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The complex liverwort flora of the Faeroe Isles

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The liverwort flora of the Faeroe Isles is presented with distribution maps of the approximately 132 taxa recorded from the islands. The flora is the result of a climate with high yearly precipitation, relatively mild winters, and rainy summers, comparable to the Queen Charlotte Islands. The distribution and phytogeography of some Faeroese liverworts are discussed. Many taxa have an Atlantic or subatlantic distribution, probably indicating the route invading species took at the end of Pleistocene. Some taxonomic notes and annotations pertinent to Faeroese liverworts are included. *Calypogeia paludosa* Warnst. is reinterpreted as a variety of *C. fissa* (L.) Raddi.

The Faeroe Isles have a fairly rich liverwort flora, resulting from a climate with high yearly precipitation, relatively mild winters and rainy summers. The flora is comparable to that of the Queen Charlotte Islands on the Pacific coast of British Columbia, Canada, although the Faeroes are placed about 10^0 further to the north. The Faeroe and Queen Charlotte Islands do not have many true oceanic species in common; instead the Faeroes are characterized by many taxa with an Atlantic or subatlantic distribution, which probably indicates the route many invading species took at the end of Pleistocene. A few species have their only Nordic occurrences at the Faeroe Isles, including *Acrobolbus wilsonii* Nees, *Aphanolejeunea microscopica* (Taylor) A.Evans, *Frullania teneriffae* (F.Weber) Nees, *Jungermannia paroica* (Schiffn.) Grolle, *Mastigophora woodsii* (Hook.) Nees, *Metzgeria leptoneura* Spruce and *Plagiochila carringtonii* (Balf.) Grolle. The North American moss *Bryum miniatum* Lesq. also has its only known European occurrence at the Faeroe Isles, where only male plants have been found.

Geologically, the Faeroe Isles are a part of the North Atlantic basalt area and consist of Tertiary igneous formations (Rasmussen 1990). The strata are probably of Eocene–Oligocene age, and macrofossils of *Metasequoia glyptostroboides* H.H.Hu & W.C.Cheng (syn. *M. occidentalis* (J.S.Newberry) Chaney) have been found in interbasaltic layers of coal. Generally, intercalated sediments consist of layers of tuff, fluviatile conglomerates, clay and sandstone. Coal and clay strata occur on Suðuroy, Mykines and the western part of Vágar. A summary of the geology, soils, climate, flora and habitat diversity of the Faeroes is given in Lewinsky and Jóhansen (1987).

In preparation for the 2017 Nordic Bryological Society Excursion to the Faeroe Isles, an updated list of the liverwort taxa known to occur there is presented (Appendix 1), along with distribution maps and taxonomic and phytogeographic notes. Distributional data are based on herbarium collections (mostly in herb. C) that were checked and (for those in C) databased by the author. The excursion will take place on 2–9 July and is jointly organized by the author and Tomas Hallingbäck of the Swedish University of Agricultural Sciences, Uppsala. It is anticipated that a summary of our current knowledge of the Faeroese liverwort flora will be a useful resource to the excursion participants, and to the public.

The number of species and subspecies of liverworts known to occur on the islands is at present 132. The liverworts of the Faeroes include 40 genera of *Jungermanniales* (*Acrobolbus* Nees, *Anastrepta* (Lindb.) Schiffn., *Anastrophyllum* (Spruce) Steph., *Anthelia* (Dumort.) Dumort., *Aphanolejeunea* A.Evans, *Bazzania* Gray, *Blepharostoma* (Dumort.) Dumort., *Calypogeia* Raddi, *Cephalozia* (Dumort.) Dumort., *Cephaloziella* (Spruce) Schiffn., *Chiloscyphus* Corda, *Cololejeunea* (Spruce) Schiffn., *Diplophyllum* (Dumort.) Dumort., *Douinia* (C.E.O.Jensen) H.Buch, *Eremonotus* Lindb. & Kaal., *Frullania* Raddi, *Gymnocolea* (Dumort.) Dumort., *Gymnomitrion* Corda, *Haplomitrium* Nees, *Herbertus* Gray, *Hygrobiella* Spruce, *Jungermannia* L., *Kurzia* G.Martens, *Lejeunea* Libert, *Lophozia* (Dumort.) Dumort., *Marsupella* Dumort., *Mastigophora* Nees, *Mylia* Gray, *Nardia* Gray, *Odontoschisma* (Dumort.) Dumort., *Plagiochila* (Dumort.) Dumort., *Pleurocladula* Grolle, *Pleurozia* Dumort., *Porella* L., *Ptilidium* Nees, *Radula* Dumort., *Saccogyna* Dumort.,

Scapania (Dumort.) Dumort., *Sphenolobopsis* R.M.Schust. & Kitag. and *Tritomaria* Loeske), 6 genera of *Metzgeriales* (*Aneura* Dumort., *Blasia* L., *Metzgeria* Raddi, *Moerchia* Gottsche, *Pellia* Raddi and *Riccardia* Gray), and only five genera of *Marchantiales* (*Conocephalum* Hill, *Lunularia* Adans., *Marchantia* L., *Preissia* Corda and *Riccia* L.).

Sexual condition is characterized for most of the liverworts of the Faeroes (e.g. in Jensen 1901), of which about 65% are unisexual, about 25% are bisexual, and the rest have not been found fertile. They were probably all originally unisexual, but have completely lost sexuality (depleted one or both sexes). Taxa lacking both sexual and vegetative reproduction are extremely vulnerable to over-collecting.

History of the investigation of the liverwort flora of the Faeroe Isles

Christian Jensen collected bryophytes on 8 of the 18 islands of the Faeroes between 7 May and 14 July 1896. His ca 500 liverwort collections (stored in herb. C) were the main basis for his contribution on liverworts to the 'Botany of the Faeroes' (Jensen 1901), where he listed 95 species. He also studied some older collections, e.g. those made by E. Rostrup and C. A. Feilberg in the summer of 1867. Jensen later redetermined some of his own collections from the Faeroes during his work on 'Danmarks mosser' (Jensen 1915, 1923). Buch (1928) also corrected collections from the Faeroes stored in C.

Eva Clausen collected on 7 of the 18 islands of the Faeroes, in 1950, 1957, 1963 and 1970, resulting in ca 557 collections stored in C; in 1950 especially, some of the northern islands were investigated. New species from the Faeroes included *Jungermannia paroica, Lophozia heterocolpos* (C.Hartm.) M.Howe, *L. rubescens* R.M.Schust. & Damsh. (treated by Clausen as a small modification of *L. hatcheri* (A.Evans) Steph.), *Marsupella sprucei* (Limpr.) Bernet (in fact already reported by Jensen 1915), who revised his earlier record of *M. sparsifolia* (Jensen 1901) from Sandoy, Tindur), *Moerchia hibernica* (Hook.) Gottsche, *Riccardia incurvata* Lindb., *Scapania aspera* M.Bernet & Bernet (checked by David Long, herb. E) and *S. lingulata* H.Buch.

Anker Pedersen visited the Faeroes in July–August 1956, resulting in about 140 collections (in C) of liverworts especially from Suðuroy, including 43 species.

I visited 8 of the 18 islands of the Faeroes, in 1961, 1973, 2000 (Damsholt 2002b), and 2014 (with T. Hallingbäck), adding 404 collections of liverworts to herb. C. Species new to the Faeroes (cf. Ellis et al. 2016) included: *Calypogeia azurea* Stotler & Crotz, *Conocephalum salebrosum* Szweyk., Buczk. & Odrzyk, *Jungermannia sphaerocarpa* Hook., *Lophozia debiliformis* R.M.Schust. & Damsh., *Pellia endiviifolia* (Dicks.) Dumort., *Plagiochila punctata* Taylor, *Porella obtusata* (Taylor) Trevis. and *Riccia beyrichiana* Lehm. In 2015, I spent one week collecting with T. Hallingbäck on the northern islands and we added *Cephaloziella spinigera* (Lindb.) Warnst., *Lunularia cruciata* (L.) Lindb., *Marsupella spiniloba* R.M.Schust. & Damsh., *Scapania calcicola* (Arnell & J.Perss.) Ingham and *Tritomaria exsectiformis* (Breidl.) Loeske to the liverwort flora of the Faeroe Isles. The common species *Blepharostoma trichophyllum* (L.) Dumort. was also collected with gemmae for the first time in the Faeroes. In 2016, we again returned to the Faeroes, spent one week collecting on five islands, and added *Eremonotus myriocarpus* (Carrington) Lindb. & Kaal., *Marsupella adusta* (Nees) Spruce and *Radula complanata* ssp. *complanata* (L.) Dumort. (paroicous) to the Faeroese flora. British and American collectors including Andrews (1915), Alan Crundwell, John Birks, Averis and Averis (1991) and others have reported additional species, some of which I have not found.

Pleistocene refugia and their influence on the composition of the extant liverwort flora

Palynological studies indicate a sudden appearance of vascular plants in the Faeroes at the end of Pleistocene, but do not reveal anything about the bryophytes, some of which could have survived in refugia, high up in the mountains above the glaciers. The recent discovery (Grolle and Meister 2004) of *Ptilidium pulcherrimum* (Weber) Hampe and other species in Baltic amber dating from the Eocene (37–54.8 mya) demonstrates that some species from the early Tertiary can still be found reproducing sexually today. Other species of Tertiary age have lost sexuality over time (depletion of one or both sexes), including several species that lack gemmae and reproduce only by branching or fragmentation, e.g. *Anastrophyllum donnianum* (Hook.) Steph., *Mastigophora woodsii*, *Pleurozia purpurea* Lindb. and *Scapania ornithopodioides* (With.) Waddell. Today, these species are not found with sporophytes, but they could have been dispersed to the Faeroes by spores prior to Pleistocene.

In the Faeroes, such species became spatially fixed, except for the possibility of dispersal by fragments. Species like *Anastrophyllum donnianum* and *Plagiochila carringtonii* (the latter not reported from the northern isles) occur among stones in screes where putative refugia could have been situated, often on the northeast side of the highest mountains, probably above the upper margins of local Pleistocene glaciers. In the postglacial period, refugial species would have dispersed down the mountain slopes as they gradually became free of ice. This is especially likely for species able to disperse via spores or gemmae, e.g. *Diplophyllum albicans* (L.) Dumort., *Frullania tamarisci* (L.) Dumort. and *Marsupella emarginata* (Ehrh.) Dumort., all of which are very common today on grassy slopes and in ravines. Vegetative dispersal by fragments is possible in *Ptilidium ciliare* (L.) Hampe and may explain the general distribution of that species in Greenland (Damsholt 2013). Similarly, fragmentation may explain the general distribution of *Mastigophora woodsii*, *P. ciliare* and *Pleurozia purpurea* in the Faeroes, where these species are more or less frequent on humid grassy slopes.

The rocky ravines or clefts (gjógv) found in the Faeroes were formed after the retreat of the glaciers and are still developing today. They are floristically richer than any other habitat in the Faeroe Isles and include species from an earlier climatic period (e.g. the hypsithermal), such as *Acrobolbus wilsonii*, *Aphanolejeunea microscopica*, *Harpalejeunea molleri* (Steph.) Grolle, *Lejeunea patens* Lindb., *Metzgeria leptoneura* and *Radula aquilegia* (Hook.f. & Taylor) Gottsche, Lindenb. & Nees.

The mountain summit flora of the Faeroes

The soils of the Faeroe Isles are generally acidic, often with a thick organic horizon, are high in silt and low in clay-sized

particles, and are derived from the disintegration of basalt and tuff. The soil on mountain summits has been leached for a longer time than the soil below, probably resulting in acidification of the summits and creating habitats suitable for boreal and arctic-alpine species that are common on mountain summits of the Scandes. Examples of such species are *Anthelia juratzkana* (Limpr.) Trevis., *Gymnomitrion apiculatum* (Schiffn.) Mull.Frib., *G. concinnatum* (Lightf.) Corda, *G. corallioides* Nees, *G. obtusum* Lindb., *Hygrobiella laxifolia* (Hook.) Spruce (on wet rock walls of ravines), *Jungermannia gracillima* Sm., *J. sphaerocarpa*, *Lophozia hatcheri*, *L. debiliformis*, *Marsupella adusta*, *M. brevissima* (Dumort.) Grolle (several specimens have been found on Slættaratindur, the highest mountain on Eysturoy, and also in snow beds at the summit of Villingadalsfjall on Viðoy), *M. spiniloba*, *M. sprucei*, *Nardia geoscyphus* (De Not.) Lindb., *Pleurocladula albescens* (Hook.) Grolle (found only once, in snow beds at the summit of Villingadalsfjall, alt. 841 m), and *Tritomaria quinquedentata* (Huds.) H.Buch. The record of *T. quinquedentata* with gemmae from a lowland locality in the Faeroes, at Glyvursreyn, south of Tórshavn (Jensen 1915: 110) is remarkable; gemmae occur on the leaf apices of a plant growing as a pioneer on a rock surface. Gemmae could be responsible for the wide distribution of this species in the Faeroes, although they are very rarely found today.

Phytogeographic groups

The liverwort flora of the Faeroe Isles includes several groups of species with common biogeographic histories. Some of the more well-defined groups are discussed below.

Endemic

Species endemic to Europe including Turkey and Macaronesia: *Cololejeunea calcarea* (Libert) Schiffn., *Frullania fragilifolia* (Taylor) Gottsche, Lindenb. & Nees, *F. tamarisci* ssp. *tamarisci, Lejeunea patens*, *Riccardia incurvata*, *Scapania aspera*, *S. gracilis* Lindb.

In eastern North America *Frullania tamarisci* ssp. *tamarisci* is partly replaced by *F. tamarisci* ssp. *asagrayana* (Mont.) S.Hatt. This is possibly an example of imperfect subspeciation dating back to the opening of the Atlantic Basin ca 60 mya, with subsequent introgression between southeastern (ssp. *asagrayana*) and northeastern (close to ssp. *tamarisci*) populations (Schuster 1983: 433).

Cosmopolitan

Cosmopolitan species: *Aneura pinguis* (L.) Dumort., *Metzgeria conjugata* Lindb., *M. leptoneura*. *Metzgeria leptoneura* is really subcosmopolitan, in oceanic and hyperoceanic areas; part of its range is recent, but it is surely relictual in North America (Schuster 1983: 501). Dispersal is probably via spores.

Bipolar

Bipolar species**:** *Anthelia juratzkana* (Limpr.) Trevis., *Cephalozia bicuspidata* (L.) Dumort. *s.l.*, *C. pleniceps* (Austin) Lindb., *Cephaloziella divaricata* (Sm.) Schiffn., *C. varians* (Gottsche) Steph., *Chiloscyphus coadunatus* (Sw.) J.J.Engel & R.M.Schust., *Lophozia excisa* (Dicks.) Dumort., *L. hatcheri*, *L. heterocolpos*, *Marsupella sprucei*, *Metzgeria violacea* (Ach.) Dumort. (syn. *M. fruticulosa* (O.F.Müll.) A.Evans), *Ptilidium ciliare*. Schuster (1983: 597) noted that 70–75% of bipolar liverworts are bisexual and ca 50% develop gemmae, concluding that dispersal effectiveness is enhanced by both bisexuality, which promotes fertilization and spore production, and by vegetative propagation.

Oceanic

Oceanic species: *Anastrepta orcadensis* (Hook.) Schiffn., *Anastrophyllum donnianum*, *Douinia ovata* (Dicks.) H.Buch, *Frullania teneriffae*, *Marsupella adusta*, *Mastigophora woodsii*, *Pleurozia purpurea*, *Scapania ornithopodioides*.

Liverworts common to the Faeroes and Pacific North America are true oceanic species, occurring in the western parts of both the New World and the Old World. Most of these species are of Tertiary age and were probably dispersed to the Faeroes after the deposit of the last of the three basaltic series (not having been able to survive a period with lava deposition). The climate of northern Laurasia at the end of the Cretaceous period before the breaking-up and creation of the Atlantic is described as being more humid and milder than today. It is therefore possible that the oceanic bryoflora of northwestern Europe once had a continuous distribution across northern Laurasia to Pacific North America. The Faeroes were formed by volcanic activity in the early part of the Tertiary. As the climate cooled in the northern zone and the Atlantic opened up, separating the continents, the bryoflora may have extended southwards to suitable climates in both Atlantic Europe and Pacific North America, and then survived only in these areas, explaining the similarity of the floras. These areas would later become centers of dispersal. *Bryum miniatum*, known from the west coast of North America, is an example of a moss with an oceanic distribution.

In the Faeroes *Anastrepta orcadensis* is frequently found with gemmae, while in Pacific North America it is dispersed by fragments (Schofield 2002). Schuster (1983: 496, 518, Fig. 21) suggested that *A. orcadensis* is a Tertiary relict with an almost continuous boreal distribution, which has suffered restriction through regional extinctions during extensive periods of low precipitation, mainly in the Pleistocene. Female plants are only known from areas with high humidity: Jørgensen (1896, 1902) reported perianths from western Norway; and in *Hallingbäck & Damsholt 16-006* from Grønaskarðskil (in C) the plants are gynoecial.

Anastrophyllum donnianum is not found with sex organs in the Faeroe Isles. It is apparently a relict that had a wider distribution in the Tertiary.

Douinia ovata is a relictual species that probably had a wider postglacial range during the hypsithermal period (Schuster 1988: 136). In the Faeroes *D. ovata* is mainly found on low-lying boulders below the upper basaltic layers in the eastern parts of the isles (e.g. *Hallingbäck & Damsholt 16-001*, with sporophytes, C).

Frullania teneriffae, not recorded with sporophytes from the Faeroes, was recently reported from Douglas Island, southeast Alaska (*Seppelt 27041*), which consequently places this liverwort in the group of true oceanic species, unless the Alaskan collection represents a modification of *F. tamarisci* ssp. *nisquallensis* (Sull.) S. Hatt. with inconspicuous or only sporadically occurring ocelli.

Marsupella adusta is recorded from Pacific North America (Godfrey 1977) and was found in the Faeroes in 2016 (*Hallingbäck 48677*, C).

Mastigophora woodsii is not known with sex organs and is probably only spread by fragments. It is another Tertiary relict with a putative antipodal origin.

Pleurozia purpurea is not known with sex organs from the Faeroes, and is probably dispersed by fragments.

Scapania ornithopodioides is not known with sex organs. Gemmae are very rare in Great Britain and are not known from the Faeroes. Like *M. woodsii*, *S. ornithopodioides* is a Tertiary relict with a putative antipodal origin.

Amphiatlantic

Amphiatlantic species: *Jungermannia gracillima*, *Lejeunea cavifolia* (Ehrh.) Lindenb., *Marsupella funckii* (F.Weber & D.Mohr) Dumort., *Odontoschisma sphagni* (Dicks.) Dumort., *Pellia epiphylla* (L.) Corda, *Radula complanata* ssp. *lindenbergiana* (C.Hartm.) R.M.Schust., *Riccardia chamedryfolia* (With.) Grolle (holarctic), *Scapania lingulata.*

Radula complanata ssp. *complanata*, which is paroicous, has only been found once on the Faeroe Isles, on the bark of the stem of a planted *Acer campestre* L. in a local park (Tórshavn, Viðarlundin, 2016, *Hallingbäck & Damsholt 16-024*, C).

Atlantic

Atlantic species: *Acrobolbus wilsonii*, *Aphanolejeunea microscopica*, *Harpalejeuna molleri*, *Herbertus stramineus* (Dumort.) Trevis., *Plagiochila punctata*, *P. spinulosa* (Dicks.) Dumort., *Radula aquilegia*, *Saccogyna viticulosa* (L.) Dumort.

Also sometimes called oceanic or euoceanic species, these plants occur in the Atlantic isles (Great Britain, Ireland, Macaronesia, etc.), western France, and northwest Spain, but are not known from western North America. The Atlantic species of the Faeroe Isles are interpreted as probably being postglacial hypsithermal immigrants, where sex expression was suppressed in some species following climate change, and these species only persist as vegetative populations today. A similar loss of fecundity probably caused by failing wind pollination was reported from populations of ordinary western European grasses like *Ammophila arenarea* (L.) Link and *Thinopyrum junceiforme* (Á.Löve & D.Löve) Á.Love, which are only known from the very few sand dunes of the Faeroe Isles (Ostenfeld 1906: 53). Similarly, the absence of *Betula* L. on the Faeroes could be explained by climatic difficulties in pollination (as well as herbivory by sheep).

In the Faeroes, only female plants of *Acrobolbus wilsonii* are known, and sporophytes of *Aphanolejeunea microscopica* are not known.

The sporophytes of *Harpalejeunea molleri*, *Plagiochila punctata* and *P. spinulosa* are unknown. The two *Plagiochila* species are probably dispersed by fragments, like *P. asplenioides* ssp. *porelloides* (Nees) R.M.Schust. (Schuster 1983: 474).

Herbertus stramineus is considered to be an exclusively Atlantic species; the population in the unglaciated southern Appalachians of eastern North America is referred to *H. tenuis* A.Evans (syn. *H. aduncus* ssp. *tenuis* (A.Evans) H.A.Mill.). The Icelandic population that was included by Schuster (1983: 487, Fig. 2) in *H. aduncus* (Dicks.) Gray *s.l.* represents *H. stramineus* (Jóhannsson 1999), which was excluded from the liverwort flora of Pacific North America by Schofield (2002). Only male plants are found at the Faeroes.

A male plant of *Radula aquilegia* from the Faeroes is illustrated in Damsholt (2002a, pl. 241, 2) Sporophytes have not been found in the Faeroes and are rare in Great Britain. Distribution: western Europe, Great Britain, northwest Spain, Macaronesia, the Himalayas and China.

A gynoecial specimen of *Saccogyna viticulosa* from the Faeroes is illustrated in Damsholt (2002a, pl. 157). Sporophytes have very rarely been found in Great Britain.

Subatlantic (suboceanic)

Subatlantic (suboceanic) species: *Calypogeia arguta* Nees & Mont., *C. azurea*, *Cololejeunea calcarea*, *Frullania fragilifolia, Jungermannia paroica* , *Lejeunea patens, Metzgeria violacea , Odontoschisma sphagni*, *Porella obtusata*, *Riccardia incurvata, Scapania aspera*, *S. gracilis*.

In North America *Cololejeunea calcarea* is replaced by *C. biddlecomiae* (Pearson) A.Evans, a speciation event that occurred after the opening of the Atlantic 50–60 mya (Schuster 1983: 287).

Jungermannia paroica has a western European distribution (Great Britain, France, Belgium and Germany). It has been found in the Faeroes with sporophytes (Damsholt 2002a, pl. 82, 2–3). A recent collection (*Hallingbäck & Damsholt 16-061*) had leaf cells with 2–13 oil-bodies, whereas sympatric *J. obovata* had the ordinary 2–6 oil-bodies per cell.

In the Faeroes, *Lejeunea patens* produces perianths frequently, but sporophytes only occasionally. It has an Atlantic-Mediterranean distribution.

Metzgeria violacea (syn. *M. fruticulosa*) occurs in Chile, Argentina, the Pacific Northwest, and northwestern and central Europe (Grolle and So 2003). It may have an antipodal origin.

Formerly treated as an amphiatlantic and suboceanic plant (Alaska, British Columbia), *Odontoschisma sphagni* is in fact probably boreal and was recently recorded from the high Arctic, in northwest Svalbard (Ellis et al. 2016). In Europe *O. sphagni* is considered to be a subatlantic species. It is rarely found with sporophytes in Great Britain.

Porella obtusata has an Atlantic-Mediterranean distribution (Italy, Tunisia, Portugal, Spain, etc.). The sporophyte is not known from the Faeroes and the British Isles.

Both *Scapania aspera* and *S. gracilis* are normally found with gemmae, but these have not been reported from the Faeroes. One of the many Faeroese collections of *S. gracilis* in herb. C has sporophytes. *Scapania aspera* is very rarely collected in the Faeroes and I have not heard reports of reproductive structures.

Liverworts known from neighboring countries but not yet recorded from the Faeroe Isles

Species known from Great Britain, western Norway and Iceland

Anastrophyllum minutum (Schreb.) R.M.Schust., *A. sphenoloboides* R.M.Schust. (Norway, Sweden, and Greenland), *Athalamia* (*Clevea*) *hyalina* (Sommerf.) S.Hatt., *Chiloscyphus minor* (Nees) J.J.Engel & R.M.Schust. (not known to Great Britain), *Cladopodiella francisci* (Hook.) Jørg., *Frullania dilatata* (L.) Dumort., *Harpanthus flotovianus* (Nees) Nees,

Jungermannia hyalina Lyell, *Lepidozia reptans* (L.) Dumort., *Lophozia atlantica* (Kaal.) Mull.Frib., *L. badensis* (Gottsche) Schiffn., *L. bicrenata* (Schmidel) Dumort., *L. gillmanii* (Austin) R.M.Schust., *L. longidens* (Lindb.) Macoun, *L. quadriloba* (Lindb.) A.Evans, *Marsupella boeckii* (Austin) Kaal., *M. commutata* (Limpr.) Bernet (besides central Europe only known from south Greenland and Iceland), *M. condensata* (C.Hartm.) Kaal., *M. sphacelata* (Lindenb.) Dumort., *Nardia compressa* (Hook.) Gray, *N. breidleri* (Limpr.) Lindb., *Odontoschisma macounii* (Austin) Underw. (arctic-alpine, from central and northern Norway and Norrland, Sweden; not likely to occur in the Faeroe Isles), *Reboulia hemisphaerica* (L.) Raddi, *Scapania curta* (Mart.) Dumort., *S. gymnostomophila* Kaal., *S. cuspiduligera* (Nees) Müll.Frib., *S. hyperborea* Jørg. (? not seen with gemmae, cf. Damsholt & Hallingbäck in Ellis et al. 2016: 250), *S. paludicola* Loeske & Müll.Frib., *Tetralophozia setiformis* (Ehrh.) Schljakov, *Tritomaria polita* (Nees) Jørg., *T. scitula* (Taylor) Jørg. (not known from Great Britain).

Known from Great Britain and Norway

Anastrophyllum saxicola (Schrad.) R.M.Schust., *Apometzgeria pubescens* (Schrank) Kuwah., *Bazzania trilobata* (L.) Gray, *Chiloscyphus fragrans* (Moris & De Not.) J.J.Engel & R.M.Schust., *C. profundus* (Nees) J.J.Engel & R.M.Schust., *Colura calyptrifolia* (Hook.) Dumort., *Diplophyllum obtusifolium* (Hook.) Dumort., *D. taxifolium* (Wahlenb.) Dumort., *Fossombronia foveolata* Lindb., *F. wondraczekii* (Corda) Lindb., *Gymnomitrion crenulatum* Carrington, *Herbertus hutchinsiae* (Gottsche & Rabenh.) A.Evans (earlier *H. aduncus* ssp. *hutchinsiae* R.M.Schust.), *H. norenus* D.G.Long, D. Bell & H.H.Blom (earlier recorded from Norway as *H. borealis* Crundw.; *H. norenus* is also known from Scotland), *H. borealis* (only known from the type locality in Scotland), *Kurzia sylvatica* (A.Evans) Grolle (also known from Pacific North America, Schofield 2002), *K. trichoclados* (Müll.Frib.) Grolle (also known from Pacific North America), *Lepidozia pearsonii* Spruce, *L. cupressina* (Sw.) Lindenb., *Leptoscyphus cuneifolius* (Hook.) Mitt., *Lejeunea ulicina* (Taylor) Gottsche, Lindenb. & Nees, *Marsupella alpina* (Husn.) Bernet, *M. andreaeoides* Müll.Frib. (only known from western Norway), *Odontoschisma denudatum* (Nees) Dumort., *Plagiochila exigua* (Taylor) Taylor, *Scapania aequiloba* (Schwägr.) Dumort., *Scapania compacta* (Roth) Dumort. (this species was excluded from western North America by Hong (1980), and then reported from Pacific North America by Schofield (2002); thus it may be a relictual, true oceanic species), *S. nemorea* (L.) Grolle, *S. nimbosa* Lehm., *S. umbrosa* (Schrad.) Dumort., *Trichocolea tomentella* (Ehrh.) Dumort., *Tritomaria exsecta* (Schrad.) Loeske.

Known from Great Britain

Adelanthus decipiens (Hook.) Mitt., *Bazzania pearsonii* Steph., *Lejeunea lamacerina* (Steph.) Schiffn. (syn. *L. planiuscula* (Lindb.) Lindb.), *Radula voluta* (Ireland, western Scotland, Wales).

Lejeunea lamacerina is frequent in the western part of Great Britain. Jensen (1901: 123) reported this species from the Faeroes (Vágar, Reynsatindar, 676 m, C) as *L. cavifolia* var. *planiuscula* Lindb., but I consider this specimen to be a poor modification of *L. cavifolia*. Jensen (1915: 246) also recorded *L. cavifolia* var. *planiuscula* from Ledreborg park, Denmark, revealing his broad interpretation of var. *planiuscula* compared to a modern concept (*L. lamacerina* has cells with 2–14 large oil-bodies, versus numerous smaller oil-bodies in *L. cavifolia*). The record of *L. lamacerina* from Vágar by Arnell (1956: 252) was probably based on Jensen's record of *L. cavifolia* var. *planiuscula*. According to Arnell (*l.c.*), *L. lamacerina* frequently occurs together with *Harpalejeunea molleri*, which is actually only represented in the Faeroes by a single record, from a cleft at Kalsoy, one of the northern islands.

Annotations

Calypogeia fissa (L.) Raddi **var. *paludosa*** (Warnst.) Damsh., **comb. nov.** Basionym: *Calypogeia paludosa* Warnst. Kryptogamen Flora der Mark Brandenburg, Laubmoose 1117. 1906. ≡ *Kantia trichomanis* var. *paludosa* (Warnst.) C.E.O.Jensen. Danmarks mosser, v. 1: 226. 1915. ≡ *Calypogeia sphagnicola* fo. *paludosa* (Warnst.) R.M.Schust. The Hepaticae and Anthocerotae of North America 2: 140. 1969. ≡ *Calypogeia muelleriana* fo. *paludosa* (Warnst.) Schljakov. Novosti Sistematiki Nizshikh Rastenii 15: 241. 1978. Syntypes: **GERMANY**. Brandenburg, Niederbarnim, Berlin, Moor südl. an der Chaussee Erkner-Gottesbrück zwischen *Sphagnum*, 23 Jan 1906, leg. *E. Schultz*, herb. Warnstorf no. 5184, ex herb. K. Müller, det. K. Buczkowska sub *C. sphagnicola* f. *paludosa* (S no. B20850), Ruppin, Neuruppin, Zippelsförde in einem Rasen von *Sphagnum imbricatum*, leg. Warnstorf (*herb. ign.*), Ostprignitz, Triglitz, Moorheide unter *Sphagnum*, leg. *O. Jaap* (*herb. ign.*), und an Gräben in der Heide, Apr 1895, leg. *O. Jaap*, herb. Warnstorf no. 3205, ex herb. K. Müller (S no. B20840), Kl. Pankow am Cressinsee, zwischen *Sphagnum warnstorfii*, 4 Aug 1898, leg. *O. Jaap*, herb. Warnstorf no. 3183, ex herb. K. Müller, det. K. Buczkowska sub *C. sphagnicola* f. *paludosa* (S no. B20841).

Warnstorf (1906) originally described *Calypogeia paludosa* from *Sphagnum* mires in Brandenburg, Germany. Jensen (1915) treated the same plant from Denmark as a variety of *Kantia trichomanis* (L.) Gray [= *C. muelleriana* (Schiffn.) Müll.Frib.]. Müller (1947) interpreted *C. trichomanis* var. *paludosa* as a hygrophytic expression of *C. trichomanis*. On the other hand, Bischler (1957) made *C. paludosa* a synonym of *C. sphagnicola* (Arnell & J.Perss.) Warnst. & Loeske, which has since been widely accepted. Schuster (1988: 32) stated that "*Calypogeia muelleriana*, even in phenotypes from fens or irrigated slopes, where one would expect to find lax modifications, seems always to develop the mod. *densifolia*" (syn. *C. trichomanis* var. *adscendens* Nees, fide Müller 1947). A Faeroese specimen of *C. muelleriana* mod. *laxifolia* from a fen (Porkerisvatn, SW of Torshavn *Damsholt 73-173*, C) with relatively remote and partly long-decurrent leaves with large cells is reinterpreted as a variety of *C. fissa*. It agrees with specimens from Denmark (in C) named *K. trichomanis* var. *paludosa* by Jensen. This change limits *C. sphagnicola* to the very small plant, not known from the Faeroes, with rather small cells and few oil-bodies per cell (usually 2–5), each composed of 2–4 spherules. By comparison, *C. fissa* var. *paludosa* has larger leaf cells with 4–12 oil-bodies per cell, each usually composed of several spherules. I redetermined a second collection from the Faeroes that was published

by Boesen et al (1975: 75) as *C. sphagnicola* (Sandoy, W of Sandsvatn, in *Sphagnum* mire, 6 July 1973, *Damsholt 73-097*, in C) as *C. muelleriana*.

The problem, pointed out by Macvicar (1926: 320), "that the *C. sphagnicola* of European botanists, except those of Scandinavia and Britain, belongs to an allied "small species" *C. paludosa* Warnst.," is solved by including *C. paludosa* in *C. fissa*. This solution fits well with observations from Denmark (Jensen 1915, p. 229, Fig. 1–10), where *C. sphagnicola* is rare, whereas *C. fissa* var. *paludosa* is rather frequent in mires and fens (*l.c.*, Fig. 10), and it also fits observations from the Faeroes. Perhaps *C. sphagnicola* is an arctic species with relictual occurrences in cold mires and fens of the Nordic countries and Britain, which in Denmark is easily mistaken for the larger helophytic *C. fissa* var. *paludosa,* as both have decurrent leaves. A recent study of Polish *Calypogeia* (Buczkowska et al. 2012) found *C. sphagnicola* to be haploid and *C. paludosa* diploid; furthermore, their phylogenetic analysis based on chloroplast DNA suggested that chloroplasts of *C. paludosa* were not inherited from *C. sphagnicola*.

Cephaloziella varians (Gottsche) Steph. A collection by C. Jensen (Borðoy, Ánir, at the settlement, 16 May 1896, in C) was listed as *C. divaricata* by Jensen (1901: 126) and as *C. hampeana* var. *amphigastriata* Douin by Jensen (1915: 217) "with small and numerous underleaves, these rarely larger and well developed, some shoots though, totally lack underleaves." Jensen (1923: 546) noted that "*C. hampeana* var. *examphigastriata* Douin, 1911, seems dropped by Douin (1920)," presumably as an expression of *C. hampeana* proper. The probably autoicous collection from Borðoy, Ánir, with underleaves, must then represent *C. varians* (syn. *C. arctica* Bryhn & Douin), the only record of this species from the Faeroes.

Lophozia debiliformis R.M.Schust. & Damsh. This species is distinguished by 1) frequently having underleaves of variable form, 2) often having leaves angularly divided to 0.4 of the length, 3) occasionally having three-lobed leaves and 4) having brownish gemmae. It occurs abundantly at the Faeroes. Some noteworthy collections (in C) include: Eysturoy, Gøtugjógv, 7 July 1896, leg. C. Jensen, published by Jensen (1901: 132) as *J. alpestris* var. *amphigastriata* v.n., with underleaves, and redetermined by Jensen (1915: 127) as *J. alpestris* var. *gélida* (Taylor) Müll.Frib.,with "underleaves frequent on vegetative shoots, at the same stem of variable size and form, rudimentary or of irregular form, undivided or divided, sometimes large and lanceolate, varying in number, often rare"; Eysturoy, Slættaratindur, *Damsholt 73-120*, with 2–3 lobed leaves; Vágar, near the summit of Reynsatíndar, 29 May 1896, leg. C. Jensen, published by Jensen (1901: 132) as *J. alpestris* var. *amphigastriata* v.n., with underleaves, redetermined by Jensen (1915: 127) as var. *minor* Nees.

Lophozia sudetica (Nees ex Huebener) Grolle (earlier *L. alpestris* Auct.) differs from *L. debiliformis* in exclusively having concave, almost rotund leaves with lunate sinuses, usually having vinaceous pigmentation of the ventral leaf bases, and in having a rather thin stem (diameter 200–300 µm) and red-brown gemmae. *Lophozia sudetica* is rare in the Faeroe Isles.

Marsupella funckii (F.Weber & D.Mohr) Dumort. This species was cited by Jensen (1901: 136) from Vágar, at the northern end of Sørvágsvatn. This specimen was redetermined by Jensen (1915: 77) as a small modification of *M. emarginata*. Authentic *M. funckii* has been found on Streymoy, at Tórshavn, Viðarlundin, on well-trodden edge of the path near the entrance to the plantation, 3 July 1973, leg. J. Birks (Boesen et al. 1975: 76), a specimen not in C. See the map for additional recent records.

Porella obtusata (Taylor) Trevis., *P. cordaeana* (Huebener) Moore and *P. platyphylla* (L.) Pfeiff. are all known and mapped from the Faeroes. C. Jensen (1915: 241) named one of his own collections (Eysturoy, Eiði, Mølin, in C) *P. laevigata* var. *Thuja* Nees 1838, whereas Müller (1905–16) treated this specimen as *Madotheca thuja* (Dicks.) Dumort., a name that is sometimes interpreted as *P. obtusata* (Taylor) Trevis. Arnell (1956: 247) proposed the name *P. thuja* (Dicks.) C.E.O. Jensen, although Jensen had noted that var. *thuja* Nees was not conspecific with *P. obtusata*. Jensen himself (1915: 241) made the combination "*P. thuja* (Dicks.)" with no author reference, as he was unsure of the identity of *Jungermannia Thuja* Dicks. Paton (1999: 462) rejected *P. thuja* (Dicks.) Lindb. and *M. thuja* (Dicks.) Dumort. as synonyms of *P. obtusata*, apparently judging Dickson's type to be a different plant, and making all names based on *J. Thuja* Dicks. illegal. The case is difficult because, as mentioned by Paton (1999: 462), mimics of *P. obtusata* occur in both *P. arboris-vitae* (With.) Grolle and *P. platyphylla*, and Dickson's type of *J. Thuja* may belong to either one. *Porella obtusata* lacks the acrid taste that distinguishes *P. arboris-vitae*, and Jensen (*l.c.*) noted that his plant lacked the distinct acrid taste of *P. laevigata* (Schrad.) Pfeiff. (syn. *P. arboris-vitae*). He furthermore described the leaves as not dentate, and chose not to refer his plant to *P. obtusata* ("*P. thuja* (Dicks.)") as Müller did, because the leaves in his opinion had wide ovate dorsal leaf lobes and narrow ovate ventral lobes only half as wide as the underleaves. In her key Paton (1999: 455) used the orientation of the ventral leaf lobes as a diagnostic character (suberect in *P. obtusata* and more often erect in *P. platyphylla*), but she ignored the relative width of the ventral lobes compared to the underleaves. Using the latter character, Jensen's collection from Eysturoy, Eiði, Mølin is *P. obtusata* (Damsholt and Hallingbäck in Ellis et al. 2016: 249), but could be interpreted 'a *P. obtusata*-like mimic of *P. platyphylla*.' A recent collection lacking an acrid taste and with erect ventral lobes (Eysturoy, Eiði, Mølin, crevices, below a dry, low rock wall, *Damsholt 14-063*, C) was identified as *P. platyphylla* and was collected at the same spot that Jensen's 1896 collection came from. *Porella obtusata* was also found in 2016 growing on the bark of *Acer campestre* in Viðarlundin, Tórshavn, together with *Radula complanata* ssp. *complanata* (paroicous), similar to the way that *R. complanata* ssp. *complanata* and *P. platyphylla* usually are found growing together on the Continent. *Porella arboris-vitae* (earlier *P. laevigata*), is not proven to occur in the Faeroe Isles.

Riccardia incurvata Lindb. The status of this species is controversial. A recent record from Zackenberg, east Greenland, leg. and det. K. Hassel, in herb. TRH (Damsholt 2013: 512) was redetermined by the collector to be *R. latifrons* (Lindb.) Lindb. *Riccardia incurvata* is a unisexual plant with a chromosome count of n = 10 (Müller 1951–1958), the basal number in the genus. This species is not present in

western North America. In Europe *R. incurvata* has a subatlantic distribution including northern Iceland, and in Asia it is recorded from Siberia. One of the two collections from the Faeroes was from a cleft on northern Streymoy (gjógv at Haldarsvik; *E. Clausen 2092*, in C), listed in Clausen's notebook as "? *R. multifida*"; the second (*A. Pedersen 56-133*, in C) from Suðuroy was a male plant.

Riccardia latifrons ssp. *arctica* R.M. Schust. & Damsh. A specimen of this taxon from Suðuroy, Oyrnafjall, slope west of the mountain summit, with fens, *Damsholt 20-078* (in C) and recent collections (e.g. Vágar, near Tormansgjógv, 2016, *Hallingbäck & Damsholt 16-105*) are the only examples of *Riccardia* from the Faeroes that lack botryoidal oil-bodies when fresh.

Excluded species

Cephalozia lunulifolia (Dumort.) Dumort. (syn. *Cephalozia media* Lindb.). This plant was reported by Jensen (1901: 126) from Suðuroy, Trongisvágur, ca 300 m, with sporophyte (in C), but this specimen was later redetermined as *C. pleniceps* (Jensen 1915: 198). I have not seen the specimen that Jensen (1901: 126) cited from Streymoy, Glyvursreyn, barren, 4 July 1896.

Frullania jackii Gottsche. This plant was reported by Jensen (1901: 123; 1915: 250) from Streymoy, Kaldbaksbotnur, on the top of low-lying large stones, alt. 50 m, barren, 18 July 1895, leg. H. G. Simmons. This specimen was redetermined by Jensen as *F. teneriffae* (Jensen, 1923: 548) with the comment: "poor material, with unusually wide underleaves." I verified the identity of the specimen in 2015 and checked it against *Jubula hutchinsiae* (Hook.) Dumort.

Frullania microphylla (Gottsche) Pearson. Boesen et al. (1975: 75) listed two Faeroese specimens of *F. microphylla*. One of these, collected on Kalsoy, Syðradalur, on shaded rocks in a northeast-facing ravine, near sea level, 30 June 1973, leg. J. Birks, was redetermined by the collector as *F. tamarisci* var. *cornubica* Carrington. The other, also cited by Paton (1999: 471), from Streymoy, gjógv in Vestmanna, 9 June 1896, leg. C. Jensen (in C) is a mix of *F. fragilifolia* and *F. tamarisci* var. *cornubica* (Damsholt 2002a: 604).

Jungermannia hyalina Lyell in Hook. was published as *Nardia hyalina* (Lyell) Lindb. by Jensen (1901: 134) from three localities on the Faeroes. The collections from Streymoy, Vestmanna (male) and Eysturoy, Gjógv were referred to *J. paroica* by Damsholt (2002a: 229, pl. 82; cf. also Váňa 1974), based on paroecious sexuality and large cells with large bulging trigones. Recent collections of *J. paroica* were observed to have 2–8(–15) and 4–14(–18) oil-bodies per cell.

Jubula hutchinsiae (Hook.) Dumort. This species was reported from the Faeroes by Guerke (1978), based on a collection made by H. G. Simmons in 1895 (in herb. S). A Simmons collection in herb. S from Streymoy, Kaldbaksbotnur, 18 July 1895, was identified as *Frullania tamarisci* by T. Hallingbäck in 2015. Jensen (1901) named an apparent duplicate in C *Frullania jackii*.

Lophozia atlantica (Kaal.) Müll.Frib. This species was reported by Jensen (1901: 133) from Eysturoy, Fuglafjørður, 220 m, 19 May 1896, leg. C. Jensen , and was later redetermined (Jensen 1915: 116) as a small, reduced modification of *L. floerkei* (F. Weber & D. Mohr) Schiffn., partly with two-lobed leaves and small underleaves (specimen not seen). A second unpublished collection labeled *Jungermannia atlantica* Kaal. from Eysturoy, Breiðaskarð, 8 July 1896, leg. C. Jensen (in C) has shoots with 2–3 lobed leaves divided 0.2–0.4 of the length and ventral appendages 2–3 cells long; it belongs to *L. kunzeana* (Huebener) A.Evans.

Marsupella sparsifolia (Lindb.) Dumort. Jensen (1901: 136) identified this species from Sandoy, Tindur, at the summit; this material was later redetermined (Jensen 1915: 76) as *M. sprucei*.

Scapania curta (Mart.) Dumort. Jensen (1901: 129) cited two Faeroese specimens (in C) of *Martinellia curta* (Mart.) Lindb. that he collected in 1896, one on Mykines (Muggenæs), and one on Suðuroy, at Øravik (Ørdevik). These specimens were redetermined by Buch as *S. scandica* (Arnell & H.Buch) Macvicar and published as new to the Faeroes (Buch 1928: 77). I consider specimens in C collected by Jensen named *M. rosacea* (Corda) Lindb. from, Sandoy, Todnes, etc., to be *S. scandica*, as is a Jensen specimen of *M. curta* var. *geniculáta* (C.Massal.) Müll.Frib. from Streymoy, Tórshavn, from an open field (in C). These specimens were referred to *S. irrigua* by both Jensen (1923: 542) and Buch (1928: 79). Recent collections referable to *S. scandica* (in C) were found to be a mix of plants with 2–6 oil-bodies per cell and plants with 2–15 oil-bodies per cell. In *Hallingbäck & Damsholt 16-061* the plants have dentate leaves with gemmae (*S. scandica* fo. *argutedentata* (H.Buch) R.M.Schust., or perhaps *S. lingulata*). *Hallingbäck & Damsholt 16-081* has 2–9 oil-bodies per cell and an almost entire perianth mouth, with only a few scattered one-celled teeth.

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Appendix 1

Liverworts found on the Faeroe Isles

1. *Acrobolbus wilsonii* Nees in Gottsche
2. *Anastrepta orcadensis* (Hook.) Schiffn.
3. *Anastrophyllum donnianum* (Hook.) Steph.
4. *Aneura pinguis* (L.) Dumort.
5. *Anthelia julacea* (L.) Dumort.
6. *Anthelia juratzkana* (Limpr.) Trevis.
7. *Aphanolejeunea microscopica* (Taylor) A.Evans
8. *Bazzania tricrenata* (Wahlenb.) Lindb. in Broth.
9. *Blasia pusilla* L.
10. *Blepharostoma trichophyllum* (L.) Dumort.
11. *Calypogeia arguta* Nees & Mont. in Nees
12. *Calypogeia azurea* Stotler & Crotz
13. *Calypogeia fissa* (L.) Raddi,
14. *Calypogeia fissa* var. *paludosa* (Warnst.) n. comb.
15. *Calypogeia muelleriana* (Schiffn.) Müll.Frib.
16. *Cephalozia bicuspidata* (L.) Dumort.
17. *Cephalozia pleniceps* (Austin) Lindb.
18. *Cephaloziella divaricata* (Sm.) Schiffn.
19. *Cephaloziella hampeana* (Nees) Schiffn.
20. *Cephaloziella rubella* (Nees) Warnst.
21. *Cephaloziella spinigera* (Lindb.) Warnst. fo. *striatula* (C.E.O.Jensen) Damsh.
22. *Cephaloziella varians* (Gottsche) Steph. (earlier known as *C. hampeana* var. *amphigastriata* Douin)
23. *Chiloscyphus coadunatus* (Sw.) J.J.Engel & R.M.Schust.
24. *Chiloscyphus pallescens* (Ehrh. ex Hoffm.) Dumort.
25. *Chiloscyphus polyanthos* (L.) Corda in Opiz
26. *Cololejeunea calcarea* (Libert) Schiffn.
27. *Conocephalum salebrosum* Szweyk., Buczk. & Odrzyk.
28. *Diplophyllum albicans* (L.) Dumort.
29. *Douinia ovata* (Dicks.) H.Buch
30. *Eremonotus myriocarpus* (Carrington) Lindb. & Kaal. in Pearson
31. *Frullania fragilifolia* (Taylor) Gottsche, Lindenb. & Nees
32. *Frullania tamarisci* (L.) Dumort.
33. *Frullania teneriffae* (F.Weber) Nees
34. *Gymnocolea inflata* (Huds.) Dumort.
35. *Gymnomitrion apiculatum* (Schiffn.) Müll.Frib.
36. *Gymnomitrion concinnatum* (Lightf.) Corda in Opiz
37. *Gymnomitrion corallioides* Nees
38. *Gymnomitrion obtusum* Lindb.
39. *Haplomitrium hookeri* (Sm.) Nees
40. *Harpalejeunea molleri* (Steph.) Grolle
41. *Herbertus stramineus* (Dumort.) Trevis.
42. *Hygrobiella laxifolia* (Hook.) Spruce
43. *Jungermannia borealis* Damsh. & Váňa
44. *Jungermannia exsertifolia* Steph. ssp. *cordifolia* (Dumort.) Váňa
45. *Jungermannia gracillima* Sm. in Sowerby
46. *Jungermannia lanceolata* L. emend. Grolle
47. *Jungermannia obovata* Nees ssp. *obovata*
48. *Jungermannia obovata* Nees ssp. *minor* (Carrington) Damsh.
49. *Jungermannia paroica* (Schiffn.) Grolle
50. *Jungermannia pumila* With.
51. *Jungermannia sphaerocarpa* Hook.
52. *Kurzia pauciflora* (Dicks.) Grolle
53. *Lejeunea cavifolia* (Ehrh.) Lindb.
54. *Lejeunea ?lamacerina* (Steph.) Schiffn. (poor collections, probably all *L. cavifolia*)
55. *Lejeunea patens* Lindb.
56. *Lophozia alpestris* (Schleich. ex F.Weber) A.Evans
57. *Lophozia bantriensis* (Hook.) Steph.
58. *Lophozia barbata* (Schmidel ex Hoffm.) Dumort.
59. *Lophozia debiliformis* R.M.Schust. & Damsh.
60. *Lophozia excisa* (Dicks.) Dumort.
61. *Lophozia floerkei* (F.Weber & D.Mohr) Schiffn.
62. *Lophozia hatcheri* (A.Evans) Steph.
63. *Lophozia heterocolpos* (Thed. ex C.Hartm.) M.Howe
64. *Lophozia incisa* (Schrad.) Dumort.
65. *Lophozia kunzeana* (Huebener) A.Evans
66. *Lophozia lycopodioides* (Wallr.) Cogn.
67. *Lophozia obtusa* (Lindb.) A.Evans
68. *Lophozia rubescens* R.M.Schust. & Damsh.
69. *Lophozia sudetica* (Nees in Huebener) Grolle
70. *Lophozia ventricosa* (Dicks.) Dumort.
71. *Lophozia wenzelii* (Steph.) Nees
72. *Lunularia cruciata* (L.) Dumort. ex Lindb.
73. *Marchantia alpestris* (Nees) Burgeff
74. *Marchantia latifolia* Gray
75. *Marchantia polymorpha* L.
76. *Marsupella adusta* (Nees emend. Limpr.) Spruce
77. *Marsupella brevissima* (Dumort.) Grolle
78. *Marsupella emarginata* (Ehrh.) Dumort.
79. *Marsupella funckii* (F.Weber & D.Mohr) Dumort.
80. *Marsupella spiniloba* R.M.Schust. & Damsh.
81. *Marsupella sprucei* (Limpr.) Bernet.
82. *Mastigophora woodsii* (Hook.) Nees
83. *Metzgeria conjugata* Lindb.
84. *Metzgeria violacea* (Ach. in F.Weber & D.Mohr) Dumort. (earlier known as *M. fruticulosa* (O.F.Müll.) A.Evans).
85. *Metzgeria furcata* (L.) Dumort.
86. *Metzgeria leptoneura* Spruce
87. *Moerchia blyttii* (Moerch) Brockm.
88. *Moerchia hibernica* (Hook.) Gottsche
89. *Mylia anomala* (Hook.) Gray
90. *Mylia taylorii* (Hook.) Gray
91. *Nardia geoscyphus* (De Not.) Lindb.
92. *Nardia scalaris* Gray
93. *Odontoschisma elongatum* (Lindb.) A.Evans
94. *Odontoschisma sphagni* (Dicks.) Dumort.
95. *Pellia endiviifolia* (Dicks.) Dumort.
96. *Pellia epiphylla* (L.) Corda
97. *Pellia neesiana* (Gottsche) Limpr.
98. *Plagiochila asplenioides* (L. emend. Taylor) Dumort. ssp. *porelloides* (Torrey ex Nees) Kaal.
99. *Plagiochila carringtonii* (Balf.) Grolle
100. *Plagiochila punctata* Taylor
101. *Plagiochila spinulosa* (Dicks.) Dumort.
102. *Pleurocladula albescens* (Hook.) Grolle
103. *Pleurozia purpurea* Lindb.

104. *Porella cordaeana* (Huebener) Moore
105. *Porella obtusata* (Taylor) Trevis.
106. *Porella platyphylla* (L.) Pfeiff.
107. *Preissia quadrata* (Scop.) Nees ssp. *quadrata*
108. *Preissia quadrata* (Scop.) Nees ssp. *hyperborea* R.M.Schust.
109. *Ptilidium ciliare* (L.) Hampe
110. *Radula aquilegia* (Hook.f. & Taylor) Gottsche, Lindenb. & Nees
111. *Radula complanata* (L.) Dumort. ssp. *complanata*
112. *Radula complanata* (L.)Dumort. ssp. *lindenbergiana* (Gottsche ex C.Hartm.) R.M.Schust.
113. *Riccardia chamedryfolia* (With.) Grolle
114. *Riccardia incurvata* Lindb.
115. *Riccardia latifrons* (Lindb.) Lindb. ssp. *arctica* R.M.Schust. & Damsh.
116. *Riccardia latifrons* (Lindb.) Lindb ssp. *latifrons*
117. *Riccardia multifida* (L.) Gray
118. *Riccia beyrichiana* Hampe ex Lehm.
119. *Saccogyna viticulosa* (L.) Dumort.
120. *Scapania aspera* M.Bernet & Bernet
121. *Scapania calcicola* (Arnell & J.Perss.) Ingham
122. *Scapania gracilis* Lindb.
123. *Scapania irrigua* (Nees) Gottsche, Lindenb. & Nees
124. *Scapania lingulata* H.Buch
125. *Scapania ornithopodioides* (With.) Waddell
126. *Scapania paludosa* (Müll.Frib.) Müll.Frib.
127. *Scapania scandica* (Arnell & H.Buch) Macvicar
128. *Scapania subalpina* (Nees ex Lindenb.) Dumort.
129. *Scapania uliginosa* (Sw. ex Lindenb.) Dumort.
130. *Scapania undulata* (L.) Dumort.
131. *Sphenolobopsis pearsonii* (Spruce) R.M.Schust.
132. *Tritomaria exsectiformis* (Breidl.) Loeske
133. *Tritomaria quinquedentata* (Huds.) H.Buch ssp. *quinquedentata*
134. *Tritomaria quinquedentata* (Huds.) H.Buch ssp. *turgida* (Lindb.) Damsh.