to be a section of *Phoma* (Farr et al. 1989), but *Plenodomus svalbardensis* does not seem to have been transferred. The true status of this species is unclear.

*Ramularia alborosella* (Desm.) Gjærum

This species has been collected many places on Spitsbergen and Bjørnøya on different *Cerastium* species (Lind 1928), and includes also his report of *Sphaerella cerastii* (Holm & Holm 1994).

*Rhabdospora campanulae* Fautrey

Only reported from Krossfjorden on *Campanula uniflora* by Lind (1928).

*Rhabdospora pleosporoides* Sacc.

Reported on *Oxyria digyna* and *Draba* species from many parts of Svalbard (Lind 1928).

*Rhizoctonia solani* J.G. Kühn

Reported as an endophytic root fungus by Väre et al. (1992).

*Rhodotorula rubra* (Demme) Lodder

Reported by Kobayasi et al. (1968).

*Sclerotium fulvum* Fr.

Reported from dead leaves of *Puccinellia vahliana* at Bohemanneset by Lind (1928).

*Scopulariopsis brevicaulis* (Sacc.) Bainier

Reported from peat at Hornsund by Zabawski (1976). The species is cosmopolitan on various substrates and has been used to detect arsenic (Farr et al. 1989).

*Seimatosporium cassiopes* (Rostr.) B. Sutton

Lind (1928) reported *Coryneum foliicolum* Fuckel (= *Seimatosporium lichenicola* (Corda) Shoemaker & E. Müller, an anamorph of the pyrenomycete *Discostroma corticola* (Fuckel) I. Brockmann) from Bohemanneset, but considered it to be conspecific with *Coryneum cassiopes* Rostr. (= *Seimatosporium cassiopes* (Rostr.) Sutton). The report is treated here as *S. cassiopes*, but a study of Lind's collection is necessary to define its identity.

*Selenophoma drabae* (Fuckel) Petr.

Reported from all visited localities on Svalbard by Lind (1928). Farr et al. (1989) listed only *Carex* as host genus, but Lind (1928) included several graminoids, *Draba* and four species within Caryophyllaceae.

*Septoria caudata* P. Karst.

Described from Bjørnøya by Karsten (1884).

*Septoria eriophori* Oudem.

Reported by Lind (1928) from Colesbukta, Ekmanfjorden and Kongsfjorden on *Eriophorum*

*triste* and *E. scheuchzeri*. The species is high arctic according to Lind (1934).

*Septoria lychnidis* Desm.

Only known from *Silene uralensis* at Tempelfjorden (Lind 1928). The species is widely distributed in temperate regions on genera in Caryophyllaceae (Farr et al. 1989).

*Septoria polaris* P. Karst.

Reported on *Ranunculus lapponicus* from Adventfjorden by Karsten (1884). It is only listed from central United States and Scandinavia on *Ranunculus* by Farr et al. (1989).

*Septoria punctoidea* P. Karst.

This species was first described by Karsten (1884) from Adventfjorden on *Carex misandra*. Later Lind (1928) reported it from numerous localities on Spitsbergen on *Luzula arcuata* ssp. *confusa* and *L. arctica*.

*Septoria saxifragae* Pass.

Only reported from Bjørnøya on *Saxifraga cespitosa* by Lind (1928).

*Sphaeronaema foliicolum* (Fuckel) Lind

Only known from Kapp Thordsen on *Salix polaris* (Lind 1928).

*Spicaria cephalospora* Kamyschko

Reported from peat at Hornsund by Zabawski (1982b).

*Stachybotrys chartarum* (Ehrenb.) S. Hughes

A cosmopolitan ubiquitous saprobe reported from peat at Hornsund by Zabawski (1976). The species produces mycotoxins responsible for stachybotryotoxicosis (Farr et al. 1989).

*Stagonospora culmicola* (Sacc.) E. Castell. & Germano

Lind (1928) reported this species as *Hendersonia crastophila* on several grass species from Bjørnbeinflya (Sørkapp Land), Adventfjorden and Sassenfjorden. Jørstad (1967) referred the material to *H. culmicola* Sacc., a species later transferred to *Stagonospora* (Castellani & Germano 1977).

*Stagonospora eriophorella* (Sacc.) Lind

Only reported from the rare species *Juncus arcticus* in the Dicksonfjorden area (Lind 1928).

*Trichocladium asperum* Harz

Reported from peat at Hornsund by Zabawski (1976).

*Trichoderma album* Preuss

Reported from peat at Hornsund by Zabawski (1976). The species was left out in the table of Zabawski (1982b) and may have been redetermined e.g. as *T. polysporum*.

*Trichoderma inflatum* Gams

Reported from peat at Hornsund by Zabawski (1976).

*Trichoderma koningi* Oudem.

Reported from peat at Hornsund by Zabawski (1976).

*Trichoderma polysporum* (Link ex. Pers.) Rifai

Reported from peat at Hornsund by Zabawski (1982b).

**BASIDIOMYCOTA: Uredinales and Ustilaginales**

*Anthracoidea altera* Nannf.

This species is a segregate from *A. misandreae*

Kukkonen, and was first reported by Kukkonen (1963) as *A. misandrae* Kukkonen from Teistfjellet. It was later transferred to *A. altera* by Nannfeldt (1979). It is uncertain whether other reports of *Cintractia caricis* from Svalbard includes this species.

*Anthracoidea elynae* (Syd.) Kukkonen

Reported as var. *nardinae* Kukkonen from Ekmanfjorden and Blomstrandhalvøya, Kongsfjorden by Kukkonen (1963). The host is *Carex nardina*.

*Anthracoidea lindebergiae* (Kukkonen) Kukkonen

Only reported as *Cintractia caricis* on *Kobresia simpliciuscula* from Mimerdalen by Lind (1928).

*Anthracoidea misandrae* Kukkonen

Reported on *Carex misandra* from Bohemanneset (Lind 1928) and Lomfjordbotn (Hagen 1950) as *Cintractia caricis*. The collections might belong to *Anthracoidea altera* and the material should be studied.

*Entyloma dactylidis* (Pass.) Cif.

First reported by Karsten (1872) from grass leaves at Adventfjorden. The host was determined as *Dupontia fisheri* by Lind (1928). Lind (1928) reported *E. dactylidis* to be common on *Dupontia* at Bjørnøya, Bellsund, Grønfjorden, Colesbukta and Lomfjorden, and also reported a collection on *Poa* from Bohemanneset.

*Melampsora epitea* Thüm.

This heteroecious rust species was reported by Lind (1928) from Bjørnøya, Bellsund, Isfjorden, where it is common, and from Krossfjorden. Its aecial stage (called "Caeoma" by Lind) is on *Saxifraga cespitosa* while the uredinia and telia are on *Salix polaris*. Hagen (1941, 1950, 1952) reported the same species on *Saxifraga cespitosa*, *S. oppositifolia* and *Salix polaris* from several localities at Isfjorden. *Melampsora epitea* is a complex rust species including several different host alternations. Klebahn (1907) demonstrated

this host alternation by inoculating aeciospores from *Saxifraga*, probably *cespitosa*, from Svalbard on *Salix herbacea*. This process produced uredinia and telia. This alternation has been regarded as a separate species *Melampsora arctica* Rostr. by several authors (Lind 1928; Ziller 1974; Farr et al. 1989). But other host alternations are morphologically indistinguishable (Hylander et al. 1953) and the species is treated in a collective sense here.

*Puccinia arenariae* (Schumacher) G.  
Winter

Wulff (1902) reported this rust on *Cerastium alpinum* (is probably *C. arcticum*) from Adventfjorden and Wijdefjorden. The species is a microform and is only known with telia. The species is widespread and occurs on *Arenaria* and other members of Caryophyllaceae (Farr et al. 1989).

*Puccinia bistortae* (F. Strauss) DC.

A rust on *Bistorta vivipara* that was reported to be common at Bellsund and Isfjorden by Lind (1928). It was also reported from Isfjorden by Hagen (1941) and was recently collected at Sabine Land by Elven (Herb. TROM, unpubl.). Only uredinia and telia have been found on Svalbard. The aecial stage occurs on hosts belonging to Apiaceae, a family which is absent from Svalbard.

*Puccinia cruciferarum* F. Rudolphi

Reported on *Cardamine bellidifolia* from Isfjorden (Lind 1928; Hagen 1941) and from Vesle-raudfjorden (Lind 1928). The species is widespread on *Cardamine* with telial stage only.

*Puccinia drabae* F. Rudolphi

Reported by Lind (1928) from Dicksonfjorden, Adventfjorden and Skansbukta on *Draba micropetala*, *D. "alpina × oblongata"*, and *D. arcica*, and later by Hagen (1941) on *D. corymbosa* from Moskushavn at Adventfjorden. Also collected at Lovénøyane, Kongsfjorden by Rønning (Herb. TROM, unpubl.). The species has only telia.

*Puccinia eutremae* Lindr.

Another species only known with telia and

reported from Sassendalen (Nannfeldt 1933), Bjørnbeinflya (Lind 1928), Bohemannesset (Lind 1928, 1934, Lid 1967), and Kapp Linné (Hagen 1942). The host is *Cochlearia groenlandica* for most collections and the species was previously referred to as *P. cochleariae* Lindr. except for the collection on *Eutrema edwardsii* from Sassendalen (Nannfeldt 1933).

*Puccinia gibberulosa* J. Schröt.

Reported as *P. blyttiana* Lagh. on *Ranunculus* from Bjønhamna at Tempelfjorden by Jørstad (1950). It is microcyclic (only known with telia). This rust was described by Blytt (1882) from Leka, northern Norway as *P. ranunculi*, a nomen provisorium, but the valid description is from the Pyrenees as *P. gibberulosa*. It is known with several localities from arctic Canada (Parmelee 1989), and from Himalaya and Argentina.

*Puccinia heucherae* (Schwein.) Dietel

Reported on six *Saxifraga* species from most parts of Svalbard (Karsten 1872; Lind 1928; Hagen 1941, 1950, 1952; Lid 1967) as *P. saxifragae* Schlechtd. which is synonymous with *P. heucherae* (Schwein.) Diet. var. *saxifragae* (Schlechtd.) Savile.

*Puccinia hieracii* (Röhl.) Mart.

Reported from Bjørnøya by Gjærum (1991). Collected by Engelskjøn and Dunfjeld on Bjørnøya in 1983 on *Taraxacum cymbifolium*. The species occurs as var. *hieracii*. This taxon has sometimes been recognised as a separate species, *P. taraxaci* Plowr. Both uredinia and telia were present in the collection.

*Puccinia oxyriae* Fuckel

Only reported from the Adventfjorden area (Lind 1928) and from easternmost Adventdalen by Hagen (1941) who reported both uredinia and telia.

*Puccinia pазschkei* Dietel

Only reported from Lyckholmdalen and Myggdalen as *P. jueliana* by Lind (1928). The species

which has only telia, is restricted to *Saxifraga* and the host on Svalbard was *S. aizoides*.

*Schizonella melanogramma* (DC.) J. Schröt.

Reported from Sorgfjorden by Wulff (1902) and from Adventfjorden by Lind (1928). The host was *Carex rupestris*.

*Tolyposporium junci* (J. Schröt.) Woronin

This smut has only been reported by Lind (1928) on *Juncus biglumis* from Adventfjorden.

*Ustilago bistortarum* (DC.) Körn.

Reported from numerous localities on *Bistorta vivipara* by Karsten (1872), Lind (1928, 1934), and Hagen (1941, 1950, 1952). The species is common both on the inflorescence and on the leaves. The former was previously considered to be a separate species, *U. inflorescentiae* (Trel.) Maire, but is now often treated as *U. bistortarum* var. *ustilaginea* (DC.) B. Lindeb. The variety on the leaves, formerly *U. candollei* Tul. & C. Tul., is *U. bistortarum* var. *bistortarum*.

*Ustilago hyperborea* A. Blytt

Only reported from *Luzula arcuata* ssp. *confusa* in the Adventdalen area by Lind (1928).

*Ustilago nivalis* Liro

Reported on *Sagina nivalis* from Adventfjorden (Lind 1928; Hagen 1941) and from Blåhuken at Van Mijenfjorden by Hagen (1941).

*Ustilago picacea* Lagerh. & Liro

Only reported once from the tiny annual species *Koenigia islandica* in the Adventfjorden area by Lind (1928).

*Ustilago striiformis* (Westend.) Niessl

Only reported on *Poa arctica* from Brentskardet in easternmost Adventdalen by Hagen (1941).

Outside Svalbard the species is widespread on grasses (Farr et al. 1989).

*Ustilago vinosa* Tul. & C. Tul.

A common smut on *Oxyria digyna* reported from numerous localities by Karsten (1872), Lind (1928) and Hagen (1941, 1952).

*Ustilago violacea* (Pers.:Pers.) Roussel

An almost cosmopolitan species attacking the anthers of members of the family Caryophyllaceae. It has been reported on *Silene acaulis* from many localities at Isfjorden and from Engelsbukta, Wijdefjorden and Lomfjorden (Wulff 1902; Lind 1928; Hagen 1941, 1950, 1952). It was reported on *Stellaria longipes* s.l. from Tempelfjorden by Lind (1928). The smut on *Stellaria* is now included in *U. violacea*, but has previously been regarded as a separate species, *U. stellariae* (Sow.) Liro, or as a variety, *U. violacea* var. *stellariae* (Sow.) Savile.

## Rejected species

*Arctosporidium lucidum* Thor

Reported from Adventfjorden and Grønfjorden as an endoparasite on a mite (Thor 1930). Systematic position unclear.

*Capronia polyspora* (Barr) E. Müll. et al.

The species was reported from Longyearbyen by Holm & Holm (1993a), but determined with uncertainty as it differs from *C. polyspora* in naked ascomata.

*Cheilymenia ciliata* (Bull.) Maas Geest.

Corresponds to *C. stercorea* (Pers.) Boud. and *Lachnea stercorea* (Fr.) Gill. as published by Karsten (1872) and Lind (1928), and is probably *C. pseudohumarioides* Dissing, J. Moravec & Sivertsen.

*Cheilymenia rubra* (Cooke ex W. Phillips) Boud.

Published by Dobbs (1942) and is probably *C. pseudohumarioides*.

*Cintractia caricis* (Pers.:Pers.) Magnus

This species was reported from Svalbard in a collective sense, and the material corresponds to several *Anthracoidea* species. *Anthracoidea caricis* (Pers.:Pers.) Bref., the synonym of *Cintractia caricis* s. str., has not been confirmed from Svalbard.

*Clathrospora elynae* Rabenh.

Reported by Karsten (1872) from Ekmanfjorden and Kongsfjorden on *Carex nardina*, and Lind (1928) added more localities and four additional hosts (graminoids). The reports refer to *C. heterospora* (De Not.) Wehm. according to Holm & Holm (1994).

*Clathrospora punctiformis* (Niessl) Berl.

Only known on *Carex misandra* from Bohemanneset (Lind 1928), but the species is probably *C. deflectens* (Holm & Holm 1994).

*Coleroa circinans* (Moug.:Fr.) G. Winter

Reported on *Potentilla pulchella* from Bellsund, Adventdalen and Billefjorden by Lind (1928). This report is probably erroneous as *C. circinans* grows on *Geranium* (Ellis & Ellis 1985; Cannon et al. 1985; Farr et al. 1989; Eriksson 1992), and the report instead refers to *Venturia potentillae* (Holm & Holm 1994).

*Diplella coniothyrium* (Fuckel) Barr

Reported from Sassendalen on leaves of *Salix polaris* as *Leptosphaeria coniothyrium* (Lind 1928). According to Holm & Holm (1994) this is a most improbable record as the species is generally found on canes of *Rubus*. No material was found in C.

*Discostroma corticola* (Fuckel) Brockmann

Its anamorph stage *Seimatosporium lichenicola*

(Corda) Shoemaker & E. Müll. was reported (as *Coryneum foliicola* Fuckel) by Lind (1928). He treated it as synonymous with *Seimatosporium cassiopes* (Rostr.) B. Sutton, a view generally not accepted (e.g. Farr et al. 1989), and only the latter species is listed in this catalogue.

*Durella lecideola* (Fr.) Rehm

Published from Bjørnøya (Lynge 1926; Hagen 1950), but probably corresponds to *D. macrospora* Fuckel (Lind 1928).

*Glutinisporidium compositum* Thor

An endoparasite of unclear systematical position described from a mite collected in the Adventdalen area by Thor (1930).

*Helvella acetabulum* (L. ex. Fr.) Quél.

Published by Dissing (1966) and Ohenoja (1971), but has been revised by Harmaja (1977) and represents three different species: *H. arctoalpina* Harmaja, *H. dryadophila* Harmaja and *H. aestivalis* (R. Heim & L. Remy) Dissing & Raitv.

*Hendersonia crastophila* Sacc.

Referred to as *Stagonospora culmicola* by Jørstad (1967).

*Hermanniasporidium juvenile* Thor

Described as an endoparasite on a mite at Bjørnøya by Thor (1930). The species could be a younger stage of *H. magnum*, and its systematic position is unclear.

*Hermanniasporidium magnum* Thor

A resting spore of a taxon of unknown systematic position reported as an endoparasite of a mite at Bjørnøya (Thor 1930).

*Humaria semi-immersa* (Karst.) Sacc.

Published from Ny-Ålesund by Dobbs (1942) but most probably refers to *Neottiella aphanodictyon* (Kobayasi) Dissing, Korf & Sivertsen.

*Leptosphaeria algida* Rostr.

Lind (1928) reported *L. algida* on *Phippsia* from some localities, but later Lind (1934) indicated that it may be included in *Phaeosphaeria microscopica*. Holm & Holm (1994), however, stated that *L. algida* is a poorly known member of the *Phaeosphaeria eustoma* complex, and no material was found in C to substantiate the records.

*Lewia infectoria* (Fuckel) E. Simmons

Reported to be very common (as *P. infectoria* and *P. media*) by Lind (1928), but Holm & Holm (1993b) considered the material to correspond to *P. penicillus* with reduced bristles.

*Lophiostoma myriocarpum* Fuckel

Reported as *L. cf. myriocarpum* on *Dryas* from the Adventdalen area based on immature material (Holm & Holm 1993a).

*Macrospora scirpicola* (DC.: Fr.) Fuckel

Reported from four host species from a few places at Isfjorden by Lind (1928) as *Pleospora scirpicola*. Two collections in C were reexamined by Holm & Holm (1994) who only found *P. arctica*.

*Massarina arundinacea* (Sow.:Fr.) Leuchtm.

Only reported from Gipsdalen on *Poa abbreviata* as *Leptosphaeria arundinacea* (Lind 1928). The species is widespread in Europe (Lind 1934), but from Sweden only recorded from dead culms of *Phragmites australis* (Eriksson 1992). Holm & Holm (1994) could not find any material in C, and the report was considered "highly improbable".

*Massariosphaeria grandispora* (Sacc.) Leuchtm.

Reported on *Juncus biglumis* from Blomstrandhalvøya at Kongsfjorden by Holm & Holm (1994), but their determination was uncertain.

*Molgosporidium ellipticum* Thor

A taxon of unknown systematic position reported



from the Adventfjorden area as an endoparasite of a mite (Thor 1930).

*Murciasporidium divisum* Thor

Also an endophytic resting spore of unknown systematic position described from a mite collected at Adventfjorden by Thor (1930).

*Mortierella pusilla* Oudem.

Reported by Zabawski (1976) from Hornsund, but the species was considered to be of "doubtful identity" by Gams (1977).

*Mortierella subtilissima*

Reported from Hornsund by Zabawski (1976) but was not among the recognised species in the *Mortierella* monograph by Gams (1977).

*Mycosphaerella cerastii* (Rabenh.) Magn.

A doubtful species indicated by Holm & Holm (1994) as a synonym of *Sphaerella cerastii* Fuckel previously reported from Svalbard by Lind (1928), but this species was redetermined by Holm & Holm (1994). See also below *M. isariophora*.

*Mycosphaerella eriophila* (Niessl) Lindau

Reported by Lind (1928) on *Erigeron humilis* from Adventdalen and Alkhornet. No material was found in C by Holm & Holm (1994), who considered the report doubtful. The species was included in *M. tassiana* by von Arx (1949), a view not followed by Farr et al. (1989).

*Mycosphaerella isariophora* (Desm.)  
Johanson

First reported as *Sphaerella cerastii* from *Cerastium* leaves from Norskøyane (Karsten 1872). Lind (1928) concluded that this material was identical with the imperfect fungus *Septoria stellariae*, and added collections from *Minuartia* and *Stellaria* from Bjørnøya, Bellsund and Adventdalen. Cannon et al. (1985) treated this taxon as an anamorph of *M. isariophora*, but Farr et al. (1989)

did not list any teleomorph. Holm & Holm (1994) listed it below "*Mycosphaerella cerastii* (Rabenh.) Magn.", but the Norskøyane material was redetermined to *Ramularia alborosella*.

*Mycosphaerella polygonorum* (Crié) Lind

The reports by Lind (1928) refer to *Venturia polygoni-vivipari* (Holm & Holm 1994).

*Mycosphaerella stellarinearum* (Rabenh.)  
Johanson

Reported as *Sphaerella stellarinearum* from Ekmanfjorden and Gråhuken on *Stellaria longipes* s.l. and *S. humifusa* by Karsten (1872), but von Arx (1949) included it in *M. tassiana*, an alternative which was supported by Holm & Holm (1994).

*Mycosphaerella wichuriana* (J. Schröt.)  
Johanson

Reported as common on many graminoids by Lind (1928), but treated as *M. recutita* (Fr.:Fr.) Johanson by Holm & Holm (1994). These species were not treated as synonyms by Farr et al. (1989).

*Octospora humosa* (Fr.:Fr.) Dennis

Published by Huhtinen (1987), but has been shown to be *Neottiella aphanodictyon*.

*Octospora leucoloma* Hedw. ex Gray

Reported from Ny-Ålesund by Kobayasi et al. (1968), but suggested by Huhtinen (1987) to correspond to *O. humosa* (Fr.:Fr.) Dennis. We would suggest that this report also corresponds to *Neottiella aphanodictyon*, see *Octospora humosa*.

*Odontotrema cassiopes* (Rostr.) L. Holm

Probably corresponds to *Scleroplella hyperborea* (Fuckel) L. Holm (*Wettsteinina andromedae* (Auersw.) Barr) according to Holm (1975).

*Pezizula cesati* (Carest.) P. Karst.

The genus corresponds to *Thelebolus* (Eriksson

& Hawksworth 1988), but the present name and the Bjørnøya collection has not been revised as far as we know.

*Phaeosphaeria graminis* (Fuckel) L. Holm

Reported on *Poa* from Olsokflå at Sørkapp Land by Lind (1928), as *Leptosphaeria graminum*. This report is doubtful as *P. graminis* is only reported from *Phragmites* by Shoemaker & Babcock (1989) and Eriksson (1992). Holm & Holm (1994) could not find any material of this poorly known taxon in C.

*Pleospora cerastii* Oudem.

Reported to be polyphagous and common on Svalbard by Lind (1928), as *Pyrenophora cerastii*. Holm & Holm (1994) stated that the Lind (1928) reports of *Pleospora cerastii*, a nomen nudum according to Wehmeyer (1961), probably refer to *P. helvetica*.

*Pleospora discors* (Durieu & Mont.) Ces. & De Not.

Recorded by Lind (1928) from a long list of monocotyledonous hosts all over Svalbard. The species was referred to *P. arctica* by Eriksson (1967b).

*Pleospora junci* Pass. & Beltr.

Recorded by Lind (1928) from *Juncus arcticus*, *J. biglumis* and *Luzula arctica* from Bellsund and from a few places at Isfjorden, and was treated as an arctic-alpine species by Lind (1934). Wehmeyer (1961) considered *P. junci* Pass. & Beltr. to be a nom. confus. Lind (1928) listed *P. spinosella* Rehm as a synonym. This species is now *Montagnula spinosella* (Rehm) Crivelli, but Crivelli (1983) did not cite *P. spinosella* as a synonym. Holm & Holm (1993b) revised two samples identified as *P. junci* by Lind as *P. helvetica* and *P. islandica*, and presented later collections of *Montagnula spinosella*.

*Pleospora magnusiana* Berl.

First published as restricted to Svalbard by Lind (1928) and reported from most parts of Spits-

bergen where it had been collected on 16 monocotyledonous hosts. It was originally described from Gotland, Sweden, but this was a mistake, as shown by Lind (1928), as its host *Puccinellia vahliana* has never been found in mainland Europe. Later Lind (1934) concluded that this species has a circumpolar distribution, and this conclusion was shared by Farr et al. (1989). Wehmeyer (1961), however, regarded the species as a synonym of *Graphyllum pentamerum* (P. Karst.) Barr or possibly *C. punctiformis* (Niessl) Berl. Eriksson (1967b) considered *P. magnusiana* "sensu Lind" to be apparently synonymous with *Pyrenophora subalpina* (a view followed here) whereas Eriksson (1992) indicated (with a question mark) that *Pleospora magnusiana* and *P. punctiformis* in Sweden might be synonymous with *Clathrospora deflectens* (P. Karst.) O.E. Erikss.

*Pleospora paucitricha* Fuckel

Common on dead leaves of *Salix polaris* and *S. reticulata* all over Svalbard (Lind 1928). The species was not included by Holm & Holm (1993b) who considered the Lind (1928) records to be doubtful. Holm & Holm (1994) examined two C collections in vain, and the species was considered to be a doubtful taxon by Wehmeyer (1961).

*Pleospora phaeocomoides* (Berk. & Broome) G. Winter

Reported by Lind (1928) from Isfjorden on *Silene furcata* and *S. uralensis* as *Pleospora dianthii* De Not., a species included in *P. phaeocomoides* (Wehmeyer 1961, Holm & Holm 1994). The identity of this species is somewhat uncertain (Cannon et al. 1985). The species was not included by Holm & Holm (1993b) who considered the Lind (1928) report doubtful. Two Lind (1928) collections in C were determined to *Cilioplea coronata* and *Pleospora comata* by Holm & Holm (1994). Farr et al. (1989) included *P. phaeocomoides* in *P. penicillius*.

*Pleospora wichuriana* J. Schröt.

Reported on *Carex saxatilis* from Adventfjorden by Lind (1928) as *Pyrenophora wichuriana*. Holm & Holm (1994) did not find any material in C,

and suggested that the report may refer to *P. penicillius*.

*Pleuroceras insulare* (Johanson) M. Monod

One Lind (1928) collection redetermined as *P. helveticum* (Rehm) Barr by Holm & Holm (1994), and all Svalbard reports of *P. insulare* should be considered as doubtful.

*Pyrenophora filicina* Lind

Reported on *Cystopteris fragilis* from Bellsund by Lind (1928), but Wehmeyer (1961) suggested that the report corresponds to *Pleospora helvetica*, and Holm & Holm (1994) could not find any material in C.

*Pyrenophora setigera* (Niessl) Sacc.

Reported on several herbaceous host species from central parts of Spitsbergen by Lind (1928). The species has an arctic-alpine distribution (Lind 1934). It was not found by Holm & Holm (1993b) who considered the Svalbard reports by Lind (1928) to be doubtful. A sample in UPS determined to *P. setigera* by Lind was redetermined to *Pleospora penicillius* by Holm & Holm (1994).

*Reticulosporidium globosum* Thor

A resting spore of unknown systematic position described from Bjørnøya by Thor (1930).

*Rhinotrichum curtisii* Corda

Reported from peat at Hornsund by Zabawski (1976), but later by Zabawski (1982b) changed to *Rhinotrichum* sp.

*Sclerotinia tuberosa* (Hedw. ex Fr.) Fuckel

An erroneous report by Skirgiello (1961, 1968) evidently referring to *Ciborinia ciborium* (Vahl: Fr.) T. Schumach. & Kohn.

*Scutellinia scutellata* (L.) Lambotte

Reported in a collective sense by Lid (1967) and should be referred to as *Scutellinia* sp. until the

material is restudied. It was not reported from Svalbard by Schumacher (1990).

*Sphaerotheca fuliginea* (Schltld.:Fr.)

Pollacci

Reported by Lind (1928) and Hagen (1941), but considered to belong to *S. erigeronis-canadensis* by Holm & Holm (1994), see also below the latter species.

*Venturia chlorospora* (Ces.) P. Karst.

Common on dead leaves of *Salix* spp. all over Svalbard according to Lind (1928), but the reports apparently refer to *V. subcutanea* (Holm & Holm 1994).

*Venturia ditricha* (Fr.:Fr.) P. Karst.

A rare southern species only reported from dead leaves of *Betula nana* collected at Colesbukta (Lind 1928). Holm & Holm (1994) did not find any material in C, and considered the report to refer to *V. subcutanea*.

*Venturia petasitidis* (Fuckel) Sacc.

Reported on *Petasites frigidus* from Longyearbyen and Kapp Thordsen (Lind 1928), but *V. petasitidis* belongs to *Gibbera* or *Epipolaeum* (Müller & von Arx 1962). Another undetermined *Venturia* species was found on *Petasites* on Svalbard by Holm & Holm (1994).

*Zercosporidium incrassatum* Thor

Described as an endoparasite on a mite from Bjørnøya by Thor (1930). The species is of unknown systematic position.

## List of synonyms

*Allophyllaria pusiola* (P. Karst.) Nannf. = *Crocicreas gramineum* (Fr.) Fr.

*Ascobolus stercorarius* (Bull.) J. Schröt. = *A. furfuraceus* Pers.:Fr.

*Belonidium juncisedum* (P. Karst.) Rehm =

- Diplonaevia circinata* (Lib.) Hein & *D. hyperborea* Nannf.
- Belonioscypha vexata* (De Not) Rehm = *Crocicreas culmicola* (Desm.) S.E. Carp.
- Belonopeziza advena* (P. Karst.) Nannf. = *Hysteronaevia advena* (P. Karst.) Nannf.
- Belonopsis graminea* (P. Karst.) Keissl. = *Hysteronaevia kobayasii* Nannf.
- Bostrichonema alpestre* Ces. = *B. polygoni* (Unger) J. Schröt.
- Chaetomium crispatoideum* Sergeeva = *C. crispatum* Fuckel
- Cheilymenia stercorea* (Pers.) Boud. = *C. ciliata* (Bull.) Maas Gees.
- Cladosporium gramineum* Corda = *C. herbarum* Link ex. Fr. (anamorph)
- Clathrospora alpina* Auersw. = *C. elynae* Rabenh.
- Clathrosporapentamera* (P. Karst.) Berl. = *Graphyllum pentamerum* (P. Karst.) Barr
- Coniochaeta discophora* (Auersw. ex Niessl) Cain = *C. ligniaria* (Grev.) Cooke
- Coniothyrium olivaceum* Bonord. in Fuckel = *Microsphaeropsis olivacea* (Bonord.) Höhn.
- Coryneum cassiopes* Rostr. = *Seimatosporium cassiopes* (Rostr.) B. Sutton
- C. folicola* Fuckel = *Seimatosporium lichenicola* (Corda) Shoemaker & E. Müll.
- Crucibulum vulgare* Tul. = *C. leve* (DC.) Kambly
- Crumenula pusiola* P. Karst. = *Crocicreas gramineum* (Fr.) Fr.
- Cyathus crucibulum* Bull. = *Crucibulum leve* (DC.) Kambly
- Dasyscyphus palearum* (Desm.) Massee = *Lachnum palearum* (Desm.) Korf
- Dendryphium fumosum* Fr. = *Dendryphion fumosum* Fr.
- Didymella distincta* (P. Karst.) O.E. Erikss. = *Wettsteinina distincta* (P. Karst.) L. & K. Holm
- Didymella hyperborea* (P. Karst.) Sacc. = *Griphosphaeria hyperborea* (P. Karst.) L. Holm
- Didymosphaeria cassiopes* Rostr. = *Scleroplella hyperborea* (Fuckel) L. Holm
- D. dryadis* (Fuckel) Berl. & Voglino = *Wettsteinina dryadis* (Rostr.) Petr.
- Diplella coniothyrium* (Fuckel) Barr = *Kalmusia coniothyrium* (Fuckel) L. Hunndorf
- Diplodia perpusilla* Desm. = *Microdiplodia perpusilla* (Desm.) Allesch.
- Diplodina arctica* Lind = *Ascochyta arctica* (Lind) Punith.
- Dothidella betulina* (Fr.) Sacc. = *Atopospora betulina* (Fr.) Petr.
- Entyloma ambiens* P. Karst. = *E. dactylidis* (Pass.) Cif.
- Erysiphe graminis* DC. = *Blumeria graminis* (DC.) Speer
- Fabraea cerastiorum* (Fr.) Rehm = *Leptotrochila cerastiorum* (Wallr.) Schüepp
- Gnomonia hyparctica* Lind = *Gnomoniella hyparctica* (Lind) Barr
- Goniosporium puccinoides* (Fr.) Link = *Arthrinium puccinoides* (DC.) Kunze.
- Griphosphaeria hyperborea* (Karst.) L. Holm = *Discostroma hyperboreum* (P. Karst.) O.E. Erikss.
- Helminthosporium flexuosum* Corda = *Cladosporium herbarum* (Pers.:Fr.) Link
- Helotiella erythrostigma* (Rehm) Sacc. = *Laetinaevia erythrostigmoides* (Fr.) Nannf.
- Helotium herbarum* Fr. = *Hymenoscyphus herbarum* (Pers.) Dennis
- Helvella arctica* Nannf. = *H. corium* (Weberb.) Mass.
- Hendersonia culmicola* Sacc. = *Stagonospora culmicola* (Sacc.) Cast. & Germano
- Hypospila rhytismoides* (Bab.) Niessl = *Isothea rhytismoides* (Bab. ex Berk.) Fr.
- Hysteropezizella lyngei* (Lind) Nannf. = *Hysteronaevia lyngei* (Lind) Nannf.
- Hysteropezizella pusilla* (Lib.) Nannf. = *Hysteronaevia luzulicola* Nannf.
- Isariopsis alborosella* (Desm.) Sacc. = *Ramularia alborosella* (Desm.) Gjørum
- Lachnea scutellata* (L.) Gill. = *Scutellinia scutellata* (L.) Lambotte
- Lachnum patens* (Fr.) P. Karst. = *Lachnum palearum* (Desm.) Korf
- L. stercorea* (Fr.) Gill. = *Cheilymenia ciliata* (Bull.) Maas Gest.
- Laetinaevia erythrostigmoides* (Fr.) Nannf. = *L. erythrostigma* (Rehm) Nannf. ex B. Hein
- Leptosphaeria andromedae* (Auersw.) Sacc. = *Scleroplella hyperborea* (Fuckel) L. Holm
- L. arundinacea* (Sow.) Sacc. = *Massarina arundinacea* (Sow.:Fr.) Leuchtm.
- L. caricinella* P. Karst. = *Phaeosphaeria caricinella* (P. Karst.) O.E. Erikss.
- L. coniothyrium* (Fuckel) Sacc. = *Diplella coniothyrium* (Fuckel) Barr.
- L. consobrina* P. Karst. = *Phaeosphaeria consobrina* (P. Karst.) O.E. Erikss.
- L. culmicola* Auersw. = *Phaeosphaeria nigrans* (Roberge ex Desm.) L. Holm
- L. culmifraga* (Fr.) Ces. = *Phaeosphaeria herpotrichoides* (De Not.) L. Holm

- L. equiseti* P. Karst. = *Phaeosphaeria equiseti* (P. Karst.) L. & K. Holm  
*L. graminum* Sacc. = *Phaeosphaeria graminis* (Fuckel) L. Holm  
*L. insignis* P. Karst. = *Phaeosphaeria insignis* (P. Karst.) L. Holm  
*L. junciseda* P. Karst. = *Phaeosphaeria caricinella* (P. Karst.) O.E. Erikss.  
*L. microscopica* P. Karst. = *Phaeosphaeria microscopica* (P. Karst.) O.E. Erikss.  
*L. silenes-acaulis* De Not. = *Phaeosphaeria silenes-acaulis* (De Not.) L. Holm  
*L. vagans* P. Karst. = *Phaeosphaeria caricinella* (P. Karst.) O.E. Erikss.  
*L. weberi* Oudem. = *Phaeosphaeria weberi* (Oudem.) L. & K. Holm  
*Linospora insularis* Johanson = *Pleuroceras insulare* (Johanson) M. Monod  
*Lizonia distincta* P. Karst. = *Didymella distincta* (P. Karst.) O.E. Erikss.  
*Lophodermium arundinaceum* (Fr.) Chev. = *L. culmigenum* (Fr.) De Not.  
*Massaria eucarpa* (P. Karst.) Lind = *Wettsteinina eucarpa* (P. Karst.) Müller & Arx  
*M. macrotheca* (Rostr.) Lind = *Wettsteinina macrotheca* (Rostr.) E. Müll.  
*Melampsora arctica* Rostr. = *M. epitea* Thüm.  
*Melasmia empetri* P. Magnus = *Hysterodiscula empetri* (White) Petr.  
*Metasphaeria cassiopes* Rostr. = *Odontotrema cassiopes* (Rostr.) L. Holm  
*M. sepalorum* Vleugel = *Bricookea sepalorum* (Vleugel) Barr  
*Microthyrium arcticum* Oudem. = *Ronnigeria arctica* (Oudem.) Petr.  
*Mollisia advena* P. Karst. = *Hysteronaevia advena* (P. Karst.) Nannf.  
*M. atrata* (Fr.) P. Karst. = *Pyrenopeziza atrata* (Pers.) Fuckel  
*M. dehnii* (Rabenh.) P. Karst. = *Pyrenopeziza atrata* (Pers.) Fuckel  
*M. graminea* P. Karst. = *Hysteronaevia kobayashii* Nannf.  
*Mycosphaerella inconspicua* (J. Schröt.) Vestergr. = *M. cassiopes* Barr  
*Myriosclerotinia vahliana* (Rostr.) N.F. Buchw. = *Ciborinia ciborium* (Vahl: Fr.) T. Schumach. & Kohn  
*Naevia diminuens* (P. Karst.) Rehm = *Hysteropezizella diminuens* (P. Karst.) Nannf.  
*N. fuscella* (P. Karst.) Lind = *Hysteropezizella fuscella* (P. Karst.) Nannf.  
*N. pusilla* (Lib.) Rehm = *Hysteronaevia luzulicola* Nannf.  
*N. stellariae* (Rostr.) Lind = *Laetinaevia stellariae* (Rostr.) Lind  
*Niptera advena* (P. Karst.) Lind = *Hysteronaevia advena* (P. Karst.) Nannf.  
*N. phaea* (Rehm) Sacc. = *Nimbomollisia erio-phori* (Kirchn.) Nannf.  
*Orbilia primulae* (Rehm) Sacc. = *Naeviopsis primulae* (Rehm) B. Hein  
*Patellaria macrospora* (Fuckel) W. Phillips = *Durella macrospora* Fuckel  
*Penicillium commune* Thom = *P. puberulum* Bainier  
*P. frequentans* Westling = *P. glabrum* (Wehmer) Westling  
*P. lanosum* Westling = *P. puberulum* Bainier  
*P. notatum* Westling = *P. chrysogenum* Thom  
*P. palitans* Westling = *P. viridicatum* Westling  
*P. terrestre* C.N. Jensen = *P. crustosum* Thom  
*Peziza stercorea* Pers. = *Cheilymenia ciliata* (Bull.) Maas Gees.  
*Phaeosphaeria equiseti* (P. Karst.) L. & K. Holm var. *lindii* L. & K. Holm = *P. lindii* (L. & K. Holm) Leuchtm.  
*P. eustoma* (Fuckel) L. Holm = *P. microscopica* (P. Karst.) O.E. Erikss.  
*Phialea rhodoleuca* (Fr.) Sacc. = *Hymenoscyphus rhodoleucus* (Fr.) W. Phillips  
*Phyllochora amenti* Rostr. = *Glomerella amenti* (Rostr.) Arx & E. Müll.  
*Pleospora arctagrostidis* Oudem. = *P. arctica* P. Karst.  
*P. cerastii* Oudem. = *P. glacialis* Niessl ex Rehm  
*P. deflectens* P. Karst. = *Clathrospora deflectens* (P. Karst.) O.E. Erikss.  
*P. dianthii* De Not. = *P. phaeocomoides* (Berk. & Broome) G. Winter  
*P. infectoria* Fuckel = *Lewia infectoria* (Fuckel) E. Simmons  
*P. karstenii* Sacc. = *P. arctica* P. Karst.  
*P. lutea* Wehm. = *P. arctica* P. Karst.  
*P. macrospora* J. Schröt. non Fuckel = *Pyrenophora schroeteri* Barr  
*P. media* Niessl = *P. penicillus* (Schm.) Fuckel  
*P. pentamera* P. Karst. = *Graphyllum pentamerum* (P. Karst.) Barr  
*P. scirpicola* (DC.: Fr.) P. Karst. = *Macrospora scirpicola* (DC.: Fr.) Fuckel  
*P. vagans* Niessl = *Phaeosphaeria vagans* (Niessl) O.E. Erikss.  
*Pseudophacidium degenerans* P. Karst. = *Hypo-derma degenerans* (P. Karst.) Nannf.

- Pseudopeziza bistortae* (Lib.) Fuckel = *Pseudorhytisma bistortae* (Lib.) Juel
- Puccinia blyttiana* Lagerh. = *P. gibberulosa* J. Schröt.
- P. cardamines-bellidifoliae* Diet. = *P. cruciferarum* Rud.
- P. cochleariae* Lindr. = *P. eutremae* Lindr.
- P. jueliana* Diet. = *P. pazschkei* Diet.
- P. polygoni-vivipari* P. Karst. = *P. bistortae* (F. Strauss) DC.
- P. ranunculi* A. Blytt = *P. gibberulosa* J. Schröt.
- P. saxifragae* Schlichtd. = *P. heucherae* (Schwein.) Diet.
- Pustularia cupularis* (L.) Fuckel = *Tarsetta cupularis* (L.) Lambotte
- Pyrenopeziza potentillae* (Rostr.) Nannf. = *P. atrata* (Pers.) Fuckel
- P. drabae* Nannf. = *Pseudopeziza svalbardensis* (Lind) Nannf.
- Pyrenophora androsaces* (Fuckel) Sacc. = *Pleospora androsaces* Fuckel
- P. chrysospora* (Niessl) Sacc. = *Pleospora helvetica* Niessl
- P. helvetica* (Niessl) Sacc. = *Pleospora helvetica* Niessl
- P. hispida* (Niessl) Sacc. = *Pleospora helvetica* Niessl
- P. paucitricha* (Fuckel) Berl. & Voglino = *Pleospora paucitricha* Fuckel
- P. wichuriana* (J. Schröt.) Sacc. = *Pleospora wichuriana* J. Schröt.
- Rhabdospora drabae* (Fuckel) Berl. & Voglini = *Selenophoma drabae* (Fuckel) Petr.
- Rhytisma empetri* Fr. = *Duplicaria empetri* (Wrangel ex Fr.) Fuckel
- Septoria melandrii* Pass. = *S. lychnidis* Desm.
- Sepultaria arenosa* (Fuckel) Rehm = *Geopora arenosa* (Fuckel) Ahmad
- Sphaerella andromedae* Auersw. = *Scleroplella hyperborea* (Fuckel) L. Holm
- S. cerastii* Fuckel = *Mycosphaerella isariophora* (Desm.) Johanson
- S. confinis* P. Karst. = *Mycosphaerella confinis* (P. Karst.) Lind
- S. distincta* P. Karst. = *Didymella distincta* (P. Karst.) O.E. Erikss.
- S. eucarpa* P. Karst. = *Wettsteinina eucarpa* (P. Karst.) Müller & Arx
- S. genuflexa* Auersw. ssp. *polaris* P. Karst. = *Mycosphaerella polaris* (P. Karst.) Lindau
- S. pachyasca* Rostr. = *Mycosphaerella pachyasca* (Rostr.) Vestergr.
- S. pedicularidis* P. Karst. = *Mycosphaerella pedicularidis* (P. Karst.) Lind
- S. perexigua* P. Karst. = *Mycosphaerella perexigua* (P. Karst.) Johanson
- S. ranunculi* (Fr.) P. Karst. = *Mycosphaerella ranunculi* (P. Karst.) Lind
- S. stellarinearum* (Rabenh.) P. Karst. = *Mycosphaerella allicina* (Fr.) Vestergr.
- S. taraxaci* P. Karst. = *Mycosphaerella taraxaci* (P. Karst.) Lind
- S. tassiana* De Not = *Mycosphaeriella tassiana* (De Not) Johanson
- Sphaeria hyperborea* P. Karst. = *Griphosphaeria hyperborea* (P. Karst.) L. Holm
- Sphaeropezia empetri* (Fr.) Rehm = *Arwidssonina empetri* (Rehm) O.E. Erikss.
- Sporormia americana* Griff. = *Sporormiella americana* (Griff.) S. Ahmed & Cain
- S. heptamera* Auersw. = *Sporormiella heptamera* (Auersw.) S. Ahmed & Cain
- Stegia subvelata* Rehm = *Hysteropezizella diminuens* (P. Karst.) Nannf.
- Syncephalis tenuis* Thaxt. = *Spinalia tenuis* (Thaxt.) Zycha
- Trochila diminuens* P. Karst. = *Hysteropezizella diminuens* (P. Karst.) Nannf.
- Ustilago candollei* Tul. & C. Tul. = *U. bistortarum* (DC.) B. Lindeb. var. *bistortarum*
- U. inflorescentiae* (Trel.) Maire = *U. bistortarum* (DC.) B. Lindeb. var. *ustilaginea* B. Lindeb.

## Anamorphs

Deuteromycota anamorphs listed under their corresponding Ascomycota teleomorphs:

*Bostrichonema polygonia* (Unger) J. Schröt. see *Diplocarpon polygoni* E. Müll.

*Botrytis cinerea* Pers. see *Botryotinia fuckeliana* (de Bary) Whetzel

*Cladosporium herbarum* Link ex Fr. see *Mycosphaerella tassiana* (De Not.) Johanson

*Leptostroma henningsii* Allesch. see *Lophodermium caricinum* (Rob. & Desm.) Duby

*Hysterodiscula empetri* (White) Petr. see *Duplicaria empetri* (Wrangel ex Fr.) Fuckel

*Phoma sepalorum* Lind see *Bricookea sepalorum* (Vleugel) Barr

*Seimatosporium lichenicola* (Corda) Shoemaker & E. Müll. see *Discostroma corticola* (Fuckel) Brockmann (Ascomycota, Pyrenomycetes) below "Rejected species".

*Septoria salicicola* (Fr.) Sacc. see *Mycosphaerella salicicola* (Fr.) Johanson ex Oudem.

*Septoria stellariae* Rob. & Desm. see *Mycosphaerella isariophora* (Desm.) Johanson

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A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae and cyanobacteria

## Part 5. Fungi III. Lichenicolous fungi

VAGN ALSTRUP and ARVE ELVEBAKK



Alstrup, V. & Elvebakk, A. 1996: Part 5. Fungi III. Lichenicolous fungi. Pp. 261–270 in Elvebakk, A. & Prestrud, P. (eds.): A catalogue of Svalbard plants, fungi, algae and cyanobacteria. *Norsk Polarinstitutet Skrifter* 198.

The published records on lichenicolous fungi of Svalbard are reviewed including information on hosts and distribution. In addition five species (*Arthonia rufidula*, *Carbonea aggregatula*, *Illosporium carneum*, *Muellerella lichenicola*, and *Nigropuncta rugulosa*) are reported as new to Svalbard, and at present the total species number is 60.

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### Introduction

The species formerly known as lichen parasites are now most commonly called lichenicolous fungi and include parasitic, commensalistic and saprophytic species. The group is systematically heterogeneous. Like the vast majority of lichens most of the species belong to the Ascomycetes, especially Dothideales and Lecanorales, but many species have not been found fertile and are classified as Deuteromycota (Coelomycetes or Hyphomycetes). The Svalbard flora also includes two basidiomycetes, a species of *Tremella* reported by Christiansen (1993) and *Fayodia arctica* which may be lichenicolous (Gulden & Mohn Jenssen 1988). However, the lichenicolous nature

of *Fayodia arctica* is unconfirmed, and this species is treated among the basidiomycetes in Part 3 of this Catalogue.

From a systematic point of view the most natural treatment in checklists is an integration of lichenised, non-lichenised and lichenicolous fungi as in Cannon et al. (1985). This treatment avoids the problem associated with species that are difficult to place in one of these categories. Traditionally, lichenised, lichenicolous and related fungi have been treated by lichenologists and the remaining fungi by mycologists. In this Catalogue we have chosen to present the lichenised fungi, the unlichenised lichenicolous fungi, and the remaining fungi in four separate parts. Lichenicolous lichens includes species which are parasitic as juveniles but lichenised at later stages (such as *Buellia nivalis*, *B. pulverulenta* and *Epilichen scabrosus*) and are included among the lichens.

The pioneer in the study of lichenicolous fungi on Svalbard was T.M. Fries who first (Fries 1860) reported four species collected by A. E. Nordenskiöld, and later (Fries 1867) reported another 13 species. Five species were listed from Bjørnøya by Lynge (1926) based on determinations by Keissler. Hafellner (1982) reported seven species from Bockfjorden. The flora of lichenicolous fungi of Svalbard has been reviewed by Hagen (1950) and Kobayashi et al. (1968).

The knowledge of the lichenicolous fungi of Svalbard, as well as of Greenland and other Nordic areas, has increased strongly during the last decade. Aptroot & Alstrup (1991) reported 10 species from a small area at Edgeøya, six of these were new to Svalbard. A recent treatment of the lichenicolous fungi of Greenland (Alstrup & Hawksworth 1990) included 124 species, 24 of them previously undescribed. Triebel (1989) added four species new to Greenland and five new to Svalbard. Four undescribed species and 14 species new to Svalbard have also been reported from Sørkapp Land (Alstrup & Olech 1993). Apart from these papers there are only occasional reports of lichenicolous fungi from Svalbard, cited in the list of species. This list attempts to give a complete survey of the literature of lichenicolous fungi from Svalbard, and some unpublished information is included.

The flora of lichenicolous fungi on Svalbard now includes 60 determined species, as compared to 50 species known from the Faroe Islands (Alstrup et al. 1994), and 314 species from Sweden and mainland Norway (Santesson 1993). *Arthonia rufidula*, *Carbonea aggregantula*, *Illosporium carneum*, *Muellerella lichenicola* and *Nigropuncta rugulosa* are published here as new to Svalbard. The total number of collections of lichenicolous fungi from Svalbard is still very low, only a few hundred, and as the studies from Greenland, the Faroe Islands and Svalbard referred to above resulted in the description and new reports of many species, we can conclude that Svalbard is certainly much richer in lichenicolous fungi than indicated by the present list of species. Some other areas are even less studied, only 78 species of lichenicolous fungi have been reported from the whole of North America (Egan 1987, 1989, 1990).

Compared to most other groups of plants and fungi, lichenicolous fungi are stenoic, but some are restricted to a specific genus of host lichens, while others to different genera. However, as the vast majority of species are known only from very few collections on Svalbard, "ecosystem component values" giving information on rarity, abundance and phytogeography etc. which are used for the lichens and other contributions in this Catalogue are not used here. Instead, a list of species is followed by comments covering all the species, in addition to some rejected species and species only determined to generic level.

Name change has been the rule rather than

the exception among the lichenicolous fungi. The Greenland flora (Alstrup & Hawksworth 1990) includes about three-fourths of the species known from Svalbard and has been used as a basic source on nomenclature together with Santesson (1993). A worldwide key to lichenicolous fungi was recently published by Clauzade et al. (1989), and this book has been used for the remaining species unless otherwise stated. Author names are abbreviated according to Kirk & Ansell (1992). Some herbarium revisions are presented here, and comments on other problematic reports have been included in the commented list or in the list of excluded or undetermined species.

It is our hope that this Catalogue will stimulate further research on the lichenicolous fungi of Svalbard and that also non-experts will discover and collect these fungi which are so easily overlooked in the field.

## List of species

### Ascomycetes

- Acanthonitschkea peltigericola* (Alstrup & Olech)  
O.E. Eriksson & R. Sant.  
*Arthonia clemens* (Tul.) Th. Fr.  
*A. excentrica* Th. Fr.  
*A. glaucomaria* Nyl.  
*A. obscurior* Triebel  
*A. rufidula* (Hue) D. Hawksw., R. Sant. & Øvstedal  
*Carbonea aggregantula* (Müll. Arg.) Diederich & Triebel  
*C. vitellinaria* (Nyl.) Hertel  
*Cecidonia umbonella* (Nyl.) Triebel & Rambold  
*Cercidospora cephalodiorum* Triebel & Grube  
*C. epipolytropa* (Mudd) Arnold  
*C. lichenicola* (Zopf) Hafellner  
*C. soror* Obermayer & Triebel  
*C. stereocaulorum* (Arnold) Hafellner  
*Clypeococcum grossum* (Körb.) D. Hawksw.  
*Corticifraga peltigerae* (Fuckel) D. Hawksw. & R. Sant.  
*Dacampia hookeri* (Borrer) A. Massal.  
*Dactylospora amygdalariae* Triebel  
*D. cladoniicola* Alstrup & Olech  
*D. diminuta* (Th. Fr.) Triebel  
*D. purpurascens* Triebel  
*Endococcus propinquus* (Körb.) D. Hawksw.

*E. rugulosus* Nyl.

*Geltingia associata* (Th. Fr.) Alstrup & D. Hawksw.

*G. stereocaulorum* Alstrup & D. Hawksw.

*Lasiosphaeriopsis christiansenii* Alstrup & D. Hawksw.

*L. stereocaulicola* (Linds.) O.E. Erikss. & R. Sant.

*Llimoniella neglecta* (Nyl.) Triebel & Rambold

*Merismatium nigritellum* (Nyl.) Vouaux

*Muellerella lichenicola* (Sommerf. : Fr) D. Hawksw.

*M. polyspora* Hepp ex. Müll. Arg.

*M. pygmaea* (Körb.) D. Hawksw.

*Phaeospora parasitica* (Lönnr.) Arnold

*P. peltigericola* D. Hawksw.

*Plectocarpon lichenum* (Sommerf.) D. Hawksw.

*Polycoccum tryptelioides* (Th. Fr.) R. Sant.

*Pronectria robergei* (Mont. & Desm.) Lowen

*Rhagadostoma lichenicola* (De Not) Keissl.

*Scutula stereocaulorum* (Anzi) Körb.

*Sphaerellothecium araneosum* (Rehm ex Arnold) Zopf

*S. cladoniicola* E.S. Hansen & Alstrup

*Stellifraga cladoniicola* Alstrup & Olech

*Stigmidium atryneae* (Arnold) Hafellner

*S. conspurcans* (Th. Fr.) Triebel & R. Sant.

*S. peltideae* (Vain.) R. Sant.

*S. schaereri* (A. Massal.) Trevis.

*Thelocarpon epibolum* Nyl.

*Weddellomyces tartaricola* (Linds.) Alstrup & D. Hawksw.

*Wentomyces peltigericola* D. Hawksw.

*Zwackhiomyces macrosporus* Alstrup & Olech

## Hyphomycetes

*Bispora christiansenii* D. Hawksw.

*Chalara lichenicola* M.S. Christ.

*Epicoccum nigrum* Link

*Illosporium carneum* Fr.

*Trimmatostroma lichenicola* M. S. Christ. & D. Hawksw.

## Coelomycetes

*Lichenoconium lecanorae* (Jaap) D. Hawksw.

*L. usneae* (Anzi) D. Hawksw.

*Lichenodiplis lecanorae* (Vouaux) Dyko & D. Hawksw.

*Nigropuncta rugulosa* D. Hawksw.

*Phaeosporobolus alpinus* R. Sant., Alstrup & D. Hawksw.

## Comments

### Ascomycetes

*Acanthonitschkea peltigericola* (Alstrup & Olech) O.E. Eriksson & R. Sant

Described as *Hystrix peltigericola* from Sørkapp Land (Alstrup & Olech 1993). The species is only known with certainty from Palflyodden on *Peltigera scabrosa*. A Greenland report of *Capronia peltigerae* by Alstrup & Hawksworth (1990) is probably identical with *A. peltigericola*.

*Arthonia clemens* (Tul.) Th. Fr.

A lichen parasite found on *Rhizoplaca melanophthalma* at Sorgfjorden (Fries 1867). Later reported on *Candelariella vitellina* and *Aspicilia* sp. from Edgeøya by Aptroot & Alstrup (1991).

*Arthonia excentrica* Th. Fr.

This species was first described from Lovénfjellet and Brennevinsfjorden in northeastern Svalbard by Fries (1867). It has not been reported later from Svalbard, but it is known from Greenland and northern and central Europe, mostly in mountains, and mostly with *Leprocaulon subalbicans* and possibly *Lepraria* ssp. as hosts (Poelt 1969; Alstrup & Hawksworth 1990; Santesson 1993). Fries (1867) reported it as muscicolous.

*Arthonia glaucomaria* (Nyl.) Nyl.

Reported on *Lecanora swartzii* from Edgeøya by Aptroot & Alstrup (1991).

*Arthonia obscurior* Triebel

The species was recently described by Triebel (1989) and was restricted to apothecia of *Pilophorus dovrensis*. It is recorded from Bolterdalen near Longyearbyen, and the only other collections reported are from northernmost Sweden and Norway (Finnmark) and from one locality on Greenland (Triebel 1989; Santesson 1993).

*Arthonia rufidula* (Hue) D. Hawksw., R. Sant. & Øvstedal.

New to Svalbard. Reported on *Umbilicaria rigida* (erroneously as *Arthonia pelvetii* (Hepp) Almq.) from Edgeøya by Aptroot & Alstrup (1991). *Arthonia rufidula* is known from *Umbilicaria antarctica* in Antarctica (Hawksworth 1991).

*Carbonea aggregantula* (Müll. Arg.)  
Diederich & Triebel

New to Svalbard. Reported on *Lecanora polytropa* from Amsterdamøya (Hertel & Ullrich 1976) and four localities at Sørkapp Land (Olech 1990) as *Carbonea vitellinaria*, but the species on *Lecanora polytropa* is different from *Carbonea vitellinaria* which grows on *Candelariella* (Santesson 1993; Kümmerling et al. 1993).

*Carbonea vitellinaria* (Nyl.) Hertel

Reported as *Lecidea vitellinaria* Nyl. on *Candelariella vitellina* from western Svalbard (no further information about the locality) and Hornsund by Fries (1860, 1867).

*Cecidonia umbonella* (Nyl.) Triebel & Rambold

Reported as *Lecidea umbonella* from Blomstrandhalvøya near Ny-Ålesund and from an area near Longyearbyen Airport (Hertel 1981). Later also reported from Van Mijenfjorden on *Lecidea lapicida* var. *pantherina* (Hertel 1991). The species was formerly thought to be lichenised, but Triebel & Rambold (1988) interpreted the "thallus" as galls formed by the host. The species is widely distributed in northern and alpine areas (Alstrup & Hawksworth 1990).

*Cercidospora cephalodiorum* Triebel & Grube

A species restricted to cephalodia of *Pilophorus dovreensis* and only known from two localities close to Ny-Ålesund and three additional localities from Iceland, Sweden and Greenland (Triebel 1989).

*Cercidospora epipolytropa* (Mudd) Arnold

Reported from Smeerenburg on *Lecanora leucococca* Sommerf. by Fries (1867) and from Edgeøya on *Aspicilia* sp. by Aptroot & Alstrup (1991).

*Cercidospora lichenicola* (Zopf) Hafellner

Collected on *Solorina crocea* in the mountains west of Bockfjorden almost 1000 m a.s.l. (Hafellner 1982) and on *Psoroma hypnorum* at Sørkapp Land (Alstrup & Olech 1993). The species is rather common outside Svalbard on *Solorina crocea* (Alstrup & Hawksworth 1990), and in Scandinavia it is found on *Peltigera leucophlebia* (Santesson 1993).

*Cercidospora soror* Obermayer & Triebel

Reported from Bockfjorden on *Arthrorhaphis* by Hafellner & Obermayer (1995). The species is known from *Arthrorhaphis* spp. also in Australia, Bolivia, China (Sichuan, Tibet) and Malaysia (Sabah).

*Cercidospora stereocaulorum* (Arnold)  
Hafellner

Collected on *Stereocaulon arcticum* at Sørkapp Land (Alstrup & Olech 1993).

*Clypeococcum grossum* (Körb.) D.  
Hawksw.

Reported from Bjørnøya on *Umbilicaria cylindrica* as *Tichothecium grossum* (Lyngby 1926). A rare species only known from Norway, Greenland, Canada, and New Zealand (Alstrup & Hawksworth 1990).

*Corticifraga peltigerae* (Fuckel) D.  
Hawksw. & R. Sant.

Reported on *Peltigera canina* from Sørkapp Land (Alstrup & Olech 1993).

*Dacampia hookeri* (Borrer) A. Massal.

The species was reported from Bjørnøya by Lyngby (1926), from Kongsfjorden and Liefdefjorden by

Elvebakk (1984) as *Pleospora hookeri* (Borrer) Keissler, and from Sørkapp Land by Alstrup & Olech (1993). It has also been observed frequently in other parts of central and western Spitsbergen (Elvebakk unpubl.), and is a common species in moist calcareous snow beds on Svalbard. There has been much confusion about the identity of its host, but it has now been settled that the hosts are *Solorina saccata* and rarely *S. octospora* which have been deformed by the parasite beyond recognition (Alstrup 1986; Alstrup & Hawksworth 1990).

### *Dactylospora amygdalariae* Triebel

Reported on *Amygdalaria panaeola* from Ny-Ålesund by Triebel (1989). The species has a wide northern distribution and is restricted to the host genus *Amygdalaria* (Triebel 1989).

### *Dactylospora cladoniicola* Alstrup & Olech

Described growing on *Cladonia macrophyllodes* from Sørkapp Land by Alstrup & Olech (1993); the only collection known so far.

### *Dactylospora diminuta* (Th. Fr.) Triebel

Described from Murchisonfjorden at Nordaustlandet on a muscicolous crustose lichen as *Buellia urceolata* Th. Fr. var. *majuscula* Th. Fr. (Fries 1860, 1867). Triebel (1989) included both this variety and lecideicolous specimens of the previous *D. urceolata* s. l. here, giving a broader description of *D. diminuta*, also including a collection on *Rinodina turfacea* from Sorgfjorden (= Treurenbergbay). *Dactylospora urceolata* s. str. is growing on *Protothelenella sphinctrinoides* (Santesson 1993). *Dactylospora diminuta* was collected on *Biatora vernalis* and *Lecanora epibryon* at Sørkapp Land by Alstrup & Olech (1993). Outside Svalbard the species is known from mainland Norway, Sweden and Austria (Triebel 1989).

### *Dactylospora purpurascens* Triebel

Reported on *Pilophorus dovrensis* from Ny-Ålesund by Triebel (1989). The species has a wide northern distribution (Triebel 1989).

### *Endococcus propinquus* (Körb.) D. Hawksw.

Reported on several lichen species at Hornsund and from three localities in the north (Fries 1860, 1867). Paulson (1923) reported it on *Lecidea confluens* from Bjørnøya.

### *Endococcus rugulosus* Nyl.

Found at Bockfjorden growing on *Rhizocarpon superficiale* (Hafellner 1982), and on *Aspicilia* sp. at Sørkapp Land (Alstrup & Olech 1993).

### *Geltingia associata* (Th. Fr.) Alstrup & D. Hawksw.

Reported on *Ochrolechia frigida* from Danskøya and Lågøya by Fries (1867) and from the Ny-Ålesund area by Elvebakk (1984). The species was described from Svalbard as *Lecidea associata*, later referred to as *Nesolechia associata*, and was recently transferred to the new genus *Geltingia* (Alstrup & Hawksworth 1990). It is known from Svalbard, Greenland, Norway, Sweden and the British Isles.

### *Geltingia stereocaulorum* Alstrup & D. Hawksw.

Recently described from Greenland (Alstrup & Hawksworth 1990) and only known from the type collection and from a locality at Sørkapp Land, on *Stereocaulon rivulorum* (Alstrup & Olech 1993).

### *Lasiosphaeriopsis christiansenii* Alstrup & D. Hawksw.

Collected on *Lecanora polytropa* at Sørkapp Land (Alstrup & Olech 1993). This is the second collection of the species which was described from Greenland on *Porpidia tuberculosa* (Alstrup & Hawksworth 1990).

### *Lasiosphaeriopsis stereocaulicola* (Linds.) O.E. Erikss. & R. Sant.

First published as *Sphaeria* sp. from Hinlopenstredet in northeastern Svalbard by Fries (1867), where it was collected on *Stereocaulon alpinum* in 1861 by Malmgren. Alstrup & Olech

(1993) added several collections from Sørkapp Land on *Stereocaulon alpinum*, *S. condensatum* and *S. rivulorum*. The species was described as *Sphaeria stereocaulicola* by Lindsay (1869) based on the Svalbard collection. It was referred to as cf. *Leptosphaeria apocalypsa* (Rehm) Wint. by Hagen (1950). The species was transferred to *Lasiosphaeropsis* by Eriksson & Santesson (1986), who cited localities from Argentina, Austria, Sweden and Uganda in addition to the type locality on Svalbard. Alstrup & Hawksworth (1990) added Greenland and Alaska.

*Llimoniella neglecta* (Nyl.) Triebel & Rambold

Reported on *Lepraria neglecta* from Bjørnøya by Lyng (1926) as *Lecidea neglecta*. The species was referred to *Llimoniella* by Kümmerling et al. (1993).

*Merismatium nigrillum* (Nyl.) Vouaux

Collected at Sørkapp Land on *Pannaria pezizoides* (Alstrup & Olech 1993). The species is widely distributed in Europe and occurs on several lichen species (Triebel 1989), but has not been reported from *Pannaria pezizoides* before.

*Muellerella lichenicola* (Sommerf.: Fr.) D. Hawksw.

New to Svalbard. Reported on *Xanthoria elegans* from Sorgfjorden, and *Fulgensia bracteata* from Repøya by Fries (1867) as *Endococcus pygmaeus* (= *Muellerella pygmaea*), but specimens at UPS have been redetermined as *M. lichenicola* (Santesson in litt.)

*Muellerella polyspora* Hepp ex Müll. Arg.

Reported on *Aspicilia elevata* and *Verrucaria* sp. by Aptroot & Alstrup (1991).

*Muellerella pygmaea* (Körb.) D. Hawksw.

Reported from numerous localities on several lichen species in northern Svalbard by Fries (1860, 1867). Later it was reported from Bjørnøya (on *Lecidea lapicida*) by Paulson (1923) and Lyng (1926), from Bockfjorden by Hafellner (1982),

from Longyearbyen by Triebel (1989), and from Edgeøya by Aptroot & Alstrup (1991).

*Phaeospora parasitica* (Lönnr.) Arnold

Reported from Billefjorden on *Lecidea marginata* by Acock (1940). The species has been reported from many crustose hosts of the genera *Rhizocarpon*, *Porpidia*, *Lecidea* etc. in Europe.

*Phaeospora peltigericola* D. Hawksw.

Only reported on *Peltigera* sp. from Bockfjorden (Hafellner 1982) and from *P. malacea* in Italy.

*Plectocarpon lichenum* (Sommerf.) D. Hawksw.

Collected on *Lobaria linita* at Sørkapp Land (Alstrup & Olech 1993). It is widely distributed on *Lobaria* spp. in the Northern Hemisphere.

*Polycoccum tryphelioides* (Th. Fr.) R. Sant.

Collected on *Stereocaulon condensatum* at Sørkapp Land (Alstrup & Olech 1993). Common on *Stereocaulon* spp. in Europe and Greenland.

*Pronectria robergei* (Mont. & Desm.) Lowen

Collected on *Solorina bispora* at Sørkapp Land (Alstrup & Olech 1993) and on *●chrolechia frigida* at Bockfjorden (Hafellner 1982, as *Nectriella robergei*). The species is widely distributed in Europe and North America on *Peltigera* spp. and is also known from Sweden on *●chrolechia frigida* (Santesson 1993).

*Rhagadostoma lichenicola* (De Not) Keissl.

Collected on *Solorina crocea* at Sørkapp Land by Alstrup & Olech (1993).

*Scutula stereocaulorum* (Anzi) Körb.

Published by Fries (1867) as *Biatorina stereocaulorum* Th. Fr. from Lovénberget and Wahlenbergfjorden, from several additional



localities in northeastern Svalbard by Hagen (1950), by Hafellner (1982) from Bockfjorden, and by Alstrup & Olech (1993) from Sørkapp Land. The species is widespread in northern areas and restricted to *Stereocaulon* hosts.

*Sphaerellothecium araneosum* (Rehm ex Arnold) Zopf

Collected on *Ochrolechia frigida* and *O. grimmiae* from Sørkapp Land and Edgeøya (Alstrup & Olech 1993). The species was described as *Echinothecium glabrum* M. S. Christ., Alstrup & D. Hawksw. from Greenland, but the material has later been studied by P. Diederich (pers. comm.), who found that the species is identical with *S. araneosum*.

*Sphaerellothecium cladoniicola* E.S. Hansen & Alstrup

Described as a common species on *Cladonia arbuscula* ssp. *mitis* and *C. stellaris* on Greenland by Hansen & Alstrup (1995), who also reported the species from Canada, Alaska and from Mitrafjellet at Krossfjorden.

*Stellifraga cladoniicola* Alstrup & Olech

Described in a new genus from Sørkapp Land where it was collected on *Cladonia gracilis* at Hohenloheskardet (Alstrup & Olech 1993). The species is only known from its type locality.

*Stigmidium atryneae* (Arnold) Hafellner

Reported on *Lecanora rupicola* ssp. *subplanata* from Bockfjorden by Hafellner (1982).

*Stigmidium conspurcans* (Th. Fr.) Triebel & R. Sant.

Described as *Arthopyrenia conspurcans* on *Psora rubiformis* by Fries (1867) from Wijdefjorden and Sorgfjorden. Hagen (1950) erroneously listed *Pharcidia dispersa* (= *Stigmidium dispersum*) as a synonym, cfr. Triebel (1989) and Alstrup & Hawksworth (1990). *Stigmidium conspurcans* is restricted to *Psora rubiformis* and known from Europe, North America and Greenland.

*Stigmidium peltideae* (Vain.) R. Sant.

Known from Sørkapp Land on *Peltigera rufescens*, *P. canina* and *Solorina crocea* (Alstrup & Olech 1993).

*Stigmidium schaereri* (Mass.) Trevis.

Reported on *Lecidea swartzoidea* from Edgeøya by Aptroot & Alstrup (1991). This determination may need to be confirmed.

*Thelocarpon epibolum* Nyl.

Reported on *Peltigera aphthosa* from Sørkapp Land by Alstrup & Olech (1993).

*Weddellomyces tartaricola* (Linds.) Alstrup & D. Hawksw.

Collected on *Ochrolechia frigida* from Sørkapp Land (Alstrup & Olech 1993). The species was described from Greenland (Alstrup & Hawksworth 1990) and is known also from Scandinavia (Santesson 1993).

*Wentiomyces peltigericola* D. Hawksw.

Collected on *Peltigera aphthosa* from Sørkapp Land (Alstrup & Olech 1993). The species is widespread in arctic and alpine areas (Alaska, Canada, Greenland, Faroe Islands, Scotland, Fennoscandia, and Austria) and is often associated with *Thelocarpon epibolum* (Alstrup & Hawksworth 1990; Alstrup & Olech 1993).

*Zwackhiomyces macrosporus* Alstrup & Olech

The species was described on *Pannaria pezizoides* from Lidfjellet, Sørkapp Land, and is only known from its type locality (Alstrup & Olech 1993).

Hyphomycetes

*Bispora christiansenii* D. Hawksw.

Reported on *Caloplaca castellanea* from Edgeøya by Aptroot & Alstrup (1991) and on *Lecanora*

*polytropa* from Sørkapp Land by Alstrup & Olech (1993).

*Chalara lichenicola* M. S. Christ.

Described from Hohenloheskardet by Christiansen (1993). The species was growing on *Cladonia gracilis* and is only known from its type locality.

*Epicoccum nigrum* Link.

Reported as *E. neglectum* Desm. on *Ochrolechia frigida* from Bjørnøya (Lyng 1926). It is a cosmopolitan saprophyte known from numerous phanerogams (Farr et al. 1989) and is also known from dead *Peltigera* spp. in Scandinavia (Santesson 1993).

*Illosporium carneum* Fr.

New to Svalbard. Surprisingly this species has not been reported from Svalbard before, although Lyng (1938) wrote that "an *Illosporium* parasite is common on *Peltigera didactyla* on Svalbard". This certainly refers to *Illosporium carneum*, which later has been collected from Liefdefjorden (Elvebakk unpubl.). The pink aggregated granules are very conspicuous. *Nectriella robergii* (Mont. & Desm.) Weese, reported from Bockfjorden by Hafellner (1982), has been considered to represent the teleomorph of *Illosporium carneum*, but this does not seem to be the case (Alstrup & Hawksworth 1990).

*Trimmatostroma lichenicola* M.S. Christ. & D. Hawksw.

Reported from Sørkapp Land by Dubiel & Olech (1990). The host is not noted, but several species of *Candelariella*, *Lecanora*, *Toninia*, *Psoroma*, and *Caloplaca* are listed from Greenland by Alstrup & Hawksworth (1990), who only reported it from Greenland, Norway and Spain. Santesson (1993) reported it from Sweden.

Coelomycetes

*Lichenocodium lecanorae* (Jaap) D. Hawksw.

Collected on *Arctopeltis thuleana* from Hornsund (Alstrup & Olech 1993).

*Lichenocodium usneae* (Anzi) D. Hawksw.

Reported on *Cladonia gracilis* from Sørkapp Land by Alstrup & Olech (1993).

*Lichenodiplis lecanorae* (Vouaux) Dyko & D. Hawksw.

Reported from Bjørnøya on *Lecanora hagenii* by Lyng (1926) and von Keissler (1928). The material was collected by T. Fries and determined by Keissler as *Diplodia lecanorae*.

*Nigropuncta rugulosa* D. Hawksw.

New to Svalbard. Found at Kobbefjorden by Malmgren in 1861 on *Bellemerea cinereorufescens*, and determined by R. Santesson (UPS), (Santesson in litt.). The species is widely distributed in mountainous areas of Scandinavia (Santesson 1993).

*Phaeosporobolus alpinus* R. Sant., Alstrup & D. Hawksw.

The species was recently described from Greenland (Alstrup & Hawksworth 1990). They reported one locality from Blomstrandhalvøya near Ny-Ålesund in addition to other records from other parts of the Arctic (Novaja Zemlja, Canada and Alaska), Scandinavia and Chile. The species is restricted to *Ochrolechia* and *Pertusaria*. Later it was also reported on *Ochrolechia frigida* from Edgeøya by Aptroot & Alstrup (1991) and from four localities at Sørkapp Land (Alstrup & Olech 1993).

## Excluded or undetermined species

*Arthonia pelvetii* (Hepp) Almqv.

Reported by Aptroot & Alstrup (1991), but here redetermined as *A. rufidula*.

*Endococcus* sp.

A specimen on *Rhizocarpon inarense* from Hornsund that could not be determined with certainty (Alstrup & Lech 1993) is probably identical with *Tichothecium macrosporum* Hepp ex Arnold, which seems to belong to *Endococcus*.

*Illosporium carneum* Fr. var. *macrosporum* Keissl.

Reported on *Dermatocarpon miniatum* from Nordaustlandet by Hagen (1950). Hagen's suggestion, that it probably belongs to a different species than *Illosporium carneum* is supposed to be correct, and the taxon is therefore not treated below the latter. It definitely needs to be restudied.

*Leptosphaeria* sp.

Fries (1867) described an unidentified *Leptosphaeria* species on *Lopadium pezizoideum* from Kobbefjorden and Lågøya. The specimen does not seem to have been identified later.

*Nectria* sp.

Reported as “? *Nectria* sp.” from Murchisonfjorden at Nordaustlandet on *Peltigera didactyla* by Hagen (1950). The collection has not been identified, only *N. lecanodes* Ces. is known from *Peltigera*, but it may also be a species of *Pronectria*.

*Scutula miliaris* (Wallr.) Trevis.

Reported as *Biatorina tuberculosa* on *Solorina saccata* from Lovénberget at Hinlopenstretet by Fries (1867). *Biatorina tuberculosa* is a synonym of *S. miliaris*, which is known from *Peltigera* spp., whereas *S. aggregata* besides *Peltigera* spp. has been found on *Solorina crocea* in Greenland

(Alstrup & Hawksworth 1990), and it is therefore possible that the Fries (1867) report refers instead to *S. aggregata*.

*Tremella* sp.

Reported by Christiansen (1993), but not determined to species.

*Torula lichenum* Keissl.

Reported from Bjørnøya by Lyng (1926) without substrate information. Soredia-like structures on *Cetraria* and *Coelocaulon* species have been interpreted as *Torula* infections, although this has not been properly studied (Kärnefelt 1979). Such possibly infected individuals have been described as varieties, forms and subspecies like *Cornicularia odontella* var. *sorediata* (Du Rietz) Du Rietz, *Cetraria delisei* ssp. *sorediifera* (Malme) Du Rietz, *C. islandica* var. *polaris* Rass. and *C. nivalis* f. *sorediifera* Hasselr. (Lyng 1938; Poelt 1969). Such forms have also been interpreted as sorediate counterparts of esorediate lichen species and resulted in descriptions of separate species like *Cetraria capitata* Lyng and *Cornicularia racemosa* Lyng. Sorediate forms of both *Arctocetraria nivalis*, *Cetrariella delisei* and *Cetraria aculeata* have been reported from Svalbard (Lyng 1938). Fries (1867) also reported apothecia of *Biatorina fraudans* Hellb. (= *Caloplaca sinapisperma* (Lam. & DC.) Maheu & Gillet) from Nordaustlandet being destroyed by ‘*Torula* filaments’.

*Bispora christiansenii* and *Trimmatostoma lichenicola* have probably been interpreted as ‘*Torula* filaments’ earlier, but the identity of the thallus infections provoking soredia formation has not been thoroughly studied.

The name *Torula lichenum* Keissl. was rejected by Hawksworth (1979) as the type collection lacks any fruiting structures. The possibly lichenicolous structures reported as *Torula* or as soredia on non-sorediose species from Svalbard are therefore left unnamed here.

*Zwackhiomyces sphinctrinoides* (Zwackh) Grube & Hafellner

Reported from Bjørnøya as *Didymella sphinctrinoides* on *Leptogium lichenoides* (Lyng 1926), but this determination is certainly erroneous. An

alternative is *Didymellopsis pulposi* (Zopf) Grube & Hafellner which was described by Grube & Hafellner (1990) growing on *Collema*, *Leptogium*, and *Lempholemma*.

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A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae, and cyanobacteria

## Part 6. Lichens

ARVE ELVEBAKK and HANNES HERTEL



Elvebakk, A. & Hertel, H. 1996: Part 6. Lichens. Pp. 271–359 in Elvebakk, A. & Prestrud, P. (eds.): A catalogue of Svalbard plants, fungi, algae and cyanobacteria. *Norsk Polarinstitutt Skrifter* 198.

The lichen flora of Svalbard is reviewed based on literature records in addition to some herbarium revisions and unpublished material. The known lichen flora of Svalbard consists of 597 species, some of them critical, but a high number for such a small arctic area. Another 62 species have been rejected as erroneous or probably erroneous. Five species (*Lempholemma isidioides*, *Leptogium byssinum*, *Placynthium tantaleum*, *Rhizocarpon norvegicum*, and *Sarcogyne algoviae*) are reported as new to Svalbard, and one new combination (*Lecanora atomarginata*) is made. Notes on taxonomy, distribution, rarity, abundance, ecology and importance to vertebrates are included. Many species only reported from a few sites are thought to be more widespread. Certainly a relatively high number of species still await discovery on Svalbard, and except for some of the most conspicuous species, the present knowledge of Svalbard lichens is very insufficient and fragmentary. Nevertheless, the lichen flora of Svalbard is probably better known than that of any other comparable part of the Arctic.

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## Introduction

The lichen flora of Svalbard has received considerable attention compared to other areas of the Arctic. The process was initiated in particular through the studies by Fries (1867) and Lynge (1938). The history of the early lichenological exploration on Svalbard has been thoroughly dealt with by Lynge (1938). Lynge regrettably could not finish his studies on the crustose lichens before his death in 1942, and after this period the lichenological research on Svalbard was almost

non-existent for more than three decades. During this period Mattick (1949) reviewed the lichen flora on Svalbard and estimated that about 450 species had been known to the archipelago. But his list of the lichen genera of Svalbard indicated only about 280 species. The only other Svalbard lichen study during this 'dark lichenological period' was an important contribution from Hornsund by Nowak (1965). In addition Eurola (1968) reported five lichen species as new to Svalbard but without indicating them as additions. Magnusson (1944, 1950) also included Svalbard material in some of his studies.

But since the mid seventies a number of studies have been devoted to the lichen flora of Svalbard. In 1975 Hertel & Ullrich (1976) made large collections at Amsterdamøya and from the Kongsfjorden and Longyearbyen areas and published 11 species new to Svalbard, according to the species concept and the lichenological exploration history presented in this catalogue. Hertel (1977a) stated that at least 473 lichen species had been published from Spitsbergen, including doubtful records. He also included 13 new Svalbard species based on collections from the Longyearbyen and Ny-Ålesund areas. Hertel (1981b) included three

new species on Svalbard. Hafellner (1982) collected at Bockfjorden and published 13 new lichens in addition to several lichenicolous fungi. Elvebakk (1984a) added 7 new species collected in different parts of Svalbard, and Olech (1987) two new species from Hornsund. Söchting (1989) included 8 additional *Caloplaca* species in the first part of his monograph of this genus on Svalbard and later another seven species (Söchting & Olech 1995). Olech & Alstrup (1989) published a list of lichens from Sørkapp Land including 17 new Svalbard species. These records were republished by Olech (1990) who also reported 10 additional new Svalbard species. Aptroot & Alstrup (1991), who studied the lichen flora of a part of Edgeøya, included 9 new Svalbard species, and finally, Elvebakk & Tønberg (1992) included 9 new species from different parts of Svalbard.

The number of recent additions to the lichen flora of Svalbard is considerable, but there is a pronounced lack of monographic treatment of genera with 'special emphasis' on the Svalbard archipelago.

Literature on lichens specifically related to Svalbard prior to 1975 has been included in three bibliographies by Kleppa (1973, 1979, 1989). However, many reports on lichens from Svalbard are found in other studies.

According to the present concept, the lichen genera richest in species are now *Cladonia* (40 species), *Caloplaca* (40 species) and *Rhizocarpon* (33 species). Conspicuous macrolichen genera such as *Peltigera*, *Stereocaulon*, and *Umbilicaria* have increased their species numbers markedly during the last years and now include 19, 13 and 15 species, respectively. Species included in '*Lecidea*' are not considered to belong to *Lecidea* s. str., and future studies will determine their status.

The number of lichen species known from Svalbard according to this catalogue totals 597 species. *Lempholemma isidioides*, *Leptogium byssinum*, *Placynthium tantaleum*, *Rhizocarpon norvegicum*, and *Sarcogyne algoviae* are reported here as new to Svalbard, and one new combination (*Lecanora atromarginata*) is made.

The lichenological papers from Svalbard include a number of poorly known or controversial taxa that have not been studied systematically during the last decades. A number of these critical species have been omitted from the European lichen flora by Poelt (1969), Poelt & Vězda (1977, 1981). A list of rejected species is

included in this catalogue and comprises 56 species. Some of the earliest doubtful records were excluded already by Fries (1867) and these exclusions have not been repeated in our list. However, many more of the species included in this catalogue are critical and in need of reinvestigation.

Each species in the list has been given *Ecosystem Component Values* (see definitions below) where the present state of knowledge is considered to allow for such values. The values have been set tentatively in many cases and will be changed in the future. This is especially the case with most crustose lichens, where the present knowledge is very insufficient.

Although a few taxa described from Svalbard have not yet been reported from areas outside Svalbard, we are fully convinced that within the lichens there are no species endemic to Svalbard. Even the number of species restricted to the Arctic is, as to our knowledge, expected to be much smaller than generally assumed. This is in strong contrast to the number of bipolar species, which may be much higher than actually known. The worldwide distribution of lichens, especially crustose lichens, is very poorly known, and it would be extremely careless to classify distribution patterns of inconspicuous crustose lichens. Almost any of the modern monographs of lichen genera demonstrate that lichens which formerly were classified as 'arctic' or 'holarctic' are in reality bipolar, and those classified as 'endemic' are either more widespread or turn out as synonyms of widespread taxa.

The basic nomenclature adopted here is that of Santesson (1993), with the exception of the genus *Flavocetraria* which follows Kärnefelt et al. (1994), the *Cetraria commixta* complex following Thell (1995), *Allocetraria* following Kärnefelt & Thell (1996), *Frutidella* following Kalb (1995), *Hymenelia* and *Ionaspis* following Lutzoni & Brodo (1995), two species (*Peltigera polydactylon* and *Rinodina tephraspis*) which follow Vitikainen (1994) and Mayrhofer et al. (1992), respectively, and *●phioparma lapponica*, treated provisionally as a variety by Santesson (1993). Nomenclature of species not known from the area treated by Santesson (1993) follow Poelt (1969), Poelt & Vězda (1977, 1981) or some more detailed studies cited below the species in question. Author abbreviations follow Kirk & Ansell (1992) and Santesson (1993) with two exceptions (E. Dahl and Mas. Inoue). Norwegian names follow Krog

et al. (1994), and Eckblad (1985) in the case of *Omphalina*. Some Norwegian names of crustose species proposed in the literature have not been used with the exception of Caliciales which were given Norwegian names by a name committee (Holien et al. 1994). A list of synonyms from the Svalbard literature is included.

Lichenicolous fungi have been treated in a separate part of the Catalogue, whereas lichenicolous lichens have been included here. Following the species list, all species are commented separately.

The task of catalogising the numerous Svalbard lichens has been demanding and we welcome information on omissions and revisions.

The literature on Svalbard lichens includes a number of old versions of geographical names. These have been transferred to the official Norwegian names following Norges Svalbard- og Ishavsundersøkelser (1942) and Ørvin (1958), both reprinted by the Norwegian Polar Institute in 1991.

## Ecosystem Component Values

### Definitions

#### R Rarity

- 3 = Very rare on Svalbard
- 2 = Rare, 3–15 localities known at present
- 1 = Scattered or common, at least locally

#### P Phytogeographical importance

- 3 = Strongly disjunct or only known from Svalbard
- 2 = Belonging to a phytogeographical element of special interest on Svalbard
- 1 = More or less widespread

#### E Ecological indicator value

- 3 = Very high (specialised, stenotic)
- 2 = Intermediate
- 1 = Low (euryoic)

#### A Local abundance

- 3 = Dominant, in places more than 50 % cover in its habitats
- 2 = Subdominant, 20–50 % cover
- 1 = Sparse

#### I Importance to vertebrate animals

- 3 = Important as a much preferred/used food plant
- 2 = Of secondary importance
- 1 = Of no importance

## List of species

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>Acarospora badiofusca</i> (Nyl.) Th. Fr.	3	2	–	1	1
<i>A. fuscata</i> (Schr.) Th. Fr.	3	1	–	1	1
<i>A. glaucocarpa</i> (Ach.) Körb.	2	–	3	1	1
<i>A. hospitans</i> H. Magn.	3	3	–	1	1
<i>A. molybdina</i> (Wahlenb.) A. Massal.	1	2	3	2	1
<i>A. peliscypha</i> Th. Fr.	3	2	–	1	1
<i>A. persimilis</i> H. Magn.	3	–	–	1	1
<i>A. rosulata</i> (Th. Fr.) H. Magn.	3	–	–	1	1
<i>A. rugulosa</i> Körb.	3	–	–	1	1
<i>A. scabrida</i> Hedl. ex H. Magn.	3	3	–	1	1
<i>A. scyphulifera</i> Vain.	3	2	–	1	1
<i>A. sinopica</i> (Wahlenb.) Körb.	2	1	3	1	1
<i>A. smaragdula</i> (Wahlenb.) A. Massal.	2	–	–	1	1
<i>A. veronensis</i> A. Massal.	3	2	–	1	1
<i>Adelolecia kolaensis</i> (Nyl.) Hertel & Rambold	3	–	–	1	1
<i>A. pilati</i> (Hepp) Hertel & Hafellner	3	–	3	1	1
<i>Alectoria nigricans</i> (Ach.) Nyl. – Jervskjegg	1	1	3	2	2
<i>A. ochroleuca</i> (Hoffm.) A. Massal. – Rabbeskjegg	2	3	3	–	–
<i>A. sarmentosa</i> (Ach.) Ach. ssp. <i>vexillifera</i> (Nyl.) D. Hawksw.	3	3	3	1	–
<i>Allantoparmelia alpicola</i> (Th. Fr.) Essl. – Fjelltopplav	1	1	2	2	1
<i>Allocetraria madreporiformis</i> (Ach.) Kärnefelt & Thell	3	3	–	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>Amandinea coniops</i> (Wahlenb.) M. Choisy ex Scheid. & H. Mayrhofer	1	1	3	–	1
<i>A. punctata</i> (Hoffm.) Coppins & Scheid.	1	1	3	1	1
<i>Amygdalaria consentiens</i> (Nyl.) Hertel, Brodo & Mas. Inoue	2	3	–	1	1
<i>A. panaeola</i> (Ach.) Hertel & Brodo	2	3	–	1	1
<i>Arctocetraria nigricascens</i> (Nyl.) Kärnefelt & Thell	3	3	2	1	1
<i>Arctomia delicatula</i> Th. Fr.	2	1	–	1	1
<i>A. interfixa</i> (Nyl.) Vain.	3	3	–	1	1
<i>Arctoparmelia centrifuga</i> (L.) Hale – Stor gulkrinslav	1	3	2	1	1
<i>A. incurva</i> (Pers.) Hale – Liten gulkrinslav	1	2	2	1	1
<i>Arctopelia thuleana</i> Poelt	1	3	3	2	1
<i>Arthonia lapidicola</i> (Taylor) Branth & Rostr.	2	2	–	1	1
<i>Arthrorhaphis alpina</i> (Schaer.) R. Sant.	–	–	2	1	1
<i>A. citrinella</i> (Ach.) Poelt	–	–	2	1	1
<i>Aspicilia alboradiata</i> (H. Magn.) Oxner	3	–	–	1	1
<i>A. aquatica</i> Körb.	3	2	3	1	1
<i>A. aspicilioides</i> (Th. Fr.) R. Sant.	3	3	–	1	1
<i>A. caesiocinerea</i> (Nyl. ex Malbr.) Arnold	2	3	–	1	1
<i>A. calcarea</i> (L.) Mudd	3	–	–	1	1
<i>A. cinerea</i> (L.) Körb.	3	3	–	1	1
<i>A. circularis</i> (H. Magn.) Oxner	3	3	–	1	1
<i>A. disperpens</i> (Zahlbr.) Räsänen	1	–	–	1	1
<i>A. elevata</i> (Lynge) J.W. Thomson	3	3	–	1	1
<i>A. gibbosa</i> (Ach.) Körb.	1	1	–	1	1
<i>A. lesleyana</i> Darb.	3	–	–	1	1
<i>A. mashiginensis</i> (Zahlbr.) Oxner	2	3	3	1	1
<i>A. mastrucata</i> (Wahlenb.) Th. Fr.	2	1	–	1	1
<i>A. nikrapensis</i> Darb.	3	3	–	1	1
<i>A. obscurascens</i> (H. Magn.) Clauzade & Rondon	3	3	–	1	1
<i>A. obscurata</i> (Fr.) Arnold	3	3	–	1	1
<i>A. pergibbosa</i> (H. Magn.) Räsänen	3	3	–	1	1
<i>'Aspicilia "Lecanora" perpendicularis</i> H. Magn.'	3	3	–	1	1
<i>A. perradiata</i> (Nyl.) Hue	3	3	–	1	1
<i>A. pleiocarpa</i> (H. Magn.) Oxner	3	3	–	1	1
<i>A. polychroma</i> Anzi?	3	3	–	1	1
<i>A. supertegens</i> Arnold	3	–	–	1	1
<i>Bacidia bagliettoana</i> (A. Massal. & De Not.) Jatta	2	–	–	1	1
<i>B. subfuscula</i> (Nyl.) Th. Fr.	2	–	1	1	1
<i>B. trachona</i> (Ach.) Lettau	3	–	–	1	1
<i>B. venusta</i> Hepp ex Th. Fr.	–	–	–	1	1
<i>Baeomyces placophyllus</i> Ach.	3	3	–	1	1
<i>B. rufus</i> (Huds.) Rebert.	–	–	–	1	1
<i>Bellemerea alpina</i> (Sommerf.) Clauzade & Roux	2	1	–	1	1
<i>B. cinerorufescens</i> (Ach.) Clauzade & Roux	2	1	–	1	1
<i>B. subsorediza</i> (Lynge) R. Sant.	–	–	3	1	1
<i>Biatora carneoalbida</i> (Müll.Arg.) Coppins	2	–	–	1	1
<i>B. cuprea</i> (Sommerf.) Fr.	2	3	–	1	1
<i>B. subduplex</i> (Nyl.) Printzen	1	1	–	1	1
<i>Brigantiaea fuscolutea</i> (Dicks.) R. Sant.	2	3	2	1	1
<i>Brodoa oroarctica</i> (Krog) Goward – Fjellrabbelav	1	2	2	3	1
<i>Bryocaulon divergens</i> (Ach.) Kärnefelt – Fjelltagg	1	1	3	2	3
<i>Bryonora castanea</i> (Hepp) Poelt	2	2	3	1	1
<i>B. curvescens</i> (Mudd) Poelt	3	3	3	1	1
<i>B. septentrionalis</i> Holt.-Hartw.	2	2	2	1	1



Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>Bryoria chalybeiformis</i> (L.) Brodo & D. Hawksw. – Flokeskjegg	1	1	2	1	2
<i>Buellia aethalea</i> (Ach.) Th. Fr.	3	3	–	1	1
<i>B. alboatra</i> (Hoffm.) Th. Fr.	3	3	–	1	1
<i>B. disciformis</i> (Fr.) Mudd	2	2	–	1	1
<i>B. ectolechoides</i> (Vain.) Erichsen	2	2	–	1	1
<i>B. geophila</i> (Flörke ex Sommerf.) Lyng	3	3	–	1	1
<i>B. insignis</i> “(Nägeli ex Hepp) Th. Fr.”	1	1	1	1	1
<i>B. malmei</i> Lyng	3	–	–	1	1
<i>B. papillata</i> (Sommerf.) Tuck.	2	1	–	1	1
<i>B. postglacialis</i> Hafellner	3	3	–	1	1
<i>B. pulverulenta</i> (Anzi) Jatta	–	–	3	1	1
<i>B. vilis</i> Th. Fr.	2	–	–	1	1
<i>Calicium viride</i> Pers. – Grønsothål	3	3	–	1	1
<i>Caloplaca alcarum</i> Poelt	2	2	3	1	1
<i>C. ammiospila</i> (Wahlenb.) H. Olivier	1	1	1	1	1
<i>C. anchon-phoeniceon</i> Poelt & Clauzade	–	–	–	1	1
<i>C. approximata</i> (Lyng) H. Magn.	–	–	–	1	1
<i>C. arenaria</i> (Pers.) Müll. Arg. non auct.	3	3	–	1	1
<i>C. caesiorufella</i> (Nyl.) Zahlbr.	2	2	1	1	1
<i>C. castellana</i> (Räsänen) Poelt	3	–	3	1	1
<i>C. cerina</i> (Ehrh. ex Hedw.) Th. Fr.	1	1	1	1	1
<i>C. citrina</i> (Hoffm.) Th. Fr.	3	2	1	1	1
<i>C. concilians</i> (Nyl.) H. Olivier	3	3	–	1	1
<i>C. conciliascens</i> (Nyl.) Zahlbr.	3	3	–	1	1
<i>C. decipiens</i> (Arnold) Blomb. & Forssell	2	2	3	1	1
<i>C. diphyodes</i> (Nyl.) Jatta	3	3	–	1	1
<i>C. epiphyta</i> Lyng	3	3	–	1	1
<i>C. epithallina</i> Lyng	–	–	–	1	1
<i>C. exsecuta</i> (Nyl.) Dalla Torre & Sarnt.	3	2	–	1	1
<i>C. fraudans</i> (Th. Fr.) H. Olivier	2	3	3	1	1
<i>C. insularis</i> Poelt	–	–	–	1	1
<i>C. invadens</i> Lyng	–	–	–	1	1
<i>C. jungermanniae</i> (Vahl) Th. Fr.	1	1	1	1	1
<i>C. leptocheila</i> H. Magn.	–	–	–	1	1
<i>C. lithophila</i> H. Magn.	–	–	–	1	1
<i>C. magni-filii</i> Poelt	3	–	3	1	1
<i>C. nivalis</i> (Körb.) Th. Fr.	2	2	3	1	1
<i>C. noeisii</i> Søchting ad int.	3	3	–	1	1
<i>C. phaeocarpella</i> (Nyl.) Zahlbr.	2	2	1	1	1
<i>C. pyracea</i> (Ach.) Th. Fr.	–	–	–	1	1
<i>C. saxicola</i> (Hoffm.) Nordin	1	1	3	1	1
<i>C. saxifragarum</i> Poelt	3	3	–	1	1
<i>C. scopularis</i> (Nyl.) Lettau	3	3	–	1	1
<i>C. scotoplaca</i> (Nyl.) H. Magn.	–	–	–	1	1
<i>C. sibirica</i> H. Magn.	3	3	–	1	1
<i>C. sinapisperma</i> (Lam. & DC.) Maheu & Gillet	3	3	–	1	1
<i>C. soropelta</i> (E.S. Hansen, Poelt & Søchting) Søchting	3	3	3	1	1
<i>C. spitsbergensis</i> H. Magn.	2	3	3	1	1
<i>C. tetraspora</i> (Nyl.) H. Olivier	1	1	–	1	1
<i>C. tirolensis</i> Zahlbr.	1	1	1	1	1
<i>C. tominii</i> Savicz	3	3	3	1	1
<i>C. tornöensis</i> H. Magn.	–	–	3	1	1
<i>C. verruculifera</i> (Vain.) Zahlbr.	3	3	3	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>Candelariella arctica</i> (Körb.) R. Sant.	1	2	3	1	1
<i>C. aurella</i> (Hoffm.) Zahlbr.	2	1	1	1	1
<i>C. placodizans</i> (Nyl.) H. Magn.	2	2	–	1	1
<i>C. vitellina</i> (Hoffm.) Müll. Arg.	1	1	2	1	1
<i>C. xanthostigma</i> (Ach.) Lettau	2	1	2	1	1
<i>Carbonea atronivea</i> (Arnold) Hertel	3	3	–	1	1
<i>C. intrusa</i> (Th. Fr.) Rambold & Triebel	3	3	3	1	1
<i>C. vorticosa</i> (Flörke) Hertel	1	1	2	1	1
<i>Catapyrenium cinereum</i> (Pers.) Körb.	1	1	–	1	1
<i>C. daedaleum</i> (Kremp.) Stein	2	1	–	1	1
<i>C. lachneum</i> (Ach.) R. Sant.	2	1	–	1	1
<i>C. norvegicum</i> Breuss	3	3	–	1	1
<i>Catillaria groenlandica</i> Lyngé	3	3	–	1	1
<i>C. lenticularis</i> (Ach.) Th. Fr.	3	3	3	1	1
<i>Cephalophysia leucospila</i> (Anzi) H. Kiliás & Scheid.	3	3	–	1	1
<i>Cetraria aculeata</i> (Schreb.) Fr. – Groptagg	1	1	1	2	3
<i>C. islandica</i> (L.) Ach. – Islandslav	1	1	1	2	3
<i>C. muricata</i> (Ach.) Eckfeldt – Busktagg	2	–	–	–	–
<i>C. nigricans</i> Nyl. – Svartskeerpe	3	3	–	1	1
<i>Cetrariella delisei</i> (Bory ex Schaer.) Kärnefelt & Thell – Snøskjerpe	1	1	2	3	2
<i>C. fastigiata</i> (Delise ex Nyl.) Kärnefelt & Thell – Brunskjerpe	2	2	–	1	1
<i>Chaenotheca furfuracea</i> (L.) Tibell – Gullnål	2	1	–	1	1
<i>Chromatochromys muscorum</i> (Fr.) H. Mayrhofer & Poelt	3	3	–	1	1
<i>Cladonia acuminata</i> (Ach.) Norrl. – Spisslav	2	1	–	1	1
<i>C. amaurocraea</i> (Flörke) Schaer. – Begerpigglav	–	1	1	1	–
<i>C. arbuscula</i> (Wallr.) Flot. ssp. <i>arbuscula</i> – Lys reinlav	–	–	–	–	–
<i>C. arbuscula</i> (Wallr.) Flot. ssp. <i>mitis</i> (Sandst.) Ruoss – Fjellreinlav	1	1	2	3	3
<i>C. bellidiflora</i> (Ach.) Schaer. – Blomsterlav	1	2	2	1	1
<i>C. borealis</i> Stenroos – Glattraudbeger	1	1	1	1	–
<i>C. cariosa</i> (Ach.) Spreng. – Småtrevelav	1	1	1	1	1
<i>C. carneola</i> (Fr.) Fr. – Bleikbeger	1	2	2	1	1
<i>C. cenotea</i> (Ach.) Schaer. – Mjøltraktlav	3	3	–	1	1
<i>C. cervicornis</i> (Ach.) Flot. – Etasjepolster	3	3	–	1	1
<i>C. chlorophaea</i> (Flörke ex Sommerf.) Spreng. – Pulverbrunbeger	1	1	2	1	–
<i>C. coccifera</i> (L.) Willd. – Grynraudbeger	–	–	–	1	1
<i>C. cornuta</i> (L.) Hoffm. – Skogsyl	3	3	–	1	1
<i>C. crispata</i> (Ach.) Flot. – Traktlav	2	2	–	1	1
<i>C. cyanipes</i> (Sommerf.) Nyl. – Blåfotlav	2	1	–	1	1
<i>C. deformis</i> (L.) Hoffm. – Bergfauskav	2	2	2	1	1
<i>C. ecmocyna</i> Leight. – Snøsyl	–	–	–	–	–
<i>C. fimbriata</i> (L.) Fr. – Mjølbeger	2	1	–	1	1
<i>C. floerkeana</i> (Fr.) Flörke – Kystraudtopp	3	3	–	1	1
<i>C. gracilis</i> (L.) Willd. – Syllav	3	–	1	1	–
<i>C. luteoalba</i> Wheldon & A. Wilson – Gulskjel	2	–	2	1	1
<i>C. macroceras</i> (Delise) Hav.	1	–	2	–	–
<i>C. macrophylla</i> (Schaer.) Stenh. – Trevlelav	1	–	–	1	1
<i>C. macrophyllodes</i> Nyl. – Krittiskjel	1	–	2	1	1
<i>C. maxima</i> (Asahina) Ahti – Storsyl	–	3	–	–	–
<i>C. merochlorophaea</i> Asahina – Brunbeger	3	–	–	1	1
<i>C. phyllophora</i> Hoffm. – Svartfotlav	2	2	–	1	1
<i>C. pleurota</i> (Flörke) Schaer. – Pulverraudbeger	2	2	1	1	1
<i>C. pocillum</i> (Ach.) Grognot – Kalkbeger	1	1	2	1	1
<i>C. pyxidata</i> (L.) Hoffm. – Kornbrunbeger	1	1	–	1	–

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	R	P	E	A	I
<i>C. rangiferina</i> (L.) Weber ex F.H. Wigg. – Grå reinlav	1	2	3	2	3
<i>C. squamosa</i> Hoffm. – Fnaslav	3	3	–	1	1
<i>C. stellaris</i> (Opiz) Pouzar & Vězda – Kvitkrull	3	3	–	1	1
<i>C. stricta</i> (Nyl.) Nyl. – Glatt svartfotlav	1	1	2	1	1
<i>C. stygia</i> (Fr.) Ruoss – Svartfotreinlav	3	2	–	1	1
<i>C. subfurcata</i> (Nyl.) Arnold – Fjellgaffellav	2	–	–	1	1
<i>C. subulata</i> (L.) Weber ex F.H. Wigg. – Hornlav	2	–	2	1	1
<i>C. symphycharpa</i> (Flörke) Fr. – Kalkpolster	3	–	–	1	1
<i>C. turgida</i> Hoffm. – Narreskjel	3	3	–	1	1
<i>C. uncialis</i> (L.) Weber ex F.H. Wigg. – Pigglav	1	1	1	1	3
<i>Collema bachmanianum</i> (Fink) Degel. – Tannjordglye	2	–	–	1	1
<i>C. ceraniscum</i> Nyl. – Fjellglye	1	1	3	1	1
<i>C. cristatum</i> (L.) Weber ex F.H. Wigg. – Fingerglye	2	1	3	1	1
<i>C. flaccidum</i> (Ach.) Ach. – Skjelglye	3	–	–	1	1
<i>C. parvum</i> Degel. – Småglye	3	–	–	1	1
<i>C. polycarpon</i> Hoffm. – Skålglye	2	1	3	1	1
<i>C. tenax</i> (Sw.) Ach. em. Degel. – Jordglye	1	1	–	1	1
<i>C. undulatum</i> Laurer ex Flot. – Krusglye	3	–	–	1	1
<i>Cystocoleus ebeneus</i> (Dillwyn) Thwaites	3	–	–	1	1
<i>Dactylina arctica</i> (M.J. Richardson) Nyl.	2	3	–	1	1
<i>D. ramulosa</i> (Hook.) Tuck.	1	3	2	1	1
<i>Dermatocarpon intestiniforme</i> (Körb.) Hasse – Putelær	2	2	2	1	1
<i>D. rivulorum</i> (Arnold) Dalla Torre & Sarnth. – Brunlær	3	3	3	1	1
<i>D. spitsbergense</i> Lynge	2	3	3	1	1
<i>Dimelaena oreina</i> (Ach.) Norman	2	3	3	3	1
<i>Eiglera flavida</i> (Hepp) Hafellner	2	1	–	1	1
<i>Endocarpon pulvinatum</i> Th. Fr.	1	2	3	2	1
<i>Epilichen scabrosus</i> (Ach.) Clem.	3	3	3	1	1
<i>Euopsis granatina</i> (Sommerf.) Nyl.	3	–	–	1	1
<i>E. pulvinata</i> (Schaer.) Vain.	2	1	–	1	1
<i>Farnoldia hypocrita</i> (A. Massal.) Frøberg	2	–	–	1	1
<i>F. jurana</i> (Schaer.) Hertel	2	2	–	1	1
<i>F. micropsis</i> (A. Massal.) Hertel	2	1	2	1	1
<i>Flavocetraria cucullata</i> (Bellardi) Kärnefelt & Thell – Gulsjerpe	1	1	1	3	3
<i>F. nivalis</i> (L.) Kärnefelt & Thell – Gulskinn	1	1	2	3	3
<i>Fruitedella caesioatra</i> (Schaer.) Kalb	2	1	–	1	1
<i>Fulgensia bracteata</i> (Hoffm.) Räsänen	1	1	3	1	1
<i>Fuscopannaria leucophaea</i> (Vahl) P.M. Jørg.	3	3	–	1	1
<i>F. praetermissa</i> (Nyl.) P.M. Jørg.	1	1	–	1	1
<i>Gyalecta foveolaris</i> (Ach.) Schaer.	3	–	3	1	1
<i>G. geoica</i> (Wahlenb. ex Ach.) Ach.	2	3	–	1	1
<i>G. subclausa</i> Anzi	3	–	3	1	1
<i>Gyalidea rivularis</i> (Eitner) Nowak & Tobol.	3	3	3	1	1
<i>Halecania alpivaga</i> (Th. Fr.) M. Mayrhofer	3	2	3	1	1
<i>Hymenelia arctica</i> (Lynge) Lutzoni	2	2	–	1	1
<i>H. ceracea</i> (Arnold) Poelt & Vězda	2	–	–	1	1
<i>H. epulotica</i> (Ach.) Lutzoni	3	3	3	1	1
<i>H. haematina</i> (Körb) Lutzoni	3	–	–	1	1
<i>H. heteromorpha</i> (Kremp) Lutzoni	3	3	3	1	1
<i>H. melanocarpa</i> (Kremp) Arnold	3	3	3	1	1
<i>H. rhodopsis</i> (Sommerf.) Lutzoni	2	2	2	1	1
<i>Hypogymnia austerodes</i> (Nyl.) Räsänen – Seterlav	3	3	3	1	1
<i>H. physodes</i> (L.) Nyl. – Vanleg kvistlav	2	3	–	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>H. subobscura</i> (Vain.) Poelt	–	–	3	1	1
<i>Ionaspis lacustris</i> (With.) Lutzoni	1	1	–	1	1
<i>I. odora</i> (Ach.) Th. Fr. ex Stein	3	3	–	1	1
<i>Japewia tornøensis</i> (Nyl.) Tønsberg	1	1	1	1	1
<i>Lecania aipospila</i> (Wahlenb.) Th. Fr.	2	2	3	1	1
<i>L. erysibe</i> (Ach.) Mudd	3	–	3	1	1
<i>L. nylanderiana</i> A. Massal.	3	–	3	1	1
<i>L. suavis</i> (Müll. Arg.) Mig.	3	–	–	1	1
<i>Lecanora actophila</i> Wedd.	3	3	3	1	1
<i>L. argopholis</i> (Ach.) Ach.	3	3	2	1	1
<i>L. atromarginata</i> (H. Magn.) Hertel & Rambold	1	–	2	1	1
<i>L. atrosulphurea</i> (Wahlenb.) Ach.	1	–	2	1	1
<i>L. bennettii</i> Lynge	2	–	2	1	1
<i>L. cenisia</i> Ach.	2	–	–	1	1
<i>L. contractula</i> Nyl.	2	2	3	1	1
<i>L. epibryon</i> (Ach.) Ach.	1	1	1	1	1
<i>L. flotowiana</i> Spreng.	1	1	2	1	1
<i>L. frustulosa</i> (Dicks.) Ach.	3	–	–	1	1
<i>L. hadacii</i> Lynge	3	3	3	1	1
<i>L. hagenii</i> (Ach.) Ach.	2	1	1	1	1
<i>L. intricata</i> (Ach.) Ach.	3	–	–	1	1
<i>L. leptacina</i> Sommerf.	3	–	3	1	1
<i>L. leucophaeoides</i> Nyl.	3	–	–	1	1
<i>L. leucococca</i> Sommerf.	2	1	1	1	1
<i>L. luteovernalis</i> Brodo	2	3	3	1	1
<i>L. micheleri</i> (Hertel) Hertel	3	3	2	1	1
<i>L. muralis</i> (Schreb.) Rabenh.	3	–	–	1	1
<i>L. nordenskiöldii</i> Vain.	3	–	3	1	1
<i>L. orae-frigidiae</i> R. Sant.	1	2	3	1	1
<i>L. polytropa</i> (Ehrh. ex Hoffm.) Rabenh.	1	1	1	2	1
<i>L. polytropella</i> Nyl.	3	–	–	1	1
<i>L. rupicola</i> (L.) Zahlbr.	2	2	–	1	1
<i>L. straminea</i> Ach.	3	3	3	1	1
<i>L. swartzii</i> (Ach.) Ach.	3	–	–	1	1
<i>L. torrida</i> Vain.	2	3	3	1	1
' <i>Lecidea</i> ' <i>alpestris</i> Sommerf.	2	–	–	1	1
<i>L. atrobrunnea</i> (Ramond ex Lam. & DC.) Schaer.	1	3	2	2	1
<i>L. auriculata</i> Th. Fr.	1	1	2	1	1
' <i>L.</i> ' <i>collodea</i> (Th. Fr.) Leight.	2	3	–	1	1
' <i>L.</i> ' <i>commaculans</i> Nyl.	3	3	–	1	1
<i>L. confluens</i> (Weber) Ach.	2	2	3	1	1
<i>L. ecrustacea</i> (Anzi ex Arnold) Arnold	3	3	–	1	1
' <i>L.</i> ' <i>ementiens</i> Nyl.	2	3	–	1	1
' <i>L.</i> ' <i>epiphaea</i> Nyl.	2	–	–	1	1
' <i>L.</i> ' <i>ileiformis</i> Fr.	3	–	3	1	1
<i>L. lapicida</i> (Ach.) Ach.	1	1	2	1	1
' <i>L.</i> ' <i>limosa</i> Ach.	2	–	3	1	1
' <i>L.</i> ' <i>lurida</i> Ach.	3	2	–	1	1
' <i>L.</i> ' <i>minutissima</i> Lynge	3	3	–	1	1
' <i>L.</i> ' <i>miseriae</i> Lynge	3	3	–	1	1
' <i>L.</i> ' <i>paanaënsis</i> Räsänen & M. Laurila	3	–	–	1	1
<i>L. paupercula</i> Th. Fr.	2	1	2	1	1
' <i>L.</i> ' <i>picea</i> Lynge	3	3	–	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>L. plana</i> (J. Lahm) Nyl.	3	–	–	1	1
' <i>L.</i> ' <i>polycocca</i> Sommerf.	3	–	2	1	1
' <i>L.</i> ' <i>polytrichina</i> Hertel	3	3	3	1	1
' <i>L.</i> ' <i>polytrichinella</i> Hertel, W. Obermayer & Poelt	3	3	3	1	1
<i>L. praenubila</i> Nyl.	3	3	–	1	1
' <i>L.</i> ' <i>ramulosa</i> Th. Fr.	1	2	2	3	–
<i>L. rhagadiella</i> (Nyl.) Th. Fr.	3	–	–	1	1
' <i>L.</i> ' <i>scrobiculata</i> (Th. Fr.) Th. Fr.	3	–	–	1	1
' <i>L.</i> ' <i>septentrionalis</i> Th. Fr.	3	–	3	1	1
<i>L. silacea</i> Ach.	3	–	–	1	1
<i>L. steineri</i> Hertel	3	–	–	1	1
<i>L. swartzioidea</i> Nyl.	2	–	–	1	1
<i>L. symphycarpea</i> Lyng	3	–	–	1	1
<i>L. syncarpa</i> Zahlbr.	1	–	3	2	1
<i>L. tessellata</i> Flörke	2	1	–	1	1
<i>L. umbonata</i> (Hepp) Mudd	3	–	3	1	1
<i>L. verruca</i> Poelt	3	–	3	1	1
<i>Lecidella aemulans</i> Arnold	3	–	–	1	1
<i>L. bullata</i> Körb.	2	2	3	1	1
<i>L. effugiens</i> (Nilson) Knoph & Hertel	3	–	–	1	1
<i>L. elaeochroma</i> (Ach.) M. Choisy sensu lato	2	2	3	1	1
<i>L. euphorea</i> (Flörke) Hertel	3	3	3	1	1
<i>L. patavina</i> (A. Massal.) Knoph & Leuckert	1	2	–	1	1
<i>L. stigmata</i> (Ach.) Hertel & Leuckert	1	1	1	1	1
<i>L. wulfenii</i> (Hepp) Körb.	2	3	–	1	1
<i>Lecidoma demissum</i> (Rutstr.) Gotth. Schneid. & Hertel	2	1	2	1	1
<i>Leciophysma finmarkicum</i> Th. Fr.	1	2	3	1	1
<i>Lempholemma isidioides</i> (Nyl. ex Arnold) H. Magn.	3	–	3	1	1
<i>Lepraria neglecta</i> (Nyl.) Erichsen	1	1	–	1	1
<i>Leproloma vouauxii</i> (Hue) J.R. Laundon	3	–	1	1	1
<i>Leptogium byssinum</i> (Hoffm.) Zwackh ex Nyl.	3	3	2	1	1
<i>L. gelatinosum</i> (With.) J.R. Laundon – Tuvehinnelav	3	–	–	1	1
<i>L. lichenoides</i> (L.) Zahlbr. – Flishinnelav	1	1	1	1	1
<i>L. saturninum</i> (Dicks.) Nyl. – Filthinnelav	3	3	3	1	1
<i>L. subtile</i> (Schrad.) Torss.	3	3	–	1	1
<i>L. tenuissimum</i> (Dicks.) Körb.	2	–	–	1	1
<i>Lobaria linita</i> (Ach.) Rabenh. – Fjellnever	1	1	2	1	1
<i>Lobothallia alphoplaca</i> (Wahlenb.) Hafellner	2	–	3	1	1
<i>L. melanaspis</i> (Ach.) Hafellner	3	3	–	1	1
<i>Lopadium coralloideum</i> (Nyl.) Lyng	2	3	–	1	1
<i>L. pezizoideum</i> (Ach.) Körb.	2	2	–	1	1
<i>Massalongia carnosa</i> (Dicks.) Körb. – Moseskjel	3	3	–	1	1
<i>Megaspore verrucosa</i> (Ach.) Hafellner & V. Wirth	1	1	3	1	1
<i>Melanelia disjuncta</i> (Erichsen) Essl. – Svart steinlav	1	1	2	1	1
<i>M. hepatizon</i> (Ach.) Thell	1	1	2	2	–
<i>M. infumata</i> (Nyl.) Essl. – Rimkrinslav	1	1	3	1	1
<i>M. soreliata</i> (Ach.) Goward & Ahti – Hovudsteinlav	2	1	2	1	1
<i>M. stygia</i> (L.) Essl. – Blankkrinslav	2	2	3	1	1
<i>Melanolecia transitoria</i> (Arnold) Hertel	3	–	3	1	1
<i>Micarea assimilata</i> (Nyl.) Coppins	1	–	–	1	1
<i>M. incrassata</i> Hedl.	3	3	3	1	1
<i>Miriquidica atrofulva</i> (Sommerf.) A.J. Schwab & Rambold	1	2	3	2	1
<i>M. complanata</i> (Körb.) Hertel & Rambold	3	–	–	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>M. garovaglii</i> (Schaer.) Hertel & Rambold	3	–	–	1	1
<i>M. griseoatra</i> (Flot.) Hertel & Rambold	2	3	–	1	1
<i>M. leucophaea</i> (Flörke ex Rabenh.) Hertel & Rambold	3	–	2	1	1
<i>M. lulensis</i> (Hellb.) Hertel & Rambold	1	1	2	1	1
<i>M. nigroleprosa</i> (Vain.) Hertel & Rambold	2	1	2	1	1
<i>Mycobilimbia berengeriana</i> (A. Massal.) Hafellner & V. Wirth	2	2	–	1	1
<i>M. hypnorum</i> (Lib.) Kalb & Hafellner	2	1	2	1	1
<i>M. lobulata</i> (Sommerf.) Hafellner	1	1	3	2	1
<i>M. microcarpa</i> (Th. Fr.) Brunnb.	2	1	–	1	1
<i>M. sabuletorum</i> (Schreb.) Hafellner	3	–	2	1	1
<i>Mycoblastus alpinus</i> (Fr.) Th. Fr. ex Hellb.	3	–	3	1	1
<i>Nephroma arcticum</i> (L.) Torss. – Storvrenge	2	2	2	1	1
<i>N. expallidum</i> (Nyl.) Nyl. – Fjellvrenge	1	1	2	1	1
<i>N. parile</i> (Ach.) Ach. – Grynvenge	3	3	–	1	1
<i>Neuropogon sphacelatus</i> (R. Br.) D.J. Galloway	1	2	3	2	–
<i>Ochrolechia androgyna</i> (Hoffm.) Arnold	2	2	–	1	1
<i>O. frigida</i> (Sw.) Lynge	1	1	1	3	–
<i>O. grimmiae</i> Lynge	1	1	3	1	1
<i>O. inaequatula</i> (Nyl.) Zahlbr.	3	–	1	1	1
<i>Omphalina alpina</i> (Britzelm.) Bresinsky & Stangl – Kantarellnavlesopp	1	3	3	1	1
<i>O. hudsoniana</i> (H.S. Jenn.) H.E. Bigelow – Lærnavlesopp	2	2	2	1	1
<i>O. umbellifera</i> (L.: Fr.) Quélet – Torvnavlesopp	1	2	2	1	1
<i>O. velutina</i> (Quélet) Quélet – Dvergnavesopp	2	2	1	1	1
<i>Ophioparma lapponica</i> (Räsänen) Hafellner & R.W. Rogers	1	2	3	1	1
<i>Orphniospora moriopsis</i> (A. Massal.) D. Hawksw.	1	1	3	2	1
<i>Pannaria hookeri</i> (Borrer ex Sm.) Nyl. – Fjellfjelllav	1	1	3	1	1
<i>P. pezizoides</i> (Weber) Trevis. – Skålfjelllav	1	1	1	1	1
<i>Parmelia omphalodes</i> (L.) Ach. – Brun fargelav	1	2	2	1	1
<i>P. saxatilis</i> (L.) Ach. – Grå fargelav	1	1	2	1	1
<i>P. skultii</i> Hale	2	2	2	1	1
<i>P. sulcata</i> Taylor – Bristlav	1	1	2	1	1
<i>Parmeliella arctophila</i> (Th. Fr.) Malme	2	1	–	1	1
<i>P. triptophylla</i> (Ach.) Müll. Arg. – Stiftfjelllav	3	3	–	1	1
<i>Parmeliopsis ambigua</i> (Wulfen) Nyl. – Gul stokklav	2	3	3	1	1
<i>Peltigera aphthosa</i> (L.) Willd. – Grønnever	1	1	–	1	1
<i>P. canina</i> (L.) Willd. – Bikkjenever	1	1	1	1	1
<i>P. collina</i> (Ach.) Schrad. – Kystårenever	3	3	–	1	1
<i>P. didactyla</i> (With.) J.R. Laundon – Smånever	1	1	2	1	1
<i>P. frippii</i> Holt.-Hartw. – Skjørnever	3	3	–	1	1
<i>P. kristinssonii</i> Vitik. – Ru brunnever	2	2	–	1	1
<i>P. lepidophora</i> (Nyl. ex Vain.) Bitter – Skjoldnever	1	1	2	1	1
<i>P. leucophlebia</i> (Nyl.) Gyeln. – Åregrønnever	1	1	1	1	1
<i>P. lyngei</i> Gyeln.	2	3	–	1	1
<i>P. malacea</i> (Ach.) Funck – Mattnever	1	1	1	1	1
<i>P. membranacea</i> (Ach.) Nyl. – Hinnenever	1	1	–	1	1
<i>P. neckeri</i> Hepp ex Müll. Arg. – Jordnever	2	–	–	1	1
<i>P. polydactylon</i> (Neck.) Hoffm. – Fingernever	2	3	–	1	1
<i>P. ponjensis</i> Gyeln. – Grånever	3	3	1	1	1
<i>P. praetextata</i> (Flörke ex Sommerf.) Zopf – Skjelnever	2	3	–	1	1
<i>P. rufescens</i> (Weiss) Humb. – Brunnever	1	1	2	1	1
<i>P. scabrosa</i> Th. Fr. – Runever	1	1	1	1	1
<i>P. scabrosella</i> Holt.-Hartw. – Sildrenever	3	3	–	1	1
<i>P. venosa</i> (L.) Hoffm. – Kalknever	1	1	2	1	1

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	R	P	E	A	I
<i>Pertusaria bryontha</i> (Ach.) Nyl.	3	–	–	1	1
<i>P. coriacea</i> (Th. Fr.) Th. Fr.	2	3	–	1	1
<i>P. dactylina</i> (Ach.) Nyl.	3	–	–	1	1
<i>P. geminipara</i> (Th. Fr.) C. Knight ex Brodo	2	2	2	1	1
<i>P. glomerata</i> (Ach.) Schaer.	3	–	–	1	1
<i>P. oculata</i> (Dicks.) Th. Fr.	1	1	2	1	1
<i>P. panyrga</i> (Ach.) A. Massal.	2	–	–	1	1
<i>Phaeophyscia constipata</i> (Norrl. & Nyl.) Moberg – Kalkrosettflav	2	2	3	2	1
<i>P. endococcinea</i> (Körb.) Moberg – Raudmarglav	2	1	2	1	1
<i>P. kairamoi</i> (Vain.) Moberg – Skjelrosettflav	3	3	2	1	1
<i>P. nigricans</i> (Flörke) Moberg – Svart rosettflav	2	–	–	1	1
<i>P. sciastra</i> (Ach.) Moberg – Stiftrosettflav	1	1	2	1	1
<i>Phaeorrhiza nimbose</i> (Fr.) H. Mayrhofer & Poelt	2	2	3	1	1
<i>Physcia caesia</i> (Hoffm.) Fűrnr. – Hovudrosettflav	1	1	1	2	1
<i>P. dubia</i> (Hoffm.) Lettau – Fuglesteinlav	1	1	2	2	1
<i>P. tenella</i> (Scop.) DC. ssp. <i>marina</i> (A. Nyl.) D. Hawksw. – Frynserosettflav	2	2	3	1	1
<i>Physconia muscigena</i> (Ach.) Poelt – Kalkdogglav	1	1	2	2	1
<i>Pilophorus cereolus</i> (Ach.) Th. Fr. – Grynkolve	3	2	2	1	1
<i>P. dovrensis</i> (Nyl.) Timdal, Hertel & Rambold – Skorpekolve	2	2	–	1	1
<i>P. robustus</i> Th. Fr. – Fjellkolve	2	2	3	1	1
<i>Placidopsis pseudocinerea</i> Breuss	3	3	–	1	1
<i>Placopsis gelida</i> (L.) Linds.	1	1	2	1	1
<i>Placynthiella icmalea</i> (Ach.) Coppins & P. James	3	–	–	1	1
<i>P. uliginosa</i> (Schröd.) Coppins & P. James	3	–	–	1	1
<i>Placynthium asperellum</i> (Ach.) Trevis.	1	1	3	1	1
<i>P. nigrum</i> (Huds.) Gray	1	2	3	1	1
<i>P. pannariellum</i> (Nyl.) H. Magn.	2	1	–	1	1
<i>P. tantaleum</i> (Hepp) Hue	3	–	–	1	1
<i>Pleopsidium chlorophanum</i> (Wahlenb.) Zopf	1	1	3	1	1
<i>Polyblastia albida</i> Arnold	3	–	3	1	1
<i>P. bryophila</i> Lönnr.	2	1	–	1	1
<i>P. cruenta</i> (Körb.) P. James & Swinscow	3	–	–	1	1
<i>P. cupularis</i> A. Massal.	3	–	3	1	1
<i>P. epomphala</i> (Nyl.) Zschacke	3	–	–	1	1
<i>P. gelatinosa</i> (Ach.) Th. Fr.	2	–	3	1	1
<i>P. gothica</i> Th. Fr.	3	–	–	1	1
<i>P. helvetica</i> Th. Fr.	3	–	–	1	1
<i>P. hyperborea</i> Th. Fr.	2	–	3	1	1
<i>P. intermedia</i> Th. Fr.	3	–	–	1	1
<i>P. melaspora</i> (Taylor) Zahlbr.	3	1	–	1	1
<i>P. sendtneri</i> Kremp.	2	–	3	1	1
<i>P. sepulta</i> A. Massal.	3	–	3	1	1
<i>P. terrestris</i> Th. Fr.	3	–	–	1	1
<i>P. theleodes</i> (Sommerf.) Th. Fr.	2	–	3	1	1
<i>Polychidium muscicola</i> (Sw.) Gray	3	–	–	1	1
<i>Polysporina simplex</i> (Davies) Vězda	2	1	–	1	1
<i>P. urceolata</i> (Anzi) Brodo	2	–	3	1	1
<i>Porina mammillosa</i> (Th. Fr.) Vain.	3	3	–	1	1
<i>Porpidia cinereoatra</i> (Ach.) Hertel & Knoph	2	3	–	1	1
<i>P. crustulata</i> (Ach.) Hertel & Knoph	3	3	–	1	1
<i>P. flavicunda</i> (Ach.) Gowan	3	–	–	1	1
<i>P. glaucophaea</i> (Körb.) Hertel & Knoph	2	2	–	1	1
<i>P. macrocarpa</i> (DC.) Hertel & A.J. Schwab	1	1	2	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>P. melinodes</i> (Körb.) Gowan & Ahti	1	1	2	3	1
<i>P. ochrolemma</i> (Vain) Brodo & R. Sant.	2	3	–	1	1
<i>P. speirea</i> (Ach.) Kremp.	2	1	2	1	1
<i>P. superba</i> (Körb.) Hertel & Knoph	2	2	–	1	1
<i>P. trullisata</i> (Ach.) Körb.	3	–	–	1	1
<i>P. tuberculosa</i> (Sm.) Hertel & Knoph	3	–	–	1	1
<i>Protoplastenia calva</i> (Dicks.) Zahlbr.	2	2	3	1	1
<i>P. incrustans</i> (DC.) J. Steiner	1	1	3	1	1
<i>P. rupestris</i> (Scop.) J. Steiner	1	2	3	1	1
<i>P. siebenhaariana</i> (Körb.) J. Steiner	2	1	2	1	1
<i>P. terricola</i> (Anzi) Lyngé	1	2	3	1	1
<i>Protoparmelia badia</i> (Hoffm.) Hafellner	2	1	2	1	1
<i>Protothelenella sphinctrinoidella</i> (Nyl.) H. Mayrhofer & Poelt	3	–	–	1	1
<i>P. sphinctrinoides</i> (Nyl.) H. Mayrhofer & Poelt	2	1	2	1	1
<i>Pseudephebe minuscula</i> (Nyl. ex Arnold) Brodo & D. Hawksw. – Småskjegg	1	1	2	1	1
<i>P. pubescens</i> (L.) M. Choisy – Vanleg steinskjegg	1	1	2	2	1
<i>Psilolechia lucida</i> (Ach.) M. Choisy	3	3	3	1	1
<i>Psora decipiens</i> (Hedw.) Hoffm.	2	1	3	1	1
<i>P. rubiformis</i> (Ach.) Hook.	2	1	2	1	1
<i>Psoroma hypnorum</i> (Vahl) Gray – Skjelfiltlav	1	1	1	1	1
<i>Pyrenocollema sublitorale</i> (Leight.) R.C. Harris ex A. Fletcher	3	3	3	1	1
<i>Rhizocarpon atroflavescens</i> Lyngé	3	–	–	1	1
<i>R. badioatrum</i> (Flörke ex Spreng.) Th. Fr.	2	2	2	1	1
<i>R. caeruleoalbum</i> (Kremp.) Zahlbr.	2	3	–	1	1
<i>R. chioneum</i> (Norman) Th. Fr.	1	1	3	1	1
<i>R. cinereovirens</i> (Müll. Arg.) Vain.	3	3	3	1	1
<i>R. copelandii</i> (Körb.) Th. Fr.	1	1	2	1	1
<i>R. dispersum</i> Runemark	–	3	–	1	1
<i>R. distinctum</i> Th. Fr.	3	–	–	1	1
<i>R. eupetraeoides</i> (Nyl.) Blomb. & Forssell	2	3	2	1	1
<i>R. eupetraeum</i> (Nyl.) Arnold	3	3	–	1	1
<i>R. expallescens</i> Th. Fr.	2	2	2	1	1
<i>R. ferax</i> H. Magn.	2	1	2	–	1
<i>R. geminatum</i> Körb.	1	–	2	1	1
<i>R. geographicum</i> (L.) DC.	1	1	1	–	1
<i>R. glaucescens</i> (Th. Fr.) Zahlbr.	2	3	–	1	1
<i>R. grande</i> (Flörke) Arnold	1	1	2	1	1
<i>R. hochstetteri</i> (Körb.) Vain.	2	3	–	1	1
<i>R. inarense</i> (Vain.) Vain.	1	1	–	3	1
<i>R. intermediellum</i> Räsänen	2	–	–	1	1
<i>R. jemtlandicum</i> (Malme) Malme	1	–	2	1	1
<i>R. lavatum</i> (Fr.) Hazsl.	3	–	–	1	1
<i>R. macrosporum</i> Räsänen	3	–	–	1	1
<i>R. mahleri</i> Hafellner	3	3	2	1	1
<i>R. norvegicum</i> Räsänen	3	–	–	1	1
<i>R. obscuratum</i> (Ach.) A. Massal.	2	3	–	1	1
<i>R. oederi</i> (Weber) Körb.	3	–	–	1	1
<i>R. polycarpum</i> (Hepp) Th. Fr.	2	–	–	1	1
<i>R. pusillum</i> Runemark	2	3	3	1	1
<i>R. ritokense</i> (Hellb.) Th. Fr.	3	3	–	1	1
<i>R. roridulum</i> (Th. Fr.) H. Olivier	3	3	–	1	1
<i>R. saanaense</i> Räsänen	2	–	–	1	1
<i>R. superficialis</i> (Schaer.) Vain.	1	1	2	–	1



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	R	P	E	A	I
<i>R. umbilicatum</i> (Ramond) Flagey	2	2	2	1	1
<i>Rhizoplaca melanophthalma</i> (DC.) Leuckert & Poelt	1	1	3	2	1
<i>Rimularia impavida</i> (Th. Fr.) Hertel & Rambold	2	1	–	1	1
<i>R. insularis</i> (Nyl.) Hertel & Rambold	3	3	3	1	1
<i>R. psephota</i> (Tuck.) Hertel & Rambold	3	3	–	1	1
<i>Rinodina archaea</i> (Ach.) Arnold	3	3	3	1	1
<i>R. arnoldii</i> H. Mayrhofer & Poelt	3	–	–	1	1
<i>R. balanina</i> (Wahlenb.) Vain.	1	2	3	–	1
<i>R. bischoffii</i> (Hepp) A. Massal.	3	–	–	1	1
<i>R. cacuminum</i> (Th. Fr.) Malme (nom. illegit.)	2	3	3	1	1
<i>R. calcigena</i> (Th. Fr.) Lynge	2	3	–	1	1
<i>R. conradii</i> Körb.	2	–	1	1	1
<i>R. lecideoides</i> (Nyl.) Kernst.	2	3	–	1	1
<i>R. milvina</i> (Wahlenb.) Th. Fr.	2	–	–	1	1
<i>R. mniaraea</i> (Ach.) Körb.	1	1	–	1	1
<i>R. olivaceobrunnea</i> C.W. Dodge & G.E. Baker	3	–	–	1	1
<i>R. roscida</i> (Sommerf.) Arnold	2	1	1	1	1
<i>R. tephraeopsis</i> (Tuck.) Herre	3	–	–	1	1
<i>R. turfacea</i> (Wahlenb.) Körb.	1	1	1	1	1
<i>Sagiolechia protuberans</i> (Ach.) A. Massal.	2	3	2	1	1
<i>S. rhexoblephara</i> (Nyl.) Zahlbr.	3	3	–	1	1
<i>Sarcogyne algoviae</i> H. Magn.	3	3	3	1	1
<i>S. privigna</i> (Ach.) A. Massal.	2	–	–	1	1
<i>Schadonia fecunda</i> (Th. Fr.) Vězda & Poelt	3	3	–	1	1
<i>Schaereria fuscocinerea</i> (Nyl.) Clauzade & Roux	2	–	–	1	1
<i>Solorina bispora</i> Nyl. – Liten skållav	1	1	3	1	1
<i>S. crocea</i> (L.) Ach. – Safranlav	1	1	2	2	1
<i>S. octospora</i> Arnold – Stor skållav	2	2	–	1	1
<i>S. saccata</i> (L.) Ach. – Vanleg skållav	2	1	–	1	1
<i>S. spongiosa</i> (Ach.) Anzi – Svampskållav	2	1	3	1	1
<i>Sphaerophorus fragilis</i> (L.) Pers. – Grå korallav	1	3	3	1	1
<i>S. globosus</i> (Huds.) Vain. – Brun korallav	1	1	3	3	3
<i>Sporastatia polyspora</i> (Nyl.) Grummann	1	2	2	1	1
<i>S. tenuirimata</i> (Th. Fr.) Lynge	3	3	–	1	1
<i>S. testudinea</i> (Ach.) A. Massal.	1	1	2	2	1
<i>Squamarina poeltii</i> Vänskä	3	3	3	1	1
<i>Staurothele areolata</i> (Ach.) Lettau	2	2	3	1	1
<i>S. fuscocuprea</i> (Nyl.) Zschacke	2	2	3	1	1
<i>Stereocaulon alpinum</i> Laurer – Fjellsaltlav	1	1	1	3	3
<i>S. arcticum</i> Lynge	1	2	2	1	1
<i>S. arenarium</i> (Savicz) I.M. Lamb – Polarsaltlav	3	3	–	1	1
<i>S. botryosum</i> Ach. – Steinsaltlav	1	1	2	2	–
<i>S. capitellatum</i> H. Magn. – Hovudsaltlav	2	2	–	1	1
<i>S. condensatum</i> Hoffm. – Sandsaltlav	3	3	–	1	1
<i>S. depressum</i> (Frey) I.M. Lamb – Polstersaltlav	2	2	1	1	1
<i>S. glareosum</i> (Savicz) H. Magn. – Grussaltlav	3	3	–	1	1
<i>S. grande</i> (H. Magn.) H. Magn. – Stor saltlav	3	3	2	1	1
<i>S. groenlandicum</i> (E. Dahl) I.M. Lamb	3	3	–	1	1
<i>S. paschale</i> (L.) Hoffm. – Vanleg saltlav	3	3	–	1	1
<i>S. rivulorum</i> H. Magn. – Bresaltlav	1	1	1	2	–
<i>S. vesuvianum</i> Pers. – Skjoldsaltlav	2	3	2	1	1
<i>Strigula sychnogonoides</i> (Nitschke) R.C. Harris	3	3	3	1	1
<i>Tephromela aglaea</i> (Sommerf.) Hertel & Rambold	2	–	–	1	1

Scientific and Norwegian names	Ecosystem Component Values				
	R	P	E	A	I
<i>T. armeniaca</i> (DC.) Hertel & Rambold	2	1	2	1	1
<i>T. atra</i> (Huds.) Hafellner	1	1	1	1	1
<i>Thamnolia vermicularis</i> (Swartz) Schaer. – Makklav	1	1	2	1	2
<i>Thelidium antoniellianum</i> Bagl. & Carestia	3	3	3	1	1
<i>T. catractarum</i> (Hepp) Lönnr.	3	3	–	1	1
<i>T. pyrenophorum</i> (Ach.) Mudd	2	2	3	1	1
<i>Thelignya lignyota</i> (Wahlenb.) P.M. Jörg. & Henssen	3	3	–	1	1
<i>Thelocarpon epibolum</i> Nyl.	3	3	3	1	1
<i>Toninia aromatica</i> (Sm.) A. Massal.	3	3	3	1	1
' <i>Toninia</i> ' <i>cumulata</i> (Sommerf.) Th. Fr.	3	–	–	–	–
<i>T. sedifolia</i> (Scop.) Timdal	2	2	3	1	1
<i>T. squalida</i> (Ach.) A. Massal.	3	3	–	1	1
<i>T. verrucarioides</i> (Nyl.) Timdal	2	2	3	1	1
<i>Tremolecia atrata</i> (Ach.) Hertel	1	1	2	3	1
<i>Tuckermannopsis inermis</i> (Nyl.) Kärnefelt	3	3	3	1	1
<i>Umbilicaria aprina</i> Nyl. – Grå navlelav	2	2	2	1	1
<i>U. arctica</i> (Ach.) Nyl. – Vardelav	1	1	2	3	–
<i>U. crustulosa</i> (Ach.) Frey – Knappskjold	3	3	–	1	1
<i>U. cylindrica</i> (L.) Delise ex Duby – Frynseskjold	1	1	2	2	1
<i>U. decussata</i> (Vill.) Zahlbr. – Åsnavlelav	1	1	3	3	–
<i>U. deusta</i> (L.) Baumg. – Stiftnavlelav	2	3	–	1	1
<i>U. hyperborea</i> (Ach.) Hoffm. – Vanleg navlelav	1	1	2	1	1
<i>U. kraschennikovii</i> (Savicz) Zahlbr.	2	2	–	1	1
<i>U. lyngei</i> Schol. – Rynkeskjold	1	2	–	1	1
<i>U. polyphylla</i> (L.) Baumg. – Glatt navlelav	3	3	–	1	1
<i>U. proboscidea</i> (L.) Schrad. – Rimnavlelav	1	1	2	1	1
<i>U. rigida</i> (Du Rietz) Frey – Lærnavlelav	3	3	–	1	1
<i>U. torrefacta</i> (Lightf.) Schrad. – Soll-lav	1	1	2	2	1
<i>U. vellea</i> (L.) Hoffm. – Lys navlelav	1	3	3	3	1
<i>U. virginis</i> Schaer. – Fjellnavlelav	1	2	3	2	1
<i>Varicellaria rhodocarpa</i> (Körb.) Th. Fr.	3	–	–	1	1
<i>Verrucaria aethiobola</i> Wahlenb.	3	–	–	1	1
<i>V. cauleptoides</i> (Nyl.) Nyl.	3	–	–	1	1
<i>V. ceuthocarpa</i> Wahlenb.	3	–	–	1	1
<i>V. deversa</i> Vain.	3	–	3	1	1
<i>V. extrema</i> Th. Fr.	2	3	3	1	1
<i>V. halophiloides</i> Vain.	2	–	–	1	1
<i>V. integra</i> (Nyl.) Nyl.	3	3	3	1	1
<i>V. margacea</i> (Wahlenb.) Wahlenb.	3	–	3	1	1
<i>V. maura</i> Wahlenb.	2	1	3	1	1
<i>V. nigrescens</i> Pers.	2	2	3	1	1
<i>V. rejecta</i> Th. Fr.	3	–	3	1	1
<i>V. wilczekii</i> Körb.	3	3	3	1	1
<i>Vestergrenopsis elaeina</i> (Wahlenb.) Gyeln.	2	2	3	1	1
<i>V. isidiata</i> (Degel.) E. Dahl	1	2	3	1	1
<i>Xanthoria borealis</i> R. Sant. & Poelt – Fjellmessinglav	–	2	3	1	1
<i>X. candelaria</i> (L.) Th. Fr. – Grynnessinglav	1	1	3	2	1
<i>X. elegans</i> (Link) Th. Fr. – Raudberglav	1	1	2	3	1
<i>X. sorediata</i> (Vain.) Poelt – Kalkmessinglav	1	1	2	–	1

## Comments

### *Acarospora badiofusca* (Nyl.) Th. Fr.

A very scanty material was reported from two localities at Van Keulenfjorden by Magnusson (1935).

### *Acarospora fuscata* (Schrad.) Th. Fr.

Reported from three localities by Magnusson (1935), as "very scantily" or as "not typical", and Summerhayes & Elton (1928) reported f. *flavescens* H. Magn. from Dirksbukta (Wijdefjorden). A reaffirmation of its status is strongly needed.

### *Acarospora glaucocarpa* (Ach.) Körb.

Reported from limestone at Sorgfjorden (= Treurenberg Bay) and from another unnamed locality by Fries (1867) and from Grønfjorden and five localities at Van Mijenfjorden by Magnusson (1935).

### *Acarospora hospitans* H. Magn.

Only recorded from Hornsund (Nowak 1965). The taxon has been treated as *A. impressula* Th. Fr. var. *hospitans* (H. Magn.) Clauzade & Roux (Clauzade & Roux 1981).

### *Acarospora molybdina* (Wahlenb.) A. Massal.

A common species on Svalbard typical of seashore siliceous rocks and rocks manured by birds. It was mapped by Hertel & Ullrich (1976).

### *Acarospora peliscypha* Th. Fr.

Reported from two unnamed localities by Fries (1867), and Magnusson (1935) cited one collection by T. Fries from Grønfjorden.

### *Acarospora persimilis* H. Magn.

Described from Greenland and Spitsbergen by Magnusson (1935). It was reported from Sveagruva at Van Mijenfjorden and Forsbladhamna

at Van Keulenfjorden. The taxon is lacking from basic reference sources and is in need of reevaluation.

### *Acarospora rosulata* (Th. Fr.) H. Magn.

In Scandinavia only known from the central interior part of southern Norway (Santesson 1993). Collected in 1868 at Adventfjorden by T. Fries (Magnusson 1935).

### *Acarospora rugulosa* Körb.

Only reported once from Van Mijenfjorden (Magnusson 1935). The material was characterised by Magnusson (1935) as "very scantily and uncertain", and a reaffirmation of its occurrence on Svalbard is needed.

### *Acarospora scabrida* Hedl. ex H. Magn.

Only known from Bjørnøya (Lynge 1926b).

### *Acarospora scyphulifera* Vain.

A rare species known only from Greenland, Finland, Norway (Tromsø), the British Isles, and Svalbard, where it was reported from Amsterdamøya (Hertel & Ullrich 1976). It was treated as *A. smaragdula* (Wahlenb.) A. Massal. var. *scyphulifera* (Vain.) Clauzade & Roux by Clauzade & Roux (1981).

### *Acarospora sinopica* (Wahlenb.) Körb.

Reported from Eholmen at Van Keulenfjorden by Magnusson (1935) and from Kongsfjorden and Longyearbyen by Hertel (1977a). It grows on siliceous rocks rich in iron.

### *Acarospora smaragdula* (Wahlenb.) A. Massal.

Collected both by J. Vahl and A. E. Norden-skiöld, but the material is transitory to *A. sinopica* (Fries 1867) and the determinations are in need of confirmation. It was reported from Nordaustlandet by Paulson (1928) and from Adventfjorden by Magnusson (1935). Recently *A. smaragdula* was reported from many localities

at Sørkapp Land by Olech (1990) and from Edge-øya by Aptroot & Alstrup (1991).

*Acarospora veronensis* A. Massal.

Recorded from Dirksbukta (Wijdefjorden) by Summerhayes & Elton (1928) and from Van Keulenfjorden by Magnusson (1935).

*Adelolecia kolaensis* (Nyl.) Hertel & Rambold

Correctly reported from Hopen (Lyng 1926a, as *Lecidea conferenda*) and from Jan Mayen (Lyng 1939b, als *Lecidea kolaensis*). This inconspicuous and easily overlooked species is rarely collected, but is widespread, especially in northern Europe. It colonises a variety of substrates, including drift wood, bark (*Betula*, *Rhododendron*, *Salix*), acidic and slightly calciferous rocks (see Hertel & Rambold 1995).

*Adelolecia pilati* (Hepp) Hertel & Hafellner

Reported from 'West Station' by Paulson (1928 – no material in BM) and from Bolterdalen near Longyearbyen by Hertel (1977a). A relatively rare alpine species which prefers perpendicular to overhanging sites of not too hard siliceous rocks, often rich in iron (see also Hertel & Rambold 1995).

*Alectoria nigricans* (Ach.) Nyl.

A common species on ridges in areas with stable substrates and where the lichen vegetation has not been destroyed by reindeer grazing. The species is bipolar (Hertel 1988).

*Alectoria ochroleuca* (Hoffm.) A. Massal.

A strictly northeastern species on Svalbard (Lyng 1938), but the species has been reported from Bjørnøya (Paulson 1923; Summerhayes & Elton 1923). It belongs to a phytogeographically interesting element on Svalbard called the "North Coast Lichens" by Lyng (1938). Most of these species are very common and widespread species in Scandinavia. *Alectoria ochroleuca* was included in phytosociological tables from the Ny-Ålesund

area by Brossard et al. (1984) and Nimis (1985), but it is suspected to be a misprinting for *A. nigricans*.

*Alectoria sarmentosa* (Ach.) Ach. ssp. *vexillifera* (Nyl.) D. Hawksw.

Only found once at Kobbefjorden in the north-western part (Lyng 1938). Phytogeographically interesting as it is a coastal alpine species in Scandinavia.

*Allantoparmelia alpicola* (Th. Fr.) Essl.

A common species on siliceous rocks.

*Amandinea coniops* (Wahlenb.) M. Choisy ex Scheid. & H. Mayrhofer

A common species, long known as *Buellia coniops*, on sea shore rocks and manured rocks. It is bipolar (Hertel 1988) and was mapped on Svalbard by Hertel & Ullrich (1976).

*Amandinea punctata* (Hoffm.) Coppins & Scheid.

Reported mostly from northern Svalbard by Fries (1867), Lyng (1939a), Hertel & Ullrich (1976), and with some uncertainty from Bjørnøya by Lyng (1926b, as *Buellia punctiformis* var. *punctata*). The species was mapped on Svalbard by Hertel & Ullrich (1976) and has a bipolar distribution (Hertel 1988).

*Amygdalaria consentiens* (Nyl.) Hertel, Brodo & Mas. Inoue

Reported from Bjørnøya by Lyng (1926b).

*Amygdalaria panaeola* (Ach.) Hertel & Brodo

Only known from the Ny-Ålesund area (Hertel 1977a).

*Arctocetraria nigricascens* (Nyl.) Kärnefelt & Thell

Only recently collected on Svalbard in middle Reindalen in a dry, siliceous *Racomitrium* boulder

slope (Elvebakk & Tønsberg 1992). The Svalbard locality and a report from Greenland (Hansen 1981) fill the distribution gap between the Queen Elizabeth Islands of northernmost Canada and Franz Josef Land as shown by Kärnefelt (1979), and the species now has a circumarctic distribution pattern. Its total distribution was also mapped by Andreev & Makarova (1982), indicating some new Russian localities.

#### *Arctomia delicatula* Th. Fr.

A rare northern species, but it is more common in alpine Fennoscandia than *A. interfixa*. It has been found in Scotland and Ireland and its European distribution is not arctic. It was reported from Hornsund, Raudfjorden and Sorgfjorden by Fries (1867), from Bjørnøya (Lyng 1926b), from Recherchefjorden, Adventfjorden, Prins Karls Forland, Kongsfjorden, Kobbefjorden (Danskøya), and Smeerenburgfjorden by Lyng (1938). It was recently published from Edgeøya as "cf. *Arctomia delicatula*" (Aptroot & Alstrup 1991) and included in vegetation relevés from Bohemanflya by Kobayashi et al. (1990).

#### *Arctomia interfixa* (Nyl.) Vain.

Only reported from Van Keulenfjorden and Kobbefjorden (Danskøya) by Lyng (1938). It is an arctic species in Europe known from Svalbard and Novaja Zemlja (Poelt & Vězda 1977) in addition to Scandinavia where it is very rare (Santesson 1993).

#### *Arctoparmelia centrifuga* (L.) Hale

This species is widespread in continental boreal areas further south, but has a distinct northern coast pattern on Svalbard according to Lyng (1938). Later it was reported from Bockfjorden (Hafellner 1982 and Schuhwerk 1992) and Sørkapp Land (Olech 1990). It has also been collected at Liefdefjorden, Kongsfjorden and Prins Karls Forland (Elvebakk unpubl.).

#### *Arctoparmelia incurva* (Pers.) Hale

Another widespread species which was a "North Coast Lichen" on Svalbard in the sense of Lyng

(1938). Some additional localities have now been found in western and northern parts of Spitsbergen (Hertel 1977a; Hafellner 1982; Elvebakk 1982, unpubl.), and Olech (1990) added four localities from Sørkapp Land.

#### *Arctopeltis thuleana* Poelt

This interesting species was first described as a subspecific taxon from Svalbard by Fries (1867), but was recombined in a new monotypical genus by Poelt (1983). It is an exclusively arctic species growing on manured siliceous rocks. Poelt (1983) indicated eight localities from Svalbard in addition to one (Reinholmen in Recherchefjorden) that was erroneously referred to Novaja Zemlja. Later studies (Elvebakk unpubl.) indicate that the species is widespread on suitable habitats on Svalbard where it can occur in large quantities. It was also reported from Sørkapp Land as "*Lecanora contractula* Nyl. (*L. thulensis* Th. Fr.)" by Olech (1990) and from Edgeøya by Aptroot & Alstrup (1991).

#### *Arthonia lapidicola* (Taylor) Branth & Rostr.

This is the only autotrophic *Arthonia* species recorded from Svalbard. It was recorded from Lomfjorden and Brennevinsfjorden by Fries (1867), and from Bockfjorden as var. *runderella* by Hafellner (1982).

#### *Arthrorhaphis alpina* (Schaer.) R. Sant.

Published from Longyearbyen, Kongsfjorden and Liefdefjorden by Elvebakk (1984a) and from Sørkapp Land by Olech (1990). *Arthrorhaphis alpina* has also been collected at Lady Franklinfjorden at Nordaustlandet by P.F. Scholander (unpubl., O). Obermayer (1994) in his monograph of *Arthrorhaphis* maps its Eurasian and Greenlandic distribution and reports it from Lovénberget (Hinlopenstretet), Kongsfjord, Woodfjord, and Amsterdamøya.

#### *Arthrorhaphis citrinella* (Ach.) Poelt

Obermayer (1994) in his monograph of *Arthrorhaphis* reports two localities from the Woodfjord area (see also Hafellner 1982). The records pub-

lished by Hertel & Ullrich (1976), Hertel (1977a), and most likely by Fries (1867) too, represent *A. alpina* (see Obermayer 1994).

*Aspicilia alboradiata* (H. Magn.) Oxner

First described by Magnusson (1939) from Siberia, Novaja Zemlja, Bjørnøya (uncertain specimen), Svalbard (Calypsobyen at Recherchefjorden), Greenland, Ellesmere Island (uncertain specimen) and from one locality in northernmost Sweden. Possibly a common circumpolar species.

*Aspicilia aquatica* Körb.

A widespread species in the Alps and in northern Europe, and published from Svalbard by Magnusson (1939) based on a T. Fries collection from Kobbefjorden.

*Aspicilia aspicilioidea* (Th. Fr.) R. Sant.

Reported from one locality on Bjørnøya (Lyng 1926b).

*Aspicilia caesiocinerea* (Nyl. ex Malbr.) Arnold

Reported from a few localities at Sørkapp Land by Olech (1990).

*Aspicilia calcarea* (L.) Mudd

Only recorded from Sorgfjorden (Fries 1867).

*Aspicilia cinerea* (L.) Körb.

Reported from one locality on Bjørnøya (Lyng 1926b) and from Edgeøya by Aptroot & Alstrup (1991).

*Aspicilia circularis* (H. Magn.) Oxner

A rare species first described from Novaja Zemlja (Magnusson 1939) and in Scandinavia only known from one locality in northernmost Sweden (Santesson 1993). Reported from Hornsund by Nowak (1965).

*Aspicilia disserpens* (Zahlbr.) Räsänen

An arctic taxon reported from several localities in Novaja Zemlja and Svalbard by Magnusson (1939) and from one locality in northernmost Sweden (Santesson 1993). Lyng (1940b) stated that it is common all over Svalbard.

*Aspicilia elevata* (Lyng) J.W. Thomson

Described by Lyng (1937) from western Greenland and later also recorded from Bjørnøya by Magnusson (1939) based on a T. Fries collection from Miseryfjellet in 1868. Reported from Edgeøya by Aptroot & Alstrup (1991).

*Aspicilia gibbosa* (Ach.) Körb.

This is treated here as a collective taxon comprising *Lecanora gibbosa* var. *squamata* (Sw.) Th. Fr. recorded by Lyng (1924) and *Lecanora virginea* Hue (Zahlbr.), being regarded by Magnusson (1939) as a synonym of both the former taxon and *Lecanora gibbosa* (Ach.) Nyl. recorded by Hue in Hariot (1893) from Svalbard. It also includes *Lecanora ursina* (Lyng) H. Magn. (= *L. heteroplaca* f. *ursina* Lyng) collected by T. Fries on Bjørnøya in 1868 and treated both by Lyng (1926b) and Magnusson (1939). The complex is badly in need of revision and several of the excluded taxa have been noted with interesting arctic distribution patterns.

*Aspicilia lesleyana* Darb.

Reported from Liefdefjorden and Reinsdyrflå by Paulson (1928) and from the area west of Sassendalen by Lyng (1940a).

*Aspicilia mashiginensis* (Zahlbr.) Oxner

Reported from Hornsund as *Lecanora bennettii* by Olech (1987) and associated with *Candelariella arctica* and *Umbilicaria decussata*.

*Aspicilia mastrucata* (Wahlenb.) Th. Fr.

Reported by Fries (1867) from Hornsund, Danskøya, Kobbefjorden, Smeerenburg, and Brennevinsfjorden, by Hue in Hariot (1893) without locality information, and by Lyng (1926b) from Bjørnøya.

*Aspicilia nikrapensis* Darb.

Reported from dolerite islands in Hinlopenstretet (Summerhayes & Elton 1928), from the area west of Sassendalen (Lyng 1940a), and from Edgeøya (Aptroot & Alstrup 1991). Synonyms were presented by Thomson & Scotter (1985).

*Aspicilia obscurascens* (H. Magn.) Clauzade & Rondon

Determined with some uncertainty from Hornsund by Nowak (1965) and included in vegetation tables from Sørkapp Land by Dubiel & Olech (1990).

*Aspicilia obscurata* (Fr.) Arnold

Also determined with some uncertainty from Hornsund by Nowak (1965).

*Aspicilia pergibbosa* (H. Magn.) Räsänen

A rare species only known from Hornsund (Nowak 1965). It was described by Magnusson (1939) from three alpine areas in Scandinavia and from western Greenland.

*'Aspicilia "Lecanora" perpendicularis* H. Magn.'

The description of this species is based on one collection from Miseryfjellet on Bjørnøya collected by T. Fries in 1868 (Magnusson 1939). It does not seem to have been studied later and is best regarded as a critical *Aspicilia* taxon.

*Aspicilia perradiata* (Nyl.) Hue

Described from Siberia and later reported from Sørkappøya and Nordaustlandet by Magnusson (1939). The species was not included by Poelt (1969), but it has recently been reported from arctic Canada (Thomson & Scotter 1985).

*Aspicilia pleiocarpa* (H. Magn.) Oxner

Determined with some uncertainty from Hornsund (Nowak 1965). The species was first

described by Magnusson (1939) from northern Sweden and from the Kola Peninsula in Russia.

*Aspicilia polychroma* Anzi?

Reported from Hornsund by Nowak (1965). The species is known from Scandinavia only from the vicinity of Oslo (Santesson 1993), and Magnusson (1939) only cited one collection from Italy and one from Novaja Zemlja.

*Aspicilia supertegens* Arnold

A widespread northern and alpine species recorded from Bjørnøya by Magnusson (1939) based on a T. Fries collection from 1868.

*Bacidia bagliettoana* (A. Massal. & De Not.) Jatta

Reported from three localities in the north (Fries 1867), from Krossfjorden (Lyng 1924), Bjørnøya (Lyng 1926b) and Sørkapp Land (Olech 1990).

*Bacidia subfuscata* (Nyl.) Th. Fr.

Reported from five localities in the north (Fries 1867; Paulson 1928; Summerhayes & Elton 1928), and from various substrates on Bjørnøya (Lyng 1926b). Systematic position unclear (Printzen 1995).

*Bacidia trachona* (Ach.) Lettau

Only recorded from Bjørnøya (Lyng 1926b). The species is bipolar (Hertel 1988).

*Bacidia venusta* Hepp ex Th. Fr.

Recorded from Hornsund, Sorgfjorden and Lågøya by Fries (1867). The taxon was referred to by Zahlbruckner (1926) in his Catalogus, but it is lacking from major modern references and is in need of critical reevaluation.

*Baeomyces placophyllus* Ach.

Only known from a single locality on Bjørnøya (Lyng 1926b).

*Baeomyces rufus* (Huds.) Rebert.

Previously reported from Bjørnøya (Lyng 1926b) and included in Lyng's list of macrolichens from Svalbard (without localities), but lacking in his treatment of macrolichens from northern and western Spitsbergen and Nord-austlandet (Lyng 1938). Reported from central Reindalen as host of *Epilichen scabrosus* (Elvebakk & Tønsberg 1992) and collected near Colesbukta in 1986 (Elvebakk unpubl.). The species has probably been widely overlooked.

*Bellemerea alpina* (Sommerf.) Clauzade & Roux

A widespread species on acid siliceous rocks; reported from Bjørnøya (Lyng 1926b), Hinlopenstrøket (Summerhayes & Elton 1928, Paulson 1928), Dyrevika (Kongsfjorden) (Paulson 1928), Sørkapp-Hornsund (Lyng 1924), Hornsund (Nowak 1965), and Sørkapp Land (Olech 1990). Fries (1867) recorded it from Bellsund but considered the determination to be doubtful.

*Bellemerea cinereorufescens* (Ach.) Clauzade & Roux

Reported from Bjørnøya (Lyng 1926b) and southern Spitsbergen (Lyng 1924; Nowak 1965; Olech 1990).

*Bellemerea subsorediza* (Lyng) R. Sant.

Reported from the Longyearbyen area by Hartmann (1980), from Bockfjorden on a siliceous erratic boulder (Hafellner 1982) and from Kongsfjorden (Hertel 1991). *Bellemerea subsorediza* is probably a very often overlooked, usually sterile, species. It is distinctly alpine in Scandinavia and, as pointed out by Santesson (1984), a pioneer species on bare rock surfaces near retreating glaciers. It was originally described from Greenland as a *Lecidea*, then transferred to *Aspicilia* and recently to *Bellemerea* (Moberg 1987).

*Biatora carneoalbida* (Müll. Arg.) Coppins

*Bacidia sphaeroides* auct. was listed in vegetation tables from Hornsund, Trygghamna and Coles-

bukta by Eurola (1968). According to Coppins (1988) the correct name for this species is *Bacidia carneoalbida* (Müll. Arg.) Coppins (misprinted as "*carneopallida*" first). However, it was later changed to *Biatora carneoalbida* by Coppins et al. (1992).

*Biatora cuprea* (Sommerf.) Fr.

Recorded from Sorgfjorden og Brennevinsfjorden in the north (Fries 1867) and from Bjørnøya by Lyng (1926b). Determinations confirmed by Printzen 1995.

*Biatora subduplex* (Nyl.) Printzen

Probably not rare on dead mosses and plant debris. The specimens reported under the name "*Lecidea vernalis*" from Bjørnøya (Paulson 1923; Summerhayes & Elton 1923; Lyng 1926b), from various localities in northwestern Sørkapp Land (Olech 1990), from Edgeøya (Aptroot & Alstrup 1991), Lovénberget and Vaigattøyane (Hinlopenstrøket) (Fries 1867), from Prins Karls Forland (Paulson 1923), and from Kongsfjorden (Nimis 1985) most likely represent *B. subduplex* (see Printzen (1995), who reports *B. subduplex* from Woodfjorden, Kongsfjorden and Bjørnøya).

*Brigantiaea fuscolutea* (Dicks.) R. Sant.

Published from Sørkapp Land by Olech & Alstrup (1989) and Olech (1990). The species has a coastal and alpine distribution in Fennoscandia (Ahlner 1944), and its occurrence in southernmost Spitsbergen is of great phytogeographical interest compared to coastal elements in the vascular flora (Elvebakk 1989).

*Brodoa oroarctica* (Krog) Goward

*Brodoa oroarctica* has only been published from a few localities on Svalbard (Krog 1974; Hafellner 1982; Spjelkavik & Elvebakk 1989), but it is reasonable to believe that all the previous reports of *Hypogymnia intestiniformis* s. l. from Svalbard refer to *B. oroarctica*; Malme (1930) even reported the widely defined species from Kvitøya. *Brodoa oroarctica* has been observed in large quantities at Sassendalen and collected in several other areas (Elvebakk unpubl.).



*Bryocaulon divergens* (Ach.) Kärnefelt

A common species on exposed stable ridges and rocks in areas not heavily grazed by reindeer.

*Bryonora castanea* (Hepp) Poelt

Recorded from Svalbard as *Lecanora castanea* from Isfjorden (Lyng 1924), Bjørnøya (Lyng 1926b), Bockfjorden (Hafellner 1982), and Sørkapp Land (Olech 1990). Holtan-Hartwig (1991) mapped four localities on Svalbard and cited one specimen from Van Mijenfjorden.

*Bryonora curvescens* (Mudd) Poelt

A muscicolous species known from Lågøya, Lovénfjellet og Sjuøyane in the north (Fries 1867), and from Hornsund (Nowak 1965). The species was revised by Holtan-Hartwig (1991) who only included one T. Fries collection from Kobbevågen from Svalbard in his distribution map. The species is restricted to *Andreaea* and *Grimmia* cushions (Holtan-Hartwig 1991).

*Bryonora septentrionalis* Holt.-Hartw.

A species with pruinose apothecia recently described by Holtan-Hartwig (1991) who mapped several localities from Svalbard. The species grows on various mosses.

*Bryoria chalybeiformis* (L.) Brodo & D. Hawksw.

A species reported by numerous authors, and it is common on rocks and ridges except in areas with unstable substrates and in areas heavily grazed by reindeer.

*Buellia aethalea* (Ach.) Th. Fr.

First reported by Paulson (1923) from Prins Karls Forland. Later reported from Sørkapp Land by Olech & Alstrup (1989) and Olech (1990).

*Buellia alboatra* (Hoffm.) Th. Fr.

Reported as *Diplothele alboatrum* from "Isbjørn-Bai" (probably Isbjørnhamna at Hornsund) by Körber (1875), by Lyng (1940) as

*B. margaritacea* Lyng from Belvedere west of Sassendalen, and by André (1993) as *B. epipolia* from Prins Karls Forland. The conspecificity of *B. alboatra*, *B. epipolia*, *B. margaritacea* and *B. nivalis* (Bagl. & Carestia) Hertel ex Hafellner (under that name mentioned by Hafellner (1979) from "Spitzbergen", without localities) was recently stated by Nordin (1996). Also collected from limestone bird cliffs near Ny-Ålesund by Elvebakk (unpubl.).

*Buellia disciformis* (Fr.) Mudd

Recorded from Longyeardalen (Lyng 1924), from Bjørnøya both on driftwood and as the common var. *muscorum* (Schaer.) Vain. (Lyng 1926b), and from Hopen (Lyng 1939a).

*Buellia ectolechoides* (Vain.) Erichsen

Recorded three times from Svalbard (Lyng 1940a, b; Hertel & Ullrich 1976) (by the latter as cf. *ectolechoides*), but Lyng suggested that it might have been overlooked.

*Buellia geophila* (Flörke ex Sommerf.) Lyng

Reported from Hornsund, Bellsund, Sorgfjorden, and Brennevinsfjorden by Fries (1867) and from the area west of Sassendalen by Hadač (1946). It was included from several relevés in vegetation tables from Bohemanfya by Kobayashi et al. (1990) and from Longyearbyen by Hartmann (1980).

*Buellia insignis* "(Nägeli ex Hepp) Th. Fr."

A rather common species reported from different areas by Fries (1867), Summerhayes & Elton (1923, 1928), Nowak (1965), Hertel & Ullrich (1976), Kobayashi et al. (1990), and Olech (1987, 1990). Fries (1867) also reported var. *albocincta* Th. Fr.

*Buellia malmei* Lyng

First described from Bjørnøya by Lyng (1926b). Previously published Swedish records refer to *Buellia uberius* Anzi (Santesson 1993). The

species was included in *B. aethalea* by Egan (1987), and Esslinger & Egan (1995).

*Buellia papillata* (Sommerf.) Tuck.

Reported by Fries (1867) from Hornsund, Bellsund, Sorgfjorden, Lovénberget (Hinlopenstretet) and Murchisonfjorden. It was listed in vegetation tables from Hornsund, Sveagruva, and the Adventdalen area by Eurola (1968, 1971) and from Kongsfjorden by Nimis (1985), and was reported by Olech (1990) from three localities at Sørkapp Land. It is a bipolar lichen (Hertel 1988) and in Scandinavia it is known from the northernmost parts (Santesson 1993).

*Buellia postglacialis* Hafellner

Described from Bockfjorden by Hafellner (1982). The species is only known from its type locality.

*Buellia pulverulenta* (Anzi) Jatta

An endoparasitic lichen collected by T. Fries in northern Svalbard and published as *Buellia convexa* Th. Fr. Whereas part of his determination (those where the host lichen is *Physcia caesia*) may be correct identifications (Santesson 1993 cites *Physcia caesia* as a rare host), the additional records from various other lichens seem to be misidentifications. The species was reported from the Gluudneset area east of Ny-Ålesund by Nimis (1985). *Buellia pulverulenta* has been treated as a lichen parasite under the name *Lecicographa muscigenae* (Anzi) Rehm. Hafellner & Poelt (1980), however, demonstrated that *Buellia pulverulenta* forms its own thallus within the destroyed thallus of the host, although this is not always clearly visible. The species is widespread in northern areas (Alstrup & Hawksworth 1990).

*Buellia vilis* Th. Fr.

A scattered arctic-alpine pioneer species on siliceous rocks, also known from the American Arctic and the nival zone of the Kavkas mountains. It was described from the western coast of Spitsbergen (without exact locality, leg. A. E. Nordenskiöld) and later only collected a few times on Svalbard, from Roosneset at Liefdefjorden (Paulson 1928) and in the Isfjorden and Kongsfjorden areas (Hertel 1977a).

*Calicium viride* Pers.

Only known from Floraberget at Murchisonfjorden (Nordaustlandet) (Lyngé 1938).

*Caloplaca alcarum* Poelt

An interesting nitrophilous arctic species described from Novaja Zemlja (Poelt 1954). It has been published from Amsterdamøya (Hertel & Ullrich 1976), Longyearbyen (Hertel 1977a), the Diabasodden area (Søchting 1989), and Sørkapp Land (Dubiel & Olech 1990). However, it had already been reported from five localities in northern Svalbard (Sorgfjorden, Rypeøya, Depotøya, Lågøya, and Brennevinsfjorden) by Fries (1867) and from Bjørnøya by Lyngé (1926b) as *Xanthoria* (*Caloplaca*) *murorum* var. *obliterata* auct. arct.

*Caloplaca ammiospila* (Wahlenb.) H. Olivier

Common and reported by numerous authors.

*Caloplaca anchon-phoeniceon* Poelt & Clauzade

Reported from Svalbard with no further information by Søchting & Olech (1995).

*Caloplaca approximata* (Lyngé) H. Magn.

Reported from Svalbard with no further information by Søchting & Olech (1995).

*Caloplaca arenaria* Müll. Arg. non auct.

Only recorded from Hornsund (Nowak 1965).

*Caloplaca caesiorufella* (Nyl.) Zahlbr.

Known from Bjørnøya, originally named *C. caesiorufa* (Ach.) Zahlbr. by Lyngé (1926b), but redetermined by Magnusson (1944). From Spitsbergen recorded from Sabine Land, Tempelfjorden, Krossfjorden and Isfjorden (Søchting 1989). The species was included in *C. phaeocarpella* (Nyl.) Zahlbr. by Hansen et al. (1987), but they were treated as two separate species by Søchting (1989).

*Caloplaca castellana* (Räsänen) Poelt

Reported from Edgeøya by Aptroot & Alstrup (1991). Found as a cyanotrophic lichen on *Placynthium asperellum* on limestone rocks in Gipsdalen in 1985 (Elvebakk unpubl.). The species was discussed and mapped on Greenland by Hansen et al. (1987). In Scandinavia only known from central Norway and Torne Lappmark (Santesson 1993). Its holarctic distribution was mapped by Poelt & Hinteregger (1993).

*Caloplaca cerina* (Ehrh. ex Hedw.) Th. Fr.

A common species reported by numerous authors.

*Caloplaca citrina* (Hoffm.) Th. Fr.

Does not seem to have been published from Svalbard until recently by Söchting (1989), who considered it to be common on different substrates. The species has a bipolar distribution (Hertel 1988).

*Caloplaca concilians* (Nyl.) H. Olivier

A record from Bjørnøya as *C. nigricans* (Tuck.) H. Olivier (Lyng 1926b) (= *C. ferruginea* var. *nigricans* (Tuck.) Th. Fr. p. p.) is in need of revision.

*Caloplaca conciliascens* (Nyl.) Zahlbr.

Described from the Austrian Alps and reported from Isfjorden by Wunder (1974), and from the Longyearbyen area by Hartmann (1980). Not accepted from Svalbard by Söchting & Olech (1995).

*Caloplaca decipiens* (Arnold) Blomb. & Forssell

Indicated from Svalbard by Söchting (1989) who plans to deal with this species on a later occasion. It has also been found by Elvebakk (unpubl.) both at Kongsfjorden, Krossfjorden, Gipsdalen, Sassendalen, Berzeliusdalen, and Colesbukta, and is probably a common species on extremely manured rocks, more strongly manured than

where *Xanthoria elegans* is dominant. It is considered to be a southern element in the lichen flora of Greenland (Hansen et al. 1987).

*Caloplaca diphyodes* (Nyl.) Jatta

Only published from Bjørnøya by Lyng (1926b) as *C. ursina*, but included in *C. diphyodes* by Magnusson (1950). On Greenland *C. diphyodes* is a species of temporarily flooded creeks and pond margins (Hansen et al. 1987). Its holarctic distribution was mapped by Poelt & Hinteregger (1993). The Bjørnøya collection of '*C. ursina*' has also been restudied by Wetmore (1994), who found it to be similar to the American *C. diplacia* (Ach.) Riddle, and he concluded that more material would be necessary to reach a conclusion about its taxonomic status.

*Caloplaca epiphyta* Lyng

A phytogeographically interesting species in Scandinavia only known from continental Gudbrandsdalen and from Åsele Lappmark (Santesson 1993). On Svalbard only known from a limestone boulder at Bockfjorden (Hafellner 1982), but was also briefly mentioned by Söchting (1989). It has previously been named *C. bryochryson* Poelt (Hansen et al. 1987).

*Caloplaca epithallina* Lyng

Reported from Svalbard with no further information from Söchting & Olech (1995).

*Caloplaca exsecuta* (Nyl.) Dalla Torre & Sarnth.

Reported by Lyng (1926b) from Bjørnøya as *Blastenia arctica* (Söchting 1992b). Recorded from Krossfjorden by Söchting (1989). A report of *Blastenia arctica* from Hornsund (Nowak 1965) may refer to the same species.

*Caloplaca fraudans* (Th. Fr.) H. Olivier

An arctic species which is probably common on Svalbard on driftwood and manured rocks (Fries 1867; Lyng 1926b, 1940a; Magnusson 1944; Söchting 1989). In Europe it is only known from the arctic islands, the Kola peninsula, Finnmark

(Poelt 1969, Santesson 1993), and has recently been found in Troms (Elvebakk unpubl.)

*Caloplaca insularis* Poelt

Reported from Svalbard with no further information by Söchting & Olech (1995).

*Caloplaca invadens* Lynge

Reported from Svalbard with no further information by Söchting & Olech (1995).

*Caloplaca jungermanniae* (Vahl) Th. Fr.

A common species reported by several authors. The species is bipolar (Hertel 1988).

*Caloplaca leptocheila* H. Magn.

Reported from Svalbard with no further information by Söchting & Olech (1995).

*Caloplaca lithophila* H. Magn.

Reported from Svalbard with no further information by Söchting & Olech (1995).

*Caloplaca magni-filii* Poelt

An obligate lichenised parasite on *Miriquidica nigroleprosa* on Svalbard only published from Amsterdamøya (Hertel & Ullrich 1976).

*Caloplaca nivalis* (Körb.) Th. Fr.

Reported from Liefdefjorden as growing on *Andreaea blyttii* (Elvebakk 1984b), and from many localities at Sørkapp Land, mainly on *A. rupestris* (*A. petrophila*) (Olech 1990).

*Caloplaca noeisii* Söchting ad. int.

Described by Söchting (1989) based on two collections on driftwood and lignum from Tempelfjorden and Sassendalen on Svalbard. It also occurred on detritus and rocks and a complete description of this species was delayed until the additional material will be treated (Söchting 1989).

*Caloplaca phaeocarpella* (Nyl.) Zahlbr.

Published from Krossfjorden and Reindalen (Söchting 1989) and from several localities at Sørkapp Land by Olech (1990).

*Caloplaca pyracea* (Ach.) Th. Fr.

Reported from Svalbard with no further information by Söchting & Olech (1995).

*Caloplaca saxicola* (Hoffm.) Nordin

Recorded only a few times from Svalbard by Fries (1867), Paulson (1927). Summerhayes & Elton (1928) and Hertel (1977a), but seems to be an important and widespread species in saxicolous bird cliff vegetation in most parts of Svalbard (Elvebakk unpubl.). It was listed in a phytosociological table from Bockfjorden in a *Dryas* community by Rønning (1965), an unusual habitat. It was also reported from fox traps near bird perching rocks (Söchting 1989). *Caloplaca murorum* var. *pusillum* (A. Massal.) Flagey reported by Paulson (1927) from Liefdefjorden and Reinsdyrflya is a pruinous form of *C. saxicola* (Nordin 1972), although it has sometimes been treated as a proper species, *C. pusilla* (A. Massal.) Zahlbr.

*Caloplaca saxifragarum* Poelt

Reported from Kulmstranda at Sørkapp Land by Olech (1990). Its distribution (western Greenland, Alps, Balkan Peninsula, Nepal) was mapped by Poelt & Hinteregger (1993).

*Caloplaca scopularis* (Nyl.) Lettau

Collected from Forsbladhamna at Van Keulen-fjorden by Lynge (Nordin 1972) and reported from Edgeøya by Aptroot & Alstrup (1991).

*Caloplaca scotoplaca* (Nyl.) H. Magn.

Published from Svalbard by Fries (1867) as *C. ferruginea* f. *caesiorufa* (Ach.) Th. Fr. from Depotøya and from Vaigattøyane. *Caloplaca scotoplaca* is not recorded from Greenland (Hansen et al. 1987) and the Fries records need affirmation.

*Caloplaca sibirica* H. Magn.

Recorded by Söchting (1989) from lignum and mosses in the lower part of Sassendalen. This is a very rare species known from northernmost Sweden (Santesson 1993) and northern Siberia (Magnusson 1952). A previous report from Greenland (Magnusson 1952) could not be verified (Hansen et al. 1987).

*Caloplaca sinapisperma* (Lam. & DC.)  
Maheu & A. Gillet

Recorded from Lovénberget (Hinlopenstretet) as *Biatorina fraudans* (Fries 1867), from Hornsund (Nowak 1965; Euroala 1968), and from Colesbukta (Euroala 1968).

*Caloplaca soropelta* (E.S. Hansen, Poelt & Söchting) Söchting

Reported from Greenland and Svalbard as *Caloplaca citrina* var. *soropelta* Hansen, Poelt & Söchting (Söchting 1989). However, it was later raised to the rank of species by Söchting (1992a), who cited two collections from lower Sassendalen. The species was found on strongly manured limestone rocks.

*Caloplaca spitsbergensis* H. Magn.

An arctic species (not known from Fennoscandia) which has been found on old driftwood on scattered localities on Svalbard (Magnusson 1944; Hertel & Ullrich 1976; Hertel 1977a). It was recently reported from Greenland (Hansen et al. 1987) and Siberia (Žurbenko & Söchting 1993). It should possibly be included in *C. ammiopila* (Söchting 1989).

*Caloplaca tetraspora* (Nyl.) H. Olivier

A bipolar species, on Svalbard not rare on dead bryophytes and plant debris and reported by many authors. Its holarctic distribution was mapped by Poelt & Hinteregger (1993).

*Caloplaca tirolensis* Zahlbr.

Another common Svalbard *Caloplaca* species reported by numerous authors. It now includes

both *C. friesii* H. Magn. and *C. subolivacea* (Hansen et al. 1987). The species is bipolar (Hertel 1988).

*Caloplaca tominii* Savicz

This is a strongly continental species with a very interesting steppe affinity and the only exclusively soil inhabiting *Caloplaca* on Greenland (Hansen et al. 1987). Phytogeographically it is among the most interesting lichens on Svalbard. Its presence on Svalbard was briefly indicated by Söchting (1989) who plans a more thorough treatment. Its holarctic distribution was mapped by Poelt & Hinteregger (1993).

*Caloplaca tornoënsis* H. Magn.

It was indicated from Svalbard by Poelt (1969) and no details about its distribution has been published, until a second report from Reindalen by Söchting (1992b). It is a very rare species in Scandinavia only known from northernmost Sweden (Magnusson 1944; Santesson 1993), but it has a similar substrate ecology and appearance as *C. nivalis* and has probably been confused with this species (Hansen et al. 1987).

*Caloplaca verruculifera* (Vain.) Zahlbr.

A bird cliff species reported from Bjørnøya as *C. granulosa* (Lyngby 1926b) and from Forsbladodden/Van Keulenhamna in Van Keulenfjorden by Nordin (1972). It was recently collected on a single locality near Isfjord Radio on a strongly manured siliceous rock near the sea (Elvebakk unpubl.). The species has also been collected on Jan Mayen (Vainio 1905). *Caloplaca verruculifera* seems to belong to a southern coastal element on Svalbard with a pattern similar to that of *Schistidium maritimum* (Frahm 1977). The early record of *Xanthoria elegans* (Link) f. *granulosa* (Schaer.) (Fries 1867) refers to *X. sorediata*.

*Candelariella arctica* (Körb.) R. Sant.

A conspicuous species from sea cliffs and manured siliceous rocks, mainly in the Arctic, but also in the northern parts of the boreal zone. It has only been reported from a few localities (Fries 1867; Hertel & Ullrich 1976; Elvebakk 1984a;

Olech 1990). But it is probably common on suitable habitats on Svalbard, which was also indicated by Lyngé & Scholander (1932) who compared the lichen flora of northeastern Greenland and Svalbard.

*Candelariella aurella* (Hoffm.) Zahlbr.

A common species reported by Fries (1867, as *Gyalolechia subsimilis*), Lyngé (1924, as *C. cerinella*, 1926b, as *C. epixantha*, 1939a, 1940a), Nowak (1965), Hafellner (1982), Kobayashi et al. (1990), Aptroot & Alstrup (1991), and Olech (1990).

*Candelariella placodizans* (Nyl.) H. Magn.

The only localities published from Svalbard are at Sørkapp Land (Olech 1990), Hornsund (Nowak 1965; Eurola 1968), Isfjorden (Eurola 1968), Kongsfjorden (Nimis 1985), and Amsterdamøya (Hertel & Ullrich 1976). The species has an alpine distribution in Scandinavia.

*Candelariella vitellina* (Hoffm.) Müll. Arg.

A common species reported by numerous authors, by Fries (1867) as *Gyalolechia vitellina*. It is bipolar (Hertel 1988).

*Candelariella xanthostigma* (Ach.) Lettau

Reported from Bockfjorden (Hafellner 1982), Hornsund (Nowak 1965) and Storøya (Lyngé 1939a). A widespread and common species further to the south.

*Carbonea atronivea* (Arnold) Hertel

Reported from Blåhuken at Van Mijenfjorden by Hertel (1970a). The species is very rare in Scandinavia and its world distribution was mapped by Hertel (1975a).

*Carbonea intrusa* (Th. Fr.) Rambold & Triebel

Reported on *Lecidea lapicida* s. str. from Bolterdalen near Longyearbyen by Hertel (1991), and a more thorough description will follow in a

yet unpublished *Carbonea* monograph by Knoph, Rambold & Triebel. The species is lichenicolous, but lichenised.

*Carbonea vorticosa* (Flörke) Hertel

Recorded from Sorgfjorden (Fries 1867), the area west of Sassendalen (Lyngé 1940a), Amsterdamøya (Hertel & Ullrich 1976), Rijpdalen on Nordaustlandet (Hertel 1977b), Kvitøya (Hertel 1981b), Bockfjorden (Hafellner 1982; Schuhwerk 1992), and Sørkapp Land (Olech 1990). A very common, but unstriking species on Svalbard (Hertel 1981b). It is bipolar (Hertel 1988).

*Catapyrenium cinereum* (Pers.) Körb.

A common species as indicated by the localities cited by Fries (1867) and Lyngé (1926b, 1938).

*Catapyrenium daedaleum* (Kremp.) Stein

A common species as indicated by the localities cited by Lyngé (1938) and Olech (1990).

*Catapyrenium lachneum* (Ach.) R. Sant.

Recorded as *Dermatocarpon rufescens* from Bjørnøya by Lyngé (1926b), from several localities by Lyngé (1938), from Sørkapp Land (Olech 1990), and confirmed from Svalbard by Breuss & Hansen (1988) and Breuss (1990). Breuss (1990) also reported *C. lachneum* var. *oleosum* Breuss from Van Keulenfjorden, van Mijenfjorden, Bellsund, and Raudfjorden.

*Catapyrenium norvegicum* Breuss

A recently described arctic-alpine species based on type material from Skibotn in northern Norway collected in 1867 (Breuss & Hansen 1988). It is known from two localities at Forsbladhamna (Van Keulenfjorden) on Svalbard and a few localities from Greenland and from the Alps (Breuss 1990).

*Catillaria groenlandica* Lyngé

Reported from Edgeøya by Aptroot & Alstrup (1991). According to Kiliyas (1981) this species belongs to *Lecania*.

*Catillaria lenticularis* (Ach.) Th. Fr.

Reported from Belvederefjellet, Isfjorden by Lyng (1940a).

*Cephalophys leucospila* (Anzi) H. Kiliass & Scheid.

A calciphilous species only known from Stuphallet at Brøggerhalvøya and Nordenskiöldfjellet near Longyearbyen (Hertel 1977a), and from an additional locality near Ny-Ålesund by Hertel (1991). Like other rare *Lecidea* s. l. species on Svalbard it has probably been overlooked. In Scandinavia it has only been collected in Hordaland and its world distribution was mapped by Hertel (1975b).

*Cetraria aculeata* (Schreb.) Fr.

A common species reported by numerous authors. It is bipolar (Kärnefelt 1986).

*Cetraria islandica* (L.) Ach.

Reported both as ssp. *islandica* and ssp. *crispiformis* (Räsänen) Kärnefelt by Kärnefelt (1979).

*Cetraria muricata* (Ach.) Eckfeldt

According to Kärnefelt (1986) a common species on Svalbard, although our observations indicate that it is far less common than *C. aculeata*. A distinct slender, almost black, form with papillae (fibrillae) was collected on a mountain plateau near Gipsdalen in 1985 (Elvebakk, TROM). The species is bipolar (Kärnefelt 1986).

*Cetraria nigricans* Nyl.

Not included by Lyng (1938) in his general treatment of the Svalbard macrolichens, but added in a summary list based on a collection by E. Dahl in 1936. *Cetraria nigricans* was not indicated from Svalbard by Kärnefelt (1979) in his monograph, but Dahl's collection has not been available in the O herbarium. Dahl's collection in O has now been studied by Tønsberg (pers. comm.) who confirms its identity. The species was collected at Duvepynten at Nordaustlandet. *Cetraria nigricans* also occurs in vegetation tables from Hornsund and

Colesbukta (Eurola 1968), but may be misidentifications, and there is no material at OULU.

*Cetrariella delisei* (Bory ex Schaer.) Kärnefelt & Thell

A very common species that is entirely dominant in some areas, e.g. near Ny-Ålesund. It is occasionally fertile.

*Cetrariella fastigiata* (Delise ex Nyl.) Kärnefelt & Thell

Reported by Kärnefelt (1979) from Sørkappøya, Prins Karls Forland and Virgohamna, and from Sørkapp Land by Olech (1990). Lyng (1926b) considered some of the *C. delisei* plants from Nordhamna on Bjørnøya to "approach var. *fastigiata* very much", but no Bjørnøya material was referred to this species by Kärnefelt (1979).

*Chaenotheca furfuracea* (L.) Tibell

Found four times on the northern coast (Fries 1867; Lyng 1938) and once near Longyearbyen (Elvebakk 1984a).

*Chromatochlamys muscorum* (Fr.) H. Mayrhofer & Poelt

Published from two localities on Bjørnøya (Lyng 1926b) and recently as new to Spitsbergen by Olech & Alstrup (1989) and Olech (1990) from Sørkapp Land where it is a rare species on mosses, mainly in *Bistorta vivipara* communities.

*Cladonia acuminata* (Ach.) Norrl.

Reported by Lyng (1938) as a rare species known from Bellsund, Isfjorden, Magdalenefjorden, Indre Norskøya, and Sorgfjorden.

*Cladonia amaurocraea* (Flörke) Schaer.

This species has been reported by a number of authors, but Lyng (1938) included only one locality from the Bellsund area and suggested that a great number of collections have been mistaken for *C. uncialis*. It has later been reported by Nowak (1965), Hofmann (1968), Eurola (1968),

Hertel & Ullrich (1976), Hadač (1989), and Olech (1990). The complex is in need of reexamination.

*Cladonia arbuscula* (Wallr.) Flot.

*Cladonia* is not considered as a separate genus, and *C. mitis* not as a separate species according to Ruoss (1987), Ruoss & Ahti (1989) and Ruoss & Huovinen (1989). The most widespread taxon along the coast (see Eurola 1968) is ssp. *mitis*, and ssp. *arbuscula* was not reported by Lynge (1938). However, ssp. *arbuscula* was reported by Ahti (1961) from "Spitzbergen, Whale's Point, 1901 Palibin (LE)". This locality on southernmost Edgeøya is now named Kvalpynten.

*Cladonia bellidiflora* (Ach.) Schaer.

Concentrated to the basement rock areas of northwestern Spitsbergen and northwestern Nordaustlandet as shown on the distribution map by Lynge (1938) who also included two localities from southern Bellsund. It has also been reported or collected from scattered localities in other parts of Svalbard (Lynge 1926b; Olech 1990; Aptroot & Alstrup 1991; Elvebakk unpubl.) and its distribution seems to be limited by the presence of hard acidic substrates.

*Cladonia borealis* S. Stenroos

After the revision of the *C. coccifera* group by Stenroos (1989), *C. borealis* and *C. pleurota* are the most widespread species, and Stenroos (1989) mapped one locality of *C. borealis* from Svalbard. However, it is probably a common species there.

*Cladonia cariosa* (Ach.) Spreng.

A rather frequent species in siliceous areas as shown by the localities reported by Lynge (1938), Nowak (1965), and Olech (1990).

*Cladonia carneola* (Fr.) Fr.

A distinct "North Coast" species on Svalbard (Lynge 1938) and only reported from four localities in the northernmost parts (Lynge 1938; Hertel & Ullrich 1976). Later reported from Sørkapp Land by Olech (1990).

*Cladonia cenotea* (Ach.) Schaer.

Only known from Kobbefjorden and Brennevinsfjorden in the north (Lynge 1938).

*Cladonia cervicornis* (Ach.) Flot.

Reported from Prins Karls Forland (Paulson 1923; Summerhayes & Elton 1923) and from Havhestfjellet (Brennevinsfjorden) by Lynge (1938).

*Cladonia chlorophaea* (Flörke ex Sommerf.) Spreng.

A common species reported by several authors.

*Cladonia coccifera* (L.) Willd.

After the separation of *C. borealis* from *C. coccifera* s. l. by Stenroos (1989), the remaining *C. coccifera* s. str. has a more limited distribution and a distribution map by Stenroos (1989) did not include any Svalbard localities. But as only one locality of *C. borealis* was included, it means that the relatively large Svalbard material (e.g. cited by Lynge 1938) of this species pair remains practically unrevised. *Cladonia coccifera* is therefore included here until such a revision has been made.

*Cladonia cornuta* (L.) Hoffm.

Reported with some reservations from Murchisonfjorden by Lynge (1938) and listed in several vegetation tables from two localities at Hornsund, from Russekeila, Trygghamna and Colesbukta and Isfjorden by Eurola (1968). The reports are in need of confirmation.

*Cladonia crispata* (Ach.) Flot.

Only known from Fuglehuken at Prins Karls Forland (Lynge 1938) and from several localities at Sørkapp Land (Olech 1990). Olech (1990) reported the species as var. *ceptrariiformis* (Delise) Vain.

*Cladonia cyanipes* (Sommerf.) Nyl.

Reported from the Bellsund area and from Mag-



daleneffjorden by Lyng (1938). Later collected in Reindalen by Tønsberg & Elvebakk (unpubl.)

### *Cladonia deformis* (L.) Hoffm.

A rare species known from Hornsund and north-western Nordaustlandet (Østhagen 1971), Amsterdamøya (Hertel & Ullrich 1976), and Sørkapp Land (Olech 1990). Fries (1867) and Lyng (1924, 1938, 1940a) treated the species in a collective sense including *C. sulphurina*. It was also reported from Nordenskiöldfjellet near Longyearbyen by Eurola & Hakala (1977).

### *Cladonia ecmocyna* Leight.

Not included from Svalbard by Ahti (1980), but the large arctic herbarium material has not been revised. Literary records from Svalbard include Hue in Hariot (1893), Nowak (1965) and Eurola (1968). There are also some additional collections (Elvebakk unpubl.), but its status on Svalbard is poorly known.

### *Cladonia fimbriata* (L.) Fr.

Reported from a few localities in northern Svalbard by Paulson (1928) and Lyng (1938) (as var. *major* (K.G. Hagen) H. Magn.), and listed from vegetation tables from Hornsund and Isfjorden by Eurola (1968) and Hartmann (1980).

### *Cladonia floerkeana* (Fr.) Flörke

A distinctly western species in Scandinavia that scarcely reaches Finnmark. It has been reported from Bjørnøya by Lyng (1926b, 1938) and is phytogeographically a very interesting species on Svalbard. The determination of this collection was recently confirmed by Tønsberg (pers. comm.). Treated as *Cladonia macilentia* Hoffm. ssp. *floerkeana* (Fr.) by Santesson (1993).

### *Cladonia gracilis* (L.) Willd.

The Svalbard material of *C. gracilis* coll. has only partly been revised in accordance with modern treatments (Ahti 1980). Lyng (1938) and Nowak (1965) listed three taxa: *C. elongata*, *C. gracilis* var. *gracilis* (= var. *chordalis*) and *C. ecmocyna*. Among these taxa Ahti (1980) only included *C.*

*gracilis* ssp. *nigripes* (Nyl.) Ahti on Svalbard, a synonym of *C. elongata* p. p. which is now called *C. gracilis* ssp. *elongata* (Jacq.) Vain. (Stenroos & Ahti 1990). This taxon has probably also been confused with *C. macroceras*. It is probable that the major part of Svalbard *C. gracilis* is ssp. *elongata*. This taxon was also reported to be common at Sørkapp Land by Olech (1990). *Cladonia gracilis* ssp. *gracilis* is a rare, southern taxon reported from Bjørnøya (Lyng 1926b), Sørkapp–Hornsund (Lyng 1924; Nowak 1965) and Bellsund (Lyng 1938), but not indicated north of Fennoscandia by Ahti (1980). Future revisions should reveal whether both subspecies are present on Svalbard. The *C. gracilis* aggregate also includes *C. ecmocyna*, *C. macroceras* and *C. maxima*.

### *Cladonia luteoalba* Wheldon & A. Wilson

Reported from Rijpfjorden at Nordaustlandet by Dahl & Krog (1970). In addition it was reported by Østhagen (1972) (Bjørnøya, Sørkapp Land, Longyearbyen area, Murchisonfjorden) and Elvebakk (1982) (Engelsbukta) and later found as scattered individuals in many parts of Svalbard (Elvebakk unpubl.). According to Stenroos (1990) *C. luteoalba* apparently forms commensalistic symbioses with other *Cladonia* spp.

### *Cladonia macroceras* (Delise) Hav.

The most common species in the *C. gracilis* group in most of the Arctic according to Ahti (1980), who listed both Spitsbergen, Jan Mayen and Bjørnøya. Unlike its relatives it seems to prefer calcareous substrates. *Cladonia uncialis* f. *rubescens* Büttner & Schade which was described from Blomstrandhalvøya near Ny-Ålesund by Schade (1966) refers to *C. macroceras* (Ahti 1980). *Cladonia macroceras* was also reported from numerous localities at Sørkapp Land by Olech (1990). According to Krog et al. (1994) *C. macroceras* is not distinguished from *C. gracilis* in the Scandinavian mountains.

### *Cladonia macrophylla* (Schaer.) Stenh.

One of the typical “North Coast Lichens” in the sense of Lyng (1938), who published a distribution map showing several localities in the northern part of Svalbard. In 1986 collected near

Colesbukta at Isfjorden by Tønsberg (unpubl., BG).

*Cladonia macrophyllodes* Nyl.

An overlooked species only reported from Hornsund by Nowak (1965) and from Sørkapp Land by Olech (1990). It was collected in the middle part of Reindalen in 1986 (Tønsberg unpubl., BG). Olech (1990) reported 11 localities from Sørkapp Land, and the species is probably common. Three collections from Nordaustlandet previously reported as *C. subcervicornis* have now been revised as *C. macrophyllodes* (Ahti pers. comm.).

*Cladonia maxima* (Asahina) Ahti

Reported from northern Bjørnøya by Ahti (1980) based on a T. Fries collection from 1868. The species has frequently been confused with *C. ecmocyna* and *C. gracilis* ssp. *elongata*, and the Svalbard material of the *C. gracilis* group has not been revised. But *C. maxima* has a northern coastal and low alpine distribution in Fennoscandia (Ahti 1980), and the species probably represents a southern coastal phytogeographical element on Svalbard.

*Cladonia merochlorophaea* Asahina

Reported as new to Svalbard by Elvebakk & Tønsberg (1992) based on one specimen from Hornsund previously published as *C. grayii* G. Merr. (Lyng 1938) and one new collection from the Colesbukta area. The Svalbard material belongs to var. *merochlorophaea*.

*Cladonia phyllophora* Hoffm.

Earlier known only from a few localities in the northern and northwestern part of Svalbard (Fries 1867; Summerhayes & Elton 1928; Lyng 1938), from Sørkapp Land (Olech 1990), and included in vegetation tables from Hornsund and Isfjorden by Eurola (1968) and Kobayashi et al. (1990). Lyng (1938) also included a distribution map. Recently found to be common in Reindalen, central Spitsbergen (Elvebakk & Tønsberg unpubl.).

*Cladonia pleurota* (Flörke) Schaer.

A common species reported by several authors. It has a bipolar distribution (Hertel 1988).

*Cladonia pocillum* (Ach.) Grognot

A common species on circumneutral or alkaline soils.

*Cladonia pyxidata* (L.) Hoffm.

A common species on Svalbard. It is bipolar (Hertel 1988).

*Cladonia rangiferina* (L.) Weber ex F.H. Wigg.

Only reported from northwestern Svalbard and from one locality at Nordaustlandet by Lyng (1938), and also from northwestern Svalbard by Hertel & Ullrich (1976). But the species has also been reported from Bjørnøya and western and southern Spitsbergen (Lyng 1924, 1926b; Summerhayes & Elton 1923; Nowak 1965; Eurola 1968; Elvebakk 1982; Hadač 1989; Olech 1990). The species has a distinctly western distribution pattern and is restricted to siliceous substrates. The author citation of this species follows Ahti (1984) and Ruoss (1990). The species is bipolar (Hertel 1988).

*Cladonia squamosa* Hoffm.

Only known from Kobbefjorden (Lyng 1938) and Mälardalen, northeast of Longyearbyen (Lyng 1940a). The latter sample was published as var. *muricella* (Delise.) Vain. Also reported from Bohemanfya by Kobayashi et al. (1990), and from northwestern Spitsbergen (Mitrahavøya/Prins Karls Forland) by André (1993). In 1986 it was collected in the middle part of Reindalen by Tønsberg (unpubl., BG).

*Cladonia stellaris* (Opiz) Pouzar & Vězda

Listed in a phytosociological table by Rønning (1965) from a *Dryas* community at Dunderbukta between Bellsund and Hornsund. The species is extremely rare on Svalbard and the habitat unusual and the report needs confirmation. The

species was also reported from Magdalenefjorden by Ahti (1984) based on an old collection from 1818 deposited at BM. The population should be searched for as the species is vulnerable to reindeer grazing and trampling as well as tourism which is developing in the area.

*Cladonia stricta* (Nyl.) Nyl.

Occurs as var. *stricta* which is very common on Svalbard, and var. *uliginosa* Ahti (= *C. lepidota* var. *gracilescens*) which has only been recorded twice from Van Mijenfjorden and Brennevinsfjorden (Lyng 1938) and from Bjørnøya (Lyng 1926b).

*Cladonia stygia* (Fr.) Ruoss

Reported from Bjørnøya by Ahti & Hyvönen (1985).

*Cladonia subfurcata* (Nyl.) Arnold

Only known from Bjørnøya (Lyng 1926b), from three localities on Nordaustlandet (Lyng 1938) and one from Hornsund (Nowak 1965). Both f. *trachytera* and f. *tenuior* were noted by Lyng (1938).

*Cladonia subulata* (L.) Weber ex F.H. Wigg.

Previously only known from northern Svalbard, where it was mapped as a rather common species (Lyng 1938). Later also collected from Hornsund (Nowak 1965), Sørkapp Land (Olech 1990), Edgeøya (Aptroot & Alstrup 1991), Liefdefjorden (Elvebakk unpubl., TROM), central Reindalen (Tønsberg unpubl., BG), and from Reindalspasset (Elvebakk unpubl., TROM). The species should no longer be considered a "North Coast Lichen".

*Cladonia symphylicarpa* (Flörke) Fr.

Only reported from two localities at Sørkapp Land (Olech 1990), but material from Van Keulenfjorden, Amsterdamøya and Nordaustlandet (S. Korsøya and Wargentindalen) published as *C. subcervicornis* by Lyng (1938) have

been revised as *C. symphylicarpa* (Ahti pers. comm.). The collection from Van Keulenfjorden is the psoromic strain, which has been referred to as *C. dahliana* Kristinsson, a species which has not been reported from Svalbard before. However, *C. dahliana* can best be considered to be a chemotype of *C. symphylicarpa* (Ahti pers. comm.) and is treated as such here.

*Cladonia turgida* Hoffm.

Only known from Virgohamna, northwestern Svalbard (Lyng 1938).

*Cladonia uncialis* (L.) Weber ex F.H. Wigg.

A common species reported by many authors.

*Collema bachmanianum* (Fink) Degel.

Reported from Olsokflyan (Sørkapp Land), Hornsund, Kvalpynten (Edgeøya), Forsbladhamna (Van Keulenfjorden), Diabasodden (Isfjorden), and Sorgfjorden by Degelius (1954), from Hornsund by Nowak (1965), and from Sørkapp Land by Dubiel & Olech (1990).

*Collema ceraniscum* Nyl.

A common small species reported by many authors, previously mostly as *C. arcticum*.

*Collema cristatum* (L.) Weber ex F.H. Wigg.

Recorded by Lyng (1924, 1938) as *C. multifidum* which corresponds to *C. cristatum* var. *marginale* (Huds.) Degel. This taxon was distributed in an exciccatum by Kurokawa & Kashiwadani (1987) which includes some common Svalbard lichens. This large species is common on limestone rocks.

*Collema flaccidum* (Ach.) Ach.

Reported from Sorgfjorden and Sørkapp by Fries (1867) and Lyng (1924), but these collections have been redetermined as *C. bachmannianum* by Degelius (1954). It has been reported from Midterhukhamna at Bellsund by Lyng (1938) and from Edgeøya by Aptroot & Alstrup (1991).

*Collema parvum* Degel.

On Svalbard only recorded once from Bockfjorden on a limestone boulder (Hafellner 1982) and from Kapp Lee, Edgeøya (Barkman 1987).

*Collema polycarpon* Hoffm.

Common as var. *polycarpon*, see Fries (1867), Stizenberger (1876), Hue in Hariot (1893), Lyng (1924, 1938), and Degelius (1954).

*Collema tenax* (Sw.) Ach. em Degel.

A rather common species on calcareous soil. see Lyng (1938).

*Collema undulatum* Laurer ex Flot.

Reported with some uncertainty by Degelius (1954) from Prins Karls Forland ("a small sterile specimen probably belonging here").

*Cystocoleus ebeneus* (Dillwyn) Thwaites

Only recorded once from Wargentindalen, northern Svalbard (Lyng 1938). The species is bipolar (Hertel 1988).

*Dactylina arctica* (M.J. Richardson) Nyl.

A very interesting arctic lichen, known only from Klovningen (northwesternmost Spitsbergen), Bockfjorden, Dirksbukta, and Nordaustlandet in northern Svalbard (Lyng 1933) and Dyrevika/Ossian Sarsfj. near Ny-Ålesund (Polunin 1946; Hertel 1977a).

*Dactylina madrepuriformis* (Ach.) Tuck.

Reported from two localities at Wijdefjorden (Kartdalen and an unprecisely defined locality) but several additional localities were observed in the area (Lyng 1933, 1938). It was also reported from Bockfjorden by Elvebakk & Spjelkavik (1981).

*Dactylina ramulosa* (Hook.) Tuck.

A "North Coast" species according to Lyng (1933, 1938) who reported it from Kongsfjorden,

Raudfjorden, Liefdefjorden, Bockfjorden, Wijdefjorden, Sorgfjorden, Lomfjorden, and Lovénberget in northern Spitsbergen and in numerous localities in Nordaustlandet. Later it has been found at Engelskbukta (Elvebakk 1982), Gyntflya (Bünsow Land), and Sassendalen (Elvebakk unpubl.). Still it is enigmatic why this conspicuous species has not been found in other parts of Svalbard such as Nordenskiöld Land. In Fennoscandia it is a rare species found only once in northern Finland very close to the Norwegian border (Hakulinen & Huuskonen 1968).

*Dermatocarpon intestiniforme* (Körb.) Hasse

Only published from two localities at Bellsund (Reinodden, Blåhukken) and one at Nordaustlandet (Floraberget) (Lyng 1938). The species is bipolar (Hertel 1988).

*Dermatocarpon rivulorum* (Arnold) Dalla Torre & Sarnth.

Only reported from Hornsund by Olech (1987). The species was found on a wet rock below a snowbed.

*Dermatocarpon spitsbergense* Lyng

This is a critical northern taxon in need of further studies. It was reported from two localities at Bellsund. and from Murchisonfjorden, Nordaustlandet and from Kong Karls Land by Lyng (1938), and has also been reported from Greenland and Iceland, but the species was not accepted by Thomson (1984).

*Dimelanea oreina* (Ach.) Norman

*Dimelaena oreina* was published from Bellsund, but as *Rinodina hueana* in a paper dealing with the Greenland lichen flora (Lyng 1940b) and the report has therefore been overlooked. Two collections from Van Mijenfjorden (Midterhuksetta and Bergmanfjellet) are deposited in O. Later it was discovered at Blomstrandhalvøya (Hertel 1977a), and on Edgeøya (Aptroot & Alstrup 1991), and in 1985 in large quantities on quartzitic sandstone/dolerite outcrops in Gipsdalen (Elvebakk unpubl.). The latter locality is a

very dry valley with a lot of aeolian calcareous dust. In 1988 its distribution was mapped in the Kongsfjorden area by Elvebakk (unpubl.). There it was concentrated to south or west-facing steep surfaces of siliceous rocks and erratic boulders in the eastern part of the fjord which has a favourable temperature climate. *Dimelaena oreina* seems to require a continental climate both on Svalbard and in Fennoscandia and Greenland, but a 1994 collection from Prins Karls Forland (Elvebakk unpubl.) is not in accordance with this pattern.

*Eiglera flavida* (Hepp) Hafellner

A widespread, inconspicuous, silicicolous species. Reported from Sorgfjorden and Hinlopenstretet by Fries (1867), from Hopen and Bjørnøya by Lyng (1926a, b), from Hornsund by Nowak (1965) and from Sørkapp Land by Olech (1990).

*Endocarpon pulvinatum* Th. Fr.

A species characteristic of limestone bird cliffs, where it can be locally dominant. It has been reported from a few localities on Svalbard (Fries 1867; Lyng & Scholander 1932; Lyng 1938; Brossard et al. 1984), and has been observed in many additional parts of Svalbard (Elvebakk unpubl.) and is evidently common on suitable habitats.

*Epilichen scabrosus* (Ach.) Clem.

Only reported from the upper part of Reindalen as a parasite on *Baeomyces rufus* (Elvebakk & Tønsberg 1992).

*Euopsis granatina* (Sommerf.) Nyl.

Recorded from Kobbefjorden by Fries (1867) and from Bockfjorden by Schuhwerk (1992), but probably a much overlooked species.

*Euopsis pulvinata* (Schaer.) Vain.

Reported by Lyng (1938, as *Pyrenopsis*) from Van Keulenfjorden, Akseløya and Blåhuken (Van Mijenfjorden), Grønfjorden, Kongsfjorden, and Kobbefjorden, by Hertel & Ullrich (1976) from Amsterdamøya, and by Olech &

Alstrup (1989 – under the name *Pyrenopsis macrocarpa* E. Dahl) and Olech (1990) from Sørkapp Land.

*Farnoldia hypocrita* (A. Massal.) Fröberg

Only known from a few collections from limestone localities near Ny-Ålesund (Hertel 1977a, 1991). In Scandinavia only known from Öland, Gotland, Torne Lappmark and Finnmark (Santesson 1993).

*Farnoldia jurana* (Schaer.) Hertel

Reported from Bjørnøya (Lyng 1926b), Oxfordbreen (central Spitsbergen) (Paulson 1928), Sørkapp Land (Olech 1990), and Edgeøya (Aptroot & Alstrup 1991).

*Farnoldia micropsis* (A. Massal.) Hertel

Known from Hinlopenstretet (Fries 1867), Bjørnøya (Lyng 1926b), Amsterdamøya (Hertel & Ullrich 1976), and from a few collections on limestone in the Ny-Ålesund area (Hertel 1977a).

*Flavocetraria cucullata* (Bellardi) Kärnefelt & Thell

A very common species reported by numerous authors. Like so many other fruticose species it is much less frequent in the continental valleys of Spitsbergen dominated by loose calcareous soil deposits and heavily grazed by reindeer.

*Flavocetraria nivalis* (L.) Kärnefelt & Thell

A very common species on ridges, but much reduced in areas heavily grazed by reindeer or dominated by loose fine-textured calcareous soil. It was mapped on Svalbard by Hertel & Ullrich (1976).

*Frutidella caesioatra* (Schaer.) Kalb

Recorded (as *Lecidea caesioatra* Schaer.) from Hornsund, Magdalenefjorden, Lomfjorden (Fries 1867), Bjørnøya (Lyng 1926b), Ulvebukta (southeast Nordaustlandet), Bjørnsundet

(= "Bismarck Strait", Hinlopenstretet) and a poorly defined third locality (Paulson 1928), and Sørkapp Land (Olech 1990). The species grows on *Andreea* cushions and on *Racomitrium lanuginosum* (Vainio 1934; Poelt 1985).

*Fulgensia bracteata* (Hoffm.) Räsänen

Occurs as var. *alpina* (Th. Fr.) Räsänen.

*Fuscopannaria leucophaea* (Vahl) P.M. Jørg.

Only recorded by Fries (1867) from Fosterøyene as *Pannaria microphylla*, but was not included by Lyngé (1938). A reexamination of the material is needed.

*Fuscopannaria praetermissa* (Nyl.) P.M. Jørg.

Many localities were reported as *Pannaria praetermissa*, by Lyngé (1938), and the species has also been reported by Fries (1867), Lyngé (1926b), Nowak (1965), Jørgensen (1978), and Olech (1991).

*Gyalecta foveolaris* (Ach.) Schaer.

The only localities that have been published are Miseryfjellet on Bjørnøya (Lyngé 1926b), Ny-Ålesund (Hertel 1977a), Hornsund (Olech 1987), and Kulmrabben, Sørkapp Land (Olech 1990).

*Gyalecta geoica* (Wahlenb. ex. Ach.) Ach.

Only reported from Bjørnøya (Lyngé 1926b).

*Gyalecta subclausa* Anzi

Published recently by Elvebakk & Tønsberg (1992) from middle Reindalen.

*Gyalidea rivularis* (Eitner) Nowak & Tobol.

Only reported from the Colesbukta area by Elvebakk & Tønsberg (1992). The species was found on periodically inundated rocks and was previously only known from the Sudety Moun-

tains of Central Europe. The genus was referred to the new family Solorinellaceae by Vězda & Poelt (1990).

*Halecania alpivaga* (Th. Fr.) M. Mayrhofer

Only reported from Bockfjorden by Hafellner (1982).

*Hymenelia arctica* (Lyngé) Lutzoni

Published from Beelsund, Van Mijenfjorden and Hopen by Magnusson (1933) as *I. epulotica* var. *arctica* (Lyngé) H. Magn. and from Edgeøya by Aptroot & Alstrup (1991). Now it has been recognised as a separate species in Scandinavia restricted to the inundation zone of rivers and lakes in the northern parts (Jørgensen 1989).

*H. ceracea* (Arnold) Poelt & Vězda

Reported from two localities in the Hornsund area (Nowak 1965) and from two localities at Sørkapp Land by Olech (1990).

*Hymenelia epulotica* (Ach.) Lutzoni

Published from Bockfjorden as *Itonaspis epulotica* var. *epulotica* (Hafellner 1982). Other varieties recognised by Magnusson (1933) have now been transferred to *Hymenelia rhodopis* while var. *arctica* has been established as a separate species (Jørgensen 1989).

*Hymenelia epulotica* s. str. is in Scandinavia only known from dry, calcareous rocks on Öland and Gotland in the southeast (Jørgensen 1989). This makes the report from Bockfjorden remarkable, and the species seems to be a member of a strongly southern element in the Svalbard flora. This can be explained from its habitat near the hot springs Jotunkjeldene at Bockfjorden. The flora of the hot springs (especially Trollkjeldene) is characterised by the only Svalbard localities of one alga (Hoel & Høltedal 1913), five vascular species and one subspecies (Rønning 1961; Frisvoll 1978; Elvebakk et al. 1994) and six bryophytes (Frisvoll 1978).

Olech (1990) reported *H. epulotica* from several localities at Sørkapp Land. However, the occurrence on acidic, wet rocks indicates that this

material is referable to *H. epulotica* in a wide sense. Following Jørgensen (1989) it is probable that this record instead indicates *H. arctica*. Also collected as *Hymenelia prevostii* from calcareous rocks on the western coast by Nordenskiöld without information on locality (Fries 1867) and from Hornsund (Nowak 1965). Associated with *Placythium asperellum*.

#### *Hymenelia haemantina* (Körb.) Lutzoni

From Magnusson's description and comments, Lutzoni (1990) concluded that "*Ioanopsis spitsbergensis* H. Magn. ad int. [nom. inval.]" may belong to this taxon. However, he has not studied Magnusson's original specimen, collected by Lyng in the Bellsund area.

#### *Hymenelia heteromorpha* (Kremp.) Lutzoni

A limestone species reported from Sorgfjorden and Lomfjorden by Fries (1867) (as *Aspicilia rhodopis* var. *melanopis*) and from Bjørnøya where it is probably rather widespread (Lyng 1926b). Magnusson (1933) described the new *Ionaspis heteromorpha* var. *lyngi* H. Magn. from Bjørnøya.

#### *Hymenelia melanocarpa* (Kremp.) Arnold

A saxicolous limestone species only known from Lomfjorden (Magnusson 1933) and Bockfjorden (Hafellner 1982).

#### *Hymenelia rhodopis* (Sommerf.) Lutzoni

A widespread species reported as *Ionaspis epulotica* var. *crustosa* H. Magn. from Bellsund and Van Mijenfjorden by Magnusson (1933). This taxon was later included in *Ionaspis rhodopis* (Jørgensen 1989). The *crustosa* taxon is pulverulent form growing on calcareous overhangs (Jørgensen 1989).

#### *Hypogymnia austerodes* (Nyl.) Räsänen

Reported as rare on Nordaustlandet by Scholander (1934), but all Scholander collections were later determined as *H. subobscura* (Lyng 1938). Well-developed sorediate specimens have later

been collected at Liefdefjorden (Elvebakk unpubl.) and from a mountain plateau near Gipsdalen (Spjelkavik & Elvebakk 1989) where the species was restricted to chert beds.

#### *Hypogymnia physodes* (L.) Nyl.

Earlier only known from the northeastern part (Lyng 1938), but reported from Vårsolbukta (Bellsund) by Elvebakk (1982) and collected from chert deposits of a mountain plateau near Gipsdalen in central Isfjorden (Spjelkavik & Elvebakk 1989).

#### *Hypogymnia subobscura* (Vain.) Poelt

A "North Coast" lichen only known from Nordaustlandet and mapped by Lyng (1938). It is difficult to distinguish from esorediate *H. austerodes* and the Svalbard material of these species is in need of revision. *Hypogymnia subobscura* is an arctic species also known from Novaja Zemlja (Poelt 1969), Greenland, arctic Canada and northern Alaska (Thomson 1984, with map). In Fennoscandia it has only been recorded from the Khibiny Mountains of the Kola Peninsula (Dombrovskaja 1970).

#### *Ionaspis lacustris* (With.) Lutzoni

A common species reported by Fries (1867, as *Lecanora*), by Lyng (1926a, 1939a), Hertel & Ullrich (1976), and Hartmann (1980, as *Lecanora* cf. *lacustris*).

#### *Ionaspis odora* (Ach.) Th. Fr. ex Stein

Reported from Edgeøya by Aptroot & Alstrup (1991).

#### *Japewia tornoënsis* (Nyl.) Tønsberg

A widespread holarctic species, rather common on dead mosses and plant debris, timber and wood. Fries (1867) reported it from Magdalenefjorden (later also reported by Hertel & Ullrich 1976), Kobbefjorden, Danskøya, Amsterdamøya (later also reported by Hertel & Ullrich 1976), Raudfjorden, Wijdefjorden, Sorgfjorden, Lågøya, and Brennevisfjorden.

Other records are from Kvitøya (Lyng 1939a; Malme 1930) and Hornsund (Nowak 1965).

*Lecania aipospila* (Wahlenb.) Th. Fr.

Recorded from Hornsund (Fries 1867) and Bjørnøya (Lyng 1924, 1926b). The species probably belongs to a southern littoral element in the lichen flora of Svalbard.

*Lecania erysibe* (Ach.) Mudd

Only recorded from Lovénberget by Fries (1867).

*Lecania nylanderiana* A. Massal.

Only recorded from Wijdefjorden by Wulff (1902). Hertel & Ullrich (1976) included a probably related, but undetermined *Lecania* species from Amsterdamøya.

*Lecania suavis* (Müll. Arg.) Mig.

Reported from Trollsteinen near Longyearbyen by M. Mayrhofer (1988).

*Lecanora actophila* Wedd.

Another southern seashore species within Svalbard only known from Bjørnøya (Lyng 1926b).

*Lecanora argopholis* (Ach.) Ach.

From Spitsbergen only published by Hue in Hariot (1893), but without geographical information about the locality. It was also reported from Bjørnøya by Lyng (1926b). However, Vänskä (1984) only included a Bjørnøya locality of *L. frustulosa*, but no Svalbard localities of *L. argopholis*. The reports of this species from Svalbard are critical and in need of reevaluation.

*Lecanora atromarginata* (H. Magn.) Hertel & Rambold comb. nov.

Basionym: *Lecidea atromarginata* H. Magn., Acta Horti Gothob. 6: 135–136 (1931).—Typus: Novaja Semlja, Matotchkin Shar, sydsiden ved Karahavet, 20.VII.1921, leg. B. Lyng (O, lectotypus, designated here).

*Lecanora atromarginata* is closely related to *Lecanora marginata* (a species most likely not occurring on Svalbard). Both taxa differ mainly in chemistry. *Lecanora atromarginata* contains usnic acid and stictic acid, whereas *Lecanora marginata* contains usnic acid and atranorin as the major lichen compounds. *Lecanora atromarginata* is probably not rare on Svalbard on basic rock types (calciferous sandstones, basalt), however, not on pure limestone. It has been reported from Hornsund and from Sørkapp Land where it was very common (Olech & Alstrup 1989; Olech 1990) and from Edgeøya (Aptroot & Alstrup 1991), and has also been collected at several localities in the Kongsfjorden area (Hertel unpubl.).

*Lecanora atosulphurea* (Wahlenb.) Ach.

Collected in large quantities by T. Fries on Bjørnøya (Lyng 1926b). From the rest of Svalbard only collected by A. E. Nordenskiöld without indication of locality (Fries 1867). In Scandinavia only known from North Norway (Santesson 1993). The taxon is in need of re-examination.

*Lecanora bennettii* Lyng

Reported at bird perches from several localities at Hornsund by Olech (1987).

*Lecanora cenisia* Ach.

Known from three localities in the north (Fries 1867) and from Edgeøya (Aptroot & Alstrup 1991).

*Lecanora contractula* Nyl.

Reported from Bjørnøya by Lyng (1926b). The larger *Arctopeltis thuleana* was previously included in this species (Poelt 1983).

*Lecanora epibryon* (Ach.) Ach.

A very common species on dead mosses and plant debris reported by numerous authors; by Fries (1876) as *L. subfusca* var. *hypnorum*.



*Lecanora flotowiana* Spreng.

Recorded by many authors as *L. dispersa* (Pers.) Sommerf., but considered here to correspond to *L. flotowiana*. For further notes, see *L. dispersa* below 'Rejected species'.

*Lecanora frustulosa* (Dicks.) Ach.

Only reported from Bjørnøya (Vänskä 1984), probably as a redetermination of a single *Lecanora argopholis* report by Lynge (1926b).

*Lecanora hadacii* Lynge

Described as a new species from the area west of Sassendalen by Lynge (1940a), and Hadač (1946) noted the type locality as Ledalen. The species does not seem to have been reported later, and it should be regarded as a critical taxon.

*Lecanora hagenii* (Ach.) Ach.

Recorded as var. *hagenii* from Hornsund, Sorgfjorden, Lovénberget, Lomfjorden (Fries 1867), from Sørkapp/Hornsund (Lynge 1924), from Depothamna/Depotøya at Nordaustlandet (Santesson 1939), as var. *fallax* Hepp from Bockfjorden (Hafellner 1982), and from Hornsund (Olech 1987). Under the name *Lecanora behringii* Nyl., var. *saxifragae* (Anzi) reported from three localities at Sørkapp Land by Olech (1990).

*Lecanora intricata* (Ach.) Ach.

Reported from Sørkapp Land and Sørkappøya by Lynge (1924) and from Edgeøya by Aptroot & Alstrup (1991).

*Lecanora leptacina* Sommerf.

A species consistently growing on *Andreaea* and reported from Hornsund by Körber (1875), from Bjørnøya by Lynge (1926b), and from Sørkapp Land by Olech (1990).

*Lecanora leucophaeoides* Nyl.

Reported from Amsterdamøya as *L. cf. leucophaeoides* by Hertel & Ullrich (1976). This is a

critical taxon often considered to be a synonym of *Miriacidica lulensis* which is common on Svalbard. The present collection differs from this taxon and is included here until further studies are available.

*Lecanora leucococca* Sommerf.

Reported as *Lecanora polytropia* & *leucococca* from Lovénberget, Lomfjorden, Lågøya, and Edgeøya by Fries (1867), and from the Adventdalen-Sassendalen area by Lynge (1940a).

*Lecanora luteovernalis* Brodo

Reported from Bockfjorden, Liefdefjorden and Kongsfjorden by Elvebakk & Tønberg (1992). The species grows on xeric fine-grained calcareous soil. It is phytogeographically interesting as otherwise it has only been reported from arctic Canada (Brodo 1981).

*Lecanora micheleri* (Hertel) Hertel

The species was described from the Norden-skiöldfjellet mountain near Longyearbyen (Hertel 1981b) and later transferred to the genus *Lecanora* (Hertel 1991). The species was collected 900 m a.s.l. on sandstone on a windexposed ridge.

*Lecanora muralis* (Schreb.) Rabenh.

Only reported from Edgeøya by Aptroot & Alstrup (1991).

*Lecanora nordenskiöldii* Vain.

A poorly known arctic taxon reported from Bjørnøya (Lynge 1926b).

*Lecanora orae-frigidae* R. Sant.

First indicated from Svalbard by Lynge (1939a) as *Lecidea sorediata*. Later reported from many localities, especially on northern Svalbard by Westman (1973) as *Lecanora symmicta* (Ach.) Ach. var. *sorediosa* L. Westman. The species is mainly arctic where it is restricted to driftwood, but it has also been found on other types of old wood as far south as central Sweden (Santesson 1993).

*Lecanora polytropa* (Ehrh. ex Hoffm.) Rabenh.

A very common species complex. Reported from many localities in northern Svalbard (Fries 1867; Lyng 1939a). A few localities have also been reported for var. *illusoria* (Lyng 1926b, 1939a) and for var. *alpigena* (Paulson 1923, 1927). The species is bipolar (Hertel 1988).

*Lecanora polytropella* Nyl.

Reported from Chermisideøya (near northernmost Nordaustlandet) by Paulson (1927). The report needs verification.

*Lecanora rupicola* (L.) Zahlbr.

Reported as var. *rupicola* from the area near Longyearbyen airport based on three collections made by Hafellner in 1979 (Leuckert & Poelt 1989). A collection from Bjørndalen west of Longyearbyen was with some uncertainty referred to the new ssp. *arctoa* Leuckert & Poelt, which otherwise is only known from the Disko area on Greenland (Leuckert & Poelt 1989). The report of *Lecanora subradiosa* from the Bockfjorden area by Hafellner (1982) probably refers to *L. swartzii*.

*Lecanora straminea* Ach.

Collected by A. E. Nordenskiöld on seashore rocks from western parts of Svalbard without information on localities (Fries 1867). Collected on bird cliffs on Bjørnøya in 1986 (Bustnes unpubl., TROM). A report of "*Lecanora subfusca* (L.) Ach. cfr. var. *angustata* Ach." from driftwood at Bjørnøya by Lyng (1926b) may refer to a different species. *Lecanora straminea* is possibly a southern representative in the Svalbard lichen flora.

*Lecanora swartzii* (Ach.) Ach.

Reported as ssp. *nylanderi* (Räsänen) Leuckert & Poelt from two localities near Longyearbyen (Leuckert & Poelt 1989) and from Edgeøya (Aptroot & Alstrup 1991). This subspecies has a more northern and alpine distribution than ssp. *swartzii* (Leuckert & Poelt 1989). The report of *Lecanora subradiosa* Nyl. from Fred Olsenfjellet

southwest of Bockfjorden by Hafellner (1982) probably refers to *L. swartzii*.

*Lecanora torrida* Vain.

A very rare limestone species in Scandinavia only known from northernmost Sweden (Santesson 1993). Recorded from Bjørnøya by Lyng (1926b) and from Jan Mayen (Havhestberget), Bjørnøya (Sørhamna; Miseryfjellet) and Spitsbergen (Mariaholmen) from Poelt & Leuckert (1995).

'*Lecidea*' *alpestris* Sommerf.

Recorded from northern Svalbard by Fries (1867) and from a few localities by Lyng (1924), Paulson (1928), and Eurola (1968). The species does not belong to *Lecidea* sensu stricto.

*Lecidea atrobrunnea* (Ramond ex Lam. & DC.) Schaer.

The *Lecidea atrobrunnea* complex needs further studies. *Lecidea atrobrunnea* s.str. is an autotrophic (non-lichenicolous), silicicolous species usually with 2'-O-methylperlatolic acid as the main lichen compound. On Svalbard it is less common than *L. syncarpa*, a taxon with which it was formerly confused.

*Lecidea auriculata* Th. Fr.

Includes var. *brachyspora* Th. Fr. – previously *L. brachyspora* (Th. Fr.) Nyl. – reported from Hopen (Lyng 1939a), Longyearbyen (Hertel 1977a), and Bellsund (Hertel 1991). This taxon differs from the type variety only by its almost globose spores. Whereas var. *brachyspora* seems to be a rather rare taxon, var. *auriculata* is one of the most common crustose lichens on acid rocks on Svalbard. A distribution map for the northern hemisphere was provided by Hertel (1977b), and it was mapped on Svalbard by Hertel & Ullrich (1976).

*Lecidea collodea* (Th. Fr.) Leight.

Described as "*Biatora collodea* n. sp." from Magdalenefjorden, Wijdefjorden, Sorgfjorden, and Lågøya by Fries (1867). This corresponds to *Lecidea collodea* (Th. Fr.) Leight., combined in Ann.

Mag. Nat. Hist. Zool. Bot. Geol. 3rd Ser., 20:441 (1867), although Zahlbruckner (1925) gave a misleading nomenclatural citation. The taxon is in need of a critical reevaluation as its systematic position is unclear (Printzen 1995).

*'Lecidea' commaculans* Nyl.

Only collected near the basis of the mountain Zeppelinfjellet, near Ny-Ålesund. The species was previously only known from four other localities in the world (Hertel 1977a), but more localities have now been added, and *L. commaculans* seems to have its highest frequency on Iceland (Schwab 1986). The species does not belong to *Lecidea* s. str., but is a member of the Lecanoraceae.

*Lecidea confluens* (Weber) Ach.

Recorded twice from Bjørnøya (Summerhayes & Elton 1923, Lyng 1926b), from Sørkapp Land (Olech 1990), and from a few localities in the north (Fries 1867). *Lecidea lepadina* Sommerf. is considered to be a teratological modification of *L. confluens*, see Hertel (1995).

*Lecidea ecrustacea* (Anzi ex Arnold) Arnold

Reported from Camp Morton at Van Mijenfjorden by Hertel (1970a) and from the Longyearbyen area by Hartmann (1980). Closely related to and sometimes included in *L. lapicida* (Clauzade & Roux 1985b; Foucard 1990).

*'Lecidea' ementiens* Nyl.

A muscicolous alpine species in Scandinavia (Santesson 1993) that has been reported from Bjørnøya (Lyng 1926b), Amsterdamøya (Hertel & Ullrich 1976) and Bohemanflya (Kobayashi et al. 1990). Does not belong to *Lecidea* s. str., but seems to be related to *Biatora* (Printzen 1995).

*'Lecidea' epiphaea* Nyl.

Only reported from Bjørnøya (Lyng 1926b). Does not belong to *Lecidea* s. str., and its systematic position is unclear (Printzen 1995).

*'Lecidea' ileiformis* Fr.

Only recorded once from a mountain (980 m altitude) near Bockfjorden (Hafellner 1982). In Scandinavia it has only been found at Dovre, central Norway (Santesson 1993). Does not belong to *Lecidea* s. str.

*Lecidea lapicida* (Ach.) Ach.

A bipolar, extremely common, however, often misidentified species. There are two chemotypes (preliminary treated as varieties, for there is some indication that they perhaps may also differ in ecology and distribution): var. *lapicida* (with stictic acid) and var. *pantherina* Ach. (with nors-tictic acid as the main lichen substance). Very closely related and likely to be included into *L. lapicida* are *L. ecrustacea* (epilithic thallus lacking) and *L. swartzoides* (with a dark or black brown, instead of a colourless or faintly brown hypothecium, as to be seen on sections  $\pm 15 \mu\text{m}$  thick). *Miriacidica lulensis* is often similar in habit, but is easily separated by its *Lecanora* type asci and the negative J reaction of the medulla.

*'Lecidea' limosa* Ach.

Recorded from Bjørnøya as *L. cf. limosa* by Lyng (1926b) and as a frequent species at Sørkapp Land by Olech & Alstrup (1989) and Olech (1990). It does not belong to *Lecidea* and is probably related to *Lecidoma* (Printzen 1995).

*'Lecidea' lurida* Ach.

Reported from Liefdefjorden by Elvebakk & Tønsberg (1992). The species does neither belong to *Lecidea* s. str. nor *Psora* (Timdal 1984).

*'Lecidea' minutissima* Lyng

Described as a new species from Sørhamna on Bjørnøya by Lyng (1926b). It does not seem to have been reported later nor restudied. According to Hertel (1971) the taxon belongs to *Lecanora*, but it remains unclear whether it represents a distinct species or not.

*'Lecidea' miseriae* Lyng

Described as a new species from the mountain Miseryfjellet on Bjørnøya by Lyng (1926b). Like

the previous species it does not seem to have been found outside its type locality. The species is not referred to in major reference sources and needs to be restudied. It does not belong to *Lecidea*, and its systematic position is unclear (Printzen 1995).

*'Lecidea' paanaënsis* Räsänen & M. Laurila

Published from Bockfjorden by Hafellner (1982) as *L. cf. paanaënsis* with reservation as comparative samples of this species were not available. In Scandinavia it has only been recorded from Luster in western Norway (Magnusson 1957). The Svalbard report is in need of confirmation. According to Rambold in Santesson (1993) the taxon belongs to the genus *Miriquidica*.

*Lecidea paupercula* Th. Fr.

Recorded from Sørkapp and Øyrlandet (between Sørkapp and Hornsund) by Lynge (1924), from Bjørnøya by Lynge (1926b), from Amsterdamøya by Hertel & Ullrich (1976) and without locality by Hue in Hariot (1893). *Lecidea paupercula* is used here in the more restricted circumscription of Hertel (1995), and not according to Hertel (1990) and Santesson (1993), where it was considered a synonym of *L. praenubila*.

*'Lecidea' picea* Lynge

Reported from Murchisonfjorden at Nordaustlandet by Lynge (1940b). This is an arctic species first described from Novaja Zemlja. The taxon is critical and most likely it does not belong to *Lecidea* s. str., but probably to *Miriquidica*.

*Lecidea plana* (J. Lahm) Nyl.

Only recorded from Marmiefjellet at Isfjorden (Lynge 1940a) and from Bockfjorden by Schuhwerk (1992).

*'Lecidea' polycocca* Sommerf.

Reported by Hertel (1991) from Brøggerhalvøya, Kongsfjorden. This tiny and inconspicuous lichen

grows on limestone, dolomite and other carbonate-rich rock types and is known from Fennoscandia, the Alps, and arctic North America. It does not belong to *Lecidea* s. str., but is a member of Lecanoraceae.

*'Lecidea' polytrichina* Hertel

The earliest record of this lichen was given by Fries (1867), who described *Biatorina globulosa* ß *polytrichina* Th. Fr. as a new variety from Fosterøya, Hinlopenstretet. Vainio (1883) made the combination *Lecanora polytrichina* (Th. Fr.) Vain. Obermayer & Poelt (1994) found that this lichen is conspecific with *Lecidea polytrichina* Hertel, a lichen, independently described from Torne Lappmark, Sweden (Hertel 1968). *'Lecidea' polytrichina* does not belong to *Lecidea* s. str.; however, its correct taxonomic position is not yet known. As long as this species is kept as a member of the genus *Lecidea*, *Lecidea polytrichina* Hertel is its correct name, although *Lecanora polytrichina* (Th. Fr.) Vain. (1883) is much older in the rank of a species. *'Lecidea' polytrichina* colonised the distal parts of the leaves of *Polytrichum* species and was also collected on *Gymnomitrium corallioides* (Obermayer & Poelt 1994).

*'Lecidea' polytrichinella* Hertel, W. Obermayer & Poelt

As *'Micarea spec. (ex aff. Micarea leptacinella)'* this lichen was described and illustrated by Hertel & Ullrich (1967) based on a collection from Amsterdamøya. The species does neither belong into *Micarea* nor into *Lecidea* s. str. *'Lecidea' polytrichinella* colonises the uppermost leaves of *Polytrichum* species, like *'L. polytrichina*. It is also known from the Austrian Alps (where its type locality is) and from northern Sweden (Obermayer & Poelt 1994).

*Lecidea praenubila* Nyl.

First reported by Lynge (1926b) from Bjørnøya as *L. arthroocarpoides* Vain., a synonym of *L. paupercula* according to Hertel (1995), but later redetermined by Lynge (1939b) to *L. helsingforsiensis* Nyl., a synonym of *L. praenubila* according to Hertel (1995). The Bjørnøya collection was not studied by Hertel (1995), who has not seen any Svalbard specimen of *L. praenubila*.

s.str. (with a pale hypothecium), and the collection needs to be restudied.

*'Lecidea' ramulosa* Th. Fr.

A widespread and often dominant species on moist circumneutral or alkaline soil or on plant debris and bryophytes. It is a member of the Bacidaceae (Printzen 1995).

*Lecidea rhagadiella* (Nyl.) Th. Fr.

Recorded only from Botneheia at Isfjorden (Lyng 1940a). In Scandinavia only known from northernmost Sweden (Santesson 1993). The taxon is in need of a critical reevaluation.

*'Lecidea' scrobiculata* (Th. Fr.) Th. Fr.

This is a species only known from arctic Canada and Svalbard (Hertel & Ullrich 1976). It was collected at Lovénberget and Lomfjorden (Fries 1867) and at Amsterdamøya as cf. *scrobiculata* (Hertel & Ullrich 1976). The species does not belong to *Lecidea* s. str., but is a member of the genus *Lecanora* that needs further studies.

*'Lecidea' septentrionalis* Th. Fr.

Only recorded from Bjørnøya (Lyng 1926b). In mainland Norway only known from Finnmark (Santesson 1993). Does not belong to *Lecidea* s. str., and its systematic position is unclear (Printzen 1995).

*Lecidea silacea* Ach.

Only known from Longyearbyen (Hertel 1977a) and Sørkapp Land (Olech 1990). The species is confined to substrate rich in iron (Schwab 1986).

*Lecidea steineri* Hertel

Only recorded from one locality close to the airport at Longyearbyen (Hertel 1981b).

*Lecidea swartzioidea* Nyl.

Reported by Hertel & Ullrich (1976) to be common on Amsterdamøya, reported from the Long-

yearbyen area as *Lecidea* cf. *swartzioidea* by Hartmann (1980), and was also collected on Edgeøya (Aptroot & Alstrup 1990). The species is widespread and should possibly be included in *L. lapicida* according to Schwab (1986).

*Lecidea symphyicarpea* Lyng

Reported from Amsterdamøya (Hertel & Ullrich 1976) and Blomstrandhalvøya near Ny-Ålesund (Hertel 1980). The species was growing on rocks in very wet polygonal fields. Apart from Svalbard *L. symphyicarpea* is only known from its type locality on Novaja Zemlja (Hertel & Ullrich 1976). The species is critical.

*Lecidea syncarpa* Zahlbr.

A species of the *Lecidea atrobrunnea* complex, usually with a pale yellowish brown, bullate thallus and with norstictic acid as the main lichen compound. It seems to be widely distributed throughout Svalbard, where it often prefers nutrient rich localities over acid rocks. Specimens in herbaria are usually named '*Lecidea atrobrunnea*', see Hertel (1995).

*Lecidea tessellata* Flörke

A very widespread and ecologically variable species, for Svalbard reported by Fries (1867), Lyng (1940a), Aptroot & Alstrup (1991), Hertel (1991), and Olech (1991) from various localities. On rocks rich in carbonate var. *caesia* (Anzi) Arnold occurs. Both varieties often behave as a youth-parasite on *Aspicilia* spp.

*Lecidea umbonata* (Hepp) Mudd

An alpine species restricted to carbonate-rich rock types. Its northern hemisphere distribution was mapped by Hertel (1977a). It is, however, rare in northern Europe. On Svalbard at present only known from the Ny-Ålesund area (Hertel 1977a).

*Lecidea verruca* Poelt

A lichenicolous species growing on thalli of *Aspicilia* species. Only reported from Bjørndalen

near Longyearbyen by Hertel (1981b). The species is closely related to *Lecidea tessellata*.

*Lecidella aemulans* Arnold

A very rare species at present known from five localities in the Alps, the Tatra Mountains and one from Blomstrandhalvøya near Ny-Ålesund (Hertel 1977a). Its generic position is unclear.

*Lecidella bullata* Körb.

Reported from Amsterdamøya (Hertel & Ullrich 1976), from Kongsfjorden and the Longyearbyen area (Hertel 1977a), from Sørkapp Land (Olech 1990) and Edgeøya (Aptroot & Alstrup 1991). A world distribution map was presented by Hertel & Ullrich (1976).

*Lecidella effugiens* (Nilson) Knoph & Hertel

Known from Isfjorden near Longyearbyen, leg. Hertel (Leuckert et al. 1992). Reported also from Sveagruva by Eurola (1971) based on material determined as *L. albidocinerella* by J.W. Thomson. Its worldwide distribution was mapped by Knoph et al. (1995).

*Lecidella elaeochroma* (Ach.) M. Choisy sensu lato

Only known from Amsterdamøya (Hertel & Ullrich 1976). *Lecidea enteroleuca* auct. was used as a name for a number of *Lecidella* species (e.g. *L. stigmatea*), whereas *Lecidea enteroleuca* Ach. is a synonym of *Melaspilea urceolata* (Fr.) Almb. (Santesson 1993). *Lecidella enteroleuca* Ach. *β latypea* (Ach.) Nyl. as published from Spitsbergen by Fries (1867) was thought to correspond to *Lecidella elaeochroma* by Hertel & Ullrich (1976). The latter alternative is followed for the T. Fries collection.

*Lecidella euphorea* (Flörke) Hertel

Reported from driftwood on Bjørnøya (Lyng 1926b) and from Adventdalen on an old reindeer's antler (Lyng 1940a).

*Lecidella patavina* (A. Massal.) Knoph & Leuckert

Previously reported from Botneheia at Isfjorden as *Lecidea spitsbergensis* by Lyng (1940a), from Sørkapp Land, from Ny-Ålesund, from Bjørnøya (Hertel 1970), and from Bockfjorden as *Lecidella inamoena* (Hertel 1981b; Hafellner 1982). Hertel (1981b), who cited numerous collections from the Ny-Ålesund area, also referred *Lecidea acrocyanea* published from Svalbard by Magnusson (1945) to *Lecidella inamoena*. *Lecidella inamoena* and *L. spitsbergensis* were recently included in *L. patavina* by Knoph (1990) and the species was reported from Edgeøya by Aptroot & Alstrup (1991).

*Lecidella stigmatea* (Ach.) Hertel & Leuckert

Recorded from Sørkapp Land (Olech 1990), Hornsund (Nowak 1965), Edgeøya (Aptroot & Alstrup 1991), Amsterdamøya (Hertel & Ullrich 1976), from numerous localities on Spitsbergen by Hertel (1981b), and from Bockfjorden by Hafellner (1982). The species is bipolar (Hertel 1988).

*Lecidella wulfenii* (Hepp) Körb.

Known from Bjørnøya (Lyng 1926b), Sørkapp Land (Olech & Alstrup 1989; Olech 1990) and from several localities in northern Svalbard (Fries 1867).

*Lecidoma demissum* (Rutstr.) Gotth. Schneid. & Hertel

Reported from Bellsund and Magdalenefjorden, Kobbefjorden, Danskøya, Lågøya, and Sjuøyane in northern Svalbard by Fries (1867, as *Psora atrorufa*), from Bjørnøya (Lyng 1926b), Sørkapp Land (Olech 1990), Hornsund (Olech 1987), Edgeøya (Aptroot & Alstrup 1991), Krossfjorden (Elvebakk unpubl.), Amsterdamøya (Hertel & Ullrich 1976). The distribution of *Lecidoma demissum* is possibly restricted due to the limited distribution of hard siliceous rocks and their corresponding strongly acidic soils.

*Leciophysma finmarkicum* Th. Fr.

A common species reported by many authors.

southern taxon on Svalbard only known from habitats with a favourable local climate.

*Lempholemma isidioides* (Nyl. ex Arnold) H. Magn.

New to Svalbard. Collected by D.O. Øvstedal at Sassendalen in 1986 (BG).

*Leptogium subtile* (Schrad.) Torss.

A very small and sterile specimen determined with some uncertainty from Hornsund by Nowak (1965). A very small species reported as far north as Tromsø by Jørgensen (1994).

*Lepraria neglecta* (Nyl.) Erichsen

A common bipolar lichen reported by several authors.

*Leptogium tenuissimum* (Dicks.) Körb.

Reported as *Leptogium lacerum* var. *tenuissimum* (Ach.) Th. Fr. by Fries (1867) from Isfjorden, Sorgfjorden, Rypeøya and Kvalpynten.

*Leproloma vouauxii* (Hue) J.R. Laundon

This species was previously known as *Crocynia arctica* Lynge as described from Greenland, but is now known as a species with a worldwide distribution (Laundon 1989). The only published records are from Hornsund (Laundon 1989) and Edgeøya (Aptroot & Alstrup 1991), but the species has probably been overlooked on Svalbard.

*Lobaria linata* (Ach.) Rabenh.

Known from localities scattered all over Svalbard; see Lynge (1938) and later reports by Lynge (1940a), Hofmann (1868), and Hertel & Ullrich (1976).

*Leptogium byssinum* (Hoffm.) Zwackh ex Nyl.

New to Svalbard. Collected from calcareous soil at Gipsdalen by D. O. Øvstedal in 1987 (BG). This small species is known from Sweden and Finland, but not from mainland Norway (Santesson 1993; Jørgensen 1994).

*Lobothallia alphoplaca* (Wahlenb.) Hafellner

Reported from irrigated rocks at Liefdefjorden by Elvebakk (1984a).

*Leptogium gelatinosum* (With.) J.R. Laundon

Only reported from Lomfjorden (Fries 1867) and Edgeøya (Aptroot & Alstrup 1991).

*Lobothallia melanaspis* (Ach.) Hafellner

Reported from Reinsdyrfløya by Paulson (1928) and from Edgeøya by Aptroot & Alstrup (1991).

*Leptogium lichenoides* (L.) Zahlbr.

Widespread on Svalbard. Reported as var. *pulvinatum* (Hoffm.) Zahlbr. by Hafellner (1982).

*Lopadium coralloideum* (Nyl.) Lynge

Reported from Sørkappøya by Lynge (1924), as a single plant from Sørhamna on Bjørnøya (Lynge 1926b), and from Kvitøya (Lynge 1939a). The species was recently reported from numerous localities at Sørkapp Land by Olech (1990), and was reported in vegetation tables from Bohe-manfløya by Kobayashi et al. (1990).

*Leptogium saturninum* (Dicks.) Nyl.

Reported from Ekmanfjorden and Liefdefjorden by Elvebakk (1984a). This is a remarkable

*Lopadium pezizoideum* (Ach.) Körb.

Reported by Fries (1867) from several localities in the north, from two localities at Hinlopenstretet by Paulson (1928), and later from four localities at Hornsund by Olech (1987). It has also

been collected at Reindalen (Engelskjøn unpubl.; Elvebakk unpubl.).

*Massalongia carnosa* (Dicks.) Körb.

Recently reported from Sørkapp Land by Olech & Alstrup (1989) and Olech (1990). The species is bipolar (Hertel 1988).

*Megaspora verrucosa* (Ach.) Hafellner & V. Wirth

A common species on soils rich in calcium.

*Melanelia disjuncta* (Erichsen) Essl.

Scattered over most parts of Svalbard (see Lyng 1938), but probably restricted due to the lack of hard siliceous rocks in large areas.

*Melanelia hepaticum* (Ach.) Thell

A very common species on Svalbard, previously named *Cetraria hepaticum*. It belongs to a complex in need of revision. According to own experiences the Svalbard, material belongs to at least two taxa, excluding *Melanelia agnata* (Nyl.) Thell and *M. commixta* (Nyl.) Thell. Fries (1867) published *C. fahlunensis* (L.) *β. polyschiza* (Nyl.) Th. Fr. (= *Platysma polyschizum* Nyl.) from Nordaustlandet, but its taxonomical significance has not been reevaluated.

*Melanelia infumata* (Nyl.) Essl.

A common species on manured rocks (Lyng 1938, 1940a; Olech 1990; Aptroot & Alstrup 1991).

*Melanelia sorediata* (Ach.) Goward & Ahti

Only reported from two localities at Van Mijenfjorden/Van Keulenfjorden (Lyng 1938) and from Edgeøya (Aptroot & Alstrup 1991), but collected from several other localities by Elvebakk (unpubl.).

*Melanelia stygia* (L.) Essl.

Concentrated to the northeastern part of Svalbard

(Nordaustlandet, Lomfjorden) with one additional locality near Pyramiden (Fries 1867; Lyng 1938) and one west of Sassendalen (Lyng 1940a). Later it has been found in large quantities on chert deposits near Gipsdalen (Spjelkavik & Elvebakk 1989) and in Sassendalen (Elvebakk unpubl.). Recorded by Lyng (1938) as var. *septentrionalis* Lyng.

*Melanolecia transitoria* (Arnold) Hertel

At present only known from China, the Alps and Svalbard, where it has been collected twice on limestone near Ny-Ålesund (Hertel 1977a). The genus is now monotypic, as other species have been transferred to *Farnoldia* Hertel.

*Micarea assimilata* (Nyl.) Coppins

Recorded from three localities on Bjørnøya (Lyng 1926b), from Brøggerhalvøya (Hertel 1985), from two localities at Hornsund (Olech 1987), from Kapp Lee, Edgeøya (Barkman 1987), and from eight localities at Sørkapp Land (Olech 1990).

*Micarea incrassata* Hedl.

Known from Bjørnøya (Lyng 1926b) and Ny-Ålesund (Hertel 1977a), in the latter case associated with *Polytrichum*.

*Miriquidica atrofusca* (Sommerf.) A. J. Schwab & Rambold

Hertel & Ullrich (1976) found it to be very common on Amsterdamøya as compared to the more continental areas around Ny-Ålesund (Hertel 1977a) and it is a moisture demanding species. Additional localities presented later by Hertel (1980) include Sørkappøya, Murchisonfjorden on Nordaustlandet, Storøya (east of Nordaustlandet), and Abeløya (easternmost island of Kong Karls Land). The species was also reported from Sørkapp Land by Olech (1990).

*Miriquidica complanata* (Körb.) Hertel & Rambold

Reported from Ulvebukta (Nordaustlandet) by



Paulson (1928) as *Aspicilia complanata* (Körb.) Stein.

(1991), and it is widespread in Scandinavia (Santesson 1993).

*Miriquidica garovaglii* (Schaer.) Hertel & Rambold

Reported from Edgeøya by Aptroot & Alstrup (1991) and from Isfjorden and Kongsfjorden by Hertel (1991).

*Miriquidica griseoatra* (Flot.) Hertel & Rambold

Only recorded from Hornsund by Nowak (1965) and from a few localities at Sørkapp Land by Olech (1990).

*Miriquidica leucophaea* (Flørke ex Rabenh.) Hertel & Rambold

Only recorded from Bjørnøya (Lyng 1926b).

*Miriquidica lulensis* (Hellb.) Hertel & Rambold

Probably a very common arctic pioneer species on siliceous (including iron-containing) rocks, and its world distribution was mapped by Hertel (1991). *Lecidea circumnigrata* H. Magn. var. *reagens* H. Magn. is a synonym.

*Miriquidica nigroleprosa* (Vain.) Hertel & Rambold

Probably a common species on Svalbard, but until now only published from Blomstrandhalvøya near Ny-Ålesund on a siliceous, erratic boulder (Hertel 1977a), from Amsterdamøya (Hertel & Ullrich 1976), Bockfjorden (Hafellner 1982), and from Sørkapp Land (Olech 1990).

*Mycobilimbia berengeriana* (A. Massal.) Hafellner & V. Wirth

Reported from Edlundfjellet at Storfjorden by Fries (1867) as "*Biatora miscella* (Sommerft.) Fr.". The species has also been reported from Bellsund by Eurola & Hakala (1977), from Sørkapp Land by Olech & Alstrup (1989) and Olech (1990), from Edgeøya by Aptroot & Alstrup

*Mycobilimbia hypnorum* (Lib.) Kalb & Hafellner

Only known from Bjørnøya (Lyng 1926b), Hornsund (Nowak 1965), Sørkapp Land (Olech 1990), Kongsfjorden (Nimis 1985), Amsterdamøya (Hertel & Ullrich 1976), and Bockfjorden (Hafellner 1982).

*Mycobilimbia lobulata* (Sommerf.) Hafellner

A common species on calcareous soil. In early literature reported as *Biatorina regeliana*, *Bilimbia sabulosa* var. *montana*, *Bilimbia syncomisia*, or *Toninia syncomista*.

*Mycobilimbia microcarpa* (Th. Fr.) Brunnb.

Reported from Brennevinsfjorden on Nordaustlandet (Fries 1867), and from Bjørnøya, where it was supposed to be common (Lyng 1926b). The identification of the Bjørnøya material was not certain. It was also listed in vegetation tables from Hornsund and Trygghamna (Isfjorden) by Eurola (1968).

*Mycobilimbia sabuletorum* (Schreb.) Hafellner

Only recorded from Hornsund by Nowak (1965).

*Mycoblastus alpinus* (Fr.) Th. Fr. ex Hellb.

Reported from Krossfjorden and Colesbukta by Elvebakk & Tønsberg (1992).

*Nephroma arcticum* (L.) Torss.

A southern species in the Arctic, recorded as one of the rarest lichens on Spitsbergen by Lyng (1938), but several additional localities have later been discovered at Dickson Land, Alkepynten and Krossfjorden (Elvebakk 1984a) and Sørkapp Land (Olech 1990). *Nephroma arcticum* has also

been collected at Nordaustlandet by E. Dahl in 1936 (unpubl., O) and on several occasions in central parts of Reindalen (Elvebakk unpubl.). It was published by Lyngé (1938) as var. *complicatum*, cfr. his critical comments on *Lobaria linita* f. *complicata* (Th. Fr.) Zahlbr. Both these infraspecific taxa seem to be modifications of low systematic value. The same goes for *Peltigera aphthosa* f. *microphyllina* Gyeln. and *P. leucophlebia* f. *complicata* Th. Fr.

*Nephroma expallidum* (Nyl.) Nyl.

A rather common species reported from scattered localities in most parts of Svalbard (Lyngé 1938; Malme 1930; Eurola 1968; Hertel & Ullrich 1976; Hartmann 1980; Kobayashi et al. 1990; Olech 1990; Aptroot & Alstrup 1991).

*Nephroma parile* (Ach.) Ach.

Recently reported from Sørkapp Land by Olech & Alstrup (1989) and Olech (1990). This is a remarkable addition of a southern species to the lichen flora of Svalbard. *Nephroma parile* is reported from the southernmost part of Greenland (Thomson 1984; James & White 1987), but it has also been collected at 70° N on Disko Island (Alstrup 1977).

*Neuropogon sphacelatus* (R. Br.) D.J. Galloway

A bipolar lichen known from Svalbard, Jan Mayen and Iceland and other circumarctic areas, but not from Fennoscandia (Lyngé 1941). It is common on Svalbard especially in humid, alpine areas. It prefers intermediate rocks and avoids granite and limestone (Elvebakk 1984a). In a monograph (Walker 1985) its widely used name *Neuropogon sulphureus* was replaced by *Usnea sphacelata*.

*Ochrolechia androgyna* (Hoffm.) Arnold

First listed in vegetation tables from Hornsund, Colesbukta and Longyearbyen (Eurola 1968), then added from the Ny-Ålesund area (Hertel 1977a), from Bockfjorden (Hafellner 1982), and from Sørkapp Land (Olech 1990).

*Ochrolechia frigida* (Sw.) Lyngé

A very common species on Svalbard. Includes *O. frigida* f. *telephoroides* (Th. Fr.) Lyngé and *O. gonotades* (Ach.) Räsänen reported by Nowak (1965). The species is bipolar (Hertel 1988).

*Ochrolechia grimmiae* Lyngé

Only published from Sørkapp Land (Olech 1990), Hornsund (Olech 1987), Hornsund and Isfjorden (Eurola 1968), Isfjorden (Lyngé 1940a; Hertel 1977a) and Amsterdamøya (Hertel & Ullrich 1976), but has been collected from several additional localities (Elvebakk unpubl.) and is probably common on *Racomitrium lanuginosum*.

*Ochrolechia inaequatula* (Nyl.) Zahlbr.

First listed as common in vegetation tables from Hornsund, Colesbukta and Longyearbyen by Eurola (1968). Later also reported from Sveagruva by Eurola (1971), from Sørkapp Land by Olech & Alstrup (1989) and Olech (1990) and from Edgeøya by Aptroot & Alstrup (1991).

*Omphalina alpina* (Britzelm.) Bresinsky & Stangl

Common along the western coast of Spitsbergen (Heikkilä & Kallio 1969; Gulden et al. 1985; Høiland 1987). The species was mapped on Svalbard by Høiland (1987) and seems to belong to a coastal phytogeographical element that only includes a restricted number of species. The genus name *Phytoconis* was proposed for these *Omphalina* species by Redhead & Kuyper (1988), but Jørgensen & Ryman (1989a), who treated the lichenised species in Scandinavia, proposed conserving the name *Omphalina*.

*Omphalina hudsoniana* (H.S. Jenn.) H. E. Bigelow

First reported from Bockfjorden by Elvebakk (1984a), who reported two localities from bird perches. Only lichenised thalli ("*Coriscium viride*") were collected. Later Høiland (1987) mapped the species on Svalbard. However, he only included one locality at St. Johnsfjorden and one from the easternmost part of Kongsfjorden as the previous publication was overlooked.

*Omphalina umbellifera* (L.: Fr.) Quélet

Reported from Svalbard by numerous authors, cfr. Heikkilä & Kallio (1969). The species was mapped on Svalbard by Høiland (1987). This map is only based on material from the four University herbaria of Norway, and many other records (cfr. Heikkilä & Kallio 1969) have not been included.

*Omphalina velutina* (Quélet) Quélet

First reported by Heikkilä & Kallio (1969), and later Høiland (1987) added several other localities.

*Ophioparma lapponica* (Räsänen)  
Hafellner & R.W. Rogers

It is probable that all *Ophioparma ventosa* s.l. material from Svalbard belongs to *O. lapponica* (= *O. ventosa* var. *lapponica*) even if the older collections published as "*Haematomma ventosum* (L.) A. Massal." (Fries 1867; Summerhayes & Elton 1928) have not been reinvestigated as to this point. The *lapponica* taxon was provisionally given the rank as a variety by Santesson (1993), who stated that the *ventosa/lapponica* complex needs further studies. It has been published as *H. lapponicum* from Svalbard by Nowak (1965), Hertel & Ullrich (1976), Hertel (1977a) and Hafellner (1982). The species has been found on scattered localities on siliceous rocks on Svalbard.

*Orphniospora moriopsis* (A. Massal.) D.  
Hawksw.

A widespread, saxicolous collective species. Reported from Hornsund, Magdalenefjorden, Kobbefjorden, Wijdefjorden, and Sorgfjorden by Fries (1867), from Bjørnøya by Lynge (1926b), from Hornsund by Nowak (1965), from Amsterdamøya by Hertel & Ullrich (1976), from Bockfjorden by Hafellner (1982), and from Sørkapp Land by Olech (1990).

*Pannaria hookeri* (Borrer ex. Sm.) Nyl.

A common species on sandstone and schistose rocks in snow beds with a moderate snow cover (Elvebakk 1982, 1984b). The species is bipolar and has been reported by several authors.

*Pannaria pezizoides* (Weber) Trevis.

A very common species.

*Parmelia omphalodes* (L.) Ach.

Believed to be a "North Coast" species on Svalbard (Lynge 1938), but scattered localities have also been reported from other parts of Svalbard. Skult (1985) described the arctic ssp. *glacialis* and listed 10 collections from Svalbard. Later Skult (1987) also included ssp. *omphalodes* and ssp. *pinnatifida* from Svalbard. The ssp. *glacialis* has now been treated as *P. skultii* Hale (Hale 1987). Hale (1987) did not recognise subspecific taxa of *P. omphalodes*.

*Parmelia saxatilis* (L.) Ach.

A common acidophilous species with a bipolar distribution pattern.

*Parmelia skultii* Hale

Published as *Parmelia omphalodes* ssp. *glacialis* by Skult (1985), see below *P. omphalodes*. Skult (1985) listed several collections from Nordaustlandet and neighbouring smaller islands, two from Edgeøya and only one from Spitsbergen (near Sveagruva). In 1985 it was observed as abundant on the mountain plateau at Gipshuken (Elvebakk unpubl.) where it was growing on soil and between mosses. The species is not normally saxicolous as *P. omphalodes*.

*Parmelia sulcata* Taylor

The species has only been reported from scattered localities (see Lynge 1938), but is not rare on manured sites.

*Parmeliella arctophila* (Th. Fr.) Malmé

Reported from Fosterøyane (Hinlopenstretet), Sorgfjorden, and Wahlenbergfjorden by Fries (1867), from Bjørnøya by Lynge (1926b) and Engelskjøn (1986), from Grønfjorden and Adventfjorden by Lynge (1938), from Hornsund and Isfjorden by Euroala (1968), and from Sørkapp Land by Olech (1990).

*Parmeliella triptophylla* (Ach.) Müll. Arg.

Only known from Sørkapp Land where it is rare (Olech & Alstrup 1989; Olech 1990).

*Parmeliopsis ambigua* (Wulfen) Nyl.

A typical "North Coast Lichen" only known from Kobbefjorden (Danskøya), Murchisonfjorden (Nordaustlandet), and Parryøya (north of Nordaustlandet) in the north (Lyngé 1938).

*Peltigera apthosa* (L.) Willd.

A common species reported by numerous authors.

*Peltigera canina* (L.) Willd.

A common species reported by numerous authors.

*Peltigera collina* (Ach.) Schrad.

Gyelnik (1930) described *P. subscutata* Gyeln. var. *spitsbergensis* Gyeln. based on a collection of two small thallus fragments from Forsbladhamna at Van Keulenfjorden. This material was studied by Holtan-Hartwig (pers. comm.) who concluded that it resembles *P. collina* but has a different thallus surface and a different chemistry. A collection from Bohemanneset published as *P. erumpens* var. *leptoderma* (= *P. didactyla*) by Lyngé (1938) is in the same critical complex which has been included in *P. collina* by Vitikainen (1981, 1994). The Svalbard locality was included in a distribution map covering Europe by Vitikainen (1994). However, *P. collina* s. str. is decidedly thermophilous in North Fennoscandia, a statement also confirmed by Vitikainen (1994), and it is one of the most unexpected lichens that has been reported from Svalbard. We follow the treatment by Vitikainen (1994) here, but we feel that more material is necessary for a better understanding of the taxon described by Gyelnik (1930).

*Peltigera didactyla* (With.) J.R. Laundon

A common species reported from many localities, see especially Lyngé (1938). The species is bipolar (Hertel 1988).

*Peltigera frippii* Holt.-Hartw.

Described from mainland Norway by Holtan-Hartwig (1988). Three collections from Nordaustlandet (Lady Franklinfjorden: Persberget and Gerardodden and Brennevinsfjorden: Kapp Hansteen) previously published as *P. polydactyloides* by Lyngé (1938) are now determined as *P. frippii* and included in a distribution map covering Europe (Vitikainen 1994). One of the *P. malacea* collections cited by Lyngé (1938) (Bellsund 1933, leg. N. Polunin) has also been determined as *P. cf. frippii* (Holtan-Hartwig pers. comm.).

*Peltigera kristinssonii* Vitik.

New to Spitsbergen. Previously only reported from Bjørnøya by Engelskjøn (1986). Holtan-Hartwig (pers. comm.) has determined one unpublished collection from Murchisonfjorden (leg. P.F. Scholander, O), one collection from Linnédalen near Isfjord Radio previously published as *P. malacea* by Lyngé (1938), and one collection from a wind exposed limestone ridge at Gludneset near Ny-Ålesund (Elvebakk unpubl., TROM). The distribution of the species was mapped by Vitikainen (1985, 1994), who included Jan Mayen, but not Svalbard.

*Peltigera lepidophora* (Nyl. ex Vain.) Bitter

Listed from several localities at Van Mijenfjorden/Van Keulenfjorden, Grønfjorden/Kapp Linné and from northern Svalbard by Lyngé (1938). It has been reported from Grønfjorden (Hadač 1989) and Sørkapp Land (Olech 1990) and collected in many other parts of Svalbard mostly on weakly acidic soil (Elvebakk 1984b) and is a common species that is easily overlooked.

*Peltigera leucophlebia* (Nyl.) Gyeln.

A common species known from many localities, see especially Lyngé (1938).

*Peltigera lyngei* Gyeln.

The species was reported from Kobbavågen by Gyelnik (1932) and from Sveagruva as *P. malacea* var. *lyngei* by Eurola (1971). The taxon is related

to *P. malacea* (Holtan-Hartwig 1988) or to *P. scabrosa* according to Vitikainen (1981) who listed it from Iceland and Svalbard. Later Vitikainen (1994) accepted it as *P. lyngei*, but stated that it should be considered a tentative species, awaiting examination of additional materials from the Arctic. Vitikainen (1994) listed it from the Grønfjorden area (three localities), Adventfjorden, and Nordaustlandet: Nordkapp and Floraberget, and outside Svalbard only from Iceland, but he stated that it is incompletely known, but probably a circumarctic species.

*Peltigera malacea* (Ach.) Funck.

A common species reported from many localities, see especially Lynge (1938).

*Peltigera membranacea* (Ach.) Nyl.

Recorded as *Peltigera canina* cf. *membranacea* as a common plant on Svalbard, but without indicating localities (Lynge 1924). Also indicated from Bjørnøya (Lynge 1926b; Engelskjøn 1986), from Hopen (Lynge 1926a) and Sørkapp Land (Olech 1990), and Lynge (1938) concluded that it is a common taxon on Svalbard. It is not always easily separated from *P. canina*, and Vitikainen (1994) mapped it from Jan Mayen but not from Svalbard, and stated that the arctic occurrences of this suboceanic species are in need of a critical study.

*Peltigera neckeri* Hepp ex Müll. Arg.

Reported from Rechercheffjorden and from several localities in the north as *P. polydactyloides* Nyl. by Lynge (1938). The collections at O have been redetermined by Holtan-Hartwig (unpubl.). It has also been reported from Hornsund as "*P. polydactyla* var. *crassoides* Gyeln." by Nowak (1965). Vitikainen (1987, 1994) included three localities from Svalbard in his distribution map of the species in Europe.

*Peltigera polydactylon* (Neck.) Hoffm.

Reported as rare on Nordaustlandet by Schölander (1934) who did not cite localities. Reported from two localities at Lomfjorden by Lynge (1938), and the determination of one of these

collections has been confirmed by Holtan-Hartwig (pers. comm.) and included on a distribution map by Vitikainen (1987, 1994). However, Vitikainen (1994) cited an examined specimen from Kapp Thordsen (leg. Gyllencreutz 1883, UPS) which was not indicated on the distribution map. The species has also been published in a phytosociological table by Rønning (1965) from a *Cassiope tetragona* community at Skansbukta, Isfjorden. The collection reported as cf. *polydactylon* from Hornsund (Nowak 1965) has not been controlled. In 1988 a large population of *P. polydactylon* was found at Agardhdalen (Elvebakk unpubl. TROM). Several thalli were more than 20 cm wide and the concentration to a south-facing slope in a depression indicated high temperature demands. *Peltigera polydactylon* published from Bellsund (Lynge 1924), was later revised to *P. rufescens* (Lynge 1938). A report of a small and sterile specimen from Sorgfjorden by Fries (1867) needs to be confirmed.

*Peltigera ponojensis* Gyeln.

Mapped by Vitikainen (1994) from Kongsfjorden and Inner Isfjorden.

*Peltigera praetextata* (Flörke ex Sommerf.) Zopf

Reported from four localities at Sørkapp Land by Olech (1990). *Peltigera praetextata* is a southern and unexpected species in the Svalbard lichen flora. It is not known from the American Arctic (Thomson 1984) and is also lacking from Svalbard in the distribution map by Vitikainen (1994). Vitikainen (1994) also stated that it is rare and obviously temperature demanding in northern Fennoscandia.

*Peltigera rufescens* (Weiss) Humb.

A common bipolar species reported by numerous authors.

*Peltigera scabrosa* Th. Fr.

A common species, see especially Lynge (1938).

*Peltigera scabrosella* Holt.-Hartw.

The species was described by Holtan-Hartwig (1988) who included localities from Norway,

Finland and Greenland. Vitikainen (1994) included one locality from Svalbard (Van Mijenfjorden: Litledalen). An additional Svalbard locality in O is: Nordaustlandet, Franklinfjorden, leg. P. F. Scholander 1931 (Holtan-Hartwig pers. comm.).

*Peltigera venosa* (L.) Hoffm.

Common in the north (Fries 1867; Scholander 1934; Lyng 1938), but elsewhere only reported from Sørkapp Land (Olech 1990), the Bellsund and Isfjord Radio areas (Fries 1867; Lyng 1938), Lusitaniadalen (at lower Sassendalen) (Lyng 1940a), from the Longyearbyen area (Hertel 1977a; Hartmann 1980), from the Ny-Ålesund area (Elvebakk 1982), and from Edgeøya (Aptroot & Alstrup 1991). But it has been collected also in several other areas on Svalbard (Elvebakk unpubl.) and is a widespread species. These collections have been concentrated to circumneutral soils, and the species has rarely been observed on distinctly alkaline soils.

*Pertusaria bryontha* (Ach.) Nyl.

Reported from Svalbard by Hue in Hariot (1893), without indication of locality, from Sørkapp-Hornsund (Lyng 1924), from Hornsund and Colesbukta by Eurola (1968), and from Borgdammane (Nordenskiöld Land) by Hadač (1989).

*Pertusaria coriacea* (Th. Fr.) Th. Fr.

Only known from the northernmost part (Fries 1867). The species is very rare in Scandinavia where it is known from northernmost Norway and Sweden (Santesson 1993).

*Pertusaria dactylina* (Ach.) Nyl.

Reported by Paulson (1928) from the Bjørnsundet area (Hinlopenstretet).

*Pertusaria geminipara* (Th. Fr.) C. Knight ex Brodo

Reported from Van Mijenfjorden by Eurola & Hakala (1977), Bockfjorden (Hafellner 1982) and from several localities at Sørkapp Land (Olech

1990). Also collected at Colesbukta (Tønsberg unpubl, BG), and is probably overlooked.

*Pertusaria glomerata* (Ach.) Schaer.

Only reported from Dirksbukta (Summerhayes & Elton 1928) and from Sørkapp Land where it is rare (Olech & Alstrup 1989, Olech 1990).

*Pertusaria oculata* (Dicks.) Th. Fr.

A common species reported by several authors (Fries 1867, as *Lecanora*, Lyng 1924, 1926b; Summerhayes & Elton 1923; Eurola 1968; Hertel & Ullrich 1976; Olech 1987, 1991). The chemistry of the species was described by Hanks (1983).

*Pertusaria panyrga* (Ach.) A. Massal.

Only listed in vegetation tables from Hornsund and Colesbukta by Eurola (1968).

*Phaeophyscia constipata* (Norrl. & Nyl.) Moberg

Reported from Sorgfjorden and Murchisonfjorden in the north (Lyng 1938), and from De Geerdalen northeast of Longyearbyen (Lyng 1940a). Later collected at Gluudneset near Ny-Ålesund, in Sassendalen and several times in the Gipsdalen area, always on dry limestone substrate slightly manured by birds or arctic fox (Elvebakk unpubl.).

*Phaeophyscia endococcinea* (Körb.) Moberg

Scattered on Svalbard (Paulson 1923, Summerhayes & Elton 1923, Lyng 1924, 1938, 1940a) and most localities are from the Bellsund area and in the north.

*Phaeophyscia kairamoi* (Vain.) Moberg

Only reported once from the Ny-Ålesund area by Elvebakk (1984a), where it was growing on a boulder manured by birds. The species is rare in Fennoscandia where it has a distinctly continental distribution pattern (Moberg 1977).

*Phaeophyscia nigricans* (Flörke) Moberg

Fries (1867) reported '*Physcia obscura* (Ehrl.) Th. Fr.' from Hornsund and numerous localities in northern Svalbard. One of these collections (from "Rypön" = Repøyane) was considered by Du Rietz (in UPS) and Lynge (1938) to represent a possible *P. nigricans*. This determination has now been confirmed (Moberg pers. comm.). The identity of the other collections referred to as *Physcia obscura* by Fries (1867) remain unclear except that two collections from Kobbvågen in UPS have been revised as *Phaeophyscia sciastra* and *Rinodina balanina*, respectively (Moberg pers. comm.). *Phaeophyscia nigricans* was recently reported from Sørkapp Land by Olech & Alstrup (1989) and Olech (1990) as a very rare species. It is a southern species in Fennoscandia (Moberg 1977), but it has later been reported twice from Disko Island in Greenland (Moberg & Hansen 1986).

*Phaeophyscia sciastra* (Ach.) Moberg

Common all over Svalbard, see especially Lynge (1938).

*Phaeorrhiza nimbosa* (Fr.) H. Mayrhofer & Poelt

A basiphilous, terricolous lichen formerly known from the Hinlopenstredet area (Fries 1867), but recently collected also near Ny-Ålesund, in upper Reindalen and in Sassendalen (Elvebakk unpubl.). The species is bipolar (Hertel 1988).

*Physcia caesia* (Hoffm.) Fűrnr.

A very common bipolar species.

*Physcia dubia* (Hoffm.) Lettau

A very common bipolar species.

*Physcia tenella* (Scop.) DC. ssp. *marina* (A. Nyl.) D. Hawksw.

Found at Klovningen in the northwest, Lomfjorden in the north and at Akseløya in Bellsund (Lynge 1938). Recently found on Bjørnøya (Bustnes unpubl, TROM). On Svalbard a rare,

coastal species, probably favoured by salt spray and manuring by birds.

*Physconia muscigena* (Ach.) Poelt

A very common bipolar species.

*Pilophorus cereolus* (Ach.) Th. Fr.

Only reported from protected parts of sandstone rocks near Ny-Ålesund (Elvebakk 1984a). Later collected on sandstone rocks at Colesbukta in 1986 and at Reindalspasset in 1990 (Elvebakk unpubl.).

*Pilophorus dovrensis* (Nyl.) Timdal, Hertel & Rambold

Reported from a few collections from the vicinity of Ny-Ålesund (Hertel 1977a, 1982). Later reported from Liefdefjorden by Timdal (1988) who transferred the species from *Lecidea* to *Pilophorus*. Hertel & Rambold (1988) included several more localities and a world distribution map. Triebel (1989) reported it from Bolterdalen, Longyearbyen, as host for *Arthonia obscurior* and from the Ny-Ålesund area as host for *Cercidospora cephalodiorum* and *Dactylospora purpurascens*. It is also known from Edgeøya (Aptroot & Alstrup 1991). In 1990 the species was found to be very frequent on the moraines at Reindalspasset (Elvebakk unpubl.).

*Pilophorus robustus* Th. Fr.

Known from Kong Karls Land and the Longyearbyen area (Lynge 1938, Elvebakk 1984a) from siliceous pebbles on exposed, climatically unfavourable sites. Later found west of Colesbukta (Tønsberg unpubl., BG) and in central Reindalen (Elvebakk unpubl., TROM) also on exposed siliceous pebbles.

*Placidiopsis pseudocinerea* Breuss

A recently described arctic-alpine species reported from Svalbard, but with no locality information (Breuss & Hansen 1988).

*Placopsis gelida* (L.) Linds.

Only reported from Bjørnøya (Lyng 1926b), Hopen (Lyng 1939a), southern and central Spitsbergen (Lamb 1947), and northwestern Spitsbergen (Elvebakk 1982, 1984b). It is, however, common on weakly acidic rocks and has been found in most areas visited, occasionally also on soil (Elvebakk unpubl.).

*Placynthiella icmalea* (Ach.) Coppins & P. James

Reported from Edgeøya by Aptroot & Alstrup (1991). Nimis & Poelt (1987) argued for using *Saccomorpha* Elenkin instead of *Placynthiella* Elenkin, whereas Eriksson & Hawksworth (1987) proposed that the name *Placynthiella* should be kept for the *Lecidea uliginosa* group. The latter alternative is followed here as has been done also by Purvis et al. (1992) and Santesson (1993).

*Placynthiella uliginosa* (Schrad.) Coppins & P. James

Only a single Svalbard record from Hornsund as *Lecidea humosa* (Nowak 1965).

*Placynthium asperellum* (Ach.) Trevis.

A common species reported by many authors.

*Placynthium nigrum* (Huds.) Gray

Reported from Gipsdalen by Summerhayes & Elton (1923) and Paulson (1923). A very small and sterile specimen was determined with some uncertainty from Hornsund by Nowak (1965), but Olech (1990) reported many localities from Sørkapp Land.

*Placynthium pannariellum* (Nyl.) H. Magn.

Recorded from Kongsfjorden, Konglomeratodden and Murchisonfjorden (Lyng 1938) and from Sørkapp Land (Olech 1990).

*Placynthium tantaleum* (Hepp) Hue

New to Svalbard. Collected at Sassendalen by D. O. Øvstedal in 1986 (BG).

*Pleopsidium chlorophanum* (Wahlenb.) Zopf

The species has been reported (as *Acarospora chlorophana* (Wahlenb.) A. Massal.) by numerous authors from Svalbard, where it is common under overhanging siliceous rocks. Its distribution is bipolar (Hertel 1988).

*Polyblastia albida* Arnold

A rare species in Scandinavia that has only been collected once on Svalbard at Bockfjorden (Hafellner 1982).

*Polyblastia bryophila* Lönnr.

This muscicolous species was reported by Fries (1867) from Fosterøyane and Lovénberget (Hindopenstretet), Lomfjorden, and Repøyane, by Lyng (1926b) from Bjørnøya, and by Aptroot & Alstrup (1991) from Edgeøya.

*Polyblastia cruenta* (Körb.) P. James & Swinscow

Reported from Bjørnøya by Lyng (1926b).

*Polyblastia cupularis* A. Massal.

Only recorded from Bjørnøya by Summerhayes & Elton (1923).

*Polyblastia epomphala* (Nyl.) Zschacke

Reported from Amsterdamøya by Hertel & Ullrich (1976) as *P. cf. epomphala* and the report is in need of confirmation.

*Polyblastia gelatinosa* (Ach.) Th. Fr.

Recorded at Lovénberget and Wahlenbergfjorden (Fries 1867), Bjørnøya (Lyng 1926b), Sørkapp Land (Olech 1990), Hornsund (Nowak 1965), and Bockfjorden (Hafellner 1982). Typical of calcareous soils according to Nowak (1965).

*Polyblastia gothica* Th. Fr.

Only reported from Lågøya in the northeast by Fries (1867). In mainland Norway only known



from Telemark in the southern part (Santesson 1993).

*Polyblastia helvetica* Th. Fr.

Only reported from Lovénfjellet on Nordaustlandet (Fries 1867). In Scandinavia only known from Vega, Nordland (Degelius 1982).

*Polyblastia hyperborea* Th. Fr.

A common species reported by many authors.

*Polyblastia intermedia* Th. Fr.

Reported from Hopen by Lyng (1926a).

*Polyblastia melasporea* (Taylor) Zahlbr.

Known from Bjørnøya (Lyng 1926b) and the Ny-Ålesund area (Hertel 1977a).

*Polyblastia sendtneri* Kremp.

A muscicolous (and terricolous) species recorded from Bjørnøya (Lyng 1926b), Sørkapp Land (Olech 1990), Edgeøya (Aptroot & Alstrup 1991), Hornsund and Isfjorden (Eurola 1968) and Bockfjorden (Hafellner 1982). Recorded as a fast-growing species on a periglacial river fan at Engelsbukta south of Ny-Ålesund (Nilsen unpubl. thesis Univ. Tromsø 1992).

*Polyblastia sepulta* A. Massal.

Only recorded from Steinøya in the northeast (Fries 1867). A rare species also in Scandinavia (Santesson 1993; Foucard 1990).

*Polyblastia terrestris* Th. Fr.

Reported from Bjørnøya (Lyng 1926b), Hopen (Lyng 1939a), and Bockfjorden (Hafellner 1982).

*Polyblastia theleodes* (Sommerf.) Th. Fr.

Recorded from northeastern Svalbard partly as *β. schaeeriana* (Mass.) by Fries (1867), from Bjørnøya (Lyng 1926b), Bockfjorden (Hafellner

1982), Sørkapp Land (Olech 1990), and Edgeøya (Aptroot & Alstrup 1991).

*Polychidium muscicola* (Sw.) Gray

Only reported from Grønfjorden by Paulson (1928). The species is rare in the Arctic and has a southern distribution in the western Arctic according to Thomson (1984).

*Polysporina simplex* (Davies) Vězda

Recorded from Sorgfjorden and an unknown locality on the western coast (Fries 1867), Abeløya (easternmost island of Kong Karls Land) (Lyng 1939a), Hornsund (Nowak 1965), Sørkapp Land (Olech 1990), and Gipsdalen (Elvebakk unpubl., BG).

*Polysporina urceolata* (Anzi) Brodo

Only recorded from limestone a few times near Ny-Ålesund (Hertel 1977a) and from Sørkapp Land (Olech 1990). In Scandinavia it has only been collected in Finnmark and Jämtland (Santesson 1993; Foucard 1990).

*Porina mammillosa* (Th. Fr.) Vain.

Reported as a very rare species at Sørkapp Land by Olech & Alstrup (1989) and Olech (1990).

*Porpidia cinereoatra* (Ach.) Hertel & Knoph

Reported from three localities at Sørkapp Land by Olech (1990).

*Porpidia crustulata* (Ach.) Hertel & Knoph

Only known from one locality at Sørkapp Land (Olech 1990).

*Porpidia flavicunda* (Ach.) Gowan

This name is used for the non-sorediate, fertile specimens of the species complex previously called *Porpidia flavocaerulescens* (Hornem.) Hertel & A.J. Schwab (in the sense of Schwab 1986),

whereas the sorediate, sterile specimens are named *Porpidia melinodes*. *Porpidia flavicunda* is not as common as *P. melinodes*, but most likely widespread over the archipelago.

*Porpidia glaucophaea* (Körb.) Hertel & Knoph

Reported from Hornsund by Nowak (1965), and from Sørkapp Land (Olech 1990).

*Porpidia macrocarpa* (DC.) Hertel & A. J. Schwab

Published from Hopen and Isfjorden by Lynge (1926a, 1939b, 1940a) and from Amsterdamøya (Hertel & Ullrich 1976). This is as to older literature records, an extremely collective species. Those records all need reexamination. *Porpidia macrocarpa* s. str. is characterised by its thick excipular hyphae and very large, basically well-constricted apothecia and by a more or less endolithic growing thallus.

*Porpidia melinodes* (Körb.) Gowan & Ahti

On Svalbard this sterile, sorediate lichen is very widespread and extremely common (Lynge 1939b), on siliceous rocks in humid situations, especially on sheltered stones lying on the ground. Körber based his description on material from Hornsund and from Novaja Zemlja. As original material could not be traced, Schwab (1986) seceded a neotype, which is from the Isfjorden area.

*Porpidia ochrolemma* (Vain.) Brodo & R. Sant.

Reported (as *Porpidia pseudomelinodes* A.J. Schwab) from four localities at Sørkapp Land by Olech (1990). Gowan & Ahti (1993) transferred this sterile species into *Hymenelia*. Its chemistry, however, does not fit in *Hymeneliaceae* s.str. (Brodo 1995).

*Porpidia speirea* (Ach.) Kremp.

Reported from southern Spitsbergen by Lynge (1924), Nowak (1965) and Olech (1990). and from

Gludneset near Ny-Ålesund (Hertel 1981a). The species is often misunderstood, and var. *trullisata* (Kremp.) Arnold is regarded as a species of its own, *P. trullisata*.

*Porpidia superba* (Körb.) Hertel & Knoph

Reported as a frequent species from three localities at Sørkapp Land by Olech & Alstrup (1989) and Olech (1990).

*Porpidia trullisata* (Ach.) Körb.

Only reported from the mountain Trollsteinen near Longyearbyen as *P. speirea* var. *trullisata* (Kremp.) Arnold (Hertel 1977a).

*Porpidia tuberculosa* (Sm.) Hertel & Knoph

Reported as a very rare species from one locality at Sørkapp Land by Olech & Alstrup (1989) and Olech (1990).

*Protoblastenia calva* (Dicks.) Zahlbr.

Reported from Bjørnøya (Summerhayes & Elton 1923) and from the area between Longyearbyen and Sassendalen (Lynge 1940a).

*Protoblastenia incrustans* (DC.) J. Steiner

Reported from Bjørnøya by Paulson (1923), from Hornsund by Nowak (1965), from several localities in the Kongsfjorden area by Hertel (1977a) and Elvebakk (1982), from Bockfjorden by Hafellner (1982), from Bellsund by Elvebakk (1982), and from Sørkapp Land by Olech (1990). It is common on limestone rocks and has also been collected in other areas (Elvebakk unpubl.).

*Protoblastenia rupestris* (Scop.) J. Steiner

A limestone species reported from Sorgfjorden, Lomfjorden, Brennevinsfjorden, and an unidentified locality ("litore occident. legit A.E. Nordenskjöld") by Fries (1867), from Hornsund by Körber (1875), from Sørkapp-Hornsund by Lynge (1924) and from Bjørnøya (Summerhayes

& Elton 1923; Lyng 1926b), where it is supposed to be common, from Kongsfjorden (Nimis 1985), and finally from Edgeøya (Aptroot & Alstrup 1991).

*Protoblastenia siebenhaariana* (Körb.) J. Steiner

Only known from the Ny-Ålesund area and Bolterdalen near Longyearbyen (Hertel 1977a) and from one locality at Sørkapp Land (Olech 1990).

*Protoblastenia terricola* (Anzi) Lyng

Reported from scattered localities by Fries (1867), Lyng (1924), Hertel (1977a), Hafellner (1982), Olech (1991), and Elvebakk (1991). It has also been collected in several localities by Elvebakk (unpubl.) as a common species on dry alkaline soil.

*Protoparmelia badia* (Hoffm.) Hafellner

A common species on siliceous rocks.

*Protothelenella sphinctrinoidella* (Nyl.) H. Mayrhofer & Poelt

Reported from Bockfjorden by Hafellner (1982). Rather widespread in Scandinavia (Santesson 1993).

*Protothelenella sphinctrinoides* (Nyl.) H. Mayrhofer & Poelt

Known from scattered localities (Fries 1867; Paulson 1923; Summerhayes & Elton 1923; Hertel & Ullrich 1976).

*Pseudephebe minuscula* (Nyl. ex Arnold) Brodo & D. Hawksw.

A very common bipolar species.

*Pseudephebe pubescens* (L.) M. Choisy

A very common bipolar species.

*Psilolechia lucida* (Ach.) M. Choisy

Recently reported from central Reindalen

(Elvebakk & Tønsberg 1992). This is a conspicuous range extension as the species has a southern distribution in Scandinavia, except for a report from northern Sweden by Alstrup (1991).

*Psora decipiens* (Hedw.) Hoffm.

Recorded from Lomfjorden (Fries 1867), the Ny-Ålesund area (Hertel 1977a; Elvebakk 1982; André 1993), Bellsund (Elvebakk 1982) and Sassendalen (Elvebakk 1991). It has also been found in several other localities (Elvebakk unpubl.) and it is probably a widespread species, but confined to alkaline soils (Elvebakk 1982).

*Psora rubiformis* (Ach.) Hook.

Only recorded from three localities in the north (Fries 1867), from Edgeøya (Hofmann 1968) and from the Ny-Ålesund area (Hertel 1977a), but a number of other localities have recently been discovered, mainly on neutral soils (Elvebakk unpubl.), and the species is probably widespread.

*Psoroma hypnorum* (Vahl) Gray

A very common bipolar species.

*Pyrenocollema sublitorale* (Leight.) R.C. Harris ex A. Fletcher

Reported as *Arthopyrenia sublitoralis* (Leight.) Arnold from Hornsund by Santesson (1939) from shell of the mollusc *Litorina rudis*. He also mapped the distribution of this worldwide distributed seashore lichen.

*Rhizocarpon atroflavescens* Lyng

Only known from Litledalsfjell (Van Mijenfjorden) (Runemark 1956), from the Ny-Ålesund area (Hertel 1977a), and from Nordenskiöldfjellet near Longyearbyen (Hertel & Vohla unpubl.) as ssp. *atroflavescens*.

*Rhizocarpon badioatrum* (Flörke ex Spreng.) Th. Fr.

Reported by Fries (1867), Lyng (1924, 1926b, 1936), Hertel & Ullrich (1976), and Aptroot & Alstrup (1991).

*Rhizocarpon caeruleoalbum* (Kremp.) Zahlbr.

Reported from the western coast (without locality information), Sorgfjorden and Wahlenbergfjorden (Fries 1867). In Europe also known from the Alps (e.g. Poelt 1969) and from Härjedalen and Nordland (Santesson 1993).

*Rhizocarpon chioneum* (Norman) Th. Fr.

A limestone species supposed to be rather common on Svalbard (Lyng 1936) and collected several times around Kongsfjorden (Hertel & Vohla unpubl.). In Scandinavia only known from the northern part (Santesson 1993).

*Rhizocarpon cinereovirens* (Müll. Arg.) Vain.

Only known from Amsterdamøya (Hertel & Ullrich 1976). This species was included in *R. hochstetteri* by Wirth (1987), but found to be morphologically and anatomically distinct by Timdal & Holtan-Hartwig (1988).

*Rhizocarpon copelandii* (Körb.) Th. Fr.

A common species reported by many authors.

*Rhizocarpon dispersum* Runemark

Described by Runemark (1956) from Wargentinfjellet at Murchisonfjorden based on a P.F. Scholander collection previously published as *R. eupetraeoides* by Lyng (1936). In Europe only reported from Svalbard (Poelt 1969; Poelt & Vězda 1977). It was also determined by Werner (1990) from samples used for lichen growth studies in northwestern Spitsbergen.

*Rhizocarpon distinctum* Th. Fr.

Reported from Prins Karls Forland by Paulson (1923) and by Lyng (1936).

*Rhizocarpon eupetraeoides* (Nyl.) Blomb. & Forssell

Reported from Amsterdamøya by Hertel & Ullrich (1976).

*Rhizocarpon eupetraeum* (Nyl.) Arnold

Only recorded by Hue in Hariot (1893) as *Lecidea eupetraeum* without locality information, and from Oskarøya (Murchisonfjorden) by Lyng (1936).

*Rhizocarpon expallesces* Th. Fr.

An inconspicuous, probably not rare pioneer species on siliceous rocks in humid sites. Reported from Bjørnøya (Lyng 1926b), Sørkapp-Hornsund (Lyng 1924), Bellsund, Van Keulenfjorden, Van Mijenfjorden, Isfjorden (Lyng 1936), Hopen (Lyng 1926a), Longyearbyen (Hartmann 1980, as uncertain), and also from Amsterdamøya by Hertel & Ullrich (1976) who mapped its Svalbard distribution.

*Rhizocarpon ferax* H. Magn.

Earlier only known from the Sveagruva area (Runemark 1956), but later recorded as a particularly common species at Amsterdamøya (Hertel & Ullrich 1976) and also reported from Isfjorden and Kongsfjorden (Hertel 1977a) and from Longyearbyen (Hartmann 1980).

*Rhizocarpon geminatum* Körb.

Recorded from Bjørnøya (Summerhayes & Elton 1923, Lyng 1926b), from Sørkapp/Hornsund (Fries 1867; Körber 1875; Lyng 1924; Nowak 1965), Edgeøya (Aptroot & Alstrup 1991), Van Mijenfjorden (Feuerer 1991), Isfjorden (Lyng 1940a), Storøya (Lyng 1939a), Bockfjorden (Schuhwerk 1992), and from numerous localities in the north (Fries 1867). Hertel collected it at various localities at Kongsfjorden and Isfjorden (Hertel & Vohla unpubl.).

*Rhizocarpon geographicum* (L.) DC.

Several reports. Recorded as ssp. *frigidum* (Räsänen) Hertel by Runemark (1956), Nowak (1965), Hertel & Ullrich (1976), and Werner (1990) and as ssp. *arcticum* (Runemark) Hertel by Runemark (1956), Hertel (1977a), and Werner (1990). The species is bipolar (Hertel 1988).

*Rhizocarpon glaucescens* (Th. Fr.) Zahlbr.

A probably rare species described from Hornsund as "*Catillaria hoeferi*" by Körber (1875). It was reported from Amsterdamøya by Hertel & Ulrich (1976) and from Sørkapp Land by Olech (1990).

*Rhizocarpon grande* (Flörke) Arnold

A common species reported by several authors.

*Rhizocarpon hochstetteri* (Körb.) Vain.

Recorded from a few localities on Bjørnøya (Lyng 1926b) and collected near Ny-Ålesund by Hertel (Hertel & Vohla unpubl.).

*Rhizocarpon inarense* (Vain.) Vain.

A probably rather common species on siliceous rocks, often in windexposed situations. Reported by Runemark (1956) from Amsterdamøya (also reported by Hertel & Ulrich 1976), Danskøya, Magdalenefjorden, Isfjorden, Hornsund (also reported by Nowak 1965), Murchisonfjorden, and Wijdefjorden, from Bockfjorden by Hafellner (1982) and Schuhwerk (1992), and from Sørkapp Land by Olech (1990). The species was used for dating purposes in northwestern Spitsbergen by Werner (1990) and André (1993).

*Rhizocarpon intermediellum* Räsänen

Reported from Van Mijenfjorden by Runemark (1956), from Hornsund by Nowak (1965), from Kongsfjorden by Hertel (1977a), from Longyearbyen by Hartmann (1980), from Sørkapp Land by Olech (1990), and collected at Gipsdalen (Elvebakk unpubl., det. A. Botnen, BG).

*Rhizocarpon jemtlandicum* (Malme) Malme

Reported from Svalbard by Lyng (1924, 1936, 1939a) and by Hafellner (1982).

*Rhizocarpon lavatum* (Fr.) Hazsl.

Reported from Hopen by Lyng (1926a).

*Rhizocarpon macrosporum* Räsänen

This species has only been reported by Werner (1990) who studied lichen growth rates in northwestern Spitsbergen.

*Rhizocarpon mahreri* Hafellner

A newly described species from a gneissic boulder in the Bockfjorden area (Hafellner 1982). The species is so far only known from its type locality.

*Rhizocarpon norvegicum* Räsänen

New to Svalbard. Collected by Hertel on a boulder rich in iron in the Longyearbyen area (Hertel & Vohla unpubl.).

*Rhizocarpon obscuratum* (Ach.) A. Massal.

Recorded from several localities on Bjørnøya (Lyng 1926b), from Mosselbukta ("Deer Bay") by Paulson (1928), from Hopen by Lyng (1936, 1939a), from Van Keulenfjorden, Van Mijenfjorden, Grønfjorden, Adventfjorden (Lyng 1936), and from Sørkapp Land (Olech 1990). It was collected by Hertel both in the Isfjorden and Kongsfjorden areas (Hertel & Vohla unpubl.).

*Rhizocarpon oederi* (Weber) Körb.

Reported by Eurola (1971) from Sveagruva (det. J. W. Thomson).

*Rhizocarpon polycarpum* (Hepp) Th. Fr.

Reported from numerous localities by Lyng (1924, 1936), and from Hornsund by Nowak (1965). It is not rare in the Kongsfjorden area (Hertel & Vohla unpubl.).

*Rhizocarpon pusillum* Runemark

Only published from the Ny-Ålesund area by Hertel (1977a), and with no locality information in a lichenometry study by André (1993). Holtan-Hartwig & Timdal (1987) indicated that *R. parvum* reported by Runemark (1956) refers to *R. pusillum/effiguratum*. The species is a parasite on *Sporastatia testudinea* and was collected at

Gipsdalen in 1985 (Elvebakk unpubl.) and a dozen times in the Kongsfjorden and Isfjorden areas, usually as tiny thalli (Hertel & Vohla unpubl.).

*Rhizocarpon rittokense* (Hellb.) Th. Fr.

Reported from Hornsund by Fries (1867), from Sveagruva by Eurola (1971) (det. J.W. Thomson) and from Bockfjorden by Schuhwerk (1992).

*Rhizocarpon roridulum* (Th. Fr.) H.

●livier

Published by Hue in Hariot (1893) as *Lecidea roridula* without information on locality. The record is in need of confirmation.

*Rhizocarpon saanaense* Räsänen

Reported from Van Mijenfjorden and Murchisonfjorden by Runemark (1956). Hertel collected it on Blomstrandhalvøya (Kongsfjorden) and near Longyearbyen (Hertel & Vohla unpubl.).

*Rhizocarpon superficiale* (Schaer.) Vain.

Some of the samples have been referred to as ssp. *boreale* Runemark (Runemark 1956; Nowak 1965; Hertel 1977a; Werner 1990). This species also includes *R. occidentale* Lynge which was reported and mapped from Nordaustlandet as a "North Coast Lichen" by Lynge (1938) and later also reported from Isfjorden (Lynge 1940a). It has a bipolar distribution (Hertel 1988). In a geography/lichenometry study André (1993) reported *R. superficiale*, as well as its synonyms *R. effiguratum* and *R. crystalligenum* as separate species.

*Rhizocarpon umbilicatum* (Ramond)

Flagey

Only recorded from Bjørnøya (Summerhayes & Elton 1923; Lynge 1926b). It is one of the few *Rhizocarpon* species that grows on calcareous rocks.

*Rhizoplaca melanophthalma* (DC.)

Leuckert & Poelt

A very common species on manured siliceous rocks. Recorded as var. *subpeltata* Lynge by Nowak (1965). According to Leuckert et al. (1976) only specimens of "chemical strain I" (containing usnic acid) occur on Svalbard. The species is bipolar (Hertel 1988).

*Rimularia impavida* (Th. Fr.) Hertel &

Rambold

Most likely this species described from Svalbard is a very common and widespread species on acid rock types. It was described and reported by Fries (1867) from Hornsund, Kobbefjorden/Danskøya, Amsterdamøya (type locality), Sorgfjorden, by Lynge (1926b) from Bjørnøya, and it was mapped on Svalbard by Hertel & Ullrich (1976) and reported by Hertel & Rambold (1990) from Bellsund, Isfjorden and Kongsfjorden.

*Rimularia insularis* (Nyl.) Hertel &

Rambold

A bipolarly distributed lichenicolous lichen on *Lecanora rupicola* s. l. The record from Bjørndalen (near Longyearbyen) (Hertel & Rambold 1990) is of phytogeographical interest, as in Scandinavia *R. insularis* is a rather southern species, rare north of 63° N.

*Rimularia psephota* (Tuck.) Hertel &

Rambold

This species, until recently thought to be a subantarctic endemic, was reported from the Arctic and adjacent regions (Svalbard, Island, N. Sweden, Novaja Zemlja) by Hertel (1991). Usually the lichen forms tiny thalli and is therefore easily overlooked. It was found at Hotellneset near Longyearbyen.

*Rinodina archaea* (Ach.) Arnold

Only recorded from a dead twig of cf. *Salix* from Bjørnøya (Lynge 1926b).

*Rinodina arnoldii* H. Mayrhofer & Poelt

Reported from Van Keulenfjorden by H. Mayrhofer & Sheard (1988).

*Rinodina balanina* (Wahlenb.) Vain.

Published from Bjørnøya (Lyng 1926b) and from several localities at Spitsbergen by Lyng (1938, 1940b), who did not include geographical information about the localities. The species is probably common on siliceous bird cliffs and littoral cliffs, even if the only localities mentioned in the literature is Amsterdamøya (Hertel & Ullrich 1976), Sørkapp Land (Olech 1990), Hornsund (Olech 1987), Edgeøya (Aptroot & Alstrup 1991), Kobbvågen and Bjørnøya (H. Mayrhofer 1984). The species is arctic and in Europe only known from northern Norway, Svalbard and Novaja Zemlja (H. Mayrhofer 1984, Santesson 1993).

*Rinodina bischoffii* (Hepp) A. Massal.

Reported by Paulson (1928) from southeast Vaigattøyane (Hinlopenstretet). The collection is in need of revision.

*Rinodina cacuminum* (Th. Fr.) Malme (nom. illegit.)

Only reported from manured rocks at two localities at Sørkapp Land by Olech & Alstrup (1989) and Olech (1990) and from Edgeøya by Aptroot & Alstrup (1991). The species is rare and the distribution is distinctly arctic, cfr. map by H. Mayrhofer (1984).

*Rinodina calcigena* (Th. Fr.) Lyng

Described from Sorgfjorden and Lomfjorden (Fries 1867), but later collected several times on limestone substrates near Ny-Ålesund (Hertel & Ullrich 1976; H. Mayrhofer & Poelt 1979). The species has an arctic-alpine distribution pattern and was mapped by H. Mayrhofer & Sheard (1988).

*Rinodina conradii* Körb.

Reported from the Bjørnsundet area at Hin-

lopenstretet ("mainland north of Bismarck Strait") and Wijdefjorden by Paulson (1928), from Dirksbukta by Summerhayes & Elton (1928), and from Kapp Ross and Isispynten (Nor-daustlandet) by Magnusson (1947).

*Rinodina lecideoides* (Nyl.) Kernst.

Only recorded from Hornsund (Nowak 1965) and from two localities at Sørkapp Land (Olech 1990).

*Rinodina milvina* (Wahlenb.) Th. Fr.

Reported from Sørkapp-Hornsund (Lyng 1924), from Bellsund (Lyng 1940a), from Wijdefjorden and Reinsdyrhavøya (Paulson 1928), and from Dirksbukta (Wijdefjorden) by Summerhayes & Elton (1928).

*Rinodina mniaraea* (Ach.) Körb.

A common species. Magnusson (1947) reported both var. *cinnamomea* Th. Fr. and var. *mniaraeiza* (Nyl.) H. Magn.

*Rinodina olivaceobrunnea* C. W. Dodge & G. E. Baker

Reported in a vegetation table from Sørkapp Land by Dubiel & Olech (1990). The report may need confirmation as the species is lacking in Olech's (1990) lichenological study from the same area. The species was originally described from Antarctica; according to Filson (1975) *R. archaeoides* H. Magn. is a younger synonym.

*Rinodina roscida* (Sommerf.) Arnold

Known from scattered localities on Svalbard. Recorded as var. *roscida* (Magnusson 1947; Hafellner 1982) and var. *crassa* H. Magn. (Hafellner 1982).

*Rinodina tephraeaspis* (Tuck.) Herre

Reported by Körber (1875) from Hornsund. The name *R. badiella* (Nyl.) Th. Fr. was used by Santesson (1993), but according to Mayrhofer et al. (1992) the correct name is *R. tephraeaspis*.

*Rinodina turfacea* (Ach.) Körb.

A very common bipolar species.

*Sagiolechia protuberans* (Ach.) A. Massal.

Known from Bjørnøya (Lyng 1926b) and Blomstrandhalvøya near Ny-Ålesund (Hertel 1977a).

*Sagiolechia rhexoblephara* (Nyl.) Zahlbr.

Recorded from Lovénfjellet and Sjuøyane in the north (Fries 1867), and also from Grønfjorden by Vězda (1967).

*Sarcogyne algoviae* H. Magn.

New to Svalbard. Collected in the Gipsdalen area by Elvebakk & Hodin (coll # 85:738) on limestone rocks below a bird cliff, and determined by A. Botnen. According to Poelt (1969) the species was previously only known from the Alps; Santesson (1993) listed it from Finnmark, Norway, too.

*Sarcogyne privigna* (Ach.) A. Massal.

Reported by Fries (1867) from Kobbefjorden and Brennevinsfjorden and Paulson (1928) from the Bjørnsundet area at Hinlopenstretet ("Mainland, north of Bismarck Strait").

*Schadonia fecunda* (Th. Fr.) Vězda & Poelt

Reported from Edgeøya by Aptroot & Alstrup (1991).

*Schaereria fuscocinerea* (Nyl.) Clauzade & Roux

Recorded from Hornsund (Fries 1867), Edgeøya (Aptroot & Alstrup 1991), and Isfjorden (Hertel 1991). This is now the correct name for *S. tenebrosa* (Flot.) Hertel & Poelt. A report of *S. endocyanea* (Stirt.) Hertel & Gotth. Schneid. from Amsterdamøya (Hertel & Ullrich 1976) also belongs here as this is now regarded as a synonym of *S. fuscocinerea* (Hertel & Zürn unpubl.).

*Solorina bispora* Nyl.

A very common species on soil rich in calcium.

*Solorina crocea* (L.) Ach.

A very common species on siliceous soil in snow beds and frost boils. Its Svalbard distribution was mapped by Hertel & Ullrich (1976).

*Solorina octospora* Arnold

Scholander (1934) and Lyng (1938) reported this species from Nordaustlandet and the latter also included one locality at De Geerdalen north of Longyearbyen. Later it was added from two localities west of Sassendalen by Lyng (1940a), from one locality at Hornsund (Nowak 1965) and from Bolterdalen near Longyearbyen by Hertel (1977a). It should still be regarded as a rare species on Svalbard.

*Solorina saccata* (L.) Ach.

Reported from scattered localities by Fries (1867), Lyng (1938, 1940a), and Aptroot & Alstrup (1991), and collected from several localities by Elvebakk (unpubl.). The species is much less frequent than *S. bispora*.

*Solorina spongiosa* (Ach.) Anzi

Reported as rare on Nordaustlandet by Scholander (1934) and reported from Midterhuken (Bellsund) and from Kobbvågen and two localities in the north by Lyng (1938), who previously also had published *S. spongiosa* from Bjørnøya (Lyng 1926b). Lyng (1938) considered it to be the rarest *Solorina* species on Svalbard, but later collections from several areas (Elvebakk unpubl.) indicate that it is an overlooked, widespread species. It seems to be favoured by manuring from birds.

*Sphaerophorus fragilis* (L.) Pers.

Reported from several localities in the north by Fries (1867), from Hornsund by Körber (1875) and recorded as a "North Coast" lichen by Lyng (1938). Later studies indicated more localities further south (Lyng 1940a; Hafellner 1982;



Elvebakk unpubl.) although some occurrences listed by Elvebakk (1982) are erroneous.

*Sphaerophorus globosus* (Huds.) Vain.

A characteristic and common species on ridges on siliceous substrates, where it can dominate provided that the reindeer population is not too large. The species is bipolar (Hertel 1988) and its Svalbard distribution was mapped by Hertel & Ullrich (1976).

*Sporastatia polyspora* (Nyl.) Grumann

The frequency of *S. polyspora* vs. *S. testudinea* on Svalbard is probably not quite understood yet. Fries (1867) included this species as *Biatorella coracina* and some authors (e.g. Lynge 1939a; Hertel & Ullrich 1976; Hertel 1977a) considered *S. testudinea* to be the far more common one. This is commented on by Nowak (1965) who considered *S. polyspora* to be "one of the commonest lichens in Hornsund", while *S. testudinea* is not mentioned at all. Olech (1987) and Dubiel & Olech (1990) also mentioned *S. polyspora* as a dominant species in saxicolous communities of Hornsund. Olech (1990) reported *S. polyspora* from numerous localities at Sørkapp Land, and did not include *S. testudinea*. André (1993) only reported *S. polyspora*.

*Sporastatia tenuirimata* (Th. Fr.) Lynge

In Europe only known from Svalbard (Poelt 1969). It was recorded from Lomfjorden by Fries (1867) and from the Longyearbyen area by Hartmann (1980). The taxon is critical and in urgent need of further studies.

*Sporastatia testudinea* (Ach.) A. Massal.

A bipolar, probably common species on Svalbard, see below *S. polyspora*.

*Squamarina poeltii* Vånskä

The species was recently described from Novaja Zemlja (Vånskä 1985), and was later reported from Greenland and from Treskelen at Hornsund by Olech & Alstrup (1989). This arctic species is a remarkable member of the lichen flora of

Svalbard and the northernmost species of a genus confined to calcareous substrates, in Scandinavia mostly in the southern parts (Timdal 1983).

*Staurothele areolata* (Ach.) Lettau

Reported from one locality at Sørkapp Land by Olech (1990). Collected in abundance on calcareous bird cliffs at Stuphallet west of Ny-Ålesund and Templet at Isfjorden (Elvebakk unpubl., BG and TROM, det. A. Botnen).

*Staurothele fuscocuprea* (Nyl.) Zschacke

*Staurothele clopima* (Wahlenb.) Th. Fr. was reported from several localities in the north (Fries 1867), from Hornsund by Olech (1987), and from Edgeøya by Aptroot & Alstrup (1991). This taxon refers both to *S. fuscocuprea* and an undetermined *Staurothele* species (Santesson 1993) and the identity of the Svalbard material needs to be confirmed. *Staurothele fuscocuprea* has been collected from limestone rocks below a bird cliff at the mountain Templet, Isfjorden (Elvebakk unpubl., det. A. Botnen, BG). According to Thomson (1991) the correct name should be *S. drummondii* (Tuck.) Tuck.

*Stereocaulon alpinum* Laurer

A very common bipolar species. Lynge (1938) revised material published by Fries (1867) as *S. paschale*. All the samples were referred to *S. alpinum*.

*Stereocaulon arcticum* Lynge

Common on Svalbard. Plants published as *S. denudatum* by Fries (1867) belong here.

*Stereocaulon arenarium* (Savicz) I.M. Lamb

Reported from Sørkapp Land by Olech and Alstrup (1989) and Olech (1990). The species has a northern, probably circumpolar distribution and was mapped by Lamb (1972).

*Stereocaulon botryosum* Ach.

Common on Svalbard. Lynge (1938) stated that esorediated plants are less common than the sore

diated f. *dissolutum* H. Magn. This indicates *S. spathuliferum* Vain. in addition to *S. botryosum*, and a revision of the herbarium material is needed.

*Stereocaulon capitellatum* H. Magn.

A rare species on Svalbard only recorded once in Hornsund (Nowak 1965), but has also been collected from the Ny-Ålesund area by Øvstedal (unpubl., BG) and from moraines at Reindalspasset (Elvebakk unpubl.). The species is known from the Alps, Fennoscandia, Iceland, Greenland, and Svalbard (Lamb 1977).

*Stereocaulon condensatum* Hoffm.

Reported from Hornsund by Körber (1875) and later from Hornsund and Sørkapp Land (Olech & Alstrup 1989; Olech 1990).

*Stereocaulon depressum* (Frey) I.M. Lamb

Published from Krossfjorden and Reindalen by Elvebakk & Tønsberg (1992).

*Stereocaulon glareosum* (Savicz) H. Magn.

Reported from Bjørnøya (Lyng 1926b) and listed in vegetation tables from Hornsund and Isfjorden by Eurola (1968). It was also listed from Svalbard by Lamb (1977) without indication of locality. It has probably been overlooked on Svalbard, and the species was common at Reindalspasset (Nilsen & Elvebakk unpubl.).

*Stereocaulon grande* (H. Magn.) H. Magn.

Reported from two localities at Sørkapp Land by Olech (1990).

*Stereocaulon groenlandicum* (E. Dahl)  
I.M. Lamb

Reported from the area between Isfjord Radio and Grønfjorden where it was collected by a group from the University of Turku in Finland (Lamb 1973). Lamb (1973) mapped the species from Alaska, Greenland and Svalbard and later

(Lamb 1977) added localities from Canada and Scandinavia, but these collections were incorrectly determined according to Santesson (1993). The species is closely related to *S. depressum*, and the taxon is critical as these species can not always be separated (Lamb 1977).

*Stereocaulon paschale* (L.) Hoffm.

Recorded from a number of localities by Fries (1867), but referred to as *S. alpinum* by Lyng (1938). On Bjørnøya, however, one collection has been determined as *S. paschale*, while *S. alpinum* is a very common species (Lyng 1926b). The species was also listed in a vegetation table from Hornsund by Eurola (1968) and from Longyearbyen by Hartmann (1980). *Stereocaulon paschale* is definitely a southern species, and the determinations need to be confirmed.

*Stereocaulon rivulorum* H. Magn.

Common on Svalbard, see especially Lyng (1938). Tønsberg (1977), who studied the chemistry of *S. rivulorum*, concluded that an acid deficient strain was predominant on Svalbard, while other strains dominate further to the south.

*Stereocaulon vesuvianum* Pers.

Listed as an apparently common species in vegetation tables from Hornsund, Trygghamna, Colesbukta, and the Longyearbyen area by Eurola (1968) and reported from Svalbard by Lamb (1977) without information about localities. Lamb (1977) indicated the presence of both var. *nodosum* (Wallr.) I.M. Lamb, f. *depressum* (H. Magn.) I.M. Lamb and f. *umbonatum* (Wallr.) I.M. Lamb. Recently reported from five localities at Sørkapp Land by Olech (1990) and included in two vegetation tables from Bohemanflya by Kobayashi et al. (1990). *Stereocaulon vesuvianum* belongs to a southern element in the lichen flora of Svalbard. It also has a southern distribution in the North American Arctic (Thomson 1984) and is bipolar (Hertel 1988).

*Strigula sychnogonoides* (Nitschke) R.C.  
Harris

Only reported from soil in a *Gymnomitrium cor-*

*allioides* community at Sørkapp Land as *Geisleria sychnogonoides* (Olech & Alstrup 1989; Olech 1990). Hertel & Ullrich (1976) described one collection from Amsterdamøya as an uncertain *Geisleria* species.

*Tephromela aglaea* (Sommerf.) Hertel & Rambold

Reported by Fries (1867), Hue in Hariot (1893), and Magnusson (1933) but without locality information. Later reported from the Bockfjorden area by Hafellner (1982) and from two localities at Sørkapp Land by Olech (1990). Reported as *f. expallens* Th. Fr. by Hue in Hariot (1893).

*Tephromela armeniaca* (DC.) Hertel & Rambold

Not common on steep surfaces of hard siliceous rocks, normally windexposed. Reported from Bellsund, Magdalenefjorden, Wijdefjorden, and Sorgfjorden by Fries (1867), from Sørkapp-Hornsund by Lyng (1924), Olech (1990), and Hertel (1991), from Bjørnøya by Lyng (1926b), from Amsterdamøya by Hertel & Ullrich (1976), and from Kongsfjorden by Hertel (1991).

*Tephromela atra* (Huds.) Hafellner

Recorded from the southwest without locality (Fries 1867), from Adventfjorden (Paulson 1923), from Botneheia in Isfjorden (Lyng 1940a), Bjørnøya (Lyng 1926b), Edgeøya (Aptroot & Alstrup 1991) and Sørkapp Land (Olech 1990). The species is bipolar (Hertel 1988).

*Thamnolia vermicularis* (Swartz) Schaer.

In Svalbard only as var. *subuliformis* (Ehrh.) Schaer. (Nowak 1965; Hertel & Ullrich 1976), by these authors treated as a separate species. Nowak (1965) also listed *T. vermicularis* var. *robusta* Savicz, a doubtful taxon.

*Thelidium antoniellianum* Bagl. & Carestia

On Svalbard only recorded from a very hard siliceous boulder at Amsterdamøya (Hertel & Ullrich 1976). The species was first described from the summit of Monte Rosa (4630 m alt.). In

Scandinavia it has only been found on Mount Vassitjåkko in northern Sweden (Santesson 1993).

*Thelidium cataractarum* (Hepp) Lönner.

Lyng (1926b) was inclined to include this species within *T. cataractarum* even if he proposed a provisional name *T. denudatum*. It is only known from Bjørnøya.

*Thelidium pyrenophorum* (Ach.) Mudd

Recorded from Sorgfjorden by Fries (1867) and Bjørnøya by Summerhayes & Elton (1923) and Lyng (1926b).

*Thelignya lignyota* (Wahlenb.) P.M. Jørg. & Henssen.

Reported, under the name *Psorotichia fuliginea* from Hornsund by Körber (1875), and under the name *Poroscyphus dispersus*, as a rare species from Sørkapp Land (Olech & Alstrup 1989; Olech 1990). The species was only listed from Greenland and Sweden by Poelt (1969).

*Thelocarpon epibolum* Nyl.

A lichenicolous lichen collected on *Peltigera aphthosa* at Sørkapp Land (Alstrup & Olech 1992).

*Toninia aromatica* (Sm.) A. Massal.

A widely distributed species on Svalbard only known from Sorgfjorden and Lomfjorden (Fries 1867; Timdal 1991 and suppl. list). A list of localities was made available as a supplement to Timdal (1991).

'*Toninia*' *cumulata* (Sommerf.) Th. Fr.

Recorded from Bellsund and Lågøya (Fries 1867), but not accepted in the genus *Toninia* by Timdal (1991).

*Toninia sedifolia* (Scop.) Timdal

Listed from three vegetation relevés from Hornsund, Colesbukta and the Longyearbyen

area by Eurola (1968), and reported by Elvebakk (1991) and Timdal (1991) from Sassendalen, Kongsfjorden, Bockfjorden, Lomfjorden, and Sorgfjorden. The species has usually been called *T. caeruleonigricans*, but is not identical with *T. caeruleonigricans* (Lightf.) Th. Fr. (Timdal 1991).

*Toninia squalida* (Ach.) A. Massal.

Only reported from Prins Karls Forland by Timdal (1991, suppl. list).

*Toninia verrucarioides* (Nyl.) Timdal

Reported from Sorgfjorden as *T. conjugens* Th. Fr. by Fries (1867), from Bockfjorden by Hafellner (1982) as *T. kolax* Poelt. Timdal (1991, suppl. list) mapped the species from Sorgfjorden and Murchisonfjorden on northern Svalbard.

*Tremolecia atrata* (Ach.) Hertel

This bipolar species is one of the most common crustose lichens on Svalbard on siliceous rocks and stones. It was mapped on Svalbard by Hertel & Ullrich (1976).

*Tuckermannopsis inermis* (Nyl.) Kärnefelt

Collected at Sjuøyane, the northernmost islands in the Svalbard archipelago by E. Dahl in 1936 and reported by Tønsberg & Elvebakk (1993). The species has been known as *Cetraria inermis*, but was transferred to *Tuckermannopsis* by Kärnefelt et al. (1993). Previously *T. inermis* was known to have a narrow amphi-Beringian distribution (Kärnefelt 1979), but later Andreev & Makarova (1982) mapped several additional localities in easternmost arctic Russia (Čukotka) and two localities much further west (Jamal/Tajmyr). Žurbenko (pers comm.) has collected the species in the New Siberian Islands, even on the isolated Bennett Island (76°) with a polar desert climate like Sjuøyane. The species occurs in oligotrophic habitats in the amphi-Beringian area and its occurrence on the gneiss/schistose Sjuøyane may be related to a preference for acidic sites, as the case is for many other lichen species concentrated to the northern part of Svalbard. Phytogeographically it is one of the most inter-

esting lichens on Svalbard, but it may prove to have a circumpolar distribution, and it should particularly be searched for in siliceous areas of northern Greenland and arctic Canada.

*Umbilicaria aprina* Nyl.

Reported from Van Mijenfjorden by Elvebakk et al. (1987) and later published by Elvebakk & Tønsberg (1992) from many localities all over Spitsbergen, including fertile specimens. It is a small species that is easily overlooked and is found in open saxicolous lichen communities on siliceous rocks with a strong or intermediate exposure and snow cover. *Umbilicaria aprina* is a notable species with a special apothecium structure and a disjunct worldwide distribution in all continents except Australia (Elvebakk & Tønsberg 1992).

*Umbilicaria arctica* (Ach.) Nyl.

A very common species and its distribution on Svalbard was mapped by Hertel & Ullrich (1976).

*Umbilicaria crustulosa* (Ach.) Frey

Reported from Edgeøya by Aptroot & Alstrup (1991). This is a remarkable extension northwards of a species that does not seem to have been found in the Arctic before. It is rare even in northernmost Fennoscandia where it has a coastal distribution tendency, although it has been found in the mountains of northernmost Finland (Hakulinen 1962). Aptroot & Alstrup (1991) reported no less than three very rare *Umbilicaria* species from the Kapp Lee area on western Edgeøya, including also *U. polyphylla* and *U. rigida*. The macrolichen flora of Svalbard is fairly well studied, and it is difficult to explain the concentration of such rare species in the study area. The lichens were collected by vegetation ecologists. No data on frequencies have yet been published, and the list presented by Aptroot & Alstrup (1991) lacked common species like *U. cylindrica* and *U. virginis*.

*Umbilicaria crustulosa* was reported from Svalbard by Lynge (1924), but the material was later redetermined as *U. cylindrica* (Lynge 1938).

*Umbilicaria cylindrica* (L.) Delise ex Duby

Most of the records are probably var. *delisei* Nyl. (Hertel & Ullrich 1976).

*Umbilicaria decussata* (Vill.) Zahlbr.

A very common bipolar species. Elvebakk et al. (1987) reported on fertile material from Van Mijenfjorden.

*Umbilicaria deusta* (L.) Baumg.

Only recorded from two localities of Nordaustlandet (Lyng 1938), and one from Hornsund (Nowak 1965). It was also collected at Rossøya on Parry's expedition to the northernmost part of Svalbard according to Hooker (1828). Hooker's list, however, obviously includes some erroneous names, cfr. the critical remarks by Fries (1867). However, *U. deusta* was not included in Fries' list of rejected species. *Umbilicaria deusta* has later been collected from Longyearbyen and Reindalen (Elvebakk unpubl.).

*Umbilicaria hyperborea* (Ach.) Hoffm.

A very common species.

*Umbilicaria kraschennikovii* (Savicz) Zahlbr.

Only published from Longyearbyen and Magdalenefjorden by Lyng & Scholander (1932), from Lomfjorden and Wahlenbergfjorden in the north by Lyng (1938), and from Van Mijenfjorden by Elvebakk et al. (1987). Later it has been collected at Krossfjorden and Kongsfjorden (Blomstrandhalvøya) by Elvebakk (unpubl., TROM). The species is a widespread exclusively arctic species which in Europe is only known from Svalbard (Poelt 1969).

*Umbilicaria lyngei* Schol.

Regarded to be common in the northern part of Svalbard, but only published from a few localities in central Spitsbergen (Lyng 1938, 1940a). It was listed from Hinlopenstretet and Faxedalen by Llano (1950), but several herbarium collections have not been published. The species is rarely

fertile. We have only found a single apothecium in the Svalbard herbarium material at O. As it is rarely fertile it is often difficult to distinguish between this species and *U. decussata*, and the relationship between these two species is not understood (Krog et al. 1994).

*Umbilicaria polyphylla* (L.) Baumg.

Reported from Chermisøya near Nordaustlandet by Paulson (1927), from Nordkapp, Nordaustlandet by Summerhayes & Elton (1928), and from Edgeøya by Aptroot & Alstrup (1991). It was also collected near Longyearbyen in 1981 (Elvebakk unpubl.). The species is only known from the southernmost parts of the American Arctic (Thomson 1984), is not common in Fennoscandian mountains and should represent a southern thermophilous element in the lichen flora of Svalbard. The collections from northernmost Svalbard need to be confirmed.

*Umbilicaria proboscidea* (L.) Schrad.

A very common species.

*Umbilicaria rigida* (Du Rietz) Frey

Reported from Kvalpynten, Edgeøya by Elenkin & Savicz (1912) (as *Gyrophora anthracina* (Wulfen) Th. Fr.) and from the Kapp Lee area also at Edgeøya by Aptroot & Alstrup (1981). Only known from the southernmost part of the Arctic in North America (Thomson 1984).

*Umbilicaria torrefacta* (Lightf.) Schrad.

A very common species.

*Umbilicaria vellea* (L.) Hoffm.

A "North Coast" lichen (Lyng 1938, 1940a), restricted to percolation areas of steep surfaces in bird cliffs where it can occur in great quantities. Recorded from Amsterdamøya (Hertel & Ullrich 1976), as rather common in Hornsund (Nowak 1965), from Van Mijenfjorden (Elvebakk et al. 1987), and from one locality at Sørkapp Land (Olech 1990). It has been collected at Krossfjorden, Kongsfjorden and Kapp Laila (Isfjorden) by Elvebakk (unpubl.)

*Umbilicaria virginis* Schaer.

A common species. Lyng (1938) who was the first to report it from Svalbard listed many localities, see also Llano (1950), Lyng (1939a), Nowak (1965), Hertel & Ullrich (1976), Euroala & Hakala (1977).

*Varicellaria rhodocarpa* (Körb.) Th. Fr.

Reported by Körber (1875) from Hornsund.

*Verrucaria aethiobola* Wahlenb.

Recorded from Hopen (Lyng 1926a), from Fosterøyane at Hinlopenstretet (Paulson 1928), and from Gattytoppen (west of Sassendalen) by Lyng (1940a). It was also included in a vegetation table from Bohemanflya by Kobayashi et al. (1990).

*Verrucaria cataleptoides* (Nyl.) Nyl.

Only recorded from Bjørnøya by Lyng (1926b).

*Verrucaria ceutocarpa* Wahlenb.

Recorded from Smeerenburg (Fries 1867) and Bjørnøya (Lyng 1926b; Engelskjøn 1986). The species is bipolar (Hertel 1988).

*Verrucaria deversa* Vain.

Reported from Bjørnøya by Lyng (1926b).

*Verrucaria extrema* Th. Fr.

Described from northern Svalbard by Fries (1867) who reported it from granitic rocks at Kobbavågen, Fosterøyane (Hinlopenstretet) and Sjuøyane. The taxon is lacking from major reference sources and needs to be restudied.

*Verrucaria halophiloides* Vain.

Reported by Santesson (1939) from Sørkappøya, Vaigattøyane (Hinlopenstretet) and from Depotøya, Repøyane and Steinøya near Nordaustlandet.

*Verrucaria integra* (Nyl.) Nyl.

A single specimen was found on a limestone rock in Lomfjorden (Fries 1867). In mainland Norway only known from Finnmark (Santesson 1993).

*Verrucaria margacea* (Wahlenb.) Wahlenb.

Recorded from Kobbefjorden and Fosterøyane on irrigated rocks (Fries 1867).

*Verrucaria maura* Wahlenb.

A characteristic littoral species very common further to the south, but rare on Spitsbergen where it has only been recorded from Bellsund, Magdalenefjorden and as *B. evoluta* Th. Fr. from Sorgfjorden (Fries 1867). Recorded from a number of localities on Bjørnøya (Lyng 1926b; Engelskjøn 1986). It is bipolar.

*Verrucaria nigrescens* Pers.

Only known from Bjørnøya (Summerhayes & Elton 1923; Lyng 1926b).

*Verrucaria rejecta* Th. Fr.

A limestone species first described from Svalbard (Sorgfjorden and Lågøya) by Fries (1867) and also reported from dolomite near Tommelbreen (=“Duymbreen”, east of Lomfjorden). A very rare species in Scandinavia only known from Nordland and Torne-Lappland (Santesson 1993).

*Verrucaria wilczekii* Körb.

Described from limestone at Hornsund by Körber (1875). The species is lacking from other major reference sources and is in need of a restudy.

*Vestergrenopsis elaeina* (Wahlenb.) Gyeln.

Only reported from Sørkapp (Lyng 1924) and Forsbladhamna (Van Keulenfjorden), Sveagruva and Kobbavågen (Lyng 1938). But the species has definitively been overlooked, and it has been collected on scattered localities on Spitsbergen (Elvebakk 1982, 1984b, unpubl.).

*Vestergrenopsis isidiata* (Degel.) E. Dahl

First reported from Svalbard by Elvebakk (1982) and later from Sørkapp Land by Olech (1990). The species has been overlooked and is definitively common on moderately siliceous rocks in moderate snowbeds. It has been collected in most areas visited on Svalbard (Elvebakk unpubl.).

*Xanthoria borealis* R. Sant. & Poelt

This is a recently described species (Poelt & Petutschnig 1992), at present only known from Svalbard (Amsterdamøya and Longyearbyen), mountains of Fennoscandia, Greenland/North America, and Nepal. The species grows together with and in similar bird manured habitats as *X. candelaria*. The two reported localities on Svalbard are only selected collections and further studies will reveal whether *X. borealis* is common on Svalbard.

*Xanthoria candelaria* (L.) Th. Fr.

A very common bipolar species.

*Xanthoria elegans* (Link) Th. Fr.

A bipolar, very common and dominating lichen on manured rocks or rocks rich in calcium. A fruticose form was discovered at Gipsdalen in 1985 (Elvebakk unpubl.), possibly the same as reported from Hornsund as var. *splendens* (Darbish.) Christ. by Nowak (1965). A similar lichen has been published from arctic Canada by Fahselt & Krol (1989) where it also has been collected by Elvebakk (unpubl.). This form probably deserves the rank of a separate taxon although Fahselt & Krol (1989) included it within *X. elegans*.

*Xanthoria soredata* (Vain.) Poelt

Recorded in the literature from surprisingly few localities: Sorgfjorden (Fries 1867), Bjørnøya (Lynge 1926b), De Geerdalen (Lynge 1940a), Hornsund (Nowak 1965), Edgeøya (Hofmann 1968), Kongsfjorden (Nimis 1985), and Sørkapp Land (Olech 1990). However, the species has been collected from a large number of localities both recently (Elvebakk unpubl.), and probably also earlier, but it was referred to the genus

*Caloplaca* by Lynge and therefore not included in his major macrolichen study (Lynge 1938).

## Rejected Species

*Arctocetraria andrejevii* (Oxner) Kärnefelt & Thell

Reported from Hornsund by Nowak (1965) as "*Cetraria delisei* var. *dilatata*", but was not included from the European Arctic by Kärnefelt (1979), and the material has been redetermined as *Cetrariella delisei* (Tønsberg & Elvebakk unpubl.).

*Aspicilia laevata* (Ach.) Arnold

Collected by T. Fries on Bjørnøya and published by Lynge (1926b) (as *Lecanora laevata* (Ach.) Nyl.). It was referred to *L. elevata* Lynge (= *Aspicilia elevata* (Lynge) J.W. Thomson) by Magnusson (1939).

*Biatora vernalis* (L.) Fr.

*B. vernalis* has been reported by numerous authors from Svalbard, but *B. vernalis* s.str. is not known from the Arctic where the taxon is replaced by *Biatora subduplex* (Nyl.) Printzen (see Printzen 1995).

*Blastenia arctica* Lynge

Described from Bjørnøya by Lynge (1926b), and later reported from Hornsund (Nowak 1965). The species corresponds to *Caloplaca executata* according to Søchting (1992b).

*Brodoa intestiniformis* (Vill.) Goward

This complex was revised by Krog (1974) and only *Hypogymnia oroarctica* (now *Brodoa oroarctica*) was indicated from Svalbard, although only selected collections were studied. Reports of *B. intestiniformis* from Svalbard by André (1993) are not thought to be correct.

*Bryoria bicolor* (Ehrh.) Brodo & D. Hawksw.

Reported from Bjørnøya by Summerhayes & Elton (1923) and Paulson (1923). The common *Bryoria* on Svalbard, *B. chalybeiformis*, is lacking from their papers, and the determination is regarded here as probably erroneous.

*Buellia lauricassiae* (Fée) Müll. Arg.

Reported as *B. disciformis* (Fr.) Mudd var. *triphragma* (Nyl.) H. Olivier by Paulson (1923) from Prins Karls Forland and Gipsdalen. It was also reported from Gipsdalen by Summerhayes & Elton (1923). However, the species is corticolous and the Svalbard reports are probably not correct.

*Buellia stellulata* (Taylor) Mudd

Reported by Summerhayes & Elton (1928) from Wijdefjorden, but is most probably an incorrect identification.

*Buellia xylophila* Malme

Published by Hertel (1977a) as '*B. cf. xylophila*' and associated with *Caloplaca spitsbergensis* on driftwood a few km west of Ny-Ålesund. The species was keyed out using Malme (1927), but the determination was very tentative as no original material of this taxon (described from South America) was studied.

*Caloplaca arctica* H. Magn.

Described on driftwood from the small island Moffen in northernmost Svalbard (Magnusson 1944), but the species was synonymised with *C. tirolensis* by Söchting (1992b).

*Caloplaca albolutescens* auct.

Reported by Paulson (1928) from Fosterøyane (Hinlopenstretet) and Wijdefjorden. The species is southern in Scandinavia (Santesson 1993) and not recorded from Greenland (Hansen et al. 1987), and this is probably an erroneous identification.

*Caloplaca holocarpa* (Hoffm. ex Ach.) A.E. Wade

A variable, and probably rather heterogenous (see Poelt & Hinteregger 1993) species, published from Depotøya og Vaigattøyane by Fries (1867) and from Sassendalen by Söchting (1989) as *C. pyracea*. *C. halocarpa* was provisionally separated in *C. lithophila* and *C. pyracea* by Söchting & Olech (1995).

*Caloplaca variabilis* (Pers.) Müll. Arg.

Recorded only once from Isfjorden on old reindeer antler as var. *ossicola* Lynge (1940a). The material is very scarce and is badly in need of revision. Magnusson (1950) as well as Wunder (1974) did not include any material from Svalbard in their treatment of the species. *Caloplaca variabilis* is not known from Greenland (Hansen et al. 1987), and it has a definitely southern distribution in Scandinavia (Santesson 1993).

*Candelaria concolor* (Dicks.) Stein

Reported from Bjørnøya by Summerhayes & Elton (1928). *Candelaria concolor* is strongly southern, and the species was probably confused with *Xanthoria candelaria/borealis* or a *Candelariella* species.

*Candelariella canadensis* H. Magn.

Reported as "cfr. *canadensis*" from the Hornsund and Isfjorden areas in vegetation tables by Eurola (1968), and the report is considered as doubtful.

*Candelariella dispersa* (Räsänen) Hakul.

Associated with *Placynthium*, and reported from Spitsbergen without locality information by Hakulinen (1954). In Europe only known from Svalbard, Finland and northernmost Sweden (Poelt & Vězda 1977, Alstrup 1991). It was reported from many localities at Sørkapp Land by Olech (1990), who also noted *Vestergrenopsis elaeina* as host. It was collected by Øvstedal (unpubl., BG) at Sassendalen in 1986. However, it was considered to be a cyanotrophic life form of *Candelariella aurella* by Poelt & Mayrhofer (1988).



*Catapyrenium rufescens* (Ach.) Breuss

Reported from Svalbard by Lynge (1924, 1926b, 1938) but not mentioned from Svalbard by Breuss (1990).

*Cetraria ericetorum* Opiz

Reported by several authors (Hue in Hariot 1893; Lynge 1924, 1926b, 1938, 1939a, 1940a; Hadač 1946, 1989; Nowak 1965; Eurola 1968; Hertel & Ullrich 1976; Hartmann 1980; Dubiel & Olech 1990; Kobayashi et al. 1990), but confused with *C. islandica* ssp. *crispiformis*, cfr. Kärnefelt (1979) who did not recognise *C. ericetorum* from the Arctic. *Cetraria ericetorum* was recently included in vegetation tables from Bohemanflya as almost as common as *C. islandica* (Kobayashi et al. 1990).

*Cladonia foliacea* (Huds.) Willd.

A southern species erroneously reported from Bjørnøya by Summerhayes & Elton (1923).

*Cladonia furcata* (Huds.) Schrad.

Reported from Bjørnøya and Prins Karls Forland (Paulson 1923, 1928; Summerhayes & Elton 1923, 1928) as var. '*palmacea*', var. '*surrecta*', and var. '*spinosa*'. The determinations are doubtfully correct and the material needs to be restudied.

*Cladonia grayi* Merr. ex Sandst.

Reported from Hornsund and St. Johnsfjorden (Lynge 1938), but the Hornsund specimen is *C. merochlorophaea* and the St. Johnsfjorden specimen is *C. deformis* (Elvebakk & Tønsberg 1992).

*Cladonia magyarica* Vain.

Indicated by Lynge (1938) from Svalbard, but this species is excluded here and the material should be reexamined. The species has also been reported erroneously from Sweden (Santesson 1993), and Farkas & Lökös (1994) only mapped it from Hungary and neighbouring areas.

*Cladonia portentosa* (Dufour) Zahlbr.

Listed in a phytosociological table from the Barentsburg area by Hadač (1989). The species has

a distinctive coastal distribution in mainland Norway where it is lacking from the northernmost parts, and this report is considered here to need verification.

*Cladonia rangiformis* Hoffm.

Published from Bjørnøya by Summerhayes & Elton (1923) and probably confused with *Cladonia rangiferina*. A report of *C. rangiformis* in a geographical/lichenometrical study by André (1993) is probably also incorrect; *Cladonia rangiformis* is a thermophilous coastal species in Scandinavia.

*Cladonia scabriuscula* (Delise) Leight.

Only reported from Svenskegattet by Lynge (1938). This small collection cited by Lynge (1938) is not correctly determined and is referable to *Cladonia gracilis* ssp. *gracilis* or *C. stricta* (Ahti pers. comm.). In Scandinavia *C. scabriuscula* is concentrated to the southern and central parts and does not occur in alpine areas (Santesson 1993).

*Cladonia subcervicornis* (Vain.) Kernst.

Reported as a 'North Coast Lichen' by Lynge (1938) with one additional locality at Bellsund—a phytogeographically remarkable pattern, as the species has a distinct coastal distribution in Scandinavia. The collections at O have now been revised (Øvstedal pers. comm., Ahti pers. comm.) as partly *C. symphycarpa* and partly *C. macrophyllodes*. A collection from Lady Franklinfjorden: Persberget resembles *C. subcervicornis*, but its identity is uncertain.

*Collema crispum* (Huds.) Weber ex F.H. Wigg.

Reported by Paulson (1928) from Liefdefjorden. The report is dubious as the species is only known from southern Fennoscandia and Nordland (Norway) according to Degelius (1954) and Santesson (1993).

*Cornicularia racemosa* Lynge

Published from two localities in central Spitsbergen by Lynge (1938), and also collected by

Elvebakk (unpubl.) at Berzeliusdalen and near Isfjord Radio. But the sorediate forms in this genus and in the brown fruticose *Cetraria* s.l. species seem to develop as a result of attack by a lichenicolous fungus, probably *Torula* (Kärnefelt 1979, 1986). The sorediate forms can be treated as a modification or a forma, cfr. *Coelocaulon aculeatum* f. *sorediatum* (Du Rietz) D. Hawksw. by Cannon et al. (1985).

*Dermatocarpon miniatum* (L.) W. Mann

Probably erroneously reported by Paulson (1928) and Summerhayes & Elton (1928).

*Dermatocarpon luridum* (With.) J.R. Laundon

Reported from Olsokflyan (Sørkapp Land) by Lyng (1924). The species is lacking from the northern part of Scandinavia (Santesson 1993) and the determination needs to be verified.

*Lecanora albescens* (Hoffm.) Branth & Rostr.

Reported from 'Stans Foreland' (= Edgeøya) by Fries (1867) and from Liefdefjorden and Reinsdyrflya by Paulson (1928). According to Poelt & Leuckert (1995) *Lecanora albescens* is a species confined to low elevation sites. In Central Europe there are no records from the montane or alpine belts. So it is most unlikely that this species occurs in Svalbard.

*Lecanora dispersa* (Pers.) Sommerf.

A common species reported by many authors (Körber 1875, as *L. caesiocalba* var. *dispersa*); Lyng 1924, 1940a; Summerhayes & Elton 1923, as *L. galactina* var. *dispersa*, 1928; Nowak 1965; Hertel & Ullrich 1976; Hafellner 1982; Olech 1990; Aptroot & Alstrup 1991). Santesson (1993) treated *L. flotowiana* Spreng. as a synonym of *L. dispersa*. According to J. Poelt (pers. comm.), however, *Lecanora dispersa* s.str. does not occur on Svalbard, and material lying in herbaria under this name usually represent the different *L. flotowiana*.

*Lecanora fuscata* (Schrad.) Nyl.

Reported by Hue in Hariot (1893) without information on locality. According to Zahlbruckner (1926–1927) only Nylander's citation of 1863 is accepted as a synonym of *Acarospora atrata* Hue. Zahlbruckner (1926–1927) clearly stated 'non loc. al.'. The identity of Hue's specimen is unknown.

*Lecanora galactina* Ach. ssp. *dispersa* Nyl.

Reported from Bjørnøya by Summerhayes & Elton (1923). *Lecanora galactina* is considered to be identical with *L. albescens* by Santesson (1993), but Lyng (1926b) claimed that *L. galactina* ssp. *dispersa* "should be compared with *L. nordenskiöldii* or *L. torrida*".

*Lecanora heteroplaca* Zahlbr. f. *ursina* Lyng, see below *Aspicilia gibbosa*.

*Lecanora marginata* (Schaer.) Hertel & Rambold

Reported as *Lecidea elata* by Fries (1867) from several localities, but these specimens probably belong to *L. atomarginata*.

*Lecanora microfusca* Lyng

Indicated from the Longyearbyen area by Hartmann (1980) as *L. cf. microfusca* and not accepted here.

*Lecanora ursina* (Lyng) H. Magn.

Reported by Lyng (1926b) and Magnusson (1944) based on one T. Fries collection from Bjørnøya, and according to Magnusson (1944) the collection included "three specimens, one typical". It does not seem to have been collected outside its type locality and was not included by Poelt (1969). The taxon is here referred to the *Aspicilia gibbosa* (Ach.) Körb. complex.

*Lecanora virginea* (Hue) Zahlbr.

This taxon was described from Svalbard, Novaja Zemlja and Tromsø in mainland Norway by Magnusson (1944). It includes *Lecanora gibbosa*

and *L. gibbosa* v. *squamata* reported from Svalbard by Hue in Hariot (1893). The taxon is included in the *Aspicilia gibbosa* complex.

*Lecidea athrocarpoides* Vain.

A rare species in Scandinavia only known from Lycksele Lappmark and it is uncertain whether the species belongs to *Lecidea* s. str. or not. On Svalbard only reported from Bjørnøya (Lyng 1926b), but Lyng (1939b) later changed his determination to *L. helsingforsiensis* Nyl. The report is treated here as *L. praenubila* Nyl.

'*Lecidea*' *cavatula* Nyl.

A critical taxon only known from the Gåsebu/Gluudneset area near Ny-Ålesund and reported from a few localities in the world (Hertel 1977a). The taxon was synonymised with *Eiglera homalomorpha* (Nyl.) Clauzade & Roux (Clauzade & Roux 1985). However, the specimen from Gåsebu differs by asci with nonamyloid tholi and may therefore belong to *Aspicilia*.

*Lecidea diducens* Nyl.

There is no record of *Lecidea diducens* from Svalbard (cfr. Schwab 1986; Hertel unpubl.). The taxon is closely related to *Lecidea auriculata*, but differs in chemistry. More or less endolithic specimens of *L. auriculata* in older literature, like Lyng (1926b), often became named "*L. diducens*" or "*L. auriculata* var. *diducens*".

*Lecidea helsingforsiensis* Nyl.

Treated here as *L. praenubila*, see note below *L. athrocarpoides*.

*Lecidea lithophila* (Ach.) Th. Fr.

Recorded as f. *aberrans* from Bjørnøya (Lyng 1926b) and by Paulson (1928) from an unexplained locality. The species was also reported from Feiringfjellet at Kongsfjorden in a geographic study that involved lichenometry (André 1993). Schwab (1986) did not include collections from Svalbard and did not treat f. *aberrans*, and we do not think the species occurs on Svalbard.

*Lecidella anomaloides* (A. Massal.) Hertel & R. Kilius

Several reports, but is most likely absent from Svalbard. Former records under the name "*Lecidea goniophila*" usually refer to *Lecidella stigmata* and *pataviana*.

*Ochrolechia upsaliensis* (L.) A. Massal.

Reported from Fosterøyane and Dirksbukta by Summerhayes & Elton (1928), but are most probably misidentified specimens of *O. frigida*.

*Rhizocarpon alpicola* (Anzi) Rabenh.

The species is not correctly reported from Svalbard. Older records usually refer to *R. inarense* (Hertel & Vohla unpubl.).

*Rhizocarpon disporum* (Nägeli ex Hepp) Müll. Arg.

In contrast to *Rhizocarpon geminatum* (with two-spored asci) which on Svalbard is an extremely common species on acidic rocks in cool and humid situations, there is no confirmed record of the very similar *R. disporum* (in spite of its name characterised by single-spored asci) from Svalbard. The latter taxon prefers a dry continental climate. The reports by Lyng (1936) and Hadač (1946) from Isfjorden most likely refer to *R. geminatum*.

*Rhizocarpon occidentale* Lyng

Reported from a few localities by Lyng (1936, 1938, 1940a) and included in *R. superficiale* by Egan (1987).

*Rhizocarpon parvum* Runemark

Reported by Runemark (1956), but redetermined to *R. pusillum/effiguratum* by Holtan-Hartwig & Timdal (1987).

*Rhizocarpon petraeum* (Wulfen) A. Massal.

According to Feuerer (1991) this is the correct name for *R. excetricum* (Ach.) Arnold. The

identity of the Svalbard collections is unclear. Hertel & Ullrich (1976) indicated *R. grande* as a possibility.

*Rhizocarpon porphyrostrotum* (Vain.) Vain.

Reported as "*R. cf. porphyrostrotum*" by Hartmann (1980) from the Longyearbyen area. The taxon was only listed from Finland by Poelt (1969). According to Feuerer (1991) *R. porphyrostrotum* is a synonym of *R. distinctum* Th. Fr.

*Rhizocarpon submodestum* (Vain.) Vain.

Reported as "*R. cf. submodestum*" by Hartmann (1980) from the Longyearbyen area. According to Feuerer (1991) *R. submodestum* is a synonym of *R. obscuratum* (Ach.) A. Massal.

*Rhizoplaca chrysoleuca* (Sm.) Zopf

Reported by Stitzenberger (1876) in a catalogue without locality information. Most likely a misinterpretation.

*Rhizoplaca peltata* (Ram.) Leuckert & Poelt

Reported from Sørkapp Land by Dubiel & Olech (1990). This species is known from the mountains of the Macaronesian Islands, the western Alps, Mediterranean Europe, the Irano-Turanian region, East African mountains and North America and not from the Arctic. The report certainly refers to *R. melanophthalma*, which is the taxon that was reported from Sørkapp Land by Olech (1990).

*Rinodina exigua* (Ach.) S.F. Gray

Reported by Paulson (1923) from Gipsdalen, most likely a misidentification.

*Stereocaulon evolutum* Graewe

Reported from Dirksfjorden by Summerhayes & Elton (1928). According to Lamb (1977) probably a misidentification.

*Stereocaulon saxatile* H. Magn.

Reported from the Hornsund and Isfjorden areas by Eurola (1968). However, this must be a misidentification as this suboceanic species does not occur in the Arctic according to Lamb (1977).

*Toninia candida* (Weber) Th. Fr.

Recorded from Sorgfjorden and Lomfjorden by Fries (1867). The species has been wrongly determined from Svalbard and is in Norway only known from the southern part (Timdal 1991).

*Umbilicaria leiocarpa* DC.

The possible presence of *U. leiocarpa* on Svalbard was discussed by Du Rietz (1924) based on a collection from Lovénberget. This may possibly refer to *U. lyngei* which at that time had not been described yet.

*Verrucaria striatula* Wahlenb.

Reported by Fries (1867), Lynge (1923), and Paulson (1928) from various localities. However, Santesson (1939) stated that these records are misidentifications for *V. halophiloides*.

*Xanthoria parietina* (L.) Th. Fr.

Included by Fries (1867) based on J. Vahl's collection from seashore rocks in Bellsund, affirmed by Malmgren. Also listed by Paulson (1923) from Bjørnøya, Prins Karls Forland and Gipsdalen. The species was not included by Lynge (1938) and is also regarded here as probably misidentified, but it should be looked for, especially at Bjørnøya.

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## Appendix. List of synonyms to the names of Svalbard lichens

- Acarospora cervina* A. Massal. = *A. glaucocarpa*  
*A. chlorophana* (Wahlenb.) A. Massal. = *Pleopsidium chlorophanum*  
*A. fuscata* var. *smaragdula* (Wahlenb.) E.K. Novák = *A. smaragdula*  
*A. impressula* Fr. var. *hospitans* (H. Magn.) Clauzade & Cl. Roux = *A. hospitans*  
*A. impressula* var. *scyphulifera* (Vain.) Clauzade & Cl. Roux = *A. scyphulifera*  
*A. montana* H. Magn. = *A. rugulosa*  
*A. peliocypha* (Wahlenb.) Arnold nom. inval. = *A. peliscypha*  
*A. smaragdula* var. *scyphulifera* (Vain.) Clauzade & Cl. Roux = *A. scyphulifera*  
*Alectoria bicolor* (Ehrh.) Nyl. = *Bryoria bicolor*  
*A. chalybeiformis* auct. [non (L.) S.F. Gray] = *Bryoria chalybeiformis*  
*A. cincinnata* (Fr.) Lynge = *A. sarmentosa* ssp. *vexillifera*  
*A. divergens* (Ach.) Nyl. = *Bryocaulon divergens*  
*A. jubata* f. *chalybeiformis* "(L.) Lynge" = *Bryoria chalybeiformis*  
*A. minuscula* (Nyl. ex Arnold) Degel. = *Pseudephebe minuscula*  
*A. ochroleuca* var. *rigida* (Schaer.) Th. Fr. = *A. ochroleuca*  
*A. pubescens* (L.) R. Howe = *Pseudephebe pubescens*  
*A. sarmentosa* var. *cincinnata* (Fr.) Nyl. = *A. sarmentosa* ssp. *vexillifera*  
*A. thulensis* Th. Fr. = *A. nigricans*  
*A. vexillifera* (Nyl.) Stizenb. = *A. sarmentosa* ssp. *vexillifera*  
*Arthopyrenia conspurcans* Th. Fr. = *Stigmidium conspurcans*  
*A. sublitoralis* (Leight.) Arnold = *Pyrenocollema sublitorale*  
*Arthrorhaphis citrinella* var. *alpina* (Schaer.) Poelt = *A. alpina*  
*A. flavovirescens* (Dicks.) Th. Fr. = *A. citrinella*  
*Aspicilia alphoplaca* (Wahlenb.) Poelt & Leuckert = *Lobothallia alphoplaca*  
*A. alpina* (Sommerf.) Arnold = *Bellemerea alpina*  
*A. candida* var. *nikrapensis* (Darb.) Oxner = *A. nikrapensis*  
*A. ceracea* Arnold = *Hymenelia ceracea*  
*A. cinereorufescens* (Ach.) A. Massal. = *Bellemerea cinereorufescens*  
*A. flavida* (Hepp) Rehm = *Eiglera flavida*  
*A. lacustris* (With.) Th. Fr. = *Ionaspis lacustris*  
*A. melanaspis* (Ach.) Poelt & Leuckert = *Lobothallia melanaspis*  
*A. prevostii* (Duby) Anzi = *Hymenelia epulotica*  
*A. subsorediza* (Lynge) R. Sant. = *Bellemerea subsorediza*  
*Bacidia 'carneopallida'* (Müll. Arg.) Coppins = *Biatora carnealbida*  
*B. alpina* (Schaer.) Vain. = *Arthrorhaphis alpina*  
*B. coprodes* (Körb.) Lettau = *B. trachona*  
*B. flavovirescens* (Dicks.) Anzi = *Arthrorhaphis citrinella*  
*B. microcarpa* (Th. Fr.) Lettau = *Mycobilimbia microcarpa*  
*B. muscorum* (Ach.) Mudd = *B. bagliettoana*  
*B. sabuletorum* (Schreb.) Lettau = *Mycobilimbia sabuletorum*  
*B. sphaeroides* auct. = *Biatora carnealbida*  
*B. subfuscula* f. *venusta* (Hepp) Zahlbr. = *B. subfuscula*  
*B. viridescens* (A. Massal.) Hellb. = *B. bagliettoana*  
*Biatora curvescens* (Mudd) Th. Fr. = *Bryonora curvescens*  
*B. lulensis* (Hellb.) Th. Fr. = *Miriquidica lulensis*  
*B. miscella* (Sommerf.) Fr. = *Mycobilimbia berengeriana*  
*B. miscella* ssp. *collodea* Th. Fr. = *Lecidea collodea*  
*B. rupestris* (Scop.) Fr. = *Protoblastenia rupestris*  
*B. terricola* (Anzi) Th. Fr. = *Protoblastenia terricola*  
*B. tornoënsis* (Nyl.) Th. Fr. = *Japewia tornoënsis*  
*Biatora vernalis* (specim. arct.) see *B. subduplex*  
*Biatorella coracina* (Sommerf.) Lynge = *Sporastatia testudinea*  
*B. privigna* (Ach.) Sandst. = *Sarcogyne privigna*  
*Biatorina cumulata* (Sommerf.) Th. Fr. = *Toninia cumulata*  
*B. fraudans* Hellb. = *Caloplaca sinapisperma*  
*B. globulosa* var. *polytrichina* Th. Fr. = '*Lecidea*' *polytrichina*

- B. regeliana* (Hepp) Körb. = *Mycobilimbia lobulata*  
*B. tuberculosa* Th. Fr. = *Stigmidium aggregata*  
*Bilimbia microcarpa* (Th. Fr.) Th. Fr. = *Mycobilimbia microcarpa*  
*B. sabulosa* var. *montana* (Nyl.) A.L. Sm. = *Mycobilimbia lobulata*  
*B. syncomista* (Flörke) Körb. = *Mycobilimbia lobulata*  
*Blastenia leucoraea* (Ach.) Th. Fr. = *Caloplaca sinapisperma*  
*B. rupestris* (Scop.) Zahlbr. = *Protoblastenia rupestris*  
*B. sinapisperma* (Lam. & DC.) A. Massal. = *Caloplaca sinapisperma*  
*B. tetraspora* (Nyl.) Rehm = *Caloplaca tetraspora*  
*Bryopogon jubatus* var. *chalybeiformis* "(L.) Rabenh." = *Bryoria chalybeiformis*  
*Buellia alpicola* Anzi = *Rhizocarpon alpicola*  
*B. atrata* (Sm.) Anzi = *Orphniospora moriopsis*  
*B. atroalba* (L.) Th. Fr. = *Rhizocarpon badioatrum*  
*B. caeruleoalba* (Kremp.) Th. Fr. = *Rhizocarpon caeruleoalbum*  
*B. coniops* (Wahlenb.) Th. Fr. = *Amandinia coniops*  
*B. convexa* Th. Fr. = *B. pulverulenta*  
*B. coracina* (Nyl.) Körb. = *Orphniospora moriopsis*  
*B. disciformis* var. *alboincta* (Th. Fr.) Lynge = *B. insignis*  
*B. disciformis* var. *muscorum* (Schaer.) Vain. = *B. geophila*  
*B. disciformis* var. *triphragma* (Nyl.) H. Olivier = *B. lauricassiae*  
*B. epilopia* (Ach.) Mong. = *B. alboatra*  
*B. insignis* var. *alboincta* Th. Fr. = *B. insignis*  
*B. insignis* var. *geophila* (Sommerf.) Th. Fr. = *B. geophila*  
*B. insignis* var. *papillata* (Sommerf.) Th. Fr. = *B. papillata*  
*B. malmei* Lynge = *B. aethalea*  
*B. margaritacea* Lynge = *B. alboatra*  
*B. microplaca* (Vain.) Erichs. = *B. ectolechioides*  
*B. myriocarpa* (DC.) Mudd = *Amandinea punctata*  
*B. nivalis*. (Bagl. & Carestia) Hertal ex Hafellner = *B. alboatra*  
*B. punctata* (Hoffm.) A. Massal. = *Amandinea punctata*  
*B. punctiformis* (Hoffm.) A. Massal. = *Amandinea punctata*  
*B. punctiformis* f. *stigmataea* (Körb.) Vain. = *Amandinea punctata*  
*B. punctiformis* var. *punctata* (Hoffm.) Vain. = *Amandinea punctata*  
*B. riitokensis* Hellb. = *Rhizocarpon riitokense*  
*B. sororia* Th. Fr. = *B. aethalia*  
*B. scabrosa* (Ach.) A. Massal. = *Epilichen scabrosus*  
*Caloplaca ammiopila* (Wahlenb.) H. Olivier = *C. ammiopila*  
*C. bracteata* (Hoffm.) Jatta = *Fulgensia bracteata*  
*C. bryochrysion* Poelt = *C. epiphyta*  
*C. caesiorufa* auct. [non (Ach.) Flag.] = *C. scotoplaca*  
*C. cerina* var. *stillicidiorum* (Vahl) Lynge = *C. cerina*  
*C. cinnamomea* (Th. Fr.) H. Olivier = *C. ammiopila*  
*C. citrina* var. *soropelta* Hansen, Poelt & Söchting = *C. soropelta*  
*C. diplacia* (Ach.) Riddle see *C. diphyodes*  
*C. elegans* (Link) Th. Fr. = *Xanthoria elegans*  
*C. ferruginea* var. *ammiopila* (Wahlenb.) Th. Fr. = *C. ammiopila*  
*C. ferruginea* var. *caesiorufa* auct. = *C. scotoplaca*  
*C. ferruginea* var. *cinnamomea* Th. Fr. = *C. cinnamomea*  
*C. ferruginea* var. *fraudans* Th. Fr. = *C. fraudans*  
*C. ferruginea* var. *melanocarpa* Th. Fr. = *C. tirolensis*  
*C. friesii* H. Magn. = *C. titoliensis*  
*C. gilva* (Hoffm.) Zahlbr. = *C. cerina*  
*C. holocarpa* (Hoffm.) Wade = *C. pyracea* and *lithophila*  
*C. jungermanniae* var. *subolivacea* Th. Fr. = *C. tirolensis*  
*C. lamprocheila* (DC.) Flagey = *C. arenaria*  
*C. leucoraea* (Ach.) Branth = *C. sinapisperma*  
*C. murorum* (Ach.) Th. Fr. = *C. saxicola*  
*C. murorum* var. *obliterata* auct. arct. = *C. alcarum*

- C. nigricans* (Tuck.) H. Olivier = *C. concilians*  
*C. oligospora* (Körb.) Th. Fr. = *C. tetraspora*  
*C. soledata* (Vain.) Du Rietz = *Xanthoria soledata*  
*C. stillicidiorum* (Vahl) Lyng = *C. cerina*  
*C. subolivacea* (Th. Fr.) Lyng = *C. tirolensis*  
*C. ursina* Lyng = *C. diphyodes*  
*Candelariella cerinella* (Flörke) Zahlbr. = *C. aurella*  
*C. crenulata* (Wahlenb.) Zahlbr. = *C. arctica*  
*C. dispersa* (Räsänen) Hakul. = *C. aurella*  
*C. epixantha* auct. [non (Ach.) Sandst.] = *C. aurella*  
*C. septentrionalis* Hakul. = *C. placodizans*  
*Caillaria concreta* (Wahlenb. ex Ach.) A. Massal. = *Rhizocarpon geminatum*  
*C. hoeferi* Körb. = *Rhizocarpon glaucescens*  
*Cerania vermicularis* (Sw.) S.F. Gray = *Thamnolia vermicularis*  
*C. vermicularis* var. *taurica* (Wulfen) A.L. Sm. = *Thamnolia vermicularis*  
*Cetraria cucullata* (Bellardi) Ach. = *Flavocetraria cucullata*  
*C. delisei* (Bory ex Schaer.) Nyl. = *Cetrariella delisei*  
*C. delisei* var. *dilatata* (Vain.) Hasselrot = *Arctocetraria andrejevii*  
*C. delisei* var. *rhizophora* (Vain.) [Nowak] = *Arctocetraria nigricascens*  
*C. fahlunensis* (L.) Schaer. = *Melanelia commixta*, *Melanelia hepatizon*  
*C. fahlunensis* var. *polyschiza* (Nyl.) Th. Fr. see *Melanelia hepatizon*  
*C. fastigiata* (Delise ex Nyl.) Kärnefelt = *Cetrariella fastigiata*  
*C. hepatizon* (Ach.) Vain. = *Melanelia hepatizon*  
*C. hiascens* (Fr.) Th. Fr. = *Cetrariella delisei*  
*C. hiascens* var. *delisei* (Bory ex Schaer.) Vain. = *Cetrariella delisei*  
*C. inermis* Nyl. = *Tuckermannopsis inermis*  
*C. islandica* var. *tenuifolia* (Retz.) Vain. = *C. ericetorum* s.str.  
*C. nigricascens* Nyl. = *Arctocetraria nigricascens*  
*C. nivalis* (L.) Ach. = *Flavocetraria nivalis*  
*C. tenuifolia* (Retz.) Howe = *Cetraria ericetorum* ssp. *ericetorum*  
*C. tenuissima* (L.) Vain. = *Cetraria aculeata*  
*C. tenuissima* var. *campestris* (Schaer.) Erichs. = *Cetraria aculeata*  
*Cladina arbuscula* (Wallr.) Hale & W.L. Culb. = *Cladonia arbuscula*  
*C. mitis* (Sandst.) Hustich = *Cladonia arbuscula* ssp. *mitis*  
*C. rangiferina* (L.) Nyl. = *Cladonia rangiferina*  
*C. stellaris* (Opiz) Brodo = *Cladonia stellaris*  
*C. stygia* (Fr.) Ahti = *Cladonia stygia*  
*Cladonia alpestris* (L.) Rabenh. = *C. stellaris*  
*C. alpicola* (Flot.) Vain. = *C. macrophylla*  
*C. cerasophora* Vain. = *C. stricta* var. *stricta*  
*C. coccifera* var. *pleurota* (Flörke) Schaer. = *C. pleurota*  
*C. coccifera* var. *stematina* (Ach.) Vain. = *C. coccifera*  
*C. cornutoradiata* (Coem.) Zopf = *C. subulata*  
*C. crispata* var. *gracilescens* (Rabenh.) Vain. = *C. crispata* var. *cetrariiformis*  
*C. dahlana* Kristinsson = *C. symphyocarpa*  
*C. degenerans* (Flörke) Spreng. = *C. phyllophora*  
*C. delessertii* Vain. = *C. subfurcata*  
*C. delicata* f. *subsquamosa* Nyl. ex Leight. = *C. squamosa* var. *subsquamosa*  
*C. elongata* auct. = *C. gracilis* ssp. *elongata*, *C. maxima*, *C. macroceras*  
*C. fimbriata* var. *major* (L.) Fr. = *C. fimbriata*  
*C. gonecha* (Ach.) Asahina = *C. sulphurina*  
*C. gracilescens* (Flörke) Vain. = *C. crispata* var. *cetrariiformis*  
*C. gracilis* ssp. *nigripes* (Nyl.) Ahti = *C. gracilis* ssp. *elongata*  
*C. gracilis* var. *chordalis* (Flörke) Schaer. = *C. gracilis* var. *gracilis*  
*C. lepidota* Nyl. = *C. stricta*  
*C. lepidota* var. *gracilescens* Du Rietz see *C. stricta*  
*C. lepidota* var. *stricta* (Nyl.) Du Rietz = *C. stricta* var. *stricta*  
*C. macilenta* var. *floerkeana* (Fr.) = *Cladonia floerkeana*

- C. mitis* Sandst. = *C. arbuscula* ssp. *mitis*  
*C. pyxidata* var. *chlorophaea* (Flörke ex Sommerf.) Flörke = *C. chlorophaea*  
*C. pyxidata* var. *neglecta* (Flörke) A. Massal. = *C. pyxidata*  
*C. pyxidata* var. *pocillum* (Ach.) Flot. = *C. pocillum*  
*C. rangiferina* var. *silvatica* auct. = *C. arbuscula*  
*C. silvatica* auct. = *C. arbuscula*  
*C. squamosa* var. *allosquamosa* Hennipman = *C. squamosa* var. *subsquamosa*  
*C. sylvatica* auct. = *C. arbuscula*  
*C. uncialis* var. *amaurocraea* (Flörke) Th. Fr. = *C. amaurocraea*  
*C. vermicularis* (Sw.) DC. = *Thamnia vermicularis*  
*Coelocaulon aculeatum* (Schreb.) Link = *Cetraria aculeata*  
*C. divergens* (Ach.) R. Howe = *Bryocaulon divergens*  
*C. muricatum* (Ach.) J.R. Laundon = *Cetraria muricata*  
*Collema arcticum* Lynge = *C. ceraniscum*  
*C. ceranoides* sensu Mudd [non Borrer] = *C. ceraniscum*  
*C. melaenum* var. *polycarpon* (Hoffm.) Nyl. = *C. polycarpon*  
*C. multifidum* (Scop.) Rabenh. = *C. cristatum* var. *marginale*  
*C. pulposum* (Bernh.) Ach. = *C. tenax*  
*Coniocybe furfuracea* (L.) Ach. = *Chaenotheca furfuracea*  
*Coriscium viride* (Ach.) Vain. = *Omphalina hudsoniana*  
*Cornicularia aculeata* (Schreb.) Ach. = *Cetraria aculeata*  
*C. divergens* Ach. = *Bryocaulon divergens*  
*C. muricata* (Ach.) Ach. = *Cetraria muricata*  
*C. racemosa* Lynge = *Cetraria aculeata*  
*C. tenuissima* (L.) Vain. = *Cetraria aculeata*  
*Crocynia arctica* Lynge = *Leproloma vouauxii*  
*C. membranacea* (Dicks.) Zahlbr. = *Leproloma membranaceum*  
*C. neglecta* (Nyl.) Hue = *Lepraria neglecta*  
*Cystocoleus niger* auct. = *C. ebenus*  
*Dactylina madreporiformis* (Ach.) Tuck. = *Allocetraria madreporiformis*  
*Dermatocarpon aquaticum* (Weiss) Zahlbr. = *D. weberi*  
*D. cinereum* (Pers.) Th. Fr. = *Catapyrenium cinereum*  
*D. daedaleum* (Kremp.) Th. Fr. = *Catapyrenium daedaleum*  
*D. lachneum* (Ach.) A.L. Sm. = *Catapyrenium lachneum*  
*D. polyphyllum* (Wulfen) Dalla Torre & Sarnth. = *D. intestiniforme*  
*D. rufescens* (Ach.) Th. Fr. = *Catapyrenium rufescens*  
*Dimelaena nimbosa* (Fr.) Norman = *Phaeorrhiza nimbosa*  
*Diplotomma alboatrum* (Hoffm.) Flot. = *Buellia alboatra*  
*D. epipolium* (Ach.) Arnold = *Buellia epipolia*  
*Dufourea muricata* Laurer = *Dactylina ramulosa*  
*Foraminella ambigua* (Wulfen) Fricke-Meyer = *Parmeliopsis ambigua*  
*Geisleria sychnogonioides* Nitschke = *Strigula sychnogonioides*  
*Gyalolechia crenulata* (Wahlenb.) Th. Fr. = *Candelariella arctica*  
*G. subsimilis* Th. Fr. = *Candelariella aurella*  
*G. vitellina* (Hoffm.) Anzi = *Candelariella vitellina*  
*Gyrophora anthracina* var. *reticulata* (Schaer.) Tuck. = *Umbilicaria decussata*  
*G. arctica* Ach. = *Umbilicaria arctica*  
*G. cylindrica* (L.) Ach. = *Umbilicaria cylindrica*  
*G. cylindrica* var. *delisei* (Nyl.) Syd. = *Umbilicaria cylindrica* var. *delisei*  
*G. decussata* (Vill.) Schol. = *Umbilicaria decussata*  
*G. deusta* (L.) Baumg. = *Umbilicaria deusta*  
*G. erosa* (Weber) Ach. = *Umbilicaria torrefacta*  
*G. hyperborea* (Ach.) Ach. = *Umbilicaria hyperborea*  
*G. polyphylla* (L.) Funck = *Umbilicaria polyphylla*  
*G. proboscidea* (L.) Ach. = *Umbilicaria proboscidea*  
*G. torrefacta* (Leightf.) Cromb. = *Umbilicaria torrefacta*  
*G. vellea* (L.) Ach. = *Umbilicaria vellea*  
*Haematomma lapponicum* Räsänen = *Ophioparma lapponica*

- H. ventosum* (L.) A. Massal. = *Ophioparma ventosa*  
*Huilia cinereoatra* (Ach.) Hertel = *Porpidia cinereoatra*  
*H. crustulata* (Ach.) Hertel = *Porpidia crustulata*  
*H. flavocoerulescens* (Hornem.) Hertel = *Porpidia flavocoerulescens*  
*H. glaucophaea* (Körb.) Hertel = *Porpidia glaucophaea*  
*H. macrocarpa* (DC.) Hertel = *Porpidia macrocarpa*  
*H. melinodes* (Körb.) Hertel = *Porpidia flavocoerulescens*  
*H. panaeola* (Ach.) Hertel = *Amygdalaria panaeola*  
*H. superba* (Körb.) Hertel = *Porpidia superba*  
*H. tuberculosa* (Sm.) P. James = *Porpidia tuberculosa*  
*Hymenelia lacustris* (With.) M. Choisy = *Ionaspis lacustris*  
*H. ochrolemma* (Vain.) Gowan & Ahti = *Porpidia ochrolemma*  
*H. prevostii* (Duby) Kremp. = *Hymenelia epulotica*  
*Hypogymnia intestiniformis* (Vill.) Räsänen = *Brodoa intestiniformis*  
*H. oroarctica* Krog = *Brodoa oroarctica*  
*Involucrothele antonellianum* (Bagl. & Carestia) Servit = *Thelidium antoniellum*  
*I. epulotica* (Ach.) Arnold = *Hymenelia epulotica*  
*Ionaspis arctica* Lyng = *Hymenelia arctica*  
*I. epulotica* var. *arctica* (Lyng) H. Magn. = *Hymenelia arctica*  
*I. epulotica* var. *crustosa* H. Magn. = *Hymenelia rhodopis*  
*I. heteromorpha* (Kremp.) Arnold = *Hymenelia heteromorpha*  
*I. melanocarpa* (Kremp.) Arnold = *Hymenelia melanocarpa*  
*I. rhodopis* (Sommerf.) Blomb. & Forsell = *Hymenelia rhodopis*  
*I. spitsbergensis* H. Magn. nom. inval. = *Hymenelia haematina*  
*Lecania alpivaga* Th. Fr. = *Halecania alpivaga*  
*Lecanora alboradiata* H. Magn. = *Aspicilia alboradiata*  
*L. alpina* (Sommerf.) Arnold = *Bellemerea alpina*  
*L. atra* (Huds.) Ach. = *Tephromela atra*  
*L. badia* (Pers.) Ach. = *Protoparmelia badia*  
*L. bennetti* Lyng = *Aspicilia mashigiensis*  
*L. caesioalba* var. *dispersa* (Pers.) Körb. = *L. dispersa*  
*L. calcarea* (L.) Sommerf. = *Aspicilia calcarea*  
*L. castanea* (Hepp) Th. Fr. = *Bryonora castanea*  
*L. ceracea* (Arnold) Stizenb. = *Hymenelia ceracea*  
*L. cinerea* (L.) Sommerf. = *Aspicilia cinerea*  
*L. cinereoides* Lyng = *Aspicilia cinereoides*  
*L. cinereoides* var. *partialis* = *Aspicilia cinereoides* var. *partialis*  
*L. cinereorufescens* var. *alpina* (Sommerf.) Th. Fr. = *Bellemerea alpina*  
*L. circularis* H. Magn. = *Aspicilia circularis*  
*L. complanata* Körb. = *Aspicilia complanata*  
*L. contractula* auct. [non Nyl.] = *Arctopeltis thuleana*  
*L. curvescens* (Mudd) Arnold = *Bryonora curvescens*  
*L. dicksonii* auct. [non (Gmel.) Nyl.] = *Tremolecia atrata*  
*L. elegans* (Link) Ach. = *Xanthoria elegans*  
*L. flavida* Hepp = *Eiglera flavida*  
*L. frustulosa* var. *argopholis* (Ach.) Link = *Lecanora argopholis*  
*L. fuscata* Nyl. = *Acarospora atrata*  
*L. galactina* Ach. = *Lecanora albescens*  
*L. galactina* var. *dispersa* (Pers.) Ach. = *L. dispersa*  
*L. gelida* (L.) Ach. = *Placopsis gelida*  
*L. gibbosa* (Ach.) Nyl. = *Aspicilia gibbosa*  
*L. granatina* Sommerf. = *Euopsis granatina*  
*L. heteroplaca* f. *ursina* Lyng see *Aspicilia gibbosa*  
*L. heteroplaca* = *Aspicilia heteroplaca*  
*L. lacustris* (With.) Nyl. = *Ionaspis lacustris*  
*L. laevata* (Ach.) Nyl. = *Aspicilia laevata*  
*L. lesleyana* (Darb.) Paulson = *Aspicilia lesleyana*  
*L. mastrucata* (Wahlenb.) Ach. = *Aspicilia mastrucata*

- L. melanaspis* (Ach.) Ach. = *Lobothallia melanaspis*  
*L. melanophthalma* (DC.) Ram. = *Rhizoplaca melanophthalma*  
*L. melanophthalma* var. *subpeltata* Lyng. nom. inval. = *Rhizoplaca melanophthalma*  
*L. nikrapensis* (Darb.) Zahlbr. = *Aspicilia nikrapensis*  
*L. obscurascens* H. Magn. = *Aspicilia obscurascens*  
*L. obscurata* (Fr.) Arnold = *Aspicilia obscurata*  
*L. oculata* (Dicks.) Ach. = *Pertusaria oculata*  
*L. pelobotryon* (Wahlenb.) Sommerf. = *Amygdalaria pelobotryon*  
*L. pergibbosa* H. Magn. = *Aspicilia pergibbosa*  
*L. perradiata* Nyl. = *Aspicilia perradiata*  
*L. pleiocarpa* H. Magn. = *Aspicilia pleiocarpa*  
*L. polychroma* (Anzi) Nyl. = *Aspicilia polychroma*  
*L. quartzina* Nyl. = *L. actophila*  
*L. rhodopis* var. *melanopis* (Sommerf.) Blomb. & Forssell = *Hymenelia heteromorpha*  
*L. subfusca* var. *hypnorum* (Wulfen) Schaer. = *L. epibryon*  
*L. subradiosa* Nyl. = *L. rupicola* ssp. *subplanata*  
*L. subpeltata* Lyng. = *Rhizoplaca melanophthalma*  
*L. subradiosa* auct. [non Nyl.] = *L. swartzii* ssp. *nylanderi*  
*L. subsorediza* (Lyng.) R. Sant. = *Bellemerea subsorediza*  
*L. supertegens* (Arnold) Zahlbr. = *Aspicilia supertegens*  
*L. symmicta* var. *sorediosa* L. Westman = *L. orae-frigidae*  
*L. tartarea* (L.) Ach. = *Ochrolechia tartarea*  
*L. tartarea* var. *frigida* (Sw.) Ach. = *Ochrolechia frigida*  
*L. tartarea* var. *upsaliensis* (L.) Hook. = *Ochrolechia upsaliensis*  
*L. thulensis* Th. Fr. = *L. contractula*  
*L. thulensis* var. *feracissima* Th. Fr. = *Arctopeltis thuleana*  
*L. ursina* (Lyng.) H. Magn. see *Aspicilia gibbosa*  
*L. verrucosa* (Ach.) Laurer = *Megaspora verrucosa*  
*L. virginea* (Hue) Zahlbr. see *Aspicilia gibbosa*  
*L. vitellina* (Ehrh.) Ach. = *Candelariella vitellina*  
*Lecidea aglaea* Sommerf. = *Tephromela aglaea*  
*L. albidocinerella* Vain. = *Lecidella albidocinerella*  
*L. albosuffusa* Th. Fr. = *Farnoldia jurana*  
*L. arctica* Sommerf. = *Frutidella caesioatra*  
*L. arctogena* (Th. Fr.) H. Olivier = *Tephromela testaceoatra*  
*L. armeniaca* (DC.) Fr. = *Tephromela armeniaca*  
*L. armeniaca* f. *melaleuca* (Sommerf.) Fr. = *Tephromela armeniaca*  
*L. aspicilioidea* Th. Fr. = *Aspicilia aspicilioidea*  
*L. assimilata* Nyl. = *Micarea assimilata*  
*L. assimilata* var. *infusca* Th. Fr. = *Micarea incrassata*  
*L. assimilata* var. *irrubata* Th. Fr. = *Micarea assimilata*  
*L. atrata* (Ach.) Wahlenb. = *Tremolecia atrata*  
*L. atrofulva* Sommerf. = *Miriquidica atrofulva*  
*L. atrofusca* (Hepp) Mudd = *Mycobilimbia hypnorum*  
*L. atromarginata* H. Magn. = *Lecanora atromarginata*  
*L. atronivea* Arnold = *Carbonea atronivea*  
*L. auriculata* var. *diducens* auct. [non (Nyl.) Th. Fr.] = *L. auriculata* var. *auriculata*  
*L. auriculata* var. *paupera* Th. Fr. = *L. auriculata*  
*L. berengeriana* (A. Massal.) Th. Fr. = *Mycobilimbia berengeriana*  
*L. brachyspora* (Th. Fr.) Nyl. = *L. auriculata* var. *brachyspora*  
*L. caesioatra* Schaer. = *Frutidella caesioatra*  
*L. cavatula* Nyl. = *Eiglera homalomorpha*  
*L. circumnigrata* var. *reagens* H. Magn. = *Miriquidica lulensis*  
*L. coarctata* var. *trapelia* (Ach.) Vain. = *Trapelia coarctata*?  
*L. concreta* f. *geminata* (Körb.) Vain. = *Rhizocarpon geminatum*  
*L. conferenda* Nyl. = *Adelolecia kolaensis*  
*L. consentiens* Nyl. = *Amygdalaria consentiens*  
*L. contigua* var. *flavicunda* (Ach.) Nyl. = *Porpidia flavicunda*



- L. cuprea* Sommerf. = *Biatora cuprea*  
*L. decipiens* (Hedw.) Ach. = *Psora decipiens*  
*L. demissa* (Rutstr.) Ach. = *Lecidoma demissum*  
*L. dendroclinis* Nyl. = *Lecidea lapicida* var. *lapicida*  
*L. dicksonii* auct. [non (Gmel.) Ach.] = *Tremolecia atrata*  
*L. elata* Schaer. = *Lecanora marginata*  
*L. elata* ssp. *scrobiculata* Th. Fr. = '*L.*' *scrobiculata*  
*L. enteroleuca* var. *latypea* auct. = *Lecidella elaeochroma*  
*L. enteroleuca* var. *muscorum* (Wulfen) Th. Fr. = *Lecidella wulfenii*  
*L. epiiodiza* Nyl. = *Schaereria fuscocinerea*  
*L. flavocaerulescens* Hornem. = *Porpidia flavicunda*  
*L. geographica* (L.) Rebent. = *Rhizocarpon geographicum*  
*L. glaucophaea* Körb. = *Porpidia glaucophaea*  
*L. glomerulosa* f. *euphorea* (Flörke) Vain. = *Lecidella euphorea*  
*L. glomerulosa* f. *wulfenii* (Hepp) Vain. = *Lecidella wulfenii*  
*L. glomerulosa* var. *laureri* (Hepp) Vain. = *Lecidella laureri*  
*L. goniophila* sensu H. Magn. = *Lecidella anomaloides*  
*L. griseoatra* (Flot.) Schaer. = *Miriquadica griseoatra*  
*L. helsingforsiensis* Nyl. = *Lecidea praenubila*  
*L. humosa* (Hoffm.) Leight. = *Placynthiella uliginosa*  
*L. hypnorum* Lib. = *Mycobilimbia hypnorum*  
*L. hypocrita* A. Massal. = *Farnoldia hypocrita*  
*L. kolaensis* Nyl. = *Adelolecia kolaensis*  
*L. impavida* Th. Fr. = *Rimularia impavida*  
*L. inamoena* Müll. Arg. = *Lecidella pataviana*  
*L. insularis* Nyl. = *Rimularia insularis*  
*L. jurana* Schaer. = *Farnoldia jurana*  
*L. lactea* Flörke ex Schaer. = *L. lapicida* var. *pantherina*  
*L. lapicida* var. *declinans* Nyl. = *L. lapicida*  
*L. lepadina* Sommerf. = *Lecidea confluens*  
*L. leucophaea* (Flörke ex Rabenh.) Nyl. = *Miriquadica leucophaea*  
*L. lulensis* Hellb. = *Miriquadica lulensis*  
*L. macrocarpa* (DC.) Steud. = *Porpidia macrocarpa*  
*L. marginata* Schaer. = *Lecanora marginata*  
*L. melanodes* (Körb.) H. Magn. = *Porpidia flavicunda*  
*L. micheleri* Hertel = *Lecanora micheleri*  
*L. minutissima* Lynge = *Lecanora minutissima*  
*L. miscella* Sommerf. non Ach. = *Mycobilimbia berengeriana*  
*L. neglecta* Nyl. (pl. steril.) = *Lepraria neglecta*  
*L. nigroleprosa* (Vain.) H. Magn. = *Miriquadica nigroleprosa*  
*L. pallida* Th. Fr. = *Pilophorus dovrensis*  
*L. panaeola* Ach. = *Amygdalaria panaeola*  
*L. pantherina* (Ach.) Th. Fr. = *L. lapicida* var. *pantherina*  
*L. parapetraea* Nyl. = *Rhizocarpon grande*  
*L. pelobotrya* (Wahlenb. in Ach.) Leight. = *Amygdalaria pelobotryon*  
*L. petrosa* Arnold = *Farnoldia jurana*  
*L. petrosa* var. *nuda* Th. Fr. = *Farnoldia jurana*  
*L. pilati* (Hepp) Körb. = *Adelolecia pilati*  
*L. polycarpa* Flörke = *L. lapicida* var. *pantherina*  
*L. polycarpa* var. *clavulifera* Th. Fr. = *L. lapicida* var. *pantherina*  
*L. pullulans* Th. Fr. = *Carbonea vorticosa*  
*L. ramulosa* f. *depressa* Th. Fr. = '*L.*' *ementiens*  
*L. rhaetica* Hepp ex Th. Fr. = *Farnoldia micropsis*  
*L. rubiformis* (Ach.) Wahlenb. = *Psora rubiformis*  
*L. sanguineoatra* sensu Nyl. = '*L.*' *hypnorum*  
*L. sorediata* Lynge [non Ach.] = *Lecanora orae-frigidae*  
*L. sorediza* Nyl. = *Porpidia tuberculosa*  
*L. speirea* (Ach.) Ach. = *Porpidia speirea*

- L. speirea* var. *trullisata* (Kremp.) Arnold = *Porpidia trullisata*  
*L. spilota* Fr. = *L. tessellata*  
*L. spitsbergensis* Lynge = *Lecidella pataviana*  
*L. steriza* (Ach.) Vain. = *Porpidia macrocarpa*  
*L. stigmatæa* Ach. = *Lecidella stigmatæa*  
*L. subsorediza* Lynge = *Bellemerea subsorediza*  
*L. tenebrosa* Flot. = *Schaereria fuscocinerea*  
*L. theiodes* Sommerf. = *L. lapicida* var. *pantherina*  
*L. tornoënsis* Nyl. = *Japewia tornoënsis*  
*L. uliginosa* (Hoffm.) Leight. = *Placynthiella uliginosa*  
*L. ultima* Th. Fr. = *Cephalophysia leucospila*  
*L. umbonella* Nyl. = *Cecidonia umbonella*  
*L. vernalis* (L.) Ach. = *Biatora vernalis*  
*L. vernalis* f. *minor* Nyl. = ?*Biatora vernalis*  
*L. vorticosa* (Flörke) Körb. = *Carbonea vorticosa*  
*L. ypocrita* A. Massal. = *Farnoldia hypocrita*  
*Lecidella enteroleuca* var. *muscorum* (Wulfen) Hazsl. = *L. wulfenii*  
*L. inamoena* (Müll. Arg.) Hertel = *L. pataviana*  
*L. spitsbergensis* (Lynge) Hertel = *L. pataviana*  
*Leciographa inspersa* (Flörke ex Spreng.) Rehm = *Buellia pulverulenta*  
*Leciophysma arctophila* Th. Fr. = *Parmeliella arctophila*  
*Lecothecium asperellum* (Ach.) Th. Fr. = *Placynthium asperellum*  
*Lepraria membranacea* (Dicks.) Vain. = *Leproloma membranaceum*  
*Leptogium lacerum* var. *tenuissimum* (Dicks.) Fr. = *L. tenuissimum*  
*L. pulvinatum* (Hoffm.) Cromb. = *L. lichenoides* var. *pulvinatum*  
*L. scotinum* (Ach.) Fr. = *L. gelatinosum*  
*L. sinuatum* (Huds.) A. Massal. = *L. gelatinosum*  
*Lopadium fecundum* Th. Fr. = *Schadonia fecunda*  
*L. fuscoluteum* (Dicks.) Müll. = *Brigantiaea fuscolutea*  
*L. muscicola* var. *coralloidea* (Nyl.) Lynge = *L. coralloideum*  
*Melanelia granulosa* (Lynge) Essl. = *M. disjuncta*  
*M. sorediosa* (Almb.) Essl. = *M. sorediata*  
*Melanolecia jurana* (Schaer.) Hertel = *Farnoldia jurana*  
*M. micropsis* (A. Massal.) Hertel = *Farnoldia micropsis*  
*Micarea polytrichi* Poelt & Döbbeler = *M. prasina*  
*Microglæna muscorum* (Fr.) Th. Fr. = *Chromaochlamys muscorum*  
*M. sphinctrinelloidea* (Nyl.) Norman = *Protothelenella sphinctrinoidella*  
*M. sphinctrinoides* (Nyl.) Lönnr. = *Protothelenella sphinctrinoides*  
*Mycoblastus tornoënsis* (Nyl.) R.A. Anderson = *Japewia tornoënsis*  
*Neuropogon melaxanthum* auct. = *N. sphacelatus*  
*N. sulphureus* (Th. Fr.) Hellb. = *N. sphacelatus*  
*Ochrolechia geminipara* (Th. Fr.) Vain. = *Pertusaria geminipara*  
*O. gonatodes* (Ach.) Räsänen = *O. frigida*  
*O. tartarea* var. *frigida* (Sw.) Körb. = *O. frigida*  
*O. tartarea* var. *saxorum* (Oeder) A. Massal. = *O. tartarea*  
*Omphalina luteolilacina* (Favre) D.M. Hend. = *O. hudsoniana*  
*O. luteovitellina* (Pilát & Nannf.) M. Lange = *O. alpina*  
*O. pseudoandrosacea* (Bull. ex St.-Amans) M.M. Moser = *O. velutina*  
*Omphalodiscus decussatus* (Vill.) Schol. = *Umbilicaria decussata*  
*O. polaris* Schol. = *Umbilicaria krascheninnikovii*  
*O. virginis* (Schaer.) Schol. = *Umbilicaria virginis*  
*Ophioparma ventosa* var. *lapponica* (Räsänen) = *O. lapponica*  
*Orphniospora atrata* (Sm.) Poelt = *O. moriopsis*  
*Pachyospora verrucosa* (Ach.) A. Massal. = *Megaspora verrucosa*  
*Pannaria arctophila* Th. Fr. = *Parmeliella arctophila*  
*P. brunnea* (Sw.) A. Massal. = *P. pezizoides*  
*P. elaeina* (Wahlenb.) Nyl. = *Vestergrenopsis elaeina*  
*P. leucophaea* (Vahl.) P.M. Jørg. = *Fuscopannaria leucophaea*

- P. lepidiota* (Sommerf.) Vain. = *Fuscopannaria praetermissa*  
*P. microphylla* '(Sw.)' A. Massal. = *Fuscopannaria leucophaea*  
*P. praetermissa* Nyl. = *Fuscopannaria praetermissa*  
*Parmelia alpicola* Th. Fr. = *Allantoparmelia alpicola*  
*P. centrifuga* (L.) Ach. = *Arctoparmelia centrifuga*  
*P. disjuncta* Erichsen = *Melanelia disjuncta*  
*P. encausta* (Sm.) Nyl. = *Brodoa intestiniformis*  
*P. encausta* var. *intestiniformis* (Vill.) Bisch. = *Brodoa intestiniformis*  
*P. granulosa* Lynge = *Melanelia disjuncta*  
*P. incurva* (Pers.) Fr. = *Arctoparmelia incurva*  
*P. infumata* Nyl. = *Melanelia infumata*  
*P. intestiniformis* (Vill.) Ach. = *Brodoa intestiniformis*  
*P. lanata* auct. = *Pseudephebe pubescens*  
*P. lanea* (Ehrh. ex Hoffm.) Vain. = *Pseudephebe pubescens*  
*P. minuscula* (Arnold) Nyl. = *Pseudephebe minuscula*  
*P. omphalodes* var. *glacialis* Skult = *P. skultii*  
*P. physodes* (L.) Ach. = *Hypogymnia physodes*  
*P. pubescens* (L.) Vain. = *Pseudephebe pubescens*  
*P. sorediata* (Ach.) Th. Fr. = *Melanelia sorediata*  
*P. sorediosa* Almb. = *Melanelia sorediata*  
*P. stygia* (L.) Ach. = *Melanelia stygia*  
*P. subobscura* Vain. = *Hypogymnia subobscura*  
*Parmeliella corallinoides* auct. = *Parmeliella triptophylla*  
*P. lepidiota* (Sommerf.) Vain. = *Fuscopannaria praetermissa*  
*P. microphylla* '(Sw.)' Müll. Arg. = *Fuscopannaria leucophaea*  
*Peltigera canina* var. *membranacea* (Ach.) Duby = *P. membranacea*  
*P. canina* var. *rufescens* (Weiss) Mudd = *P. rufescens*  
*P. erumpens* (Taylor) Elenkin = *P. didactyla*  
*P. erumpens* f. *leptoderma* auct. = *P. didactyla*  
*P. polydactyla* var. *crassoides* Gyeln. = *P. neckeri*  
*P. polydactyla* (Neck.) Hoffm. = *P. polydactylon*  
*P. polydactyloides* auct. [non Nyl.] = *P. neckeri*  
*P. spuria* (Ach.) DC. = *P. didactyla*  
*P. spuria* var. *leptoderma* (Nyl.) Frey = *P. didactyla*  
*P. subscutata* Gyeln. var. *spitsbergensis* Gyeln. = *P. collina*  
*Physcia caesia* var. *ventosa* (Lynge) Frey = *P. caesia*  
*P. constipata* Norrl. & Nyl. = *Phaeophyscia constipata*  
*P. endococcinea* (Körb.) Th. Fr. = *Phaeophyscia endococcinea*  
*P. intermedia* Vain. = *P. dubia*  
*P. intermedia* var. *wahlenbergii* (Lynge) Lynge = *P. dubia*  
*P. kairamoi* Vain. = *Phaeophyscia kairamoi*  
*P. lithotodes* Nyl. = *Phaeophyscia endococcinea*  
*P. lychnea* (Ach.) Nyl. = *Xanthoria candelaris*  
*P. marina* (E. Nyl.) Lynge nom. illegit. = *P. tenella* var. *marina*  
*P. muscigena* (Ach.) Nyl. = *Physconia muscigena*  
*P. nigricans* (Flörke) Stizenb. = *Phaeophyscia nigricans*  
*P. obscura* auct. [non (Humb.) Fürnr.] = *Phaeophyscia ciliata*  
*P. pulverulenta* var. *muscigena* (Ach.) Nyl. = *Physconia muscigena*  
*P. sciastra* (Ach.) Du Rietz = *Phaeophyscia sciastra*  
*P. sciastra* var. *lithodea* '(Ach.) Nyl.' = *Phaeophyscia sciastra*  
*P. stellaris* var. *tribacia* auct. = *P. dubia*  
*P. tribacia* auct. [non (Ach.) Nyl.] = *P. dubia*  
*Phytoconis* Redhead & Kuyper = *Omphalina*  
*Pilophoron robustus* Th. Fr. = *Pilophorus robustus*  
*P. pallidus* (Th. Fr.) Timdal = *P. dovrensis*  
*Placodium albescens* (Hoffm.) DC. = *Lecanora albescens*  
*P. cerinum* (Ehrh. ex Hedw.) Nägeli ex Hepp = *Caloplaca cerina*  
*P. chrysoleucum* var. *feracissimum* Th. Fr. = *Arctopeltis thuleana*

- P. elegans* (Link) DC. = *Xanthoria elegans*  
*P. murorum* (Hoffm.) DC. = *Caloplaca saxicola*  
*P. murorum* var. *pusillum* (Trevis.) Flagey = *Caloplaca saxicola*  
*P. rupestre* (Scop.) Branth & Rostr. = *Protoblastenia rupestris*  
*P. rupestre* f. *incrustans* (DC.) Paulson = *Protoblastenia incrustans*  
*P. rupestre* var. *calva* (Dicks.) A.L. Sm. = *Protoblastenia calva*  
*P. stramineum* (Ach.) Th. Fr. = *Lecanora straminea*  
*P. tetraspora* (Nyl.) Vain. = *Caloplaca tetraspora*  
*P. verruculiferum* Vain. = *Caloplaca verruculifera*  
*P. vitellinulum* auct. [non (Nyl.) Vain.] = *Caloplaca vitellinula*  
*Placynthium aspratile* (Ach.) Henssen = *P. asperellum*  
*Platysma polyschizum* Nyl. see *Melanelia hepatizon*  
*Polyblastia henscheliana* (Körb.) Lönnr. = *P. cruenta*  
*P. intercedens* sensu Th. Fr. = *P. hyperborea*  
*P. scotinospora* (Nyl.) Hellb. = *P. melaspora*  
*P. sommerfeltii* Lynge = *P. terrestris*  
*Polysporina privigna* (Ach.) A. Massal. = *Sarcogyne privigna* (??)  
*Porocyphus dispersus* E. Dahl = *Thelignya lignyota*  
*Porpidia pseudomelinodes* A.J. Schwab = *P. ochrolemma*  
*P. speirea* var. *trullisata* (Kremp.) Arnold = *P. trullisata*  
*Protoparmeliopsis muralis* (Schreb.) M. Choisy = *Lecanora muralis*  
*Psora atrorufa* (Dicks.) Körb. = *Lecidoma demissum*  
*Psorotichia fuliginea* Wahlenb. = *Thelignya lygnyota*  
*Pyrenopsis granatina* (Sommerf.) Nyl. = *Euopsis granatina*  
*P. pulvinata* (Schaer.) Th. Fr. = *Euopsis pulvinata*  
*Rhexophiale coronata* Th. Fr. = *Sagiolechia rhexoblephara*  
*Rhizocarpon calcareum* (Ach.) Anzi = *R. umbilicatum*  
*R. chionophiloides* (Vain.) Vain. = *R. atroalbescens*  
*R. disporum* auct. [non (Hepp) Müll. Arg.] = *R. montagnei*  
*R. disporum* f. *geminatum* (Körb.) Paulson = *R. geminatum*  
*R. effiguratum* sensu Th. Fr. = *R. superficiale*  
*R. frigidum* Räsänen = *R. geographicum* ssp. *frigidum*  
*R. geographicum* var. *geronticum* (Ach.) Th. Fr. = *R. geographicum*  
*R. grande* var. *quaternaria* Th. Fr. = *R. grande*  
*R. occidentale* Lynge = *R. superficiale*  
*R. petraeum* auct. = *R. concentricum*  
*R. porphyrostrotum* (Vain.) Vain. = *R. distinctum*  
*R. pseudospeireum* (Th. Fr.) Lynge = *R. umbilicatum*  
*R. submodestum* (Vain.) Vain. = *R. obscuratum*  
*R. tinei* ssp. *frigidum* Runemark = *R. geographicum* ssp. *frigidum*  
*R. vainioense* Lynge = *R. jemtlandicum*  
*Rinodina archaea* var. *orbata* (Ach.) Vain. = *R. turfacea*  
*R. archaeoides* H. Magn. = *R. olivaceobrunnea*  
*S. drummondii* (Tuck.) Tuck, see: *S. fuscopurpurea*  
*R. hueana* Vain. = *Dimelaena oreina*  
*R. mniaraea* var. *calcigena* Th. Fr. = *R. calcigena*  
*R. nimbose* (Fr.) Th. Fr. = *Phaeorrhiza nimbose*  
*R. orbata* (Ach.) Vain. = *R. turfacea*  
*Saccomorpha icmalea* (Ach.) Clauzade & Cl. Roux = *Placynthiella icmalea*  
*S. uliginosa* (Schr.) Hafellner = *Placynthiella uliginosa*  
*Sarcogyne simplex* (Dav.) Nyl. = *Polysporina simplex*  
*S. urceolata* Anzi = *Polysporina urceolata*  
*Schaereria endocyanea* (Stirt.) Hertel & Gotth. Schneid. = *S. fuscocinerea*  
*S. tenebrosa* (Flot.) Hertel & Poelt = *S. fuscocinerea*  
*Solorina saccata* var. *spongiosa* (Sm.) Nyl. = *S. spongiosa*  
*Sphaerophorus coralloides* Pers. = *S. globosus*  
*Sporastatia cinerea* (Schaer.) Körb. = *S. polyspora*  
*S. morio* ssp. *tenuirimata* Th. Fr. = *S. tenuirimata*

- S. morio* var. *coracina* (Sommerf.) Th. Fr. = *S. testudinea*  
*S. spitsbergensis* Th. Fr. = *Polysporina simplex*  
*Staurothele clopima* sensu Th. Fr. (non ' (Wahlenb.) Th. Fr.') = *S. fuscocuprea* and *S. sp.*  
*S. clopima* sensu ' (Wahlenb.) Th. Fr.' = *S. areolata*  
*S. drummondii* (Tuck.) Tuck, see: *S. fuscopurpurea*  
*Stereocaulon denudatum* Flörke = *S. vesuvianum*  
*S. denudatum* var. *pulvinatum* sensu Th. Fr. = *S. arcticum*  
*S. farinaceum* H. Magn. = *S. capitellatum*  
*S. fastigiatum* Anzi = *S. botryosum*  
*S. pulvinatum* auct. [non Ach.] = *S. vesuvianum* var. *nodulosum*  
*S. tomentosum* var. *alpinum* (Laurer) Th. Fr. = *S. alpinum*  
*Sticta linita* Ach. = *Lobaria linita*  
*Thamnolia subuliformis* (Ehrh.) W.L. Culb. = *T. vermicularis* var. *subuliformis*  
*Thelidium denudatum* Lynge = *T. cataractarum*  
*Toninia caeruleonigricans* auct. [non (Lightf.) Th. Fr.] = *T. sedifolia*  
*T. conjungens* Th. Fr. = *T. verrucarioides*  
*T. fusispora* (Körb.) Th. Fr. = *T. aromatica*  
*T. kolax* Poelt = *T. verrucarioides*  
*T. lobulata* (Sommerf.) Lynge = *Mycobilimbia lobulata*  
*T. syncomista* (Flörke) Th. Fr. = *Mycobilimbia lobulata*  
*Tremolecia nivalis* (Anzi) Hertel = *Farnoldia micropsis*  
*T. transitoria* (Arnold) Hertel = *Melanolecia transitoria*  
*Umbilicaria anthracina* sensu Th. Fr. = *U. rigida*  
*Usnea melaxantha* sensu Th. Fr. non Ach. = *Neuropogon sphacelatus*  
*U. sulphurea* Th. Fr. = *Neuropogon sphacelatus*  
*Verrucaria aethiobola* var. *cataleptoides* (Nyl.) Vain. = *V. cataleptoides*  
*V. maura* var. *aractina* (Wahlenb.) Torss. = *V. maura*  
*V. rupestris* var. *integra* Nyl. = *V. integra*  
*V. scotina* Wedd. = *V. maura*  
*Xanthoparmelia centrifuga* (L.) Hale = *Arctoparmelia centrifuga*  
*X. incurva* (Pers.) Hale = *Arctoparmelia incurva*  
*Xanthoria controversa* var. *pygmaea* (Bory) Th. Fr. = *X. candelaria*  
*X. elegans* var. *granulosa* (Schaer.) Th. Fr. = *X. soresdiata*  
*X. elegans* var. *tenior* Th. Fr. [lapsu pro 'tenuis (Wahlenb.) Th. Fr.'] = *X. elegans*  
*X. lychnea* (Ach.) Th. Fr. = *X. candelaria*  
*X. murorum* (Hoffm.) Th. Fr. = *Caloplaca saxicola*  
*X. murorum* var. *obliterata* auct. arct. = *Caloplaca alcarum*  
*X. parietina* var. *aureola* (Ach.) Th. Fr. = *X. parietina*  
*Xylographa parella* var. *difformis* Vain. = *Xylographa abietina*



A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae and cyanobacteria

## Part 7. Benthic marine algae and cyanobacteria

JOHN RICHARD HANSEN and LARS HARRY JENNEBORG



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A list of 163 benthic marine algae and cyanobacteria is provided for the Svalbard archipelago including 38 chlorophytes, 60 phaeophytes, 59 rhodophytes, one chrysophyte, and five cyanobacteria in addition to six species only determined to genus; 29 of these species are new reports for Svalbard, and four of these are cyanobacteria. One new combination, *Spongomorpha incurva*, is made. Notes on distribution and ecology are included for all species reported as new to Svalbard as well as for some other uncommon and critical taxa.

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### Introduction

The first comprehensive compilation of the marine benthic algae of the Barents Sea was by Kjellman (1883) in his classic *The algae of the Arctic Sea*. This work was a survey of recorded species from an active period of phycological research in the Barents Sea between 1860–1880 (Agardh 1862, 1868a, 1868b, 1868c; Kjellman 1875a, 1875b, 1877). Since then, exclusive studies of the marine benthic flora on Svalbard have been published by Svendsen (1959), Zinova (1961), and Florczyk & Latała (1989).

Contributions to the knowledge of the algal flora of Svalbard is included in studies by Sommerfelt (1832), Lindblom (1840), Wittrock (1874), Zeller (1874), Eaton (1876), Walton (1922), Summerhayes & Elton (1923, 1928), Jenneborg (1977), Gulliksen & Taasen (1982), Hansen & Haugen (1989), Vozžinskaja et al.

(1992), Wesławski et al. (1993), and Klekowski & Wesławski (1995). The checklist and distributional index of marine benthic algae for the North Atlantic Ocean, which also included algae from Svalbard, was published by South & Tittley in 1986.

The following list is an extension of the checklist by South & Tittley (1986) for the Svalbard area. It presents, in addition to recent studies, new information from unpublished algological investigations by Svendsen around 1960 (his herbarium at TROM and field notes), by one of the authors between 1971–1979 (Jenneborg unpubl. thesis and his herbarium at Bot. Mus. & Dept. Mar. Bot Univ. Gothenb.), and species from the general algological literature from Svalbard not mentioned by South & Tittley (1986). This, together with the new findings by Vozžinskaja et al. (1992), has extended the checklist from 1986 with 71 new species of algae and cyanobacteria to a total of 158 species, of which 25 species are new reports for Svalbard. The knowledge of the cyanobacteria connected to marine habitats on Svalbard is poor. It is therefore reasonable to expect that many more taxa will be added to this group in the future.

The basic taxonomy, nomenclature, synonymy, abbreviation of author names, and the priority of name for taxa with different life stages, in general

follow South & Tittley (1986). Author citation includes only authors of taxa and not publication authors where these are not identical. South & Tittley (1986) is also referred to for a more detailed and systematic arrangement of the species.

The list includes vernacular Norwegian names according to Anon. (1990). An asterisk (\*) in the list indicates comments, and species not listed by South & Tittley (1986) for Svalbard are marked with a solid dot (•). A question mark indicates that the occurrence of the species on Svalbard is questionable, or that there is a nomenclature or taxonomic problem. In the latter case, a comment is always given.

The species *Cladophora hutchinsiae* (Dillwyn) Kütz., *Cladophora laetevirens* (Dillwyn) Kütz., *Feldmannia irregularis* (Kütz.) Hamel, *Pseudolithoderma rosenvingii* (Wärn) S. Lund, *Sphacelaria radicans* (Dillwyn) C. Agardh, *Porphyrostomium boryana* (Mont.) Trevisan (= *Erythrotrichiopeltis boryana* (Mont.) Kornm.), *Porphyropsis coccinea* (J. Agardh ex Aresch.) Rosenv. and *Phymatolithon purpureum* (P. & H. Crouan) Wölk. & Irvine (= *P. polymorphum* (L.) Foslie) are indicated with a question mark because they were not found referred to in the primary literature, although they were included by South & Tittley (1986). Comments have been kept to a minimum, concentrating mainly on unpublished or uncommon records. Further information can be found in the literature cited in the references.

The following species names in South & Tittley (1986) are here treated as synonyms:

*Chaetophora maritima* Kjellman, see note below *Pleurocladia lacustris* A. Braun.

*Enteromorpha compressa* (L.) Grev., see note below *Enteromorpha intestinalis* (L.) Link.

*Monostroma lubricum* Kjellman, see note below *Kornmannia leptoderma* (Kjellman) Kornm.

*Ralfsia clavata* (Harv.) P. Crouan & H. Crouan, see note below *Strangularia clavata* (Harv.) Hamel.

*Ulothrix discifera* Kjellman, see note below *Ulothrix speciosa* (Carmich. ex Harvey) Kütz.

*Ulvaria obscura* (Kütz.) Gayral, see note below *Monostroma obscurum* (Kütz.) J. Agardh.

The following name changes should be noted:

*Chaetomorpha capillaris* (Kütz.) Børg. to *Chaetomorpha mediterranea* (Kütz.) Kütz. (see Burrows 1991).

*Dermatolithon crouanii* (Foslie) Hamel & Lemoine to *Lithophyllum crouanii* Foslie (see Irvine & Chamberlain 1994).

*Pneophyllum lejolisii* (Rosan.) Chamberlain to *Pneophyllum fragile* Kütz. (see Irvine & Chamberlain 1994).

*Desmotrichum undulatum* (J. Agardh) Reinke to *Punctaria tenuissima* (C. Agardh) Greville (see Fletcher 1987).

*Epicladia flustrae* Reinke to *Entocladia flustrae* (Reinke) Taylor (see Burrows 1991).

*Phymatolithon polymorphum* (L.) Foslie to *Phymatolithon purpureum* (P. & H. Crouan) Wölk. & Irvine (see Irvine & Chamberlain 1994).

*Phyllophora truncata* (Pallas) A. Zin. to *Coccotylus truncata* (Pallas) M. Wynne & J. Heine (see Wynne & Heine 1992).

*Polysiphonia nigrescens* (Huds.) Grev. to *P. fucoidea* (Huds.) Grev. (see Maggs & Hommersand 1993).

*Ptilota plumosa* (L.) C. Agardh to *P. gunneri* Silva, Maggs & L. Irvine (see Maggs & Hommersand 1993).

*Audouinella spetsbergensis* (Kjellman) Wölk. to *Meodiscus spetsbergensis* (Kjellman) Saunders & McLachlan (see Saunders & McLachlan 1991).

*Rhizoclonium riparium* (Roth) Kütz. ex Harvey to *R. tortuosum* (Dillwyn) Kütz. (see Burrows 1991).

*Sorocarpus micromorus* (Bory) Silva to *Botrytella micromora* Bory (see Kornmann & Sahling 1988).

Work on this part of the Catalogue of Svalbard flora began almost ten years ago when one of the authors, J.R. Hansen, was encouraged by the Norwegian Polar Institute to make a comprehensive review of the Svalbard benthic marine algae (Hansen 1986 unpubl.). This basic manuscript was later supplemented with information from the numerous unpublished collections held by the collaborating author L.H. Jenneborg from his studies in the 1970s. Also incorporated are findings from recent studies from Svalbard. With the publication by South & Tittley's checklist from 1986, the basic paper was reduced with regard to information on synonyms and general comments to taxonomical problems. South & Tittley (1986) is now referred to as a major reference on supplementary information. It is Jenneborg's intention to publish more extensive data on his large Svalbard collection at a later date.



## List of Species

Scientific and Norwegian names (\* = comments; ● = not listed from Svalbard in South & Tittley (1986); ? = questionable occurrence, uncertain nomenclature, or taxonomic problem)

## Cyanobacteria – Cyanobakterier

<i>Anabena</i> sp.	*
<i>Calothrix scopulorum</i> (Web. & Mohr) C. Agardh	*
<i>Dermocarpa</i> sp.	*
<i>Microcoleus tenerimus</i> Gom.	*
<i>Merismopedia</i> sp.	*
<i>Nostoc planctonicum</i> W. Poretzky & Tschernow	*
<i>Oscillatoria</i> sp.	*
<i>Pleurocapsa amethystea</i> Rosenv.	*
<i>Pormidium</i> sp.	*
<i>Schizothrix antarcticum</i> Fritsch	*
<i>Spirulina</i> sp.	*

## Chlorophycota – Grønnalger

<i>Acrochaete repens</i> N. Pringsh.	*	●	
<i>Blidingia marginata</i> (J. Agardh) P. Dang.			
<i>B. minima</i> (Näg. ex Kütz.) Kylin – Dverg-tarmgrønske	*	●	
<i>B. subsalsa</i> (Kjellman) Kornm. & Sahling	*		
<i>Bolbocoleon piliferum</i> N. Pringsh.	*	●	
<i>Capsosiphon groenlandicum</i> (J. Agardh) Vinograd.	*	●	
<i>Chaetomorpha mediterranea</i> (Kütz.) Kütz. – Viklesnøre	*	●	
<i>C. melagonium</i> (F. Weber & Mohr) Kütz. – Laksesnøre			
<i>Cladophora fracta</i> (O.F. Müll. ex Vahl) Kütz.	*	●	
<i>C. hutchinsiae</i> (Dillwyn) Kütz.			?
<i>C. laetevirens</i> (Dillwyn) Kütz.			?
<i>Enteromorpha intestinalis</i> (L.) Nees – Greinet tarmgrønske	*		
<i>E. prolifera</i> (O.F. Müll.) J. Agardh	*	●	
<i>Entocladia flustrae</i> (Reinke) Taylor	*	●	
<i>Kornmannia leptoderma</i> (Kjellman) Kornm. – Kornmanns grønnhinne	*	●	
<i>Monostroma obscurum</i> (Kütz.) J. Agardh.	*		
<i>Ostreobium quekettii</i> Bornet & Flah.	*	●	
<i>Percursaria percursa</i> (C. Agardh) Bory – Tvetråd			
<i>Prasiola crispa</i> (Lightf.) Kütz.	*	●	
<i>Pringsheimiella scutata</i> (Reinke) Marchew.	*	●	
<i>Pseudendoclonium submarinum</i> Wille	*	●	
<i>Rhizoclonium pachydermum</i> Kjellman	*	●	
<i>R. tortuosum</i> (Dillwyn) Kütz.			
<i>Spongomorpha aeruginosa</i> (L.) Hoek – Liten grønneddott	*	●	
<i>S. arcta</i> (Dillwyn) Kütz.	*		
<i>S. centralis</i> (Lyngbye) Kütz.	*	●	?
<i>S. flagellata</i> (Kjellman) South & Tittley		●	?
<i>S. incurva</i> (Kjellman) J.R. Hansen & Jenneborg comb. nov.	*	●	?
<i>S. sonderi</i> Kütz. – Storcellet grønneddott	*	●	
<i>Ulothrix flacca</i> (Dillwyn) Thuret	*		
<i>U. implexa</i> (Kütz.) Kütz.	*	●	
<i>U. speciosa</i> (Carmich. ex Harvey) Kütz.	*	●	
<i>U. subflaccida</i> Wille	*	●	?
<i>Urospora elongata</i> (Rosenv.) Hagem	*	●	
<i>U. pencilliformis</i> (Roth) Aresch.			



## Scientific and Norwegian names

(\* = comments; ● = not listed from Svalbard in South & Tittley (1986); ? = questionable occurrence, uncertain nomenclature, or taxonomic problem)

<i>P. rosenvingii</i> (Wärn) S. Lund			?
<i>Punctaria latifolia</i> Grev. – Bredtunge			
<i>Punctaria tenuissima</i> (C. Agardh) Grev. – Bølget brunbånd	*	●	
<i>Ralfsia verrucosa</i> (Aresch.) J. Agardh	*	●	
<i>Saundersella simplex</i> (Saunders) Kylin	*	●	
<i>Saccorhiza dermatodea</i> (de la Pyl.) J. Agardh – Bladtare			
<i>Scytosiphon lomentaria</i> (Lyngbye) Link – Fjæreslo	*		
<i>Sphacelaria arctica</i> Harvey			
<i>S. plumosa</i> Lyngbye – Fjærtufs			
<i>S. radicans</i> (Dillvyn) C. Agardh			?
<i>Stictyosiphon tortilis</i> (Rupr.) Reinke – Langellet brunskjegg			
<i>Strangularia clavata</i> (Harv.) Hamel	*	●	
Rhodophycota – Rødalger			
<i>Acrochaetium microscopicum</i> (Näg.) Näg.	*	●	
<i>Ahnfeltia plicata</i> (Huds.) Fries – Sjørís			
<i>Audouinella efflorescens</i> (J. Agardh) Papenf.			
<i>A. hallandicum</i> (Kylin) Hamel	*	●	?
<i>A. membranacea</i> (Magnus) Papenf. – Hydroide-rødpusling			
<i>A. parvulum</i> (Kylin) Hoyt	*	●	?
<i>A. purpurea</i> (Lightf.) Wölk. – Filtrødpusling			
<i>Callocolax neglectus</i> Schmitz ex Batters	*	●	
<i>Callophyllis cristata</i> (C. Agardh) Kütz. – Smalrødhånd			
<i>Ceramium circinatum</i> (Kütz.) J. Agardh	*	●	?
<i>C. nodulosum</i> (Lightf.) Ducluzeau	*		
<i>Ceratocolax hartzii</i> Rosenv.	*	●	
<i>Clathromorphum compactum</i> (Kjellman) Foslie	*	●	
<i>Coccytulus truncata</i> (Pallas) M. Wynne & J. Heine – Hummerblekke			
<i>Cystoclonium purpureum</i> (Huds.) Batters	*	●	
<i>Delesseria rossica</i> Sin.	*	●	
<i>Devaleraea ramentacea</i> (L.) Guiry – Draugskjegg			
<i>Dilsea carnosa</i> (Schmidel) O. Kuntze	*		?
<i>D. integra</i> (Kjellman) Rosenv.	*		
<i>Dumontia contorta</i> (S. Gmelin) Rupr. – Bendelsleipe	*	●	
<i>Fimbrifolium dichotomum</i> (Lepechin) G. Hansen – Gaffelflik			
<i>Furcellaria lumbricalis</i> (Huds.) Lamouroux	*		?
<i>Halosacciocolax kjellmanii</i> S. Lund	*	●	
<i>Halosaccion arcticum</i> A. Zin.	*	●	
<i>Hildenbrandia rubra</i> (Sommerf.) Menegh. – Fjæreblod			
<i>Mastocarpus stellatus</i> (Stackh.) Guiry – Vorteflik	*	●	
<i>Membranoptera alata</i> (Huds.) Stackh. – Smalving	*	●	
<i>Mesophyllum lichenoides</i> (Ellis) Lemoine	*	●	
<i>Leptophytum laeve</i> (Foslie) Adey	*	●	
<i>Lithophyllum crouanii</i> Foslie	*	●	
<i>L. fasciculatum</i> (Lamarck) Foslie			
<i>Lithothamnion glaciale</i> Kjellman – Vorterugl	*		
<i>L. tophiforme</i> Unger	*	●	
<i>Meiodiscus spetsbergenis</i> (Kjellman) Saunders & McLachlan			
<i>Odonthalia dentata</i> (L.) Lyngbye – Tannskåring			
<i>Palmaria palmata</i> (L.) O. Kuntze – Søl	*		
<i>Pantoneura baerii</i> (Postels & Rupr.) Kylin			
<i>Phycodrys rubens</i> (L.) Batters – Eikeving			
<i>Phymatolithon purpureum</i> (P. & H. Crouan) Wölk. & Irvine			?

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(\* = comments; ● = not listed from Svalbard in South & Tittley (1986); ? = questionable occurrence, uncertain nomenclature, or taxonomic problem)

<i>Pneophyllum fragile</i> Kütz.	*		
<i>Polysiphonia arctica</i> J. Agardh – Ishavsdokke	*		
<i>P. elongata</i> (Huds.) Sprengel – Stilkdokke	*		?
<i>P. fucoides</i> (Huds.) Grev. – Svartdokke	*	●	
<i>P. lanosa</i> (L.) Tandy	*	●	?
<i>P. nigra</i> (Huds.) Batters – Kuskjelldokke	*	●	?
<i>P. stricta</i> (Dillwyn) Grev. – Røddokke	*	●	
<i>Porphyra amplissima</i> (Kjellman) Setch. & Hus.			?
<i>P. miniata</i> (C. Agardh) C. Agardh – Ametystfjærehinne			
<i>Porphyropsis coccinea</i> (J. Agardh ex Aresch.) Rosenv.			?
<i>Porphyrostromium boryana</i> (Mont.) Trevisan			?
<i>Pterothamnion plumula</i> (Ellis) Näg.			?
<i>Ptilota gunneri</i> Silva, Maggs & L. Irvine			
<i>P. serrata</i> Kütz. – Tagget draugfjær			
<i>Rhodomela confervoides</i> (Huds.) Silva – Teinebusk			?
<i>R. lycopodioides</i> (L.) C. Agardh	*	●	
<i>Rhodophycema georgii</i> Batters	*	●	
<i>Scagelia pylaisei</i> (Mont.) Wynne – Stor havdun			
<i>Titanoderma pustulatum</i> (Lamouroux) Wölk., Chamberlain & Silva	*		
<i>Turnerella pennyi</i> (Harvey) Schmitz – Draugøre			
Chrysophycota – Gullalger			
<i>Phaeosaccion collinsii</i> Farl.	*		

## Comments

transferred to the genus *Xenococcus* or *Cyanocystis*.

## Cyanobacteria

*Anabena* sp.

In bottom mud from Brandalslaguna, Kongsfjorden (Jenneborg unpubl.).

*Merismopedia* sp.

Recorded from Sallyhamna (NW Spitsbergen) as epilithic or epiphytic on *Prasiola crispa* (Lightf.) Kütz. (Jenneborg unpubl.).

*Calothrix scopulorum* (Web. & Mohr) C. Agardh. Very common in the supralittoral zone at extremely exposed localities, but more seldom in places affected by ice scouring (Jenneborg unpubl.).

*Microcoleus tenerrimus* Gom.

New to Svalbard. Recorded once as epiphyte on *Punctaria tenuissima* (C. Agardh) Grev. from Kvadehuken, Kongsfjorden (Jenneborg unpubl.).

*Dermocarpa* sp.

Recorded from 25 m depth at Hukodden, Kongsfjorden as an epiphyte on *Chlamys islandica* (Müll.) (Jenneborg unpubl.). According to Komárek & Anagnostidis (1986), *Dermocarpa* H. & P. Crouan is ambiguous. Species are now

*Nostoc planctonicum* W. Poretzky & Tschernow. New to Svalbard. Recorded in large lagoons with brackish water like Brandalslagunen, Kongsfjorden. Usually as epiphyte on *Cladophora fracta* (O.F. Müll. ex Vahl) Kütz. (Jenneborg unpubl.).

*Oscillatoria* sp.

Recorded from the inner part of Kongsfjorden (Jenneborg unpubl.), and observed at Adolfbukta, Isfjorden (Walton 1922).

(unpubl.) at Worsleyhamna in 1960 as an epiphyte on *Cladophora fracta* (O.F. Müll. ex Vahl) Kütz. The species is very common in North Norway (Jaasund 1965).

*Pleurocapsa amethystea* Rosenv.

New to Svalbard. Recorded as epiphyte on *Delamarea attenuata* (Kjellman) Rosenv. from Brandedalspynten, Kongsfjorden (Jenneborg unpubl.).

*Capsosiphon groenlandicum* (J. Agardh) Vinograd.

New to Svalbard. Recorded only twice from Klovningen (in 1975) and Bellsund (in 1979) from 0 and 6 m depths (Jenneborg unpubl.).

*Pormidium* sp.

Recorded from the inner part of Kongsfjorden (Jenneborg unpubl.)

*Chaetomorpha mediterranea* (Kütz.) Kütz.

New to Svalbard. Recorded once at Krossfjorden in 1979, washed ashore (Jenneborg unpubl.).

*Schizothrix antarctica* Fritsch.

New to Svalbard. Recorded as carpets in brackish ponds at Aberdeenflya, Prins Karls Forland (Jenneborg unpubl.).

*Cladophora fracta* (O.F. Müll. ex Vahl) Kütz. Loose-laying and matforming in low salinity lagoons, brackish water and on sandy shores (Svendsen unpubl., Jenneborg unpubl.).

*Spirulina* sp.

Observed at Adolfbukta, Isfjorden (Walton 1922).

*Enteromorpha prolifera* (O.F. Müll.) J. Agardh. Common, especially on sheltered and moderately exposed shores. The most common *Enteromorpha* species in North Norway (Jaasund 1965).

## Chlorophycota

*Acrochaete repens* N. Pringsh.

Recorded by Klekowski & Wesławski (1995) as an endophyte on *Rhodomela*, *Phycodrys* and other algal species.

*Enteromorpha intestinalis* (L.) Link.

See Burrows (1991) for a discussion on the fusion of *E. intestinalis* (L.) Link and *E. compressa* (L.) Grev.

*Blidingia minima* (Näg. ex Kütz.) Kylin.

Common supralittorally and eulittorally at exposed shores, and in salt and freshwater pools. Growing on rock, and locally in dense settlements. Includes *Enteromorpha* sp. in Svendsen (1959).

*Entocladia flustrae* (Reinke) Taylor.

New to Svalbard. Recorded twice as epizooic in hydrozoans at 2 and 4 m depth (Jenneborg unpubl.).

*Blidingia subsalsa* (Kjellman) Kornm. & Sahling. According to Burrows (1991), this taxon only describes a habitat modification of the thallus in *Blidingia marginata* (J. Agardh) P. Dang., but see Kornmann & Sahling (1978).

*Kornmannia leptoderma* (Kjellman) Kornm.

Includes *Monostroma lubricum* Kjellman (listed for Svalbard by South & Tittley 1986). There is uncertainty to the validity of the genus *Kornmannia* (see Burrows 1991). Scattered in the upper sublittoral on exposed shores at 1–4 m depth where it can form small dense patches. Epiphytic and on rock.

*Bolbocoleon piliferum* N. Pringsh.

New to Svalbard. Recorded by Svendsen

*Monostroma obscurum* (Kütz.) J. Agardh.

Includes *Ulvaria obscura* (Kütz.) Gayral (see Burrow 1991).

*Ostreobium quekettii* Bornet & Flah.

New to Svalbard. Common in old shells and calcareous hydrozoans at 25 m depth (Jenneborg unpubl.).

*Prasiola crispa* (Lightf.) Kütz.

Recorded from the whole area. Very common.

*Pringsheimiella scutata* (Reinke) Höhnelt ex Marchew.

Recorded from Norskøya as an epiphyte on *Sphacelaria arctica* Harvey (Svendsen unpubl.) and by Klekowski & Wesławski (1995) on algae. Rare.

*Pseudendoclonium submarinum* Wille.

New to Svalbard. Recorded once as epiphyte on *Chaetomorpha melagonium* (F. Weber & Mohr) Kütz. (Jenneborg unpubl.).

*Rhizoclonium pachydermum* Kjellman.

Listed by Zinova (1961) from Svalbard.

*Spongomorpha aeruginosa* (L.) Hoek.

New to Svalbard. Recorded twice, epilithic and epiphytic on *Chaetomorpha melagonium* (F. Weber & Mohr) Kütz., eulittorally and sublittorally (Jenneborg unpubl.).

*Spongomorpha arctica* (Dillwyn) Kütz.

The species was included by South & Tittley (1986), but see comments on *S. centralis* (Lyngbye) Kütz. and *S. sonderi* Kütz.

*Spongomorpha centralis* (Lyngbye) Kütz.

Two different common, turf-forming *Spongomorpha* forms exist on Svalbard. Thinbranched, pale green plants are here referred to as *S. centralis*, whereas dark green plants with coarse branches are referred to as *S. sonderi* Kütz. However, the status of these taxa at species level is questionable as indicated by South & Tittley (1986), but Burrows (1991) included the species in *S. arctica* (Dillwyn) Kütz. (as *Acrosiphonia centralis* (Lyngbye) Kjellman). The *Spongomorpha* complex on the High Arctic islands needs further investigation. Both species grow at 0–3 m depth

on sandy substrate, and form large, conspicuous turfts.

*Spongomorpha flagellata* (Kjellman) South & Tittley.

Recorded by Klekowski & Wesławski (1995). Common on rock in shallow waters.

*Spongomorpha incurva* (Kjellman) J.R. Hansen & Jenneborg comb. nov.

Basionym: *Acrosiphonia incurva* Kjellman, Bih. K. Svenska Vetensk.-Akad. Handl. 18: 3(5), 61 (1893).

The genus *Acrosiphonia* is now considered to be a synonym of *Spongomorpha* (Burrows 1991), but *A. incurva* has not been recombined before. *Spongomorpha incurva* was reported from southern Spitsbergen by Klekowski & Wesławski (1995). The type material is from North Norway (Kjellman 1893) and other records are also from the North Atlantic (Lund 1959). The species was considered by Jónsson (1903) to be closely related to *S. arctica* (Dillwyn) Kütz., a species with an unclear taxonomic position, and future studies should reveal the status also of *S. incurva*.

*Spongomorpha sonderi* Kütz.

Includes here *S. arctica* (Dillwyn) Kütz. as used by Kjellman (1883), but South & Tittley (1986) only include *S. arctica* f. *penciliformis* Foslie in *S. sonderi* Kütz. Seems to be more common nowadays at 0–10 m depth, epiphytic and epilithic. Forms locally dense settlements on open coasts. More abundant than *S. centralis*, especially in southern and northern parts of Spitsbergen. See note on *S. centralis* (Lyngbye) Kütz.

*Ulothrix flacca* (Dillwyn) Thuret.

Recorded in a sheltered locality on the shore at Øssian Sarsfjellet, Kongsfjorden, by Jenneborg (unpubl.) and by Klekowski & Wesławski (1995). Rare.

*Ulothrix implexa* (Kütz.) Kütz.

Recorded epilithic, eulittorally down to 15 m, Kapp Guisnez, Kongsfjorden, and by Klekowski & Wesławski (1995). Common.

*Ulothrix speciosa* (Carmich. ex Harvey).

Includes *U. discifera* Kjellman (listed for Svalbard by South & Tittley 1986), and *U. cf. pseudoflaccida* reported by Svendsen (1959). Common in the eulittoral zone on exposed shores.

*Ulothrix subflaccida* Wille.

New to Svalbard. Common in the eulittoral zone at exposed shores (Jenneborg unpubl.). According to Burrows (1991), it is difficult to separate this species from *U. implexa* (Kütz.) Kütz and he treated it as a synonym of *U. implexa* (Kütz.) Kütz.

*Ulva crassa* Kjellman.

Described by Kjellman (1875a). The status of the taxon is questionable. Own examination of the herbarium material (at the Swedish Museum of Natural History, Stockholm) shows that the plant can as well be an extreme form of *Monostroma obscurum* (Kütz.) J. Agardh.

*Ulva lactuca* L.

Recorded by Klekowski & Westawski (1995) in lower eulittoral and sublittoral sites. Common. *Ulva lactuca* L. in Kjellman (1875a) are in fact *Monostroma obscurum* (Kütz.) J. Agardh (Jenneborg unpubl.)

*Urospora elongata* (Rosenv.) Hagem.

Recorded by Klekowski & Westawski (1995). On stones and rock in the eulittoral zone. Rare.

## Phaeophycota

*Alaria esculenta* (L.) Grev.

Recorded from Bjørnøya at 8–15 m depth (Jenneborg unpubl.).

*Alaria grandifolia* J. Agardh.

Includes probably *A. membranacea* J. Agardh. This is the most common and largest among the kelps in Svalbard reaching 5 m in length, are up to 0.5 m broad, and with sporophylls reaching 1 m in length. It has a uniform distribution in the whole area, growing at 5–27 m depth.

*Ascophyllum nodosum* (L.) Le Jolis.

Recorded by Kjellman (1883), Agardh (1868b), Svendsen (unpubl. 1960), and by Jenneborg (unpubl.) as drifted species. All could be drifted plants from lower latitudes, and the species' occurrence on Svalbard is questionable. Recently recorded by Klekowski & Westawski (1995).

*Botrytella micromora* Boryl.

Reported from Kapp Guisnez (Jenneborg unpubl.), and Danskegattet (Svendsen unpubl.) at 2–4 m. Epiphyte.

*Botrytella reinboldii* (Reinke) Kornm. & Sahling.

New to Svalbard. Probably a common epiphyte at 12–25 m depth (Jenneborg unpubl.).

*Climacosorus mediterraneus* Sauvageau.

Reported by Svendsen (1959) as *Isthmoplea sphaerophora* (Carmich. ex Harvey) Kjellman from Ymerbukta and Kapp Linné, and from Isfjord radio (B. Gutestam, unpubl.). A rare species with only few records in Europe; first described from the Mediterranean (Sauvageau 1933), later from North Norway (Jaasund 1965). Epilithic, eulittorally down to 5 m depth.

*Dermatocelis laminariae* Rosenv.

Recorded as an epiphyte on *Saccorhiza dermatodea* (de la Pyl.) J. Agardh (Jenneborg unpubl.), and by Klekowski & Westawski (1995) on *Laminaria*. Common.

*Elachista stellaris* Aresch.

Reported once by Zinova (1961).

*Eudesme virescens* (Carmich. ex Harvey) J. Agardh.

Includes *Mesogloia cf. vermiculata* reported by Svendsen (1959). Common, from rock pools to 25 m depth.

*Fucus ceranoides* L.

This species has not been reported from Svalbard since Kjellman (1883), and the present day occurrence on Svalbard is therefore questionable. For the Norwegian mainland, Lein (1987) proposed

the northern limit for the species' distribution to be in Troms county around 70° N.

*Fucus serratus* L.

Reported from Svalbard by Agardh (1868b) and later by Summerhayes & Elton (1923), both as *F. serratus* f. *arctica* J. Agardh. This could probably be drifted plants from lower latitudes—as suggested by Agardh (1868b) for his record. Recently recorded by Klekowski & Wesławski (1995).

*Fucus vesiculosus* L.

Collected at Danskøya, where it is belt-forming in the eulittoral zone (Hansen & Haugen 1989) (TROM), and by Klekowski & Wesławski (1995).

*Gononema aecidioides* (Rosenv.) P. Pedersen.

Recorded by Klekowski & Wesławski (1995) on *Laminaria*. Common.

*Gononema alariae* P. Pedersen.

New to Svalbard. Common epiphyte on *Alaria* (Jenneborg unpubl.). Probably common along the whole Norwegian coast (Jaasund 1965).

*Halopteris scoparia* (L.) Sauvageau.

Recorded from Isfjorden by Vozžinskaja et al. (1992).

*Isthmoplea sphaerophora* (Carmich.) Kjellman.

Recorded by Klekowski & Wesławski (1995). On stones and rock in the eulittoral zone. Rare. See note on *Climacosorus mediterraneus* Sauvageau.

*Laminaria hyperborea* (Gunnerus) Foslie.

Recorded from Isfjorden by Vozžinskaja et al. (1992).

*Laminariocolax tomentosoides* (Farlow) Kylin.

Collected by Svendsen (unpubl.) from Fuglesangen and Cummingøya on the northern coast, as a common epiphyte on *Callophyllis cristata* (C. Agardh) Kütz.

*Leptonematella fasciculata* (Reinke) Silva.

New to Svalbard. Collected from the northern

coast twice (Svendsen unpubl.), from Isfjorden and from Kapp Guisnez (Jenneborg unpubl.). A rare epiphyte found at 12–24 m depth.

*Myrionema strangulans* Grev.

Collected by Svendsen (unpubl.) from Isfjorden as an epiphyte, at 2–15 m depth.

*Myrionema corunnae* Sauvageau.

Recorded by Klekowski & Wesławski (1995). Epiphyte on *Odonthalia* and other algal species. Rare.

*Petroderma maculiforme* (Wollny) Kuck.

Includes *Lithoderma fatiscens* Aresch. reported by Kjellman (1883). Epilithic and epiphytic on *Palmaria palmata* (L.) O. Kuntze.

*Pilayella littoralis* (L.) Kjellman.

Includes *Pilayella varia* Kjellman (1883).

*Pilayella varia* Kjellman.

Recorded by Klekowski & Wesławski (1995). On stones and algae, and often loose laying. Rare. See note on *Pilayella littoralis* (L.) Kjellman.

*Pleurocladia lacustris* A. Braun.

Includes *Chaetophora maritima* Kjellman listed by South & Tittley (1986).

*Petalonia fascia* (O.F. Müll.) O. Kuntze.

New to Svalbard. Recorded at Prins Karls Forland, Fair Haven, Vasahelvøya (NW Spitsbergen) and Axeløya. Rare (Jenneborg unpubl.).

*Petalonia zosterifolia* (Reinke) O. Kuntze.

Reported by Florczyk & Latała (1989) at Hornsund, and by Klekowski & Wesławski (1995) once, as a loose specimen on the shore.

*Phaeostroma parasiticum* Børg.

New to Svalbard. Recorded once as an epiphyte on *Laminaria saccharina* (L.) Lamouroux at 20 m depth, at Kapp Starostin (Jenneborg unpubl.).



*Phaeostroma pustulosum* Kuck.

Common epiphyte on *Laminaria*, and sometimes on *Dictyosiphon foeniculaceus* (Huds.) Grev. (Jenneborg unpubl., Klekowski & Wesławski (1995). Common. Probably the most common microepiphyte in North Norway (Jaasund 1965).

*Punctaria tenuissima* (C. Agardh) Grev.

New to Svalbard. Recorded twice in Kongsfjorden as an epiphyte on *S. dermatodea* (de la Pyl.) J. Agardh, and epilithic at 15 m depth (Jenneborg unpubl.).

*Ralfsia verrucosa* (Aresch.) J. Agardh.

Recorded from Isfjorden by Vozžinskaja et al. (1992).

*Saundersella simplex* (Saunders) Kylin.

Recorded by Klekowski & Wesławski (1995) as an epiphyte on *Chordaria*. Rare.

*Scytosiphon lomentaria* (Lyngbye) Link.

Own examination of the herbarium material by Svendsen shows that *Scytosiphon* sp. in Svendsen (1959) is *Scytosiphon lomentaria* (Lyngbye) Link. Also recorded by Klekowski & Wesławski (1995). On stones, from the lower eulittoral down to the sublittoral zone.

*Strangularia clavata* (Harv.) Hamel.

New to Svalbard. A synonym of *Ralfsia clavata* (Harv.) P. Crouan & H. Crouan and includes *R. bornetii* Kuck. (see Fletcher 1987). South & Tittley (1986) described *S. clavata* (Harv.) Hamel (as *R. clavata* (Harv.) P. Crouan & H. Crouan) as a stage in the life history of *Scytosiphon*. Collected on Svalbard by Jenneborg (unpubl.). Common, growing on rock in the eulittoral and upper part of the sublittoral zone mainly on exposed coasts.

## Rhodophycota

*Acrochaetium microscopium* (Näg.) Näg.

New to Svalbard. Epiphyte on *Chordaria flagelliformis* (O.F. Müll.) C. Agardh (Jenneborg

unpubl.). Recorded by Svendsen (unpubl.) from Biskayerhuken.

*A. hallandicum* (Kylin) Hamel.

Recorded by Klekowski & Wesławski (1995). The nomenclatural status of the taxon is questionable (South & Tittley 1986).

*A. parvulum* (Kylin) Hoyt.

Common sublittoral and eulittoral epiphyte on algal species (Jenneborg unpubl., Klekowski & Wesławski 1995). The nomenclatural status of the taxon is questionable (South & Tittley 1986).

*Ceramium circinatum* (Kütz.) J. Agardh.

Recorded by Klekowski & Wesławski (1995). The nomenclatural status of the taxon is questionable (South & Tittley 1986), but see Maggs & Hommersand (1993).

*Ceramium nodulosum* (Lightf.) Ducluzeau.

Includes *Ceramium rubrum* (Huds.) C. Agardh listed by Kjellman (1875a) and *Ceramium* sp. by Svendsen (1959). Grows in moderately exposed localities at 1–7 m depth, both epilithic, epiphytic and epizooic.

*Callocolax neglectus* Schmitz ex Batters.

New to Svalbard. Rather sparse as an epiphyte on *Callophyllis cristata* (C. Agardh) Kütz. (Jenneborg unpubl.).

*Ceratocolax hartzii* Rosenv.

New to Svalbard. Probably a rare parasite on *Phyllophora truncata* (Pallas) A. Zin. (Jenneborg unpubl.).

*Clathromorphum compactum* (Kjellman) Foslie.

Common, epilithic between 0–45 m depth. Occasionally epiphytic. Common, growing on rock in the lower part of the eulittoral and the sublittoral zone down to 45 m on open coast.

*Cystoclonium purpureum* (Huds.) Batters.

Recorded from Isfjorden by Vozžinskaja et al. (1992).

*Delesseria rossica* Sin.

Recorded from Isfjorden by Vozžinskaja et al. (1992).

*Mastocarpus stellata* (Stackh.) Guiry.

Recorded from Isfjorden by Vozžinskaja et al. (1992).

*Dilsea carnosa* (Schmidel) O. Kuntze.

Reported once by Kjellman (1875a) as a small plant fragment. Own examination of the herbarium material shows that the species could as well be *D. integra* (Kjellman) Rosenv. Lately recorded by Klekowski & Wesławski (1995).

*Membranoptera alata* (Huds.) Stackh.

Recorded by Florczyk & Latała (1989) at Hornsund in the eulittoral zone, and sublittorally by Klekowski & Wesławski (1995). Rare.

*Dumontia contorta* (S. Gmelin) Rupr.

Recorded by Florczyk & Latała (1989) at Hornsund, and by Klekowski & Wesławski (1995). In the lower eulittoral and sublittoral zone. Common.

*Mesophyllum lichenoides* (Ellis) Lemoine.

New to Svalbard. Common on maerl reefs dominated by *Lithothamnium glaciale* Kjellman at 8–15 m depth on the north coast (Jenneborg unpubl.).

*Furcellaria lumbricalis* (Huds.) Lamouroux.

Reported once from Svalbard by Agardh (1868a), and could have been a misidentification.

*Leptophytum laeve* (Strömf.) Adey.

New to Svalbard. Recorded twice at Kapp Martin and Raudfjorden on *Clathromorphum compactum* (Kjellman) Foslie at 14–20 m depth (Jenneborg unpubl.).

*Halosacciocolax kjellmanii* S. Lund.

Reported by Kjellman (1875a), as a "peculiar outgrowth" on *Devaleraea ramentacea* (L.) Guiry in the eulittoral and sublittoral zone on Svalbard (see Hansen & Lein 1984). Probably common epiphyte on *D. ramentacea* (L.) Guiry.

*Lithothamnion tophiforme* Unger.

New to Svalbard. Recorded as dead specimens at Bredalspynten, Kongsfjorden, and Poolpynten (Prins Karls Forland) at 20 m depth (Jenneborg unpubl.). Also collected by Svendsen (unpubl.).

*Halosaccion arcticum* A. Zinova.

Recorded by Florczyk & Latała (1989) at Hornsund in the eulittoral zone.

*Pneophyllum fragile* Kütz.

Reported only once from Mosselbukta by Kjellman (1875a) as *Melobesia* sp., later determined as *Melobesia lejolisii* Rosan. (Kjellman 1883).

*Palmaria palmata* (L.) O. Kuntze.

Reported by Kjellman (1875a) as *Rhodymenia pertusa* (Postel & Rupr.) J. Agardh and by Svendsen (unpubl.). Very common in the sublittoral zone.

*Polysiphonia arctica* J. Agardh.

Common sublittorally between 2–30 m, and sometimes forming a dense and uniform vegetation below 12 meter where it can replace *Ptilota serrata* Kütz. and *Ptilota gunneri* Silva, Maggs & L. Irvine.

*Lithophyllum crouanii* Foslie.

New to Svalbard. Collected once at Sallyhamna, Vasahelvøya, as epiphyte on *Laminaria digitata* (Huds.) Lamouroux (Jenneborg unpubl.).

*Polysiphonia elongata* (Huds.).

Recorded once by Agardh (1868a) without specification of locality.

*Lithothamnion glaciale* Kjellman.

Dominant crustose corallinean on Spitsbergen.

*Polysiphonia lanosa* (L.) Tandy.

Reported by Kjellman (1875a) from the south

coast of Spitsbergen. Probably drifted specimen from the Norwegian mainland.

*Polysiphonia nigra* (Huds.) Batters.

Reported once (Agardh 1868c) without specification of locality.

*Polysiphonia fucoides* (Huds.) Grev.

Recorded by Florczyk & Latała (1989) at Hornsund in the eulittoral zone.

*Polysiphonia stricta* (Dillwyn) Grev.

This species shows a wide range of morphological variation. The name most commonly used for this group is *P. urceolata* (Lightf. ex Dillwyn) Grev. However, until species limits in this group are characterised, Maggs & Hommersand (1993) propose to use the oldest available name for the species. Recorded by Florczyk & Latała (1989) in the eulittoral zone at Hornsund, and sublittorally by Klekowski & Wesławski (1995) on stones and rock, occasionally epiphytic. Not common.

*Rhodophycema elegans* (P. Crouan & H. Crouan ex J. Agardh) P. Dixon.

New to Svalbard. Found as epiphyte on *Alaria* and *Laminaria* at 3–7 m depth (Svendsen unpubl., Jenneborg unpubl.).

*Rhodophysema georgii* Batters.

New to Svalbard. Common as epilithic and epizooic on tunicates from 13 to 50 m depth (Jenneborg unpubl.).

*Titanoderma pustulatum* (Lamouroux) Wölk., Chamberlain & Silva.

New to Svalbard. Recorded once at Vasahalvøya as an epiphyte on *L. digitata* (Huds.) Lamouroux at 20 m depth (Jenneborg unpubl.).

## Chrysophycota

*Phaeosaccion collinsii* Farl.

Recorded at Vasahalvøya near glaciers sublittorally on sandy bottom (Jenneborg unpubl.).

## Excluded taxon

*Mesogloia* cf. *vermiculata* reported by Svendsen (1959) is in fact *Eudesme virescens* (Carmich. ex Harvey) J. Agardh (Jenneborg unpubl.).

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A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae and cyanobacteria

## Part 8. Marine microalgae

GRETHE RYTTER HASLE and CECILIE HELLUM VON QUILLFELDT



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The known marine microalgae of Svalbard are listed and include 193 species and five varieties and forms in addition to five species determined with uncertainty and eight species only determined to genus. Twenty-seven species are reported from Svalbard for the first time.

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### Introduction

The list of marine microalgae recorded from the Svalbard area is based on investigations primarily dealing with phytoplankton. But in addition to the planktonic, free-floating algae, plankton material collected in fjords and other nearshore localities always contains a certain fraction of benthic microalgae. The normal habitats of marine benthic microalgae are as epiphytes on macroalgae (seaweeds), sediments underlying shallow waters, rocks, sand grains and, what is most important, in polar regions, the sea ice. When the ice melts in late spring or early summer, the so-called ice algae may live for a varying period of time in the open water. Brackish water and

freshwater microalgae may also be found in arctic waters, especially in areas influenced by rivers.

Marine planktonic algae are subject to transport by currents, and their distribution is therefore to a certain extent a result of the ocean circulation. The West Spitsbergen Current has its origin in the Atlantic Ocean, whereas the eastern coast is mainly influenced by colder arctic waters. As illustrated by the species list, some of the marine microalgae recorded from the Svalbard area belong to the Arctic or have their main distribution and their greatest abundances in the Arctic (mainly those associated with ice during a part of the season) or in areas further south during the coldest season. Others have a much wider distribution, and still others have definitely been carried into the area by Atlantic water.

Diatoms are considered the most abundant components of the plankton algae in polar waters, in number of species as well as in number of individuals, together with the prymnesiophyte *Phaeocystis pouchetii*. But, in common with temperate waters, the dinoflagellates in the Svalbard area seem to be more abundant than diatoms in summer and early autumn, often along with representatives of other algal classes, e.g. Dinobryon spp.

It must be recognised that the information on the marine plankton algae of the Svalbard area is

still fragmentary, being based on expedition collections from the end of the 19th or the beginning of the 20th century (Cleve 1899; Broch 1910; Braarud 1935), and on material collected during a short period of time (Halldal & Halldal 1973; Heimdal 1983; Hellum 1989; Heimdal & Hasle unpubl.). In addition, the taxonomic position in general and the identification of several of the taxa recorded need further investigation. With these limitations in mind, an attempt to outline the biogeography and ecology of the taxa recorded beyond what is done here would be a hazardous project.

The species list below comprises 193 species and five varieties and forms. In addition, it includes five species considered to have been determined with uncertainty and marked with "cf.", and eight species only determined to genus. These are all microalgae that may require special techniques for proper identification, techniques that might not have been available for the studies

referred to. The list includes 27 species that are reported here from Svalbard for the first time.

The list is based on the papers numbered (1) to (11) in the References. It was compiled in 1992 and possible records published in the 1990s have not been included. The numbers 1–11 in the List of species indicate the source of the records, i.e. in which of the papers (1) to (11) the records of the particular alga appear. The list mainly includes planktonic microalgae, but some ice algae have been included. The list does not include other benthic algae. No cyanobacteria have been reported from the Svalbard plankton and ice floras. The scientific names listed are, as far as we have been able to check, those in current use. The most common, but far from all, synonyms have been included. The species are arranged below their divisions and classes. The choanoflagellates are placed below a phylum and a class of the zoological classification system, but these species are normally dealt with by algologists.

## List of species

Scientific names	Sources (see reference list)	Comments
<b>CRYPTOPHYTA</b>		
Cryptophyceae		
<i>Hemiselmis</i> sp.	7	
<i>Isoselmis obconica</i> Butcher	11	
<i>Leucocryptos marina</i> (Braarud) Butcher	5,7,8	
<i>Teleaulax acuta</i> (Butcher) Hill (syn. <i>Cryptomonas acuta</i> Butcher)	11	
<b>DINOPHYTA</b>		
Dinophyceae – Dinoflagellates		
<i>Alexandrium ostenfeldii</i> (Paulsen) Balech & Tangen (syn. <i>Goniodoma ostenfeldii</i> Paulsen)	2,5,6	III
<i>A. excavatum</i> (Braarud) Balech & Tangen (syn. <i>Gonyaulax excavata</i> Braarud)	5	
<i>Amphidinium longum</i> Lohmann	7,11	
<i>A. sphenoides</i> Wulff	7,11	
<i>Amylax triacantha</i> (Jørgensen) Sourmia (syn. <i>Gonyaulax triacantha</i> Jørgensen)	6	I, III
<i>Cachonina niei</i> Loeblich III	5	
<i>Ceratium arcticum</i> (Ehrenberg) Cleve	2,3,5,6,7,9	III
<i>C. furca</i> (Ehrenberg) Claparède & Lachmann	3	
<i>C. fusus</i> (Ehrenberg) Dujardin	3,5,7	
<i>C. longipes</i> (Bailey) Gran	2,3,5,7	
<i>C. macroceros</i> (Ehrenberg) Cleve	2	
<i>C. tripos</i> (O.F. Müller) Nitzsch	2,7	
<i>Cladopyxis claytonii</i> Holmes	5,8	

Scientific names	Sources (see reference list)	Comments
<i>Dinophysis acuminata</i> Claparède & Lachmann	5,6,7,9	
<i>D. acuta</i> Ehrenberg	1,2,3,5,9	
<i>D. arctica</i> Mereszkowsky	2	III
<i>D. islandica</i> Paulsen	6	I, III
<i>D. norvegica</i> Claparède & Lachmann	2,5,6,7,8	
<i>D. rotundata</i> Claparède & Lachmann (syn. <i>Phalacroma rotundatum</i> Claparède & Lachmann) Kofoid & Michener)	1,2,5,6,8	
<i>D. ruudii</i> (Braarud) Balech (syn. <i>Phalacroma ruudii</i> Braarud)	1,5,6,8	
<i>Diplopsalis lenticula</i> Bergh (syn. <i>Glenodinium lenticula</i> (Bergh) Schiller)	1,3	
<i>Ebria tripartita</i> (Schumann) Lemmermann	1,5,8	
<i>Glenodinium danicum</i> Paulsen	5	
<i>G. spitsbergense</i> Ramsfjell	8	III
<i>Gonyaulax grindleyi</i> Reinecke (syn. <i>Protoceratium reticulatum</i> (Claparède & Lachmann) Bütschli)	2,8	
<i>G. parva</i> Ramsfjell	6	I
<i>G. spinifera</i> (Claparède & Lachmann) Diesing	2,3,5	
<i>Gymnodinium abbreviatum</i> Kofoid & Swezy	6	I
<i>G. arcticum</i> Wulff	11	III
<i>G. lohmannii</i> Paulsen	1,5,6,8	
<i>G. simplex</i> (Lohmann) Kofoid & Swezy	11	
<i>Gyrodinium grenlandicum</i> Braarud	5,6,7,8	III
<i>Heterocapsa triquetra</i> (Ehrenberg) Stein (syn. <i>Peridinium triquetrum</i> (Ehrenberg) Lebour)	5	
<i>Katodinium rotundatum</i> (Lohmann) Løeblich III (syn. <i>Massartia rotundata</i> (Lohmann) Schiller)	11	
<i>Oxytoxum</i> sp.	5	
<i>Paulsenella chaetoceratis</i> (Paulsen) Chatton	1,8	
<i>Peridinium faeroense</i> Paulsen	6	I
<i>Prorocentrum aporum</i> (Schiller) Dodge	8	V
<i>P. balticum</i> (Schiller) Løeblich III	5,6,8,11	
<i>P. compressum</i> (Bailey) Abé ex Dodge	1	
<i>P. micans</i> Ehrenberg	7	
<i>Protoperidinium bipes</i> (Paulsen) Balech	1,5,6,7,8	II
<i>P. breve</i> (Paulsen) Balech	2,8	
<i>P. brevipes</i> (Paulsen) Balech	1,2,5,6,7,8	
<i>P. conicoides</i> (Paulsen) Balech	1,2,5,6,7,8	
<i>P. depressum</i> (Bailey) Balech	1,2,3,5,7,8,9	
<i>P. divergens</i> (Ehrenberg) Balech	1,4,5	
<i>P. granii</i> (Ostenfeld) Balech	5,8	
<i>P. grenlandicum</i> (Woloszynska) Balech	8	III
<i>P. islandicum</i> (Paulsen) Balech	2,6,8	III
<i>P. monacanthum</i> (Broch) Balech	1,2,8	III
<i>P. ovatum</i> (Schütt) Balech	2,3,5	
<i>P. pallidum</i> (Ostenfeld) Balech	2,5,7,8	
<i>P. pellucidum</i> (Bergh) Balech	1,2,3,5,6,7,8,9	
<i>P. pyriforme</i> (Paulsen) Balech	8	
<i>P. quarnerense</i> (Schröder) Balech	8	
<i>P. steinii</i> (Jørgensen) Balech	2,5,7	
<i>P. subinermis</i> (Paulsen) Balech	2,8	
<i>Scrippsiella trochoidea</i> (Stein) Løeblich III (syn. <i>Peridinium trochoideum</i> (Stein) Lemmermann)	1,5,7,8	
<i>Torodinium</i> sp.	5	

Scientific names	Sources (see reference list)	Comments
<b>CHRYSTOPHYTA</b>		
<b>Prymnesiophyceae – Haptophyceae</b>		
<i>Algirosphaera robusta</i> (Lohmann) Norris (syn. <i>Anthosphaera robusta</i> Lohmann)	4,8	
<i>Calciopappus caudatus</i> Gaarder & Ramsfjell	8	
<i>Chrysochromulina</i> cf. <i>ericina</i> Parke & Manton	11	
<i>C.</i> cf. <i>kappa</i> Parke & Manton	11	
<i>C.</i> cf. <i>strobilus</i> Parke & Manton	11	
<i>Coccolithus pelagicus</i> (Wallich) Schiller	1,6,8	III
<i>Crystallolithus hyalinus</i> Gaarder & Markali	4	III
<i>Dicrateria inornata</i> Parke	4,8,11	
<i>Discosphaera tubifer</i> (Murray & Blackman) Ostenfeld	11	
<i>Emiliania huxleyi</i> (Lohmann) Hay & Mohler	1,5,8	
<i>Phaeocystis pouchetii</i> (Hariot) Lagerheim	1,2,3,5,6,7,8,10	
<b>Chrysophyceae</b>		
<i>Apedinella spinifera</i> (Throndsen) Throndsen	4,5,6	
<i>Calycomonas vangoorii</i> (Conrad) Lund	5	
<i>Dictyocha speculum</i> Ehrenberg	5,6,7,8,11	
<i>Dinobryon balticum</i> (Schütt) Lemmermann (syn. <i>D. pellucidum</i> Levander)	1,2,4,5,6,8,11	
<i>D. belgicum</i> Meunier	6	I
<i>D. faculiferum</i> (Willén) Willén (syn. <i>D. petiolatum</i> Willén)	5,6	
<i>Meringosphaera mediterranea</i> Lohmann	6	I
<i>M. tenerrima</i> Schiller	4	
<i>Ochromonas</i> sp.	7	
<b>Bacillariophyceae – Diatoms</b>		
<i>Achnanthes taeniata</i> Grunow	1,7,8	III
<i>Actinocyclus</i> cf. <i>curvatulus</i> Janisch (syn.? <i>Coscinodiscus curvatulus</i> Grunow)	2,6,8	III
<i>A. subtilis</i> (Gregory) Ralfs		I
<i>Asteromphalus heptactis</i> (Brébisson) Ralfs	8	
<i>Attheya septentrionalis</i> (Østrup) Crawford (syn. <i>Chaetoceros septentrionalis</i> Østrup)		
<i>Bacterosira bathyomphala</i> (Gran) Syvertsen & Hasle (syn. <i>B. fragilis</i> (Gran) Gran)	1,6,7,8	III
<i>Berkeleya rutilans</i> (Trentepohl & Roth) Grunow	6	I
<i>Chaetoceros affinis</i> Lauder	5	
<i>C. atlanticus</i> Cleve	1,3,5,7,8	
<i>C. borealis</i> Bailey	2,3,5,6	
<i>C. borealis</i> f. <i>concavicornis</i> (Mangin) Braarud	1,8	
<i>C. borealis</i> f. <i>varians</i> Gran	1	
<i>C. concavicornis</i> Mangin	5,7	
<i>C. cinctus</i> Gran	1	
<i>C. convolutus</i> Castracane	1,6,8	
<i>C. debilis</i> Cleve	1,4,5,7,8	
<i>C. decipiens</i> Cleve	1,2,3,5,6,7,8	
<i>C. densus</i> Cleve	1	
<i>C. diadema</i> (Ehrenberg) Gran (syn. <i>C. subsecundus</i> (Grunow) Hustedt)	1,3,5	
<i>C. furcellatus</i> Bailey	1,5,6,7,8	III
<i>C. gracilis</i> Schütt	5	
<i>C. karianus</i> Grunow	1,5,8	III



Scientific names	Sources (see reference list)	Comments
<i>C. laciniosus</i> Schütt	4,5,7,8	
<i>C. mitra</i> (Bailey) Cleve	6,7	III
<i>C. simplex</i> Ostenfeld	5	
<i>C. socialis</i> Lauder	1,5,6,7,8	III
<i>C. teres</i> Cleve	2,3,8	
<i>C. wighamii</i> Brightwell	5,7,8	
<i>Corethron criophilum</i> Castracane	3,5,8	
<i>Coscinodiscus asteromphalus</i> Ehrenberg	1	
<i>C. centralis</i> Ehrenberg	2,8	
<i>C. divisus</i> Grunow	1	
<i>C. oculus-iridis</i> Ehrenberg	3	
<i>C. radiatus</i> Ehrenberg	2	
<i>Cylindrotheca closterium</i> (Ehrenberg) J. Lewin & Reimann (syn. <i>Nitzschia closterium</i> (Ehrenberg) W. Smith)	1,5,6,7,8	
<i>Dactyliosolen fragilissimus</i> (Bergon) Hasle (syn. <i>Rhizosolenia fragilissima</i> Bergon)	5	
<i>Detonula confervacea</i> (Cleve) Gran	1	
<i>Diatoma elongatum</i> (Lyngbye) Agardh	6	I, IV
<i>Ditylum brightwellii</i> (West) Grunow	5	
<i>Eucampia groenlandica</i> Cleve	5	III
<i>E. zodiacus</i> Ehrenberg	1,5,8	
<i>Fragilaria striatula</i> Lyngbye	6	I
<i>Fragilariopsis atlantica</i> Paasche (syn. <i>Nitzschia paaschei</i> Hasle)	6	I
<i>F. cylindrus</i> (Grunow) Krieger in Helmcke & Krieger (syn. <i>Fragilaria cylindrus</i> Grunow, <i>Nitzschia cylindrus</i> (Grunow) Hasle)	5,6,7	III
<i>F. oceanica</i> (Cleve) Hasle (syn. <i>Fragilaria oceanica</i> Cleve, <i>Fragilaria arctica</i> Grunow in Cleve, <i>Nitzschia grunowii</i> Hasle)	1,7,8	III
<i>F. pseudonana</i> (Hasle) Hasle (syn. <i>Nitzschia pseudonana</i> Hasle, <i>F. nana</i> (Steemann Nielsen) Paasche)	6	I
<i>Gyrosigma fasciola</i> (Ehrenberg) Griffith & Henfrey var. <i>tenuirostris</i> (Grunow) Cleve	6	I
<i>G. tenuissimum</i> (W. Smith) Griffith & Henfrey var. <i>hyperborea</i> (Grunow) Cleve	6	I
<i>Haslea crucigeroides</i> (Hustedt) Poulin & Cardinal	7	III
<i>Leptocylindrus danicus</i> Cleve	3,5,6	
<i>L. minimus</i> Gran	5	
<i>Licmophora</i> sp.	1,8	
<i>Melosira arctica</i> Dickie	8	III
<i>Navicula directa</i> (W. Smith) Ralfs	6,7	
<i>N. gelida</i> Grunow	7	III
<i>N. granii</i> (Jørgensen) Gran	1,8	III
<i>N. pelagica</i> Cleve	7,8	III
<i>N. septentrionalis</i> (Grunow) Gran	7	III
<i>N. siberica</i> (Grunow) Gran	7	III
<i>N. superba</i> Cleve	7	III
<i>N. transitans</i> Cleve	7	
<i>N. vanhoeffenii</i> Gran	7	III
<i>Nitzschia frigida</i> Grunow	6,7,8	III
<i>N. hudsonii</i> Poulin & Cardinal	6	I
<i>N. hybrida</i> Grunow	6	I, III
<i>N. laevisissima</i> Grunow	7	III
<i>N. longissima</i> (Brébisson) Ralfs	5	
<i>N. pellucida</i> Grunow	6	I, III
<i>N. scabra</i> Cleve	6	I, III

Scientific names	Sources (see reference list)	Comments
<i>Odontella aurita</i> Agardh	1,7,8	
<i>Paralia sulcata</i> (Ehrenberg) Cleve (syn. <i>Melosira sulcata</i> Ehrenberg) Kützing		I
<i>Pleurosigma clevei</i> Grunow	7	
<i>P. intermedium</i> W. Smith	6	I
<i>P. stuxbergii</i> Cleve & Grunow	6,7	
<i>Porosira glacialis</i> (Grunow) Jørgensen	1,6,7,8	III
<i>Proboscia alata</i> (Brightwell) Sundström (syn. <i>Rhizosolenia alata</i> Brightwell)	3,5,6,8	
<i>Pseudogomphonema arcticum</i> (Grunow) Medlin (syn. <i>Gomphonema</i> <i>arcticum</i> Grunow ex Van Heurck)	7	III
<i>Pseudo-nitzschia delicatissima</i> (Cleve) Heiden in Heiden & Kolbe (syn. <i>Nitzschia delicatissima</i> Cleve, <i>Nitzschia actydropbila</i> Hasle)	1,5,7,8	
<i>P. granii</i> (Hasle) Hasle (syn. <i>Nitzschia granii</i> Hasle)	6	I
<i>P. seriata</i> (Cleve) H. & M. Peragallo (syn. <i>Nitzschia seriata</i> Cleve)	1,5,7,8	
<i>P. seriata</i> f. <i>obtusata</i> (Hasle) Hasle (syn. <i>Nitzschia seriata</i> f. <i>obtusata</i> Hasle)	6,7	III
<i>Rhizosolenia hebetata</i> Bailey f. <i>hebetata</i>	6,8	
<i>R. hebetata</i> f. <i>semispina</i> (Hensen) Gran	1,3,5,6,7	
<i>R. setigera</i> Brightwell	5	
<i>R. styliiformis</i> Brightwell	2,3	
<i>Synedropsis hyperborea</i> (Grunow) Hasle, Medlin & Syvertsen (syn. <i>Synedra hyperborea</i> Grunow)	5,7	III
<i>Tabellaria flocculosa</i> (Roth) Kützing	8	IV
<i>Tabularia fasciculata</i> (Agardh) Williams & Round (syn. <i>Synedra tabulata</i> (Agardh) Kützing)	7	
<i>Thalassionema nitzschioides</i> (Grunow) Mereschkowsky	8	
<i>Thalassiosira angulata</i> (Gregory) Hasle	8	VI
<i>T. anguste-lineata</i> (A. Schmidt) G. Fryxell & Hasle (syn. <i>T. polychorda</i> (Gran) Jørgensen, <i>Coscinosira polychorda</i> (Gran) Gran)	1,5,8	
<i>T. antarctica</i> Comber var. <i>borealis</i> G. Fryxell, Douchette & Hubbard	5,6,7	III
<i>T. baltica</i> (Grunow) Østenfeld		I
<i>T. bioculata</i> (Grunow) Østenfeld	1,5,6,7,8	III
<i>T. bulbosa</i> Syvertsen	7	III
<i>T. constricta</i> Gaarder	7	III
<i>T. eccentrica</i> (Ehrenberg) Cleve (syn. <i>Coscinodiscus eccentricus</i> Ehrenberg)	8	
<i>T. gravida</i> Cleve	1,2,3,5,6,8	
<i>T. hispida</i> Syvertsen	7	
<i>T. hyalina</i> (Grunow) Gran	1,5,6,7,8	III
<i>T. hyperborea</i> (Grunow) Hasle & Lange		I, III
<i>T. kushirensis</i> Takanø	7	
<i>T. nordenskiöldii</i> Cleve	1,2,5,6,7,8	
<i>T. pacifica</i> Gran & Angst	5	
<i>T. poroseriata</i> (Ramsfjell) Hasle (syn. <i>Coscinosira poroseriata</i> Ramsfjell)	6	I
<i>Thalassiothrix longissima</i> Cleve & Grunow	3,8	
<i>Trachyneis aspera</i> (Ehrenberg) Cleve	6	I
<i>Triceratium arcticum</i> Brightwell	1	
EUGLENOPHYTA		
Euglenophyceae		
<i>Eutreptiella braarudii</i> Throndsen	6,7	
<i>E. gymnastica</i> Throndsen	11	

Scientific names	Sources (see reference list)	Comments
<b>CHLOROPHYTA</b>		
<b>Prasinophyceae</b>		
<i>Halosphaera viridis</i> Schmitz	1,3	
<i>Micromonas pusilla</i> (Butcher) Manton & Parke	7,11	
<i>Nephroselmis pyriformis</i> (N. Carter) Ettl	11	
<i>Pachysphaera</i> sp.	7	
<i>Pterosperma dictyon</i> (Jørgensen) Ostenfeld	2	
<i>P. moebiusii</i> (Jørgensen) Ostenfeld	2	
<i>P. vanhoeffenii</i> (Jørgensen) Ostenfeld	2	
<i>Pyramimonas grossii</i> Parke	11	
<i>P. cf. plurioculata</i> Butcher	11	
<i>Resultor micron</i> (Throndsen) Moestrup (syn. <i>Pedimonas micron</i> Throndsen)	7	
<i>Tetraselmis</i> sp.	7	
<b>ZOOMASTIGOPHORA</b>		
Choanoflagellidea (= Craspedophyceae) – Choanoflagellates		
<i>Bicosta spinifera</i> (Throndsen) Leadbeater (syn. <i>Salpingoeca spinifera</i> Throndsen)	6,11	
<i>Calliacantha natans</i> (Grøntved) Leadbeater (syn. <i>Salpingoeca natans</i> Grøntved)	5	
<i>Diaphanoeca</i> sp.	6	I
<i>Monosiga marina</i> Grøntved	5,8	
<i>M. marina</i> var. <i>minima</i> Paasche	7	
<i>Parvicorbicula socialis</i> (Meunier) Deflandre	1,8,11	
<i>Pleurasiga</i> sp.	11	

## Comments

- I First record from Svalbard.  
 II All species were previously in the genus *Peridinium*.  
 III These species are all typical arctic marine microalgae, either originally described from the Arctic (usually indicated by the specific epithet), by occurring only in the Arctic or by appearing in greatest abundance in the Arctic.  
 IV Freshwater/brackish water species.  
 V All species except *P. micans* were previously in the genus *Exuviella*.  
 VI In the past usually identified as *Thalassiosira decipiens*.

## Acknowledgements

J. Throndsen and K. Tangen were consulted and their assistance is greatly appreciated.

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A. Elvebakk & P. Prestrud (eds.)

# A catalogue of Svalbard plants, fungi, algae and cyanobacteria

## Part 9. Terrestrial and limnic algae and cyanobacteria

OLAV M. SKULBERG



Skulberg, O.M. 1996: Part 9. Terrestrial and limnic algae and cyanobacteria. Pp. 383–395 in Elvebakk, A. & Prestrud, P. (eds.): A catalogue of Svalbard plants, fungi, algae and cyanobacteria. *Norsk Polarinstitutt Skrifter* 198.

A survey of the terrestrial and limnic Svalbard flora of algae and cyanobacteria is made based on the literary records. The list includes 766 species in addition to some insufficiently determined taxa and some subspecific taxa. Cyanobacteria (68 species), diatoms (393 species), Chlorophyceae (85 species) and desmids (162 species) represent the most species-rich groups. The catalogue is provisional, and the names and author citations of taxa are given as published in the original literature cited. *Ankyra judai*, *Gymnodinium uberrimum*, *Katablepharis ovalis*, *Monoraphidium komarkovae*, and *Rhodomonas lacustris* are reported as new to Svalbard. The phycological knowledge of the Svalbard archipelago is still in its infancy, creating an open field for continued investigations on diversity and phyto-geographical relationships.

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Die Steine durchgehends seint Aderisch auf allerhand Art, wie ein Marmor, Roth, Weiss und Gelb, und bei Veränderung des Gewitters natzen sie und davon wird der Schnee gefärbet, auch wenn es viel regnet laufft das Wasser bey den Steinen herab, davon der Schnee Roth gefärbet wird". (*Chlamydomonas nivalis*, Spitsbergen. Martens 1675).

### Introduction

Most vegetation types on Svalbard are dominated by cryptogams and cyanobacteria. On terrestrial and aquatic localities algae occur in a variety of situations (van den Hoek 1978). They develop in and on moist soil, on rocks, in all kinds of running water, ground-water runoff and mires. They occur most abundantly in still waters: ponds, ditches and lakes (benthos and plankton). Algal vegetation is present in all water bodies ranging in quality from freshwater, brackish water to salt water (Cholnoky 1968).

Algae and cyanobacteria are among the organisms capable of growth at environmental extremes. A number of species can exist under very varied conditions of temperature, and several may survive prolonged freezing. Svalbard has e.g. a snow-flora of algae, which pass their entire existence on the snow and ice (cryovegetation). Hot springs give shelter to a special algal vegetation. Several species are indicators of the influence of human activity (polluted areas). A number of algae live as endophytes within other organisms. Noteworthy is the symbiotic relation with fungi forming lichens—reported in Part 6 of this catalogue. Parasitic algae are present in plants and animals (Ettl 1980).

A brief review of the relevant terrestrial and limnic flora of algae and cyanobacteria of Svalbard is made. The vast theme is surveyed only as an attempt of a preliminary, practical approach.

Reports on the algal vegetation of Svalbard have usually appeared in short publications as various habitats of the archipelago over the years have been investigated. Hence literature is understandably widely scattered. The collections, mainly from the island Spitsbergen, represent customary preserved material of the more conspicuous algal growth observed (random samples). The samples have in most cases been placed at the disposal of specialists for study long

after the time of the field work. Careful and thorough collecting activity in accessible parts of Svalbard by experienced phycologists has been rather exceptional.

Scientific reports on freshwater algae from Svalbard dates back to the early nineteenth century. The first species accounted is interestingly *Chlamydomonas nivalis* (Meyen 1840). Another early observation was *Prasiola fluviatilis* from Magdalenafjorden (Jessen 1848). The diatom flora of Spitsbergen was investigated by Cleve (1864) and Lagerstedt (1873). The exploration of arctic regions was intensified during the last half of the century (Nordstedt 1872; Wittrock 1883). The knowledge of the algal vegetation of Svalbard increased as a consequence. This early phase of phycological research is well documented by Borge (1911), himself an eminent scientist with desmids from Spitsbergen as one of his interests (Borge 1892). The continued work on freshwater algae was connected with research expeditions (Strøm 1921a), several of them organised by the Norwegian Polar Institute and Tromsø Museum. The diatom flora was given special attention (Hustedt 1937; Krasske 1938), and this interest has continued right up to the present (Foged 1964; Willén 1991).

The list below includes 766 species of cyanobacteria and algae, in addition to 43 taxa determined only to generic level, species determined with uncertainty, and additional varieties and forms. Diatoms, desmids and chlorophytes have so far been the most intensively studied groups. However, the Svalbard flora contains many further species of algae from the whole taxonomic hierarchy. To obtain a reasonably complete picture of the species composition of the algal vegetation, a wide range of terrestrial and aquatic localities should be systematically investigated. All the numerous islands of Svalbard need attention (Sand et al. 1991). A taxonomic revision should also be carried out, combined with developmental studies of living material in cultures.

The divisions considered are represented on Svalbard with a large variety of morphological organisation including unicellular, colonial, filamentous and thalloid types. A multitude of habitats on Svalbard are suited for algal growth with species of aerophytes, edaphophytes, benthos and plankton. The typical limnoplankton of Svalbard is generally composed of few species and small population numbers (Thomasson 1958, 1961; Guerrero 1964; Willén 1980). An exception is the

heloplankton which may in small inland waters develop a diverse and luxuriant growth due to nutrient enrichment of the water (e.g. fertilised by organic deposits from birds (Norderhaug 1970; Willén 1970)).

The Svalbard flora of algae and cyanobacteria outlined here indicates a complexity of environmental conditions and a high species diversity. Long, cold winters and short, cool summers are decisive for the quality and quantity of the algal vegetation. The insolation and light periodicity determine the extension of the growth season. The formation of spores and resting stages of different kinds (akinetes, cysts etc.) are important for survival. Encysted cells are accordingly observed frequently in plankton samples (Willén 1980).

The predominating freshwater algae of Svalbard are usually considered to be cyanobacteria, desmids and diatoms (Hirano 1965). Even though species of these groups are common in arctic aquatic habitats, modern phycological methods will probably also uncover a multitude of delicate organisms usually destroyed in preserved samples. Making generalisations about the algal flora of Svalbard is therefore a difficult task still awaiting results of new research.

Svalbard was glaciated during the Weichselian (Mangerud 1983). The freshwater algal vegetation is consequently of post-glacial origin. The organisms of algal type are evidently, in most cases, so easily spread that they are in principle not decisively limited by the dispersal factor. The colonisation by freshwater algae and cyanobacteria has taken place from populations of the nearest land areas (e.g. Greenland, Novaja Zemlja, Finnmark). Generally the freshwater flora of algae on Svalbard show close phytogeographical connection with Fennoscandia (Strøm 1921b; Thomasson 1961; Foged 1964; Willén 1980). However, extensive phycological research is necessary to recognise the gene flow in populations, to verify possible endemicspecies, and to understand why particular substrates demonstrate the presence—and promote the development—of certain algae specialised for the prevailing severe environmental conditions on Svalbard.

Phycological knowledge of the vegetation of waters, soils and aerial habitats of Svalbard is still in its infancy and constitutes a promising issue for continued research on phytogeographical relationships (Sand et al. 1991).

This survey is supposed to reflect the Svalbard literature. Taxa epithets are therefore listed as published in the original publications. This means that both older synonyms and more recent names from the literature in general have not been considered, except in a few instances. There is no list of doubtful or excluded taxa, although for several taxa the distinctions by previous taxonomists need verification concerning biological significance (Langangen 1979). One reason for this is also that the classification of some groups, especially cyanobacteria (Castenholz & Waterbury 1989; Skulberg et al. 1993) and phytoflagellates (Margulis et al. 1990) depends decisively on cultivation studies (Stein 1973; Skulberg & Skulberg 1990). Such studies may alter the existing classification in genera and species considerably. An evaluation of this process related to the published Svalbard species is outside the scope of this survey. Culture studies should be encouraged in the years onwards and combined with relevant field observations.

The list of taxa is based principally on the monographs by Borge (1911) and Foged (1964) supplemented with results of recent investigations (Willén 1980; Matula 1982; Matula & Swies 1989). Pål Brettum, Norwegian Institute for Water Research, supplied information on five species which have not been reported from Svalbard before, and these species are marked with an asterisk in the list of species. The information about species of cryovegetation is derived mainly from Kol (1968) and Kol & Eurola (1974). The list is probably not complete. Russian literature has not been easily available and has not been included. Phycological research carried out on more or less adjacent Arctic Ocean islands, e.g. Franz Josef Land, Novaja Zemlja, Jan Mayen, Greenland, also throw light on comparable arctic algal vegetation (Boldt 1887; Lagerheim 1900; Strøm 1921b; Petersen 1935; Hustedt 1937; Willén 1970).

In the list of species below, genus and species are listed alphabetically under their families and divisions, mainly following the classification system of Ettl (1980). There are no reports of terrestrial and limnic algae of the phaeophytes and raphidophytes, nor of the families Eustigmatophyceae and Loxophyceae of the divisions Chrysophyta and Chlorophyta, respectively.

## List of species

### CYANOBACTERIA

#### Cyanophyceae

- Anabaena* cf. *aequalis* Borge
- A. planctonica* Brunnth.
- Aphanocapsa elachista* W. et G.S. West.
- A. nivalis* Lagerh.
- A. testacea* Näg.
- Aphanothece clathrata* W. et G.S. West
- A. saxicola* Näg.
- Calothrix gypsophila* (Kütz.) Thuret
- Chlorogloea* cf. *microcystoides* Geit.
- Chroococcus compacta* Kütz.
- C. limneticus* Lemm.
- C. minutus* (Kütz.) Näg.
- C. montana* Kütz.
- C. sanguinea* (Ag.) Kütz.
- C. tenax* (Kirchn.) Hieron.
- C. turgidus* (Kütz.) Näg.
- Chamaesiphon fuscus* (Rostaf.) Hansg.
- C. gracilis* Rabh.
- C. incrustans* Grun.
- Clastidium setigerum* Kirchn.
- Dactylococcopsis acicularis* Lemm.
- Dermocarpa* cf. *pseudoxenococcoides* Bourr.
- Dichothrix* cf. *fusca* F.E. Fritsch
- D. gypsophila* (Kütz.) Born. et Flah.
- Gloeocapsa alpina* (Näg.) Brand
- G. cf. bituminosa* (Bory) Kütz.
- G. decorticans* (A. Braun) P. Richt.
- G. janthina* Näg.
- G. kützingiana* Näg.
- G. minor* (Kütz.) Hollerb.
- G. montana* Kütz.
- G. punctata* Näg.
- G. ralfsii* (Harv.) Wittr.
- G. rupestris* Kütz.
- G. sanguinea* (Ag.) Kütz.
- G. turgida* (Kütz.) Hollerb.
- Gloeothece rupestris* (Lyngb.) Born.
- Gomphosphaeria aponina* Kütz.
- G. lacustris* Chod. var. *compacta* Lemm.
- G. naegeliana* (Unger) Lemm.
- Homoeothrix janthina* (Born. et Flah.) Starm.
- Lyngbya aerugineo-coerulea* (Ag.) Gom.
- L. limnetica* Lemm.
- L. vacuolifera* Skuja
- Merismopedia elegans* A. Br.

*M. glauca* (Ehr.) Näg.  
*M. minima* G. Beck  
*M. punctata* Meyen  
*M. tenuissima* Lemm.  
*Microcoleus vaginatus* (Vauch.) Gom.  
*Microcystis incerta* (Lemm.) Lemm.  
*M. cf. parietina* (Näg.) Elenkin  
*M. pulvereae* (Wood) Forti  
*Nostoc commune* Vauch.  
*N. humifusum* Carm.  
*N. linckia* (Roth) Born.  
*N. kihlmani* Lemm.  
*N. paludosum* Kütz.  
*N. cf. punctiforme* (Kütz.) Hariot  
*Oscillatoria amphibia* Ag.  
*O. brevis* (Kütz.) Gom.  
*O. cf. deflexa* W. et G.S. West  
*O. formosa* Bory  
*O. glacialis* Wittr.  
*O. irrigua* Kütz.  
*O. limosa* Ag.  
*O. splendida* Grev.  
*Phormidium ambiguum* Gom.  
*P. autumnale* (Ag.) Gom.  
*P. favosum* (Bory) Gom.  
*P. cf. frigidum* F.E. Fritsch  
*P. laminosum* (Ag.) Gom.  
*P. cf. pristleyi* F.E. Fritsch  
*P. tenue* (Menegh.) Gom.  
*P. viride* (Vauch.) Lemm.  
*Pseudanabaena catenata* Laut.  
*Rhabdoderma lineare* Schmidle et Lauterb.  
*Schizothrix arenaria* (Berk.) Gom.  
*S. tinctoria* (Ag.) Gom.  
*Scopulonema fluvialtilis* Lagerh.  
*Scytonema crustaceum* Ag.  
*S. myochrous* (Dillw.) Ag.  
*S. ocellatum* Lyngb.  
*S. tolypotrichoides* Kütz.  
*Stigonema mamillosum* (Lyngb.) Ag.  
*Synechococcus aeruginosus* Näg.  
*S. leopoliensis* (Racib.) Kom.

## CHRYSTOPHYTA

### Chrysophyceae

*Aulomonas purdyi* Lackey  
*Bicosoeca cylindrica* (Lackey) Bourr.  
*Bitrichia ollula* Fott  
*Cerobodo cf. varians* Skuja  
*Chromulina glacialis* Skuja

*Chrysococcus biporus* Skuja  
*C. minutus* (Fritsch) Nyg.  
*Chrysolykos angulatus* (Willén) Nauwerck  
*C. angulatus f. bicornis* (Willén) Nauwerck  
*C. planctonicus* Mack  
*C. skujai* (Ramberg) Bourr.  
*Desmarella moniliformis* Kent  
*Dinobryon cylindricum* Imhof  
*D. divergens* Imhof  
*D. divergens* var. *schauinslandii* (Lemm.)  
 Brunnth.  
*D. sociale* Ehr.  
*D. sociale* var. *americana* (Brunnth.) Bachmann  
*Epipyxis condensata* (Mack) Hilliard et Asmund  
*E. polymorpha* (Lund) Hilliard et Asmund  
*E. tubulosa* (Mack) Hilliard et Asmund  
*Hydrurus foetidus* (Villars) Trevisan  
*Kephyrion spirale* (Lackey) Conrad  
*Lagenoeca globulosa* Francé  
*Mallomonas* spp.  
*Monas* spp.  
*Monochrysis aphanaster* Skuja  
*M. cf. parva* Skuja  
*Ochromonas simplex* Pascher  
*Pseudokephyrion conicum* (Schiller) Schmid.  
*P. entzii* Conrad  
*Salpingoeca frequentissima* (Zach.) Lemm.  
*Stelaxomonas dichotoma* Lackey  
*Stylopyxis libera* Fott  
*Synura uvella* Ehr.  
*Uroglena americana* Calkins  
*U. volvox* Ehr.  
*Volvochrysis globosa* Schiller

### Haptophyceae

*Chrysochromulina parva* Lackey

### Xanthophyceae

*Mischococcus confervicola* Näg.  
*Ophiocytium majus* Näg.  
*Tribonema cf. affine* G.S. West  
*T. bombycinum* Derb. et Sol.  
*T. minus* Hazen  
*Vaucheria borealis* Hirn

### Bacillariophyceae

*Achnanthes austriaca* Hust.  
*A. brevipes* Ag.  
*A. brevipes* Agardh var. *intermedia* (Kütz.) Cleve



- A. broenlundensis* Foged  
*A. calcar* Cleve  
*A. coarctata* (Bréb.) Grun.  
*A. erdmannensis* Foged  
*A. flathukensis* Foged  
*A. flexella* (Kütz.) Grun.  
*A. fragilarioides* Boye Petersen  
*A. hauckiana* Grun.  
*A. holsti* Cleve  
*A. kryophila* Boye Petersen  
*A. kryophiloides* Foged  
*A. lanceolata* (Bréb.) Grun.  
*A. lanceolata* var. *rostrata* (Östrup) Hust.  
*A. lapponica* Hust.  
*A. linearis* W. Smith  
*A. marraitensis* Foged  
*A. microcephala* (Kütz.) Grun.  
*A. minutissima* Kütz.  
*A. peragalli* Brun et Hérivaud  
*A. subsalsa* Boye Petersen  
*A. thienemanni* Hust.  
*A. østrupi* (A. Cleve) Hust.  
*Amphora coraensis* Foged  
*A. normanni* Rabh.  
*A. obscura* Krasske  
*A. ovalis* Kütz.  
*A. triundulata* Ross.  
*A. veneta* Kütz.  
*Anomoeoneis exilis* (Kütz.) Cleve  
*A. serians* (Bréb.) Cleve  
*A. sphaerophora* (Kütz.) Pfitzer  
*A. zellensis* (Grun.) Cleve  
*Caloneis alpestris* (Grun.) Cleve  
*C. angustivalva* Boye Petersen  
*C. bacillum* (Grun.) Cleve  
*C. clevei* (Lagerst.) Cleve  
*C. fasciata* (Lagerst.) Cleve  
*C. jotunensis* Foged  
*C. schumanniana* (Grun.) Cleve  
*C. silicula* (Ehr.) Cleve  
*Ceratoneis arcus* (Ehr.) Kütz.  
*Cocconeis costata* Greg.  
*C. pediculus* Ehr.  
*C. placentula* Ehr.  
*C. placentula* var. *euglypta* (Ehr.) Cleve  
*C. scutellum* Ehr.  
*Cyclotella antiqua* W. Smith  
*C. bodanica* Ehr.  
*C. comta* (Ehr.) Kütz.  
*C. kützingiana* Thwaites  
*C. pseudostelligera* Hust.  
*C. striata* (Kütz.) Grun.  
*Cylindrotheca gracilis* (Bréb.) Grun.  
*Cymatopleura solea* (Bréb.) W. Smith  
*Cymbella aequalis* W. Smith  
*C. aequalis* W. Smith var. *subaequalis* Grun.  
*C. affinis* Kütz.  
*C. amphicephala* Näg.  
*C. angustata* (W. Smith) Cleve  
*C. austriaca* Grun.  
*C. brehmii* Hust.  
*C. broenlundensis* Foged  
*C. cesati* (Rabh.) Grun.  
*C. cistula* (Hempr.) Grun.  
*C. cuspidata* Kütz.  
*C. cymbiformis* (Kütz.) Van Heurck  
*C. delicatula* Kütz.  
*C. designata* Kramer  
*C. elginensis* Kramer  
*C. erdmannensis* Foged  
*C. gaeumanni* Meister  
*C. gracilis* (Rabh.) Cleve  
*C. hebridica* (Greg.) Grun.  
*C. heteropleura* Ehr.  
*C. hoelii* Foged  
*C. hornii* Foged  
*C. incerta* Grun.  
*C. keilhauii* Foged  
*C. laevis* Näg.  
*C. lanceolata* (Ehr.) Van Heurck  
*C. lapponica* Grun.  
*C. latens* Krasske  
*C. leptoceros* (Ehr.) Grun.  
*C. microcephala* Grun.  
*C. minuta* Hilse ex Rabenh.  
*C. naviculiformis* Auersw.  
*C. norvegica* Grun.  
*C. obscura* Krasske  
*C. obtusa* Greg.  
*C. obtusiuscula* (Kütz.) Grun.  
*C. parva* (W. Smith) Cleve  
*C. perpusilla* A. Cleve  
*C. poxima* Reimes  
*C. sarsii* Foged  
*C. similis* Krasske  
*C. sinuata* Greg.  
*C. spuria* Cleve  
*C. stauroneiformis* Lagerst.  
*C. tumida* (Bréb.) Van Heurck  
*C. turmidula* Grun.  
*C. turgida* (Greg.) Cleve  
*C. variabilis* (Cramer) Heiberg var. *botellus* Lagerst.  
*C. ventricosa* Kütz.  
*Denticula elegans* Kütz.  
*D. tenuis* Kütz.

- D. thermalis* Kütz.  
*Diatoma elongatum* (Lyng.) Ag.  
*D. hiemale* (Lyngbye) Heiberg  
*D. vulgare* Bory  
*Diatomella balfouriana* Grev.  
*Didymosphenia geminata* (Lyngbye) W. Smith  
*Diploneis boldtiana* Cleve  
*D. didyma* (Ehr.) Cleve  
*D. elliptica* (Kütz.) Cleve  
*D. interrupta* (Kütz.) Cleve  
*D. minuta* Boye Petersen  
*D. oculata* (Bréb.) Cleve  
*D. ovalis* (Hilse) Cleve  
*D. peterseni* Hust.  
*D. puella* (Schum.) Cleve  
*Epithemia argus* Kütz.  
*E. sorex* Kütz.  
*E. turgida* (Ehr.) Kütz.  
*E. zebra* (Ehr.) Kütz.  
*Eunotia alpina* (Näg.) Hust.  
*E. arcus* Ehr.  
*E. bigibba* Kütz.  
*E. crista-galli* Cleve  
*E. diodon* Ehr.  
*E. exigua* (Bréb.) Grun.  
*E. faba* (Ehr.) Grun.  
*E. fallax* A. Cleve  
*E. gracilis* (Ehr.) Rabh.  
*E. lapponica* Grun.  
*E. lunaris* (Ehr.) Grun.  
*E. monodon* Ehr.  
*E. papilio* (Grun.) Hust.  
*E. parallela* Ehr.  
*E. pectinalis* (Kütz.) Rabh.  
*E. polydentula* Brun.  
*E. praerupta* Ehr.  
*E. praerupta* var. *bidens* Grun.  
*E. pseudopectinalis* Hust.  
*E. septentrionalis* Östrup  
*E. sudetica* (O. Müller) Hust.  
*E. suecica* A. Cleve  
*E. tenella* (Grun.) Hust.  
*E. triodon* Ehr.  
*E. valida* Hust.  
*E. veneris* (Kütz.) O. Müller  
*Fragilaria aequalis* Heib.  
*F. alpestris* Krasske  
*F. arcus* (Ehr.) Cleve  
*F. capucina* Desmazières  
*F. construens* (Ehr.) Grun.  
*F. crotonensis* Kitton  
*F. hoelii* Foged  
*F. intermedia* Grun.  
*F. lapponica* Grun.  
*F. pinnata* Ehr.  
*F. vaucheriae* Boye Petersen  
*F. virescens* Ralfs  
*Frustular rhomboides* (Ehr.) de Toni var. *saxonica* (Rabh.) de Toni  
*F. vulgaris* (Thwaites) de Toni  
*Gomphonema acuminatum* Ehr.  
*G. angustatum* (Kütz.) Rabh.  
*G. carlsenii* Foged  
*G. constrictum* Ehr.  
*G. gracile* Ehr.  
*G. intricatum* Kütz.  
*G. lagerheimii* A. Cleve  
*G. lanceolatum* Grun. var. *insignis* (Greg.) Cleve  
*G. longiceps* Ehr.  
*G. nathorstii* Foged  
*G. olivaceum* (Lyngbye) Kütz.  
*G. olivaceoides* Hust.  
*G. olivaceoides* var. *spitsbergensis* Foged  
*G. parvulum* Kütz.  
*Gyrosigma scalproides* (Rabh.) Cleve  
*G. spencerii* (W. Smith) Cleve  
*Hantzschia amphioxys* (Ehr.) Grun.  
*Licmophora gracilis* (Ehr.) Grun. var. *anglica* (Kütz.) Peragallo  
*Melosira cataractarum* Hust.  
*M. distans* (Ehr.) Kütz.  
*M. granulata* (Ehr.) Ralfs  
*M. islandica* O. Müller  
*M. italica* (Ehr.) Kütz ssp. *subarctica* O. Müller  
*M. roeseana* Rabh.  
*M. varians* Ag.  
*Meridion circulare* Ag.  
*Navicula absoluta* Hust.  
*N. ahoensis* (Cleve) Hust.  
*N. amphibola* Cleve  
*N. amygdalina* Hust.  
*N. anglica* Ralfs.  
*N. avenacea* (Bréb.) Grun.  
*N. bacilliformis* Grun.  
*N. bacillum* Ehr.  
*N. barentsii* Foged  
*N. bicapitellata* Hust.  
*N. bryophila* Boye Petersen var. *lapponica* Hust.  
*N. cari* Ehr.  
*N. certa* Hust.  
*N. cincta* (Ehr.) Kütz.  
*N. clementis* Grun.  
*N. clemmentioides* Hust.  
*N. cocconeiformis* Greg.  
*N. contenta* Grun.  
*N. crucicula* (W. Smith) Donkin

- N. cryptocephala* Kütz.  
*N. cuspidata* Kütz.  
*N. delicatissima* Hust.  
*N. dicephala* (Ehr.) W. Smith  
*N. digitoradiata* (Greg.) A. Schmidt  
*N. digitulus* Hust.  
*N. diluviana* Krasske  
*N. disjuncta* Hust.  
*N. ekholmensis* Foged  
*N. erdmannensis* Foged  
*N. exigua* (Greg.) O. Müller  
*N. explanata* Hust.  
*N. festiva* Krasske  
*N. gastrum* Ehr.  
*N. gibbula* Cleve  
*N. gracilis* Ehr.  
*N. gregaria* Donkin  
*N. halophila* (Grun.) Cleve  
*N. hasta* Pantocsek  
*N. hungarica* Grun.  
*N. ignobilis* Krasske  
*N. ignota* (Krasske) Lund  
*N. ingrata* Krasske  
*N. ingstadii* Foged  
*N. interglacialis* Hust.  
*N. järnefelti* Hust.  
*N. kotschy* Grun.  
*N. levanderi* Hust.  
*N. londonensis* Foged  
*N. lovenii* Foged  
*N. menisculus* Schum.  
*N. minima* Grun. Ssensu J. W. G. Lund  
*N. minuscula* Grun. var. *alpestris* Hust.  
*N. mutata* Krasske  
*N. mutica* Kütz.  
*N. nansenii* Foged  
*N. naumanni* Hust.  
*N. nordenskiöldii* Foged  
*N. omissa* Hust.  
*N. orvinii* Foged  
*N. paludosa* Hust.  
*N. paulseniana* Boye Petersen  
*N. peregrina* (Ehr.) Kütz.  
*N. perpusilla* Grun.  
*N. peterseni* Hust.  
*N. placentula* (Ehr.) Grun.  
*N. protracta* Grun.  
*N. pseudocryptocephala* Foged  
*N. pseudoscutiformis* Hust.  
*N. pseudosilicula* Hust.  
*N. pseudotenelloides* Krasske  
*N. pupula* Kütz.  
*N. pusilla* W. Smith  
*N. pygmaea* Kütz.  
*N. radiosa* Kütz.  
*N. reinhardtii* Grun.  
*N. rhynchocephala* Kütz.  
*N. rotaeana* (Rabh.) Grun.  
*N. rotunda* Hust.  
*N. salinarum* Grun.  
*N. schadei* Krasske  
*N. schönfeldii* Hust.  
*N. scoresbyi* Foged  
*N. scutiformis* Grun.  
*N. seminulum* Grun.  
*N. similis* Krasske  
*N. skifte* Foged  
*N. smeerenburgensis* Foged  
*N. soehrensensis* Krasske  
*N. strömii* Hust.  
*N. subrotundata* Hust.  
*N. sverdrupii* Foged  
*N. torelii* Foged  
*N. tuscula* (Ehr.) Grun.  
*N. vahl*ii Foged  
*N. variostrata* Krasske  
*N. viridula* Kütz.  
*N. vulpina* Kütz.  
*N. waernensis* Foged  
*Neidium affine* (Ehr.) Cleve  
*N. bisulcatum* (Lagerst.) Cleve  
*N. decoratum* Brun. var. *bergii* Cleve-Euler  
*N. distincte-punctatum* Hust.  
*N. dubium* (Ehr.) Cleve  
*N. iridis* (Ehr.) Cleve  
*N. knuthii* Foged  
*N. kozłowi* Mereschkowsky  
*N. ladogense* (Cleve) Foged  
*N. marraitensis* Foged  
*N. perminutum* A. Cleve  
*N. productum* (W. Smith) Cleve var. *polygibba* Brun.  
*N. roenningii* Foged  
*N. spitsbergense* Foged  
*Nitzschia acuta* Hantzsch  
*N. alpina* Hust.  
*N. amphibia* Grun.  
*N. angustata* (W. Smith) Grun. var. *acuta* Grun.  
*N. bacilliformis* Hust.  
*N. communis* Rabh.  
*N. commutata* Grun.  
*N. denticula* Grun.  
*N. dubia* W. Smith  
*N. fonticola* Grun.  
*N. frustulum* (Kütz.) Grun.  
*N. gracilis* Hantzsch

- N. heufteriana* Grun.  
*N. hybrida* Grun.  
*N. ignorata* Krasske  
*N. kützingiana* Hilse  
*N. mahihaensis* Foged  
*N. palea* (Kütz.) W. Smith.  
*N. paleacea* Grun.  
*N. paleaeformis* Hust.  
*N. palustris* Hust.  
*N. perminuta* Grun.  
*N. pusilla* Grun.  
*N. recta* Hantzsch  
*N. romana* Grun.  
*N. salinicola* Aleem et Hust.  
*N. sinuata* (W. Smith) Grun.  
*N. stagnorum* Rabh.  
*N. thermalis* Kütz. var. *minor* Hilse  
*N. tryblionella* Hantzsch var. *debilis* (Arnott) A. Mayer  
*N. tryblionella* var. *levidensis* (W. Smith) Grun.  
*N. vitrea* Norman  
*Opephora martyi* Héríb.  
*Pinnularia amundsenii* Foged  
*P. andréei* Foged  
*P. appendiculata* (Ag.) Cleve  
*P. appendiculata* Ag. var. *irrorata* Grun.  
*P. balfouriana* Grun.  
*P. biglobosa* (Schum.) A. Cleve-Euler  
*P. boecheri* Foged  
*P. borealis* Ehr.  
*P. braunii* (Grun.) Cleve  
*P. braunii* Grun. var. *amphicephala* (A. Mayer) Hust.  
*P. divergens* W. Smith  
*P. divergentissima* (Grun.) Cleve  
*P. episcopalis* Cleve  
*P. gentilis* (Donkin) Cleve  
*P. gibba* Ehr.  
*P. gracillima* Greg.  
*P. hemiptera* (Kütz.) Cleve  
*P. hustedtii* Mölder  
*P. intermedia* Lagerst.  
*P. interrupta* W. Smith  
*P. isostauron* (Grun.) Cleve  
*P. karelica* Cleve  
*P. kneuckeri* Hust.  
*P. krockii* Grun.  
*P. lailaensis* Foged  
*P. lata* (Bréb.) W. Smith  
*P. macilenta* (Ehr.) Ehr.  
*P. maior* (Kütz.) Cleve  
*P. mesolepta* (Ehr.) W. Smith  
*P. microstauron* (Ehr.) Cleve  
*P. molaris* Grun.  
*P. nodosa* Ehr.  
*P. notata* (Perag. & Héríb.) A. Cleve  
*P. obscura* Krasske  
*P. parva* (Greg.) Cleve var. *minuta* Östrup  
*P. platycephala* (Ehr.) Cleve  
*P. pulchra* Östrup  
*P. richardensis* Foged  
*P. stomatophora* Grun.  
*P. subcapitata* Greg.  
*P. subsolaris* (Grun.) Cleve  
*P. svalbardensis* Foged  
*P. sverdrupii* Foged  
*P. undulata* Greg.  
*P. viridis* (Nitzsch) Ehr.  
*P. viridis* var. *sudetica* (Hilse) Hust.  
*P. wijkensis* Foged  
*Rhoicosphenia curvata* (Kütz.) Grun.  
*Rhopalodia gibba* (Ehr.) O. Müller  
*Stauroneis acuta* W. Smith  
*S. agrestis* Boye Petersen  
*S. anceps* Ehr.  
*S. dilatata* Ehr.  
*S. javanica* (Grun.) Cleve  
*S. kriegei* Patrick  
*S. legumen* (Ehr.) Kütz.  
*S. obtusa* Lagerst.  
*S. phoenicenteron* (Nitzsch) Ehr.  
*S. polymorpha* Lagerst.  
*S. producta* Grun.  
*S. smithii* Grun.  
*Stephanodiscus astraea* (Ehr.) Grun.  
*S. hantzschii* Grun. var. *pusillus* Grun.  
*Synedra acus* Kütz.  
*S. amphicephala* Kütz.  
*S. minuscula* Grun.  
*S. nana* Meister  
*S. pulchella* Kütz.  
*S. rumpens* Kütz. var. *scotica* Grun.  
*S. ulna* (Nitzsch) Ehr.  
*S. vaucheriae* Kütz.  
*Surirella angusta* Kütz.  
*S. gracilis* (W. Smith) Grun.  
*S. nana* A. Cleve-Euler  
*S. ovalis* Bréb.  
*S. ovata* Kütz.  
*Tabellaria flocculosa* (Roth) Kütz.

## RHODOPHYTA

### Rhodophyceae

*Batrachospermum sporulans* Sirod.

## CRYPTOPHYTA

## Cryptophyceae

- Cryptomonas* spp.  
*Cyathomonas truncata* (Fres.) From.  
 \**Katablepharis ovalis* Skuja  
 \**Rhodomonas lacustris* Pascher et Ruttner  
*R. minuta* Skuja var. *nannoplantica* Skuja

## DINOPHYTA

## Dinophyceae

- Amphidinium* sp.  
*Glenodinium pulvisculus* (Ehr.) Stein  
*Gymnodinium lacustre* Schiller  
 \**G. uberrimum* (Allman) Kofoed et Swezy  
*Gyrodinium pascheri* (Suchlandt) Schiller  
*Peridinium aciculiferum* Lemm.  
*P. cunningtonii* Lemm.  
*P. inconspicuum* Lemm.  
*P. willei* Huitfeld-Kaas

## EUGLENOPHYTA

## Euglenophyceae

- Euglena gracilis* Klebs  
*Petalomonas* sp.  
*Strombomonas acuminata* (Schmarda) Defl.  
*Trachelomonas hispida* (Perty) Stein  
*T. volvocina* Ehr.

## CHLOROPHYTA

## Prasinophyceae

- Scourfieldia complanata* G.S. West  
*Tetramitus pyriformis* Klebs  
*Trichloris paradoxa* Scherffel & Pascher

## Chlorophyceae

- Ankistrodesmus falcatus* (Corda) Ralfs

- A. cf. gracilis* (Reinsch) Kors.  
 \**Ankyra judai* (G.M. Smith) Fott  
*Apiocystis brauniana* Näg.  
*Asterococcus superbus* (Cienk.) Scherff.  
*Binuclearia tatrana* Wittr.  
*Botryococcus braunii* Kütz.  
*Carteria ovata* Jacobsen  
*C. turfosa* Fott  
*Chlamydomonas bacillus* (Teiling) Fott  
*C. lateritia* (Wittr.) Lagerh.  
*C. nivalis* (Bauer) Wille  
*C. planctogloea* Skuja  
*C. planctonica* (West et West) Fott  
*Chlorococcum infusionum* (Schränk) Menegh.  
*Chlorogonium cf. perforatum* Skuja  
*Cladophora kjellmaniana* Wittr.  
*Coelastrum cambricum* Archer  
*C. microporum* Näg.  
*Cryocystis japonica* Kol  
*Dictyosphaerium elegans* Bachmann  
*D. primarium* Skuja  
*Dimorphococcus lunatus* A.Br.  
*Diplostauron* sp.  
*Elakatothrix gelatinosa* Wille  
*Eudorina elegans* Ehr.  
*Franceia droescheri* (Lemm.) Smith  
*Geminella interrupta* (Turp.) Lagerh.  
*Gloeocystis gigas* (Kütz.) Lagerh.  
*G. minuta* Willén  
*G. planctonica* (W. et G.S. West) Lemm.  
*Gloeotila mucosa* Kütz.  
*Golenkiniopsis parvula* (Woronich.) Korsch.  
*Gonium sociale* (Dujardin) Warming  
*Koliella longiseta* (Vischer) Hindák  
*Lagerheimia subsalsa* Lemm.  
*L. genevensis* Chod.  
*Microspora floccosa* (Vauch.) Thur.  
*M. pachyderma* (Wille) Lagerh.  
*M. stagnorum* (Kütz.) Lagerh.  
*Monomastix cf. pyrenigera* Skuja  
*Monoraphidium contortum* (Thur.) Kom.-Legn.  
*M. convolutum* (Corda) Kom.-Legn.  
*M. griffithii* (Berkel) Kom.-Legn.  
 \**M. komarkovae* Nygaard  
*M. minutum* (Näg.) Kom.-Legn.  
*Oedogonium oblongum* Wittrock  
*Oocystis parva* W. et G.S. West  
*O. pusilla* Hansg.  
*O. solitaria* Wittr.  
*O. submarina* Lagerh.  
*Pandorina morum* (Müller) Bory  
*Paulschulzia pseudovolvox* (Schulz) Skuja  
*Pediastrum boryanum* (Turpin) Menegh.

- P. boryanum* var. *granulatum* (Kütz.) A. Br.  
*P. boryanum* var. *longicorne* Reinsch  
*P. braunii* Wartm.  
*P. duplex* Meyen  
*P. integrum* Näg. f. *granulatum* Racib.  
*P. muticum* Kütz.  
*Planctonema lauterbornii* Schmidle  
*Pleurococcus vulgaris* Menegh.  
*Prasiola crispa* (Lightf.) Ag.  
*P. furfuracea* (Mert.) Menegh.  
*P. fluviatilis* (Sommerf.) Aresch.  
*Protoderma viride* Kütz.  
*Raphidonema nivale* Lagerh.  
*Rhizoclonium hieroglyphicum* (Ag.) Kütz.  
*Scenedesmus acuminatus* (Lagerh.) Chod.  
*S. acutus* Meyen  
*S. ecornis* (Ralfs) Chod.  
*S. granulatus* W. et G.S. West  
*S. quadricauda* (Turpin) Brébisson  
*S. spinosus* Chod.  
*Scotiella antarctica* Fritsch  
*S. antarctica* Fritsch f. *svalbardensis* E. Kol et S. Eurola  
*S. nivalis* (Shuttleworth) Fritsch  
*Sphaerocystis Schroeteri* Chod.  
*Stichococcus bacillaris* Näg.  
*S. nivalis* Chod.  
*S. scopulinus* Hazen  
*Tetraëdron caudatum* (Corda) Hansg. var. *incisum* Lagerh.  
*T. minimum* (A.Br.) Hansg.  
*T. minimum tetralobulatum* Reinsch  
*Tetraspora gelatinosa* (Vauch.) Desv.  
*Trochiscia cryophila* Chod.  
*T. reticularis* (Reinsch) Hansg.  
*Ulothrix aequalis* Kütz.  
*U. moniliformis* Kütz.  
*U. oscillariana* Kütz.  
*U. subtilis* Kütz.  
*U. zonata* (Web. et Mohr) Kütz.  
*Willea irregularis* (Wille) Schmidle
- C. leibleinii* Kütz. var. *minimum* Schmidle  
*C. lunula* (Müll.) Nitzsch  
*C. navicula* (Bréb.) Lütken.  
*C. parvulum* Näg.  
*C. pseudolunula* Borge  
*C. spetsbergense* Borge  
*C. striolatum* Ehr.  
*C. tumidum* Johnson  
*C. venus* Kütz.  
*Cosmarium anceps* Lund.  
*C. annulatum* (Näg.) De Bary  
*C. arrosum* Nordst.  
*C. attenuatum* Bréb.  
*C. biclavatum* Borge  
*C. bioculatum* Nordst.  
*C. biretum* Bréb.  
*C. biretum* var. *trigibberum* Nordst.  
*C. bodanica* Ehr.  
*C. botrytis* Menegh.  
*C. capitulum* Roy et Biss. var. *groenlandicum* Börgesen  
*C. cinctutum* Nordst.  
*C. connatum* Kirchn.  
*C. conspersum* Ralfs var. *latum* (Bréb.) W. et G.S. West  
*C. contractum* Kirchn. var. *ellipsoideum* (Elfv.) W. et G. S. West  
*C. costatum* Nordst.  
*C. crenatum* Ralfs  
*C. cucumis* Ralfs  
*C. cyclicum* Lund. var. *arcticum* Nordst.  
*C. cymatopleurum* Nordst.  
*C. debaryi* Arch.  
*C. decedens* (Reinsch) Racib. var. *borgei* Krieger  
*C. depressum* (Näg.) Lund.  
*C. globosum* Bulnh.  
*C. granatum* Bréb.  
*C. hammeri* Reinsch var. *croasdaleae* Kriey et Gerl.  
*C. hammeri* var. *homalodermum* (Nordst.) West  
*C. hexalobum* Nordst.  
*C. holmiense* Lund.  
*C. holmiense* var. *nordstedtii* Racib.  
*C. holmii* Wille  
*C. hornavanense* Gutw. var. *dubovianum* (Lütken.) Ruz.  
*C. impressulum* Elfv.  
*C. incertum* Schmidl.  
*C. laeve* Rabb.  
*C. margaritatum* (Lund.) Roy et Biss.  
*C. margaritifera* (Turp.) Menegh.  
*C. microspinctum* Nordst.  
*C. nasutum* Nordst.

### Conjugatophyceae

- Actinotaenium curtum* (Bréb.) Teil. var. *attenuatum* (Bréb.) Teil. ex Ruzicka et Pouzar  
*Ancylonema nordenskiöldii* Berggren  
*Closterium acerosum* (Schr.) Ehr. ex Ralfs  
*C. acutum* Bréb.  
*C. diana* Ehr.  
*C. ehrenbergii* Menegh.  
*C. leibleinii* Kütz. ex Ralfs

- C. norimbergense* Reinsch var. *depressum* West et West  
*C. novae semliae* Wille  
*C. obtusatum* Schmidl.  
*C. ochthodes* Nordst.  
*C. pachydermum* Lund.  
*C. parvulum* Bréb.  
*C. parvulum* var. *minus* Först.  
*C. pericymatium* Nordst.  
*C. phaseolus* Bréb var. *elevatum* Nordst.  
*C. planogranatum* Croasol.  
*C. pokornyanum* (Grun.) West  
*C. portianum* Arch. forma Nordst.  
*C. praemorsum* Bréb.  
*C. protumidum* Nordst.  
*C. pseudoconnatum* Nordst.  
*C. pseudoholmii* Borge  
*C. pseudopyramidatum* Lund.  
*C. pulcherrimum* Nordst. var. *boreale* Nordst.  
*C. punctulatum* Bréb.  
*C. pycnochondrum* Nordst.  
*C. pyramidatum* Bréb.  
*C. quadratum* Ralfs  
*C. quasillus* Lund.  
*C. regnesi* Reinsch  
*C. sinuosum* Lund. var. *decedens* (Reinsch) Nordst.  
*C. solidum* Nordst.  
*C. speciosum* Lund.  
*C. spetsbergense* Nordst.  
*C. subcostatum* Nordst.  
*C. subcostatum* var. *spetsbergense* Borge  
*C. subcrenatum* Hantzsch  
*C. subimpressulum* Borge  
*C. subquasillus* Boldt  
*C. subreniforme* Nordst.  
*C. subspeciosum* Nordst.  
*C. tetraophthalmum* (Kütz.) Ralfs  
*C. tetraophthalmum* var. *lundellii* Wittr.  
*C. tumens* Nordst.  
*C. tumidum* Lund.  
*C. turpinii* Bréb.  
*C. turpinii* var. *eximum* W. et G.S. West  
*C. umbilicatum* Lütke.  
*C. wittrockii* Lund.  
*Cosmoastrum punctualatum* (Brébal.  
*Cylindrocystis brebissonii* Menegh.  
*C. crassa* De Bary  
*Euastrum binale* (Turp.) Ehrenb. ex Ralfs ssp. *dissimile* Nordst.  
*E. dubium* Näg.  
*E. elegans* (Bréb.) Kütz.  
*E. rostratum* Ralfs  
*E. tetralobum* Nordst.  
*E. wiesneri* Stockm.  
*Gonatozygon aculeatum* Hastings  
*G. brebissonii* De Bary  
*G. pilosum* Wolle  
*Hyalotheca dissiliens* (Smith) Bréb. var. *bidentula* Nordst.  
*Mougotia* sp.  
*Penium conspersum* Wittr.  
*P. curtum* Bréb.  
*P. polymorphum* Perty  
*Pleurotaenium trabecula* (Ehr.) ex Näg.  
*P. truncatum* Näg.  
*Sphaerosma excavatum* Ralfs  
*Spirogyra grevilleana* (Hass.) Kütz.  
*S. tenuissima* (Hass.) Kütz.  
*Spirotaenia condensata* Bréb.  
*S. endophila* (Bréb.) Arch.  
*S. obscura* Ralfs f. *minor* Lund.  
*Staurostrum acarides* Nordst.  
*S. aculeatum* (Ehrenb.) Menegh. var. *ornatum* Nordst.  
*S. alternans* Bréb.  
*S. amoenum* Hilse  
*S. amoenum* f. *spetsbergensis* Nordst.  
*S. arctiscon* (Ehrenb.) Lund.  
*S. avicula* Bréb.  
*S. bieneanum* Rabh.  
*S. bieneanum* f. *spetsbergensis* Nordst.  
*S. borgeanum* Schmidl.  
*S. brebissonii* Arch.  
*S. clepsydra* Nordst.  
*S. cyrtocerum* Bréb.  
*S. dickiei* Ralfs  
*S. dilatatum* Ehr.  
*S. furcatum* (Ehr.) Bréb. var. *senarium* (Ehr.) Nordst.  
*S. furcigerum* (Bréb.) Arch.  
*S. hexacerum* (Ehr.) Wittr.  
*S. hirsutum* Bréb.  
*S. inflexum* Bréb.  
*S. lanceolatum* Arch.  
*S. lapponicum* (Schmidl.) Grönbl.  
*S. longipes* (Nordst.) Teil. var. *contractum* Teil.  
*S. lunatum* Ralfs  
*S. margaritaceum* (Ehr.) Menegh.  
*S. megalonotum* Nordst.  
*S. minutissimum* Reinsch  
*S. mucronatum* Ralfs  
*S. muticum* Bréb.  
*S. oligacanthum* Bréb.  
*S. orbiculare* (Ehr.) Ralfs  
*S. pachyrhynchum* Nordst.

*S. petsamoense* Järnefelt var. *minus* (Messinkommer) Thomasson  
*S. pilosum* (Näg.) Arch.  
*S. polymorphum* Bréb.  
*S. punctulatum* Bréb.  
*S. pygmaeum* Bréb.  
*S. rhabdophorum* Nordst.  
*S. saxonicum* Bulnh.  
*S. seabaldi* Reinsch var. *ornatum* Nordst.  
*S. senarium* (Ehr.) Ralfs  
*S. sexcostatum* Bréb.  
*S. sibiricum* Borge  
*S. spongiosum* Bréb.  
*S. subscrabum* Nordst.  
*S. subsphaericum* Nordst.  
*S. trapezicum* Boldt  
*S. varians* Racib. var. *badense* Schmidl.  
*Staurodesmus cuspidatus* (Bréb.) Teil.  
*Tetmemorus laevis* (Kütz.) Ralfs  
*Xanthidium armatum* Bréb. ex Ralfs  
*Zygnema* sp.  
*Zygonium ericetorum* Kütz.

## CHAROPHYTA

### Charophyceae

*Chara aspera* Willd. f. *spitsbergensis* Nordst.  
 (= *C. canescens* Loiseux.)

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