

## Distribution of Hepaticae and Anthocerotae in Europe and Macaronesia

Lars Söderström, Edi Urmí and Jiří Váňa



L. Söderström



E. Urmí



J. Váňa

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The distribution of liverworts and hornworts in Europe and Macaronesia is given using “botanical countries”, i.e. countries of Europe and some well separated islands but with less extensive countries included in neighbouring areas. The list points out erroneous and doubtful reports. Several infraspecific taxa are listed. In addition, the distribution outside the treated region is briefly given. *Gymnocolea inflata* ssp. *acutiloba* (Schiffn.) Söderström & Váňa, comb. nov., and *Pleurocladula albescens* var. *islandica* (Nees) Söderström & Váňa, comb. nov., are nomenclatural novelties.

*L. Söderström*, Dept of Botany, Norwegian Univ. of Science and Technology, N-7491 Trondheim, Norway ([lars.soderstrom@chembio.ntnu.no](mailto:lars.soderstrom@chembio.ntnu.no)). – *E. Urmí*, Inst. of Systematic Botany, Univ. of Zürich, Zollikerstrasse 107, CH-8008 Zürich, Switzerland. – *J. Váňa*, Dept of Botany, Charles Univ., Benátská 2, CZ-128 01 Praha 2, Czech Republic.

Recent work with Red Lists of bryophytes in Europe has shown the need for updated distribution lists. Since nature conservation is done on national levels, the knowledge of occurrence of species in different countries is important. For evaluation of the threat to taxa, it is also important to have an overview of the whole distribution range (Söderström 1995).

Düll (1983) published the last complete distribution list of hepaticas in Europe. Since then taxonomy has changed with new investigations, nomenclatural changes are frequent, and many new records can be added to the distribution, as well as some deletions. Recently Grolle and Long (2000) have published a new checklist of species, updating the taxonomy and nomenclature at species level. The primary aim of this

checklist is to update the known distribution of the taxa occurring in Europe. We have therefore chosen to follow Grolle and Long (2000) even if we do not agree in all cases with their treatment. The only exception is that we use *Riccia crinita* instead of *R. trichocarpa* since Jovet-Ast's (2000) paper dealing with this problem appeared after that of Grolle and Long's (2000). However, Grolle and Long (2000) do not treat infraspecific taxa, while we like to list infraspecific taxa since they reflect genetic variation within species, which is an important issue for conservation. The three authors differ in the view of the value of some taxa. In cases when one or two of us doubt the value of a taxon, we have in general accepted it and tried to list its distribution, with the view that it is easier to merge the distributions of two taxa than to split a taxon if our decisions prove to be wrong in the future.

Some taxa have been considerably confused in the past and it is difficult to know which taxon is actually

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meant by a report. For example *Anthoceros punctatus* is now divided into two species, *A. punctatus* and *A. agrestis*. Older literature, and some recent reports, do not distinguish between these taxa. Since *A. punctatus* s. str. seems to be missing from northern and eastern Europe, we think all reports from these regions are actually *A. agrestis* although this cannot be stated with certainty until the material is revised.

One of the difficulties we have encountered during this compilation is that we do not always know the circumscription of a taxon used in literature reports. One of the main problems is that very few authors add the variety or subspecies when they only have one taxon, especially if it is the autonym. For example, it is often impossible to know what is meant by *Blepharostoma trichophyllum*. Is it *B. trichophyllum* subsp. *trichophyllum* or *B. trichophyllum* s. lat? We therefore recommend that all authors **explicitly spell out the variety or subspecies when they separate such taxa, even if it is the autonym**. This should also be done if only one infraspecific taxon occurs in the region. When, in the literature we have used, the subtaxon is not specified, we have interpreted the record as the generally more common taxon in the region and marked this taxon with an open symbol together with a comment in a note. In most cases it is, from the current knowledge of the taxa, obvious what taxon is meant. However, in a few cases our assumptions are less solid.

### Area treated

The area we cover in this paper is the same as that adopted by the European Committee for Conservation of Bryophytes, i.e. Europe (incl. European parts of Turkey and Kazakhstan), northern Macaronesia (Azores, Madeira and Canary Islands but excl. Cape Verde Is.), northern Caucasus (Russian part) and Novaya Zemlya and Franz Josef Land in the Russian Arctic (Fig. 1, Table 1).

The units we have chosen to consider (Fig. 1) follow mainly Hollis and Brummit (1992). This means that we use countries, with the following exceptions:

1. A few geographically distinct areas are separated from the main country (Svalbard, Faeroe Is., Baleares, Corsica, Sardinia, Sicily, Crete, Crimea, Azores, Madeira and the Canary Is.).
  2. Seven of the less extensive countries of Europe (Luxembourg, Liechtenstein, Andorra, Monaco, Malta, Vatican City and San Marino) are included in larger units (but occurrence indicated with special symbol).
  3. Four areas, widely separated from the rest of the country, but close to another country (Channel Islands, Gibraltar, Northern Ireland and Kaliningrad area), are included in the latter (but occurrence indicated with special symbol).
  4. European Russia (roughly W of the Ural mountains but following political borders instead of the summit) is divided into eight regions (in addition to Kaliningrad area that is included in Lithuania).

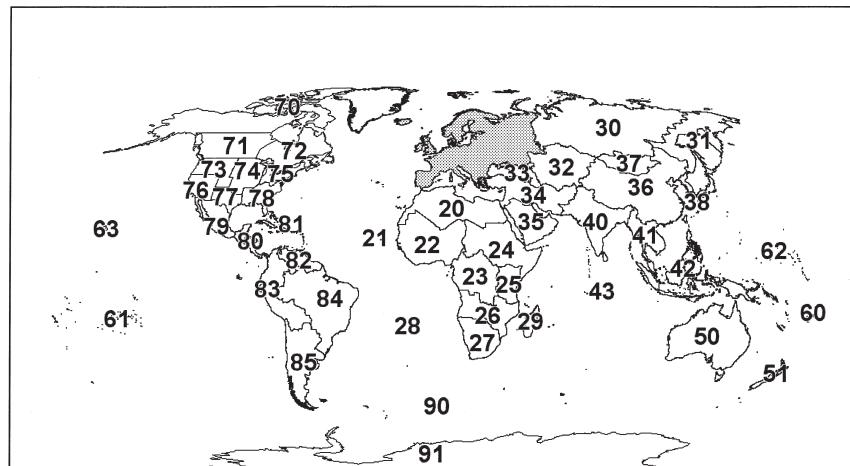


Fig. 1. Regions recognized within Europe and Macaronesia (two-letter code). One-letter codes denote areas included in areas with larger fonts, but separated in the table with a note.

Table 1. Areas in Europe and Macaronesia with their abbreviations and number of taxa we recognise at species level. Areas in bold are those recognised here. Areas in normal style are subdivisions of recognised areas. Those preceded with a letter are marked in the list with the letter in superscript. If the taxon occurs only in the smaller attached area, and not in the main part, the superscript is followed by an exclamation mark (!), i.e. a taxon occurring in Andorra is marked <sup>A</sup> and a taxon occurring in Andorra but not Spain <sup>A!</sup>. Areas in italic are combined figures for countries that we divide into two or more areas. The abbreviations of recognised areas are the two-letter ISO code whenever existing. Exceptions are marked with an asterisk (\*).

<b>Al</b>	<b>Albania</b> .....	91	<b>N</b>	Northern Ireland .....	182
<b>At</b>	<b>Austria</b> (incl. Liechtenstein) .....	260	<b>Is</b>	<b>Iceland</b> .....	147
<i>L</i>	Liechtenstein .....	100	<b>It</b>	<b>Italy</b> (excl. Sardinia and Sicily but incl. San Marino and Vatican City) .....	285
	Austria s.str. ....	260	<i>S</i>	San Marino .....	13
<b>Az*</b>	<b>Azores</b> (to Portugal) .....	168	<i>V</i>	Vatican City .....	2
<b>Ba</b>	<b>Bosnia-Herzegovine</b> .....	104		<i>Italy</i> (incl. Sardinia and Sicily) .....	289
<b>Be</b>	<b>Belgium</b> (incl. Luxembourg) .....	184	<b>Kz</b>	<b>Kazachstan</b> (European part only) .....	0
	Belgium s.str. ....	173	<b>Lt</b>	<b>Lithuania</b> (incl. Kaliningrad area) .....	122
<i>L</i>	Luxembourg .....	125		Lithuania s.str. ....	113
<b>Bg</b>	<b>Bulgaria</b> .....	172		Kaliningrad Area .....	48
<b>Bl*</b>	<b>Baleares</b> (to Spain) .....	61	<b>Lv</b>	<b>Latvia</b> .....	114
<b>Br</b>	<b>Britain</b> (excl. Northern Ireland, Channel Islands and Gibraltar) .....	291	<b>Ma*</b>	<b>Madeira</b> (to Portugal) .....	171
	<i>Britain</i> (incl. Northern Ireland, Channel Islands and Gibraltar) .....	291	<b>Md</b>	<b>Moldovo</b> .....	9
<b>By</b>	<b>Belarus</b> .....	99	<b>Mk</b>	<b>Macedonia</b> .....	63
<b>Ca*</b>	<b>North Caucasus</b> (to Russia; Adygea, Kras- nodar, Stavropol, Karacheyvo-Cherkes- siya, Kabardino-Balkariya, Severo- Ossetiya, Ingushetiya, Chechenia, Dagestan) ....	96	<b>Nl</b>	<b>Netherlands</b> .....	133
<b>Ch</b>	<b>Switzerland</b> .....	257	<b>No</b>	<b>Norway</b> (excl. Svalbard) .....	279
<b>Cm*</b>	<b>Crimea</b> (to Ukraine) .....	29		<i>Norway</i> (incl. Svalbard) .....	287
<b>Cn*</b>	<b>Canary Islands</b> (to Spain) .....	140	<b>Nz*</b>	<b>Novaya Zemlya</b> (to Russia) .....	61
<b>Co*</b>	<b>Corsica</b> (to France) .....	127	<b>Po</b>	<b>Poland</b> .....	239
<b>Ct*</b>	<b>Crete</b> (to Greece) .....	77	<b>Pt</b>	<b>Portugal</b> (excl. Azores and Madeira) .....	183
<b>Cz</b>	<b>Czech Republic</b> .....	211		<i>Portugal</i> (incl. Azores and Madeira) .....	255
<b>De</b>	<b>Germany</b> .....	247	<b>Rc*</b>	<b>Russia Central</b> (Kostroma, Tver, Yaroslavl, Vladimir, Nizhny Novgorod, Smolensk, Moscow, Ryazan, Mordoviya, Chuvashiya, Ulyanovsk, Kaluga, Tula, Lipetsk, Tambov, Penza, Bryansk, Orel, Kursk, Belgorod, Voronezh) .....	101
<b>Dk</b>	<b>Denmark</b> (excl. Faroe Island) .....	144	<b>Re*</b>	<b>Russia East</b> (Kirov, Perm, Udmurya, Bash- kiriya, Mari, Tatariya, Samara, Orenburg) .....	111
	<i>Denmark</i> (incl. Faeroe Islands) .....	199	<b>Rn*</b>	<b>Russia North</b> (Murmansk, Karelia, Archangelsk, Komi and Vologda) .....	218
<b>Ee</b>	<b>Estonia</b> .....	119	<b>Ro</b>	<b>Romania</b> .....	198
<b>Es</b>	<b>Spain</b> (excl. Canary Islands and Baleares but incl. Andorra and Gibraltar) .....	265	<b>Rs*</b>	<b>Russia South</b> (Saratov, Volgograd, Astrakhan, Rostov, Kalmykiya) .....	7
	Peninsular Spain .....	265	<b>Rw*</b>	<b>Russia Northwest</b> (St. Petersburg, Pskov, Novgorod) .....	136
<i>A</i>	Andorra .....	47		<i>Russia</i> (European part) .....	260
<i>G</i>	Gibraltar (to Britain) .....	1	<b>Sa*</b>	<b>Sardinia</b> (to Italy) .....	97
	<i>Spain</i> (incl. Canary Is. and Baleares) .....	288	<b>Sc*</b>	<b>Sicily</b> (to Italy; incl. Malta) .....	125
<b>Fi</b>	<b>Finland</b> .....	221		Sicily (Italian part) .....	123
<b>Fl*</b>	<b>Franz Josef Land</b> (to Russia) .....	42	<i>M</i>	Malta .....	21
<b>Fo</b>	<b>Faroe Islands</b> (to Denmark) .....	131	<b>Se</b>	<b>Sweden</b> .....	261
<b>Fr</b>	<b>France</b> (excl. Corsica but incl. Channel Islands and Monaco) .....	308	<b>Si</b>	<b>Slovenia</b> .....	157
	Mainland France .....	307	<b>Sj</b>	<b>Svalbard</b> (incl. Jan Mayen) .....	91
<i>C</i>	Channel Islands (to Britain) .....	80	<b>Sk</b>	<b>Slovakia</b> .....	221
<i>M</i>	Monaco .....	0	<b>Tu</b>	<b>Turkey</b> (European part only) .....	12
	<i>France</i> (incl. Corsica) .....	308	<b>Ua</b>	<b>Ukraine</b> (excl. Crimea) .....	180
<b>Gr</b>	<b>Greece</b> (excl. Crete) .....	139		<i>Ukraine</i> (incl. Crimea) .....	184
	<i>Greece</i> (incl. Crete) .....	148	<b>Yu</b>	<b>Yugoslavia</b> (i.e. Serbia and Montenegro) .....	120
<b>Hr</b>	<b>Croatia</b> .....	145			
<b>Hu</b>	<b>Hungary</b> .....	148			
<b>Ie</b>	<b>Ireland</b> (incl. Northern Ireland) .....	229			
	Eire .....	224			

Fig 2. Codes used for the areas outside Europe and Macaronesia (following Hollis and Brummitt 1992). Numbers refer to their level 2 codes (cf. Table 2). Area treated is shaded.



We give the occurrence outside our area with letters and figures (following the level 1 and level 2 areas of Hollis and Brummitt 1992, resp.; Fig. 2, Table 2). The compilation of the occurrence on this level is not as thorough as the compilation of the sources for Europe and Macaronesia. However, we are confident that the numbers of omissions are few for most species.

### Sources for distribution data

This distribution table is the result of scanning numerous literature reports from Europe and the world. Every report is accepted unless it has been rejected by later sources, or there are serious doubts about its correctness. A list of sources for each report can be obtained from the authors.

The only earlier list of this kind for Europe is by Düll

(1983). However, this list does not give sources for its reports and there are many reports proven erroneous, so we reject reports not supported by other sources. The checklist of Russia (Konstantinova et al. 1992) is also problematic since their division of Russia differs from ours. In addition, that list does not define Europe in the traditional way (the border is on the eastern foothill of the Ural mountains instead of the summit or along political borders; Konstantinova, pers. comm.). Together with N. Konstantinova, we have tried to place the reports in the areas we recognise. When it has not been possible to find any locality within a region, we have followed the recommendation from N. Konstantinova to disregard the report. This does not affect many taxa except from Eastern Russia in their checklist (almost identical with southern Russia here) that may actually be from southern Ural. A few species

Table 2. The two-digit code referring to distribution outside Europe and Macaronesia (cf. Fig. 2)

2. Africa (Af)	37 = Mongolia	71 = Western Canada
20 = Northern Africa	38 = Eastern Asia	72 = Eastern Canada
21 = Southern Macaronesia (i.e. Cape Verde Is.)	4. Tropical Asia (TrAs)	73 = North-western USA
22 = West Tropical Africa	40 = Indian Subcontinent	74 = North-Central USA
23 = West-Central Tropical Africa	41 = Indo-China	75 = North-eastern USA
24 = Northeast Tropical Africa	42 = Malesia	76 = South-western USA
25 = East Tropical Africa	43 = North Indian Ocean	77 = South-Central USA
26 = South Tropical Africa	5. Australasia (Au)	78 = South-eastern USA
27 = Southern Africa	50 = Australia	79 = North and Central Mexico
28 = Middle Atlantic Ocean	51 = New Zealand	8. Southern America (SAM)
29 = Western Indian Ocean	6. Pacific (Oc)	80 = Mesoamerica
3. Temperate Asia (TeAs)	60 = South-western Pacific	81 = Caribbean
30 = Siberia	61 = South-Central Pacific	82 = Northern South America
31 = Russian Far East	62 = North-western Pacific	83 = Western South America
32 = Middle Asia	63 = North-Central Pacific	84 = Brazil
33 = Transcaucasus	7. Northern America (NAm)	85 = Southern South America
34 = Western Asia	70 = Subarctic America	9. Antarctic (An)
35 = Arabian Peninsula		90 = Subantarctic Islands
36 = China		91 = Antarctic Continent

reported from central Russia (not exactly the same area as ours) by Düll (1983), and repeated in Konstantinova et al. (1992), have not been supported by other sources (N. Konstantinova, pers. comm.). We have thus rejected these reports.

Some taxa are reported from Caucasus by Düll (1983) and repeated in Konstantinova et al. (1992) without any other report from any side of the range (*Cephaloziella stellulifera*, *Lophozia ventricosa* var. *uliginosa* [as *L. longiflora*], *Marsupella condensata*, *Moerckia blyttii*, *Phaeoceros bulbiculosus*, *Scapania compacta*, *Riccia gougetiana* var. *gougetiana* and *R. crinita* [as *R. canescens*]). Schljakov (1980) gives *Scapania kaurinii* from Caucasus without further specification and Konstantinova et al. (1992) erroneously gives *Cephaloziella stellulifera* and *Riella paulsenii* (Konstantinova, pers. comm.). Since “Caucasus” can refer both to the Russian side and to Georgia, Armenia and Azerbaydzhān (not within our area) these rejections are not reproduced in the table.

### Red Lists of Europe

Many areas of Europe have published national Red Lists. In the following list we summarize these by giving the original category from each list. The only exception is when it is shown that the taxon does not exist in the region, or when in the taxonomy followed here the taxon is reduced to a synonym of a more common taxon. The categories in the Red List for Europe (ECCB 1995) are also reproduced here. We are aware of the following published Red Lists for areas within the treated region that include hepaticas. In cases which several red lists we have in general used the latest. In addition several red lists are published for smaller regions than we recognise here, but those lists are not reproduced. The different lists use different systems for threat assignments. The most commonly used systems are the IUCN system published in two versions, here named the old IUCN system (IUCN 1978) and the new IUCN system (IUCN 1994).

**Europe (ECCB 1995):** Follows the old IUCN categories. Ex = extinct, E = endangered, V = vulnerable, R = rare, and K = insufficiently known, and T = taxonomic problem. The categories RT (regionally threatened) and T (taxonomic problems) are not reproduced here.

**Svalbard and Norway** (Frisvoll and Blom 1997). Follows the new IUCN categories. There is a later list (DN 1999) which includes the same species as Frisvoll and Blom (1997) but uses the old IUCN categories. For increased compatibility with other recent lists, we prefer to use Frisvoll and Blom (1997). EV = vanished, CR = critically endangered, EN = endangered, VU = vulnerable, DD = data deficient.

The category LR(nt) (= lower risk – near threatened) is not reproduced here.

**Sweden** (Gärdenfors 2000). Follows the new IUCN categories. RE = regionally extinct (försvunnen), CR = critically endangered (akut hotad), EN = endangered (starkt hotad), VU = vulnerable (sårbar). The category NT = near threatened (missgynnad) is not reproduced here.

**Finland** (Rassi et al. in press). Follows the new IUCN categories. RE = regionally extinct (Hävinneet), CR = critically endangered (Äärimmäisen uhanalaiset), EN = endangered (Erittäin uhanalaiset), VU = vulnerable (Vaarantuneet). The category NT (= near threatened, Silmälläpidettävä) is not reproduced here.

**Britain** (Church et al. 2001; excluding N. Ireland and Channel Islands): Following the new IUCN categories. CR = critically endangered. EN = endangered. VU = vulnerable.

**Netherlands** (Siebel et al. 2000): Follows the new IUCN categories. VN = extinct (Verdwenen), EB = critical (Ernstig bedreigd), BE = endangered (Bedreigd), KW = vulnerable (Kwetsbaar), GE = susceptible (Gevoelig).

**Belgium** (De Zuttere and Schumacker 1984). Follows their own classification system that does not correspond to any of the IUCN categories. A = vanished or presumed so (disparu ou présumé tel), B = rare, generally declining and more or less endangered (rare, en recul général, plus ou moins menacé de disparition), C = rare but not immediately threatened (rare, non menacé dans l'immédiat), D = considered to be rare but in fact overlooked (considéré comme rare, mais, en fait, méconnu).

**Luxembourg** (Werner 1987): 1 = probably vanished, not seen for a long time (probablement disparues, non revues depuis longtemps). 2 = endangered (menacées de disparition). 3 = potentially threatened and worth conserving (potentiellement menacées et dignes de protection). Those categories are printed in superscript instead of the symbol for Luxembourg under Belgium (cf. Table 1).

**Germany** (Ludwig et al. 1996): Follows their own classification system that does not correspond to any of the IUCN categories. 0 = extinct or missing (ausgestorben oder verschollen), 1 = critically endangered (vom Aussterben bedroht), 2 = endangered (stark gefährdet), 3 = vulnerable (gefährdet), G = presumably threatened (Gefährdung anzunehmen), R = extremely rare (extrem selten). The categories V = declining (zurückgehend) and D (= data deficient; Daten mangelhaft) are not reproduced here as they explicitly are not treated as any threat category.

**Poland** (Szwejkowski 1992): Follows roughly the old IUCN categories. Ex = extinct or probably extinct (Wymarłe i zaginione), E = endangered (Wymie-

rające), V = vulnerable (Narażone), R = rare (Rzadkie), and I = indeterminate (O nieokreślonym zagrożeniu).

**Switzerland** (Urmi et al. 1992): Follows the old IUCN categories. Ex = vanished or not refound for a long time (wahrscheinlich erloschen), E = in danger of vanishing (vom Erlöschen bedroht), V = vulnerable (gefährdet), and R = rare (selten).

**Austria** (Saukel and Köckinger 1999): Follows roughly the old IUCN categories. 0 = extirpated, extinct or missing (ausgerottet, ausgestorben oder verschollen), 1 = critically endangered (vom Aussterben bedroht), 2 = endangered (stark gefährdet), 3 = vulnerable (gefährdet), 4 = potentially threatened (potentiell gefährdet). The category r (threatened outside the Alps) is not reproduced here.

**Czech Republic** (Váňa 1993): Follows the old IUCN criteria. Ex = extinct (vymizelé druhy), E = endangered (kriticky ohrozené druhy), V = vulnerable (ohrozené druhy), R = rare (vzácné druhy), K = insufficiently known (druhy nedostatečně známé). *Lophozia capitata* is classified as extinct but recently found on two new localities.

**Slovakia** (Kubinska et al. 1996) follows the old IUCN criteria. Ex = extinct or missing, E = endangered, V = vulnerable, R = rare, I = indeterminate.

**Hungary** (Rajczy 1990): Follows roughly the old IUCN categories but with the rare and indeterminate category joined to one. 1 = extinct or vanished (kipusztult), 2 = endangered (being on the way to becoming extinct; közvetlenül veszélyeztetett), 3 = vulnerable (aktuálisan veszélyeztetett), 4 = rare or insufficiently known (potenciálisan veszélyeztetett).

**Portugal and Spain** (excl. Baleares; Sérgio et al. 1994): Gives threat classification for Spain and Portugal separately and follows the old IUCN categories. Ex = extinct or probably vanished (recorded before 1950 but not collected afterwards; extintas ou provavelmente desaparecidas), E = endangered (em perigo de extinção), V = vulnerable (vulneráveis), R = rare (raras). The category K (insufficiently known; duvidosas) is not reproduced here. The following species are classified as Ex in Portugal but later refound in the country (Sérgio, pers. comm.): *Preissia quadrata*, *Radula aquilegia*, and *Scapania curta*.

**Italy incl. Sardinia and Sicily** (Aleffi and Schumacker 1995). The list does not separate Sardinia and Sicily so the same threat categories are applied for all three geographical units used here if the species occur there. The list follows the old IUCN categories. Ex = extinct from the world, Ev = vanished from Italy, E = endangered, V = vulnerable, R = rare. *Riella notarisii* was reported within Italy only from Sardinia and is regarded as extinct there. It has recently been found on Sicily (Privitera and Puglisi 1997) but the Sardinian occurrence may still be regarded as extinct.

**Bulgaria** (Ganeva 1998): Follows the old IUCN cat-

egories. E = endangered, V = vulnerable, R = rare, K = insufficiently known.

**Estonia** (Ingerpuu 1998). Follows roughly the old IUCN categories. 0 = extinct or probably extinct (Hävinud või tõenäoliselt hävinud; no hepatic), 1 = endangered (Eriti ohustatud), 2 = vulnerable (Ohualtid), 3 = rare (Haruldaset), 4 = care demanding (Tähelepanu vajavad; no hepatic), 5 = indeterminate (määratlemata)

**Latvia** (Āboliņa 1994): Follows the old IUCN categories. 0 = extinct (Ex; izzudušās sugars), 1 = endangered (E; izzūdošās sugars), 2 = vulnerable (V; sarūkkošās sugars), 3 = rare (R; retās sugars), 4 = indeterminate (I; mazpazīstamās sugars).

**Lithuania** (Jukonien 1996): Follows the old IUCN categories. 0 = extinct (Ex; no hepatic), 1 = endangered (E), 2 = vulnerable (V), 3 = rare (R), 4 = indetermined (I).

**Ukraine incl. Crimea** (Šeljag-Sosonka 1996): Categories 0, I-VI but the hepatic species listed are all in category III = rare (piōkichi).

**Madeira** (Sérgio et al. 1992): Follows the old IUCN categories. Ex = Extinct, E = endangered, V = vulnerable, R = rare, I = insufficiently known.

## Distribution table

In the distribution table, the following symbols are used:

● ▲ = occurrence confirmed (species and infraspecific taxa, respectively).

○ △ = occurrence reported but the source does not discriminate between the taxa in a complex and we have thus been forced to interpret it to this taxon (species and infraspecific level, respectively). Whenever this symbol occurs in a taxon, a note explains why.

? = occurrence doubtful (doubted by us or in earlier publications).

— = taxon reported from the area but later rejected (in earlier sources or for the first time here).

[—] = taxon reported from the area but where we did not find any first hand source.

† = endemic to the treated area.

(i) = neophyte in the treated area.

Superscript is occurrence in smaller attached areas (see 1.2).

All other symbols refer to Red List categories (see 1.3).































	E	Sj	Is	Fo	No	Dk	Sc	Fi	Ie	Br	Frt	Nl	Be	De	Po	Ch	At	Cz	Sk	Hu	Pt	Es	Bl	Co	Sa	Sc	It	Si	Hr	Yu	Ba	Mk	Ro	Bg	A	Gr	Ct	Tu	Ee	Lv	Lt	By	Md	Ua	Cn	Nz	Fl	Rn	Rw	Rc	Re	Rs	Kz	Ca	Az	Ma	Cn	Extr	ECB
<i>Marchesinia</i>																																																											
<i>mackaii</i> (Hook.) Gray																																																											
<i>Marsupella</i>																																																											
<i>adusta</i> (Nees emend. Limp.) Spruce	K																																																										
<i>alpina</i> (Gottsch ex Husn.) Bennet																																																											
† <i>andreaeoides</i> (Lindb.) Müll.Frib.	R																																																										
<i>arctica</i> (Berggr.) Bryhn et R	VU																																																										
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<i>baeckii</i> (Austini) Kaal.																																																											
<i>brevissima</i> (Dumort.) Grolle																																																											
<i>commutata</i> (Limp.) Bernet																																																											
<i>condensata</i> (Angstr. ex C.Hartm.) Kaal.																																																											
<i>emarginata</i> (Benth.) Dumort. <sup>79</sup>																																																											
- subsp. <i>aquatica</i> (Lindemb.) Meyl.																																																											
- subsp. <i>emarginata</i>																																																											
<i>fimicaria</i> (F.W. Weber et D.Mohr) Dumort.																																																											
† <i>projimunda</i> Lindb.																																																											
† <i>ramosa</i> Mill.Frib.																																																											
<i>spongifolia</i> (Lindb.) Dumort. subsp.																																																											
<i>spongifolia</i> <sup>80</sup>																																																											
<i>spongicola</i> (Gieseke ex Lindernb.) Dumort.																																																											
<i>spiniloba</i> R.M.Schust. et Damsh.	T																																																										
<i>spinicea</i> (Limp.) Bernet <sup>81</sup>																																																											
<i>stahleri</i> Spruce	T																																																										
<i>Mastigophora</i>																																																											
<i>woodsii</i> (Hook.) Nees	R																																																										
<i>Mesopachia</i>																																																											
<i>sahlbergii</i> (Lindb.) A.Evans	R	VU																																																									

	E	Sj	Is	No	Dk	Sc	Fi	Ie	Br	Fri	Nl	Be	De	Po	Ch	At	Cz	Sk	Hu	Pt	Es	Bl	Co	Sa	Sc	It	Si	Hr	Yn	Ba	Mk	Rg	A	Gr	Ct	Tu	Ee	Lv	Lt	By	Md	Ua	Cn	Nz	Fl	Rn	Rw	Re	Rs	Kz	Cs	Az	Ma	Cn	Extr	ECB	
<i>Metzgeria</i>																																																									
<i>conjugata</i> Lindb. <sup>82</sup>																																																									
<i>fruticulosa</i> (Dicks.)																																																									
<i>furcata</i> (L.) Dumort. <sup>83</sup>																																																									
<i>leptoneura</i> Spruce var.																																																									
<i>leptoneura</i> <sup>84</sup>																																																									
† <i>simplex</i> Lorb. ex Müll.Frib. <sup>85</sup>	T																																																								
<i>temperata</i> Kuwayah.																																																									
<i>Microlejeunea</i>																																																									
<i>ulicina</i> (Taylo) A.Evans <sup>86</sup>																																																									
<i>Mnioloma</i>																																																									
<i>fissum</i> (Lehm.) R.M.Schust.	R																																																								
<i>Moerchia</i>																																																									
<i>blyttii</i> (Moerch.) Brockm. <sup>87</sup>																																																									
<i>Mylia</i>																																																									
<i>anomala</i> (Hook.) Gray																																																									
<i>taylorii</i> (Hook.) Gray																																																									
<i>Nardia</i>																																																									
<i>breyderi</i> (Limp.) Lindb.																																																									
<i>compressa</i> (Hook.) Gray																																																									
<i>geoscyphus</i> (De Not.) Lindb.																																																									
<i>insecta</i> Lindb.																																																									
<i>japonica</i> Steph.	R																																																								
<i>scalaris</i> Gray subsp.																																																									
<i>scalaris</i> <sup>88</sup>																																																									



















## Notes

1. Schuster (1992b) recognises *Aspiromitus punctatus* subsp. *agrestis* var. *douinii* R.M.Schust. (invalidly described and with no combination available under *Anthoceros agrestis*) with *Anthoceros crispulus* Douin as synonym. The latter taxon is reported from Europe (Norway, Finland, Britain, Netherlands, Germany, Poland, Switzerland, Austria, Hungary, France, Portugal, Spain, Italy, Sicily, Northwest and North Russia and Canary Islands), East Asia (36, 38), India (40) and North America (72, 74, 75, 78).
2. *Anthoceros caucasicus* is given from “Antillen und Mittelamerika” by Proskauer (1958) but this is due to a nomenclatural confusion (cf. Hässel de Menéndez 1990).
3. *Anthoceros punctatus* and *A. agrestis* are often confused, especially in older literature. *A. agrestis* seems to have a more northern and continental distribution in Europe than *A. punctatus*. We therefore believe that the reports of the latter from Poland, Austria, Hungary, Romania, Bulgaria, Latvia, Belarus and Russia are *A. agrestis*. The occurrence of the two taxa outside the treated region is even more unclear and several of the reports (e.g. all from Japan) may belong to *A. agrestis*.
4. *Notothylas orbicularis* var. *pseudotemperata* R.M. Schust. occurs in eastern North America (78).
5. *Phaeoceros laevis* is not always separated from *P. carolinianus* and cases where we have not been able to confirm the occurrence of *P. laevis* s. str. are marked with a circle. We suspect that most of these cases must be excluded as *P. carolinianus*. The occurrence outside Europe is equally complicated.
6. *Acanthocoleus aberrans* var. *aberrans* occurs in tropical America (79–82, 84)
7. After the typification of the species by Grolle (1963), *Anastrophyllum minutum* var. *grande* (Lindb.) R.M. Schust. is synonymous with *A. m.* var. *minutum* (type from Greenland). The variety usually named var. *minutum* must then have a new name. *Anastrophyllum minutum* var. *weberi* (Mart.) Kartt. is the oldest available combination (Söderström et al. 1992). Schljakov (1980) uses the name *Sphenolobus minutus* var. *acutilobus* Schljakov for this taxon. *Anastrophyllum minutum* subsp. *novaguineanensis* R.M.Schust. occurs on New Guinea (42). Where no variety is specified in any known source we assume that var. *weberi* is at hand.
8. *Aneura maxima* is recently discovered in Europe and we expect it will turn up in more regions. It may be looked for in herbaria under both *A. pinguis* and *Pellia* spp.
9. *Aneura pinguis* is closely related to *A. pseudopinguis* (Herzog) Pócs and many reports from the tropics may belong to the latter species. True *A. pinguis* occurs, however, also in the tropics (at least found in 25, 29, 80, 82 and 84; cf. Wigginton and Grolle 1996) while *A. pseudopinguis* is reported from at least 22, 23, 25–27, 84.
10. *Aphanolejeunea azorica* is widespread in the neotropics (from Mexico to Brazil) but we do not know the distribution more exactly.
11. *Aphanolejeunea microscopica* var. *africana* (Pócs) Pócs & Lücking occurs in Africa (23, 25) and *A. m.* var. *exigua* (A.Evans) Pócs & Lücking in Africa (22, 23, 25, 29) and South America (79, 80, 81, 82, 83, 84).
12. *Apomarsupella revoluta* subsp. *novoguineensis* R.M. Schust. occurs in New Guinea (42).
13. *Apometzgeria pubescens* is given from Lithuania by Najaulis et al. (1995) citing a specimen collected 1822. The species should be excluded from Lithuania unless it is confirmed by newer specimens. The record from southern Ural in Konstantinova et al. (1992) probably refers to the Siberian side. *A. p.* var. *kinabaluensis* Kuwah. occurs in the Himalayas (40) together with var. *pubescens* and on Borneo (40) as the only known variety.
14. *Athalamia hyalina* var. *suecica* (Lindb.) S.Hatt. is sometimes separated. It occurs throughout the distribution area of the species. A var. *californica* (Howe) R.M. Schust. occurs in California (76).
15. Schuster and Damsholt (1987) recognise *Lophozia hyperborea* var. *helophila* R.M.Schust. et Damsh. (the combination under *Barbilophozia* is not yet made) from Greenland (70). The record from Novaya Zemlya is probably “var. *hyperborea*”.
16. Hong (1988) described *Bazzania tricrenata* var. *fulfordiae* Hong from western North America (71) and we treat all other reports as var. *tricrenata*.
17. Where no variety of *Bazzania trilobata* is specified in any known source, we have assumed that var. *trilobata* is at hand based on Düll (1983) but var. *depauperata* is also possible in most regions. We also assume that var. *trilobata* is at hand in all areas outside the treated region.
18. Schuster (1966) described (invalidly without latin diagnosis) *Blepharostoma trichophyllum* “subsp. *australisBlepharostoma trichophyllum* is specified in any known source, we assume that subsp. *trichophyllum* is at hand (for Europe mainly based on Düll 1983). Konstantinova et al. (1992) gives only subsp. *trichophyllum* from Russia except the north.

19. *Calypogeia azurea* has been reported from many localities, mostly under its old name *C. trichomanis* auct. (*C. trichomanis* (L.) Corda is *C. fissa*, Stotler and Crotz 1983) but the concept of *C. trichomanis* often includes also *C. muelleriana* and other species. Older records are therefore not reliable and the distribution of *C. azurea* is somewhat unclear. We doubt its occurrence in the north since it has a southern distribution at least in Scandinavia. The occurrence on the Azores is questioned since it is excluded from the rest of Macaronesia and R. Schumacker did not see any real *C. azurea* when revising part of the Azorean material.
20. *Calypogeia fissa* subsp. *neogaea* R.M.Schust. occurs in North America (73-78).
21. *Calypogeia muelleriana* subsp. *blomquistii* R.M. Schust. occurs in North America (75, 78).
22. *Calypogeia neesiana* subsp. *subalpina* (Inoue) Inoue occurs in eastern Asia (38).
23. *Cephalozia affinis* is a doubtful taxon often treated as a synonym of *C. lunulifolia* in modern literature since it differs mainly in being paroicous. It seems, however, also to have somewhat different habitat requirements in northern Scandinavia and may be worth recognition at some level. The distribution is, due to this, badly known.
24. *Cephalozia bicuspidata* is a complex with three main taxa in Europe (*C. ambigua*, *C. bicuspidata* and *C. lammersiana*). They are sometimes separated as species, sometimes as subspecies or varieties. *Cephalozia ambigua* is generally regarded as more distinct from *C. bicuspidata* than what *C. lammersiana*, and the distribution of *C. ambigua* is less confused than between the two subspecies of *C. bicuspidata*. The *C. bicuspidata* complex includes also *Cephalozia bicuspidata* subsp. *austrirena* R.M.Schust. from New Zealand (51), *C. hamatiloba* Steph. (=*C. bicuspidata* subsp. *otaruensis* (Steph.) S.Hatt.) from east Asia (31, 36, 38, 40-42) and possibly North America (78?), *C. darjeelingensis* Udar et D.Kumar from India (40) and *C. crossii* Spruce from South America (83, 84). Where no variety of *Cephalozia bicuspidata* is specified in any known source, we have assumed that var. *bicuspidata* is at hand. We have also assumed that var. *bicuspidata* is at hand in the following areas outside the treated region: 23, 25-27, 29, 50, 79, 85 and 90. It is possible that all reports from East Asia belong to *C. hamatiloba*.
25. *Cephalozia catenulata* subsp. *nipponica* (S. Hatt.) Inoue occurs in eastern Asia (38, 41, 42)
26. *Cephalozia connivens* subsp. *fissa* (Steph.) Váňa occurs in Africa (22, 23, 25, 26, 27, 29) and Aus-
- tralia (50), and subsp. *sandwicensis* (Mart.) Váňa in the Pacific (61, 63).
27. As *Cephalozia leucantha* var. *robusta* is recently described, its distribution range is poorly known. All reports of the species not referring specifically to var. *robusta* are treated under var. *leucantha*.
28. *Cephalozia macrostachya* subsp. *australis* R.M. Schust. occurs in North America (78). *Cephalozia macrostachya* var. *spiniflora* was recently reinstated as a good taxon by Paton et al. (1996) giving it for Britain and Ireland. Some older records from other parts of Europe exist but the distribution there is very unclear. All reports not referring explicitly to var. *spiniflora* are treated as var. *macrostachya*.
29. *Cephalozia pleniceps* var. *caroliniana* R.M. Schust. occurs in North America (72, 78).
30. *Cephaloziella byssacea* subsp. *grandiretis* R.M. Schust. (combination not available under *C. divaricata*) occurs in New Zealand (51). Where no variety of *Cephaloziella divaricata* is specified in any known source we assume that var. *divaricata* is at hand (mainly based on Düll 1983).
31. *Cephaloziella uncinata* var. *brevigyna* R.M. Schust. et Damsh., var. *mamillosa* R.M.Schust. et Damsh. and var. *sphagnicola* R.M.Schust. are all described from North America (70) but we do not know what varieties are represented in Europe.
32. Where no variety of *Chiloscyphus pallescens* is specified in any known source, we assume that var. *pallescens* is at hand.
33. Where no variety of *Chiloscyphus polyanthos* is specified in any known source, we assume that var. *polyanthos* is at hand.
34. *Cololejeunea minutissima* subsp. *myriocarpa* (Nees et Mont.) R.M.Schust. occurs in tropical Africa and America (22, 23, 25, 27, 78, 79, 81, 82, 84) and subsp. *utriculifera* Vanden Berghe in tropical Africa (23, 25).
35. Both *Diplophyllum taxifolium* var. *taxifolium* and var. *macrostictum* H.Buch occur in Europe while var. *mucronatum* R.M.Schust. only occurs in North America (78).
36. *Dumontiera hirsuta* subsp. *nepalensis* (Taylor) R.M. Schust. occurs in the tropics (23, 27, 36, 38, 40, 41, 42, 60, 61, 63, 78, 79, 80, 81, 82, 83) and subsp. *tatunoi* Horik. in Japan (38). Where no subspecies is specified in any known source, we assume that subsp. *hirsuta* is at hand (34, 50).
37. *Fossombronia foveolata* var. *cristula* (Austin) R.M. Schust. (nom. illeg.) occurs in North America and southeast Asia (38, 42, 74, 75, 78). Other taxa of the *F. foveolata* complex (that maybe should be joined into a single species) are *F. brasiliensis*

- Steph. (74-75, 77-81, 84) and *F. crispa* Nees (24, 26, 27). The report of *F. foveolata* from Brazil is *F. brasiliensis* and reports from South Africa are *F. crispa*.
38. Scott and Bradshaw (1985) give *Fossumbronia pusilla* var. *maritima* Paton from Victoria (Australia) but it is probable that this report refers to *F. maritima* G.A.M.Scott et D.G.Pike, nom. inval.
39. *Frullania inflata* var. *communis* R.M.Schust. occurs in North America (71, 73-78; but 71 and 73 may be var. *inflata*) and var. *mayebarae* (S.Hatt.) R.M.Schust. occurs in Japan (38). The occurrence in Mexico (78) and Brazil (84) may be var. *communis* and all East Asian (38) and Chinese (36) reports may be var. *mayebarae*. *Frullania illyrica* Grolle is regarded as a synonym of *F. inflata* var. *inflata* as shown by Grolle and Long (2000).
40. *Frullania oakesiana* subsp. *takayuensis* (Steph.) R.M.Schust. occurs in eastern Asia (31, 38) and western North America (71).
41. *Frullania riparia* is a complex of related taxa variously treated as species, subspecies and synonyms. Grolle and Long (2000) treat *F. riparia* and *F. cesatiana* as the same species, but *F. muscicola* Steph. from east Asia (30, 31, 36, 38 and 40) and *F. azorica* from Macaronesia as separate species. Bisang et al. (1989) treat *F. muscicola* and *F. cesatiana* as subspecies of the same species but *F. riparia* as a separate species while Sim-Sim et al. (1999) treat all three taxa as separate species. As we follow Grolle and Long (2000) we use their concept. However, if further investigation shows that *F. cesatiana* and *F. riparia* should be separated at any level, all European records belong to the *cesatiana* element while the American records are true *F. riparia*.
42. *Frullania tamarisci* subsp. *asagrayana* (Mont.) S.Hatt. occurs in eastern North America (72, 74, 75, 78, 81), subsp. *nisquallensis* (Sull.) S.Hatt. in western North America and eastern Asia (30, 31, 70, 71, 73, 76) and subsp. *obscura* (Verd.) S.Hatt. in eastern and southeastern Asia (31, 36, 38, 40, 42). They are often treated at species level. The occurrence of subsp. *tamarisci* in eastern North America is doubtful.
43. Where no subspecies of *Gymnolea inflata* is specified in any known source, we assume that subsp. *inflata* is at hand.
44. *Haplomitrium hookeri* var. *minutum* (E.O. Campb.) Barth.-Beg. occurs in New Zealand.
45. Records of *Harpalejeunea molleri* (*H. ovata* auct.) from America are *H. subacuta* A.Evans (Schuster 1999).
46. *Herbertus aduncus* subsp. *aduncus* occurs in western North America and eastern Asia (30, 31, 36, 38, 42, 70, 71, 73) and subsp. *tenuis* (A.Evans) H.A.Miller et E.B.Scott in eastern North America (72, 75, 78).
47. *Herbertus stramineus* is probably endemic to Europe. The records from eastern North America probably belong to other species.
48. Schuster (1969) separates two varieties of *Jamesoniella autumnalis* from North America, var. *myriocarpa* (Brinkm.) Frye et L.Clark (72) and var. *heterostipa* (A.Evans) Frye et L.Clark (72, 73). The former is also reported from Northwest Russia.
49. *Jubula pennsylvanica* subsp. *bogotensis* (Steph.) Guerke occurs in America (78-83)
50. *Jungermannia exsertifolia* subsp. *exsertifolia* occurs in eastern Asia (30?, 31, 36, 38 40) and subsp. *cordifolia* var. *pendletonii* (Pearson) Váňa in western North America (76)
51. *Lophozia badensis* var. *apiculata* R.M.Schust. (not yet combined under *Leiocolea*) is described from arctic North America (70). All other reports belong to "var. *badensis*".
52. *Leiocolea bantriensis* var. *subcompressa* (Limpr.) Jørg. is sometimes recognised. It occurs at least in north and central Europe.
53. *Lophozia collaris* var. *libertae* (Huebener) Damsh. ex Söderström (not yet combined under *Leiocolea*) is sometimes distinguished. It occurs from Scandinavia to at least central and south-eastern Europe.
54. *Lophozia gillmanii* var. *ciliolata* R.M.Schust. (not yet combined under *Leiocolea*) occurs on Greenland (70). All other records are probably "var. *gillmanii*".
55. Where no variety of *Leiocolea heterocolpos* is specified in any known source we assume that var. *heterocolpos* is at hand.
56. We assume that all specimens not explicitly referred to *Lophozia rutheana* var. *laxa* belong to var. *rutheana*.
57. If separated from *Lejeunea eckloniana*, it is *L. holtii* Spruce that occurs in the British Isles.
58. *Lejeunea flava* subsp. *flava* occurs in tropical Africa and America (22-27, 29, 77-84), subsp. *orientalis* R.M.Schust. in southeast Asia and the Pacific (36, 38, 40-42, 50, 51, 60-62) and subsp. *tabularis* (Spreng.) S.W.Arnell in sub-Saharan Africa (22, 23, 25-27, 29). The populations from Macaronesia are here placed in subsp. *moorei* but further investigation is needed.
59. *Lejeunea lamacerina* subsp. *geminata* R.M. Schust. occurs in eastern North America (72, 74, 75, 78). The reports from Turkey and Iran are doubtful.
60. *Lepidozia cupressina* subsp. *natalensis* (Steph.) Pócs (25, 27) and subsp. *quinquefida* (Steph.) Pócs (23, 25) occur in Africa. We do not know

- which subspecies is present in Australia (50) but we assume that it is subsp. *cupressina*.
61. *Leptoscyphus cuneifolius* subsp. *fragilis* (J.B. Jack et Steph.) Grolle occurs in South America (80, 81, 82, 83, 85, 90). We assume that it is ssp. *cuneifolius* that occur in Russian Far East (31) and North America (78, 79).
  62. Nomenclatural confusion is at its height in *Lophocolea bidentata*. Vogelpoel (1977) and Steel (1978) showed that the type of *L. bidentata* belongs to the taxon up to then usually named *L. cuspidata* (Nees) Limpr. The “old” *L. bidentata* should then be named *L. latifolia* Nees at species level. However, the two taxa are often treated at varietal level and should be named *L. bidentata* var. *bidentata* (=*L. cuspidata*) and var. *rivularis* (Raddi) Warnst. (=*L. bidentata* auct.). To add to this, Engel and Schuster (1984) treated the genus *Lophocolea* as a subgenus of *Chiloscyphus* and transferred all species to that genus. The epithet *bidentata* is not available in that genus and *C. coadunatus* (Sw.) J.J.Engel et R.M.Schust. is the oldest available name. Thus, within *Chiloscyphus* the correct names appear to be *C. coadunatus* (=*L. cuspidata*, *C. cuspidatus* (Nees) J.J.Engel et R.M.Schust.) and *C. latifolius* (Nees) J.J.Engel et R.M.Schust. (=*L. bidentata* auct.) at species level and *C. coadunatus* var. *coadunatus* and var. *rivularis* (Raddi) A.A.Frisv. et al., resp. at variety level. In addition *Lophocolea cuspidata* subsp. *antipodea* R.M.Schust. (no combination under *L. bidentata* available) is described from New Zealand (51). Where no variety is specified in any known source, we assume that mostly var. *rivularis* is at hand. Most literature reports are from the time when both taxa were usually separated and *L. bidentata* was used for var. *rivularis*. Outside Europe, however, var. *bidentata* is more common and we assumed it is this taxon that occur in 34, 35, 42, 50 (may be “subsp. *antipodea*”), 72 and 85.
  63. *Lophocolea heterophylla* subsp. *cladogyna* R.M. Schust. occurs in North America (78).
  64. *Lophocolea minor* var. *chinensis* C.Massal. is recognised from China (36) by Piippo (1990). European specimens all belong probably to var. *minor*.
  65. *Lophozia birenata* var. *immersa* R.M.Schust. et Damsh. occurs in northern North America (70).
  66. *Lophozia debiliformis* var. *concolor* occurs in Norway and Greenland and var. *debiliformis* on Greenland. We do not know what variety is at hand for the rest of the records.
  67. *Lophozia excisa* var. *infuscata* R.M.Schust. et Damsh. (30, 31, 70) and var. *succulenta* R.M. Schust. et Damsh. (30, 70) occur both in northern North America and in Siberia.
  68. Where no variety of *Lophozia grandiretis* is specified in any known source we assume that it is var. *grandiretis*.
  69. Where no subspecies of *Lophozia longidens* is specified in any known source we assume that subsp. *longidens* is at hand.
  70. It seems that both *Lophozia pellucida* var. *pellucida* and var. *minor* R.M.Schust. occur in Europe. The latter is reported from Spitzbergen, 30, 31 and 70.
  71. *Lophozia polaris* var. *sphagnorum* (R.M.Schust.) R.M.Schust. et Damsh. occurs on Greenland (70). Whether any of the European specimens belong to this variety is not known to us.
  72. Bakalin (2000) states that *Lophozia silvicola* var. *grandiretis* H.Buch et S.W.Arnell is conspecific with *L. savicziae*. If *L. silvicola* is not upheld as a separate species, then it will be difficult to keep *L. savicziae*. However, there are indications that they may be conspecific with *L. schusterana* known from North America (70, 72, 74, 75). Future studies must solve the taxonomy in this messy complex.
  73. *Lophozia ventricosa* var. *confusa* R.M.Schust. and var. *rigida* R.M.Schust. both occur in arctic North America (70 and 70?, 72, 30 resp.). Where no variety of *L. ventricosa* is specified in any known source we assume that var. *ventricosa* is at hand.
  74. Where no variety of *Lophozia wenzelii* is specified in any known source we assume that var. *wenzelii* is at hand.
  75. *Lunularia cruciata* subsp. *thaxteri* (A.Evans et Herzog) R.M.Schust. occurs in South America (83-85) and New Zealand (51) with a doubtful record from the Azores (Boisselier et al. 1995). The rest is here treated as ssp. *cruciata*.
  76. *Mannia fragrans* subsp. *orientalis* R.M.Schust. occurs in Japan (38). Schuster (1992b) thinks it may be synonymous with var. *inodora*, which is more widespread and occurs also in Europe. We treat all reports from outside Japan as subsp. *fragrans* until the taxonomy is clarified.
  77. *Marchantia paleacea* subsp. *diptera* (Nees et Mont.) Inoue occurs in east Asia (36, 38)
  78. Where no subspecies of *Marchantia polymorpha* is specified in any known source we assume that subsp. *ruderalis* is at hand.
  79. Where no subspecies of *Marsupella emarginata* is specified in any known source we assume that subsp. *emarginata* is at hand.
  80. *Marsupella sparsifolia* subsp. *childii* R.M. Schust. occurs on New Zealand (51).
  81. *Marsupella ustulata* var. *neglecta* (Limpr.)

- Müll.Frib. (not yet combined under *M. sprucei*) occurs in the Alps and northern North America (70). Its distribution is badly known and it has been confused with other taxa of the genus. North European reports of the variety belong mostly to *M. spiniloba* (Damsholt 1993).
82. *Metzgeria conjugata* is closely related to *M. lindbergii* Schiffn. (=*M. conjugata* subsp. *japonica* (S.Hatt.) Kuwah.; 31, 36, 38, 40-42, 50, 60-61, 63) and *M. simplex*. Reports of *M. conjugata* from east Asia (31, 36, 38, 42), Australia (50) and the Pacific (60) may all belong to *M. lindbergii*.
  83. *Metzgeria furcata* var. *ulvula* Nees is often separated. In North America var. *furcata* is rare if occurring at all, while var. *ulvula* is common (Schuster 1992a). Both varieties are common in Europe. Var. *setigera* R.M.Schust. is also described from eastern North America (78).
  84. *Metzgeria leptoneura* var. *polychaeta* R.M. Schust. occurs in southeastern North America (78).
  85. *Metzgeria simplex* may be synonymous with *M. lindbergii* Schiffn. occurring in Asia (31, 36, 38, 40-42), Australia (50) and the Pacific (60-61, 63).
  86. *Microlejeunea ulicina* belongs to a complex including (and often regarded as subspecies of the same species) the African *M. africana* Steph. (22-27, 29) and the neotropical *M. bullata* (Taylor) A.Evans (78-85). All reports from South America belong to *M. bullata* and the records from Macaronesia should also be checked against this taxon. The report from Tristan da Cunha (90) is almost certainly erroneous.
  87. *Moerckia hibernica* is sometimes separated into two taxa. Formerly they were usually separated on species level (*M. flotoviana* (Nees) Schiffn. and *M. hibernica*) but they are now mostly regarded as synonyms or varieties (a combination of *M. flotoviana* at variety level seems not to exist). The distribution of the two taxa is not clear due to frequent lumping but “var. *flotoviana*” occurs at least in Norway, Sweden, Finland, Denmark, Ireland, Britain, Netherland, Germany, Poland, Switzerland, Austria, Czech Republic, Slovakia, Hungary, France, Slovenia, Romania and North Russia, in addition to 33, 70-75. True var. *hibernica* occurs at least in Sweden, Finland, Denmark, Ireland, Britain, Belgium, Switzerland, Austria, Czech Republic, Italy, Slovenia, North and Northwest Russia, in addition to 70-72, 74-75. We have not been able to identify which variety is involved in reports from the other areas the species occurs in.
  88. *Nardia scalaris* subsp. *botryoidea* R.M.Schust. occurs in North America (70, 72, 78) and subsp. *harae* (Amakawa) Amakawa in Japan (38).
  89. *Odontoschisma denudatum* var. *laevissimum* R.M. Schust. occurs in North America (74). We assume that only var. *denudatum* occurs in Eurasia, South America and western North America although the variety is never specified except by Schuster (1974).
  90. *Pellia endiviifolia* subsp. *alpicola* R.M.Schust. occurs in western North America (71). All specimens from western North America may belong to this taxon, which may be treated at species rank according to Schuster (1992a). Reports from eastern North America are *P. megaspora* R.M.Schust. (Schuster 1992a).
  91. Where no subspecies of *Pellia epiphylla* is specified in any known source we assume that subsp. *epiphylla* is at hand.
  92. *Pellia neesiana* subsp. *columbiana* (Krajina et Bray-shaw) R.M.Schust. occurs in western North America (71). All specimens from western North America may belong to that taxon (Schuster 1992a).
  93. *Plagiochasma rupestre* var. *volkii* Bischl. occurs in southern Africa (26, 27).
  94. The nomenclature and taxonomy of *Plagiochila asplenoides* is complex. *P. arctica* and *P. poreloides* are sometimes treated as subspecies of *P. asplenoides*. Moreover, *P. asplenoides* was used earlier for the taxon now called *P. poreloides* while the present day *P. asplenoides* was named *P. major* S.W.Arnell. It has therefore not always been possible to understand what taxon an author means and when we have not been able to solve it, we have marked it with a circle. In most cases, we think *P. poreloides* is at hand.
  95. The synonymisation of *P. killarniensis* with *P. bifaria* is not fully supported by chemical evidence (Rycroft et al. 1999). If proven wrong in the future the European and Macaronesian reports belong to *P. killarniensis* and the American reports to *P. bifaria*.
  96. *Plagiochila carringtonii* ssp. *lobuchensis* Grolle occurs in the Himalayas (36, 40).
  97. *Plagiochila dubia* var. *integrifolia* R.M.Schust. occurs in eastern North America (78).
  98. Where no variety of *Plagiochila poreloides* is specified in any known source we assumed that var. *poreloides* is at hand.
  99. Where no variety of *Pleurocladula albescens* is specified in any known source, we have assumed that var. *albescens* is at hand.
  100. *Porella arboris-vitae* subsp. *nitidula* (C.Massal.) S.Hatt. occurs in China (36). *Porella chamaedryfolia* (With.) Grolle given for the Canary Islands by Düll (1983) is an error for *Riccardia chamaedryfolia*.
  101. Boisselier et al. (1998b) has shown that *Porella*

- baueri* is an allopolyploid species with *P. platyphylla* and *P. cordaeana* as parent species. It has often been treated together with *P. platyphylla* and the distribution is therefore badly known.
102. The distribution of *Preissia quadrata* subsp. *hyperforea* R.M.Schust. is unclear. All arctic European specimens could be this subspecies.
  103. *Radula complanata* is often united with *R. lindbergiana* in a single species and the distribution is therefore not completely clear. When the taxon is not unambiguously specified in any known source, we have assumed that *R. complanata* is at hand. We have also assumed that *R. complanata* is at hand in the following areas outside the treated region: 30, 32, 37, 40, 79, 80 and 84.
  104. Schuster (1992b) reports *Reboulia hemisphaerica* subsp. *australis* from Spain and Portugal but Boisselier-Dubayle et al. (1998a) could not find this subspecies outside SE Asia and Australasia. Subsp. *acrogyna* R.M.Schust. occurs in North America (77), subsp. *orientalis* R.M. Schust. in eastern Asia (36, 38) and subsp. *sabalina* R.M.Schust. in North America (78). Where no subspecies is specified in any known source we assume that subsp. *hemisphaerica* is at hand.
  105. The occurrence of *Riccardia incurvata* in Korea (38) and Oregon (73) is doubtful.
  106. *Riccardia latifrons* subsp. *arctica* was recently described and the distribution is therefore only rudimentary known. Where no subspecies of *R. latifrons* is specified in any known source we assume that subsp. *latifrons* is at hand. *R. l.* var. *miyakeana* (Schiffn.) Furuki occurs in Japan (38).
  107. *Riccardia multifida* subsp. *decrescens* (Steph.) Furuki occurs in Japan (38) and subsp. *synoica* R.M.Schust. in North America (74?, 78).
  108. *Riccia atromarginata* is a species complex. *R. atromarginata* var. *jovet-astiae* Rauh et Buchloh occurs in Arabia, Pakistan and Madagascar (29, 35, 40) and *R. iodocheila* M.Howe (syn. *R. atromarginata* subsp. *iodocheila* (M.Howe) R.M. Schust.) in North and South America (78, 79, 83, 85).
  109. Jovet-Ast (2000) unites *Riccia trichocarpa*, *R. canescens* Steph. and *R. ciliata* subsp. *grisea* with the Australian *R. crinita* and the latter is the oldest name. This complex taxon has often been divided into several species and/or subspecies where the European taxon, if recognized, should be named *R. canescens*.
  110. If *Riccia albida* Sull. ex Austin is synonymous with *R. crustata* as indicated by Jovet-Ast (1986), then *R. crustata* occurs also in Australia and North America (50, 77, 78, 79; Scott and Bradshaw 1985, Jovet-Ast 1986)
  111. Many reports of *R. crystallina* are *R. cavernosa*, at least in the north and east, and we doubt all records that do not explicitly refer to the former. Knowledge of the distribution must therefore be regarded as preliminary.
  112. *Riccia duplex* var. *megaspora* Na-Thalang occurs in Australia (50).
  113. Schuster (1992b) assumed that fertile records of *Riccia fluitans* from Europe (Denmark, Britain, France) belong to *R. stenophylla* Spruce. However, this remains to be confirmed.
  114. Where no variety of *Riccia glauca* is specified in any known source, we assume that var. *glauca* is at hand.
  115. *Riccia gougetiana* var. *armatissima* is recognised at species level (as *R. erinacea* Schiffn.) by Schuster (1992b).
  116. *Riccia sorocarpa* subsp. *arctica* R.M.Schust. occurs in Siberia and northern North America (30, 70) and subsp. *erythrophora* R.M.Schust. in southwestern North America (76, 79). The subspecies has never been separated in Europe and we assume that it is subsp. *sorocarpa* that occurs here, even if the occurrences in northern Europe may belong to ssp. *arctica*. *R. s.* var. *heegii* Schiffn. is sometimes recognised. It occurs in central and southwestern Europe, Macaronesia and North Africa.
  117. *Scapania apiculata* and *S. carinthiaca* var. *carinthiaca* are both reported from Liechtenstein but the records are probably based on the same collection interpreted differently by different authors. We report both taxa until the question is clarified.
  118. *Scapania degeneri* Schiffn. ex Müll.Frib. var. *degeneri* and var. *dubia* R.M.Schust. (no combination under *S. brevicaulis* exist) both occur in Europe. The latter is found in Sweden and North America (70-72, 74).
  119. *Scapania calcicola* in North America differs from the European plants and specimens may all belong to the recently described *S. pseudocalcicola* R.M.Schust. et Damsh.
  120. *Scapania curta* var. *grandiretis* R.M.Schust. occurs in northern Asia (30, 31) and North America (70). Where no variety is specified in any known source we assume that var. *curta* is at hand.
  121. *Scapania cuspiduligera* var. *diplophyllopsis* R.M. Schust. occurs in Siberia (30) and northern North America (70). So far, var. *cuspiduligera* is the only variety reported from Europe but var. *diplophyllopsis* is possible in the European arctic. We assume that var. *cuspiduligera* is at hand in all areas outside the arctic.

122. Where no subspecies of *Scapania irrigua* is specified in any known source, we have assumed that subsp. *irrigua* is at hand (mainly based on Düll 1983).
123. Where no variety of *Scapania lingulata* is specified in any known source we assume that var. *lingulata* is at hand.
124. The occurrence of *Scapania obcordata* in the Alps is doubtful. All specimens seen by us so far are *S. praetervisa*. *Scapania paradoxa* R.M. Schust. is reported from Kola Peninsula. It is here treated as a synonym of *S. obcordata*. It occurs otherwise on Greenland from where also *S. paradoxa* var. *ramosa* R.M.Schust. is described.
125. *Scapania paludicola* var. *viridigemma* R.M. Schust. occurs in North America (70, 72, 75). Where no variety is specified in any known source we assume that var. *paludicola* is at hand.
126. *Scapania praetervisa* var. *polaris* R.M.Schust. occurs in arctic North America (70). All reports outside that area are treated as var. *praetervisa*.
127. *Scapania parvifolia* Warnst. is treated as a synonym of *S. scandica* but it is unclear to us which variety it belongs to. It occurs in Sj? (DD), Is, No, Se, Fi, Br (DD), De, Po, Cz (E), Sk (I), Hu (R), Ua (only this taxon reported, marked with open sign), Rn, Rw, 30-31, 36, 38, 70, 72. Where no variety of *Scapania scandica* is specified in any known source we assume that var. *scandica* is at hand. *S. scandica* var. *argutedentata* H.Buch is sometimes separated (e.g. Potemkin 1993, 1995). It occurs in Europe but the distribution is very incompletely known.
128. *Sphaerocarpos texanus* is probably introduced into Australia (50) and South America (85).
129. *Targionia lorbeeriana* is often (and maybe correctly so) synonymized completely with *T. hypophylla* and the distribution is therefore badly known. Where it is unclear to us which taxon is meant, we have assumed that *T. hypophylla* is at hand. We have also assumed that *T. hypophylla* is at hand in the following provinces: 21, 30, 31, 32, 40, 61, 63, 80 and 84.
130. The distribution of *Trichocolea tomentella* outside Europe is difficult to list due to confused taxonomy. It may be that all reports from the tropics belong to other taxa.
131. Where no subspecies of *Tritomaria exsectiformis* is specified in any known source we assume that subsp. *exsectiformis* is at hand.
132. *Tritomaria quinquedentata* subsp. *papillifera* R.M. Schust. occurs in eastern Asia (36, 38) and the Himalayas (40). Where no subspecies is specified in any known source we assume that subsp. *quinquedentata* is at hand.

### **Taxa of which the occurrence in Europe and Macaronesia is rejected**

Below are listed all taxa, to our knowledge, that at some time have been reported from the region but later rejected. In addition, some taxa that we do not know where they taxonomically belong are noted.

*Asterella blumeana* (Nees) Kachroo is reported from Italy by Tassi (1901; as *Fimbriaria blumeana* Nees) but this taxon known from Java is rejected by Aleffi and Schumacker (1995). Reports from the Himalayas are erroneous (R. Grolle, pers. comm.).

*A. elegans* (Spreng.) Trevis. is reported from Corsica but rejected as *A. africana* by Bischler and Jovet-Ast (1973).

*Bazzania denudata* (Gottsche et al.) Trevis. is reported from several countries in Central Europe but rejected as *B. flaccida* by Grolle (1973). It occurs in North America (70-76, 78) and eastern Asia (31, 36, 38).

*Blepharostoma arachnoideum* M.Howe is reported from northern Ural but excluded as *B. trichophyllum* subsp. *brevirete* by Konstantinova and Potemkin (1996). The former occurs in Russian Far East (31) and North America (71, 73, 76)

*Chiloscyphus integrifolius* Lehm. et Lindenb. is reported from Italy by Rodegher (1896) but the occurrence in Europe of this Chilean species is rejected by Aleffi and Schumacker (1995).

*Fimbriaria raddii* Corda is reported from Italy by Zodda (1934) but it is not clear what taxon this is. The occurrence in Italy is rejected by Aleffi and Schumacker (1995).

*F. stahlii* Steph. is reported from Italy by Tassi (1901) but the occurrence in Europe of this taxon known from Central America is rejected by Aleffi and Schumacker (1995).

*Fossombronia crispa* Nees is reported from Portugal (e.g. Sérgio 1987) but rejected by Perold (1997). The taxon occurs in tropical and southern Africa.

*Frullania davurica* Hampe is erroneously reported from Ukraine (Konstantinova et al. 1992 with a question mark) and the report from Caucasus (no source or locality traced) is doubtful. It occurs in Tyumen in western Siberia, in east Asia (30, 31, 36, 38), and Alaska (70).

*Frullania eboracensis* Gottsche is reported from the Azores (Russell 1862) but rejected by Eggers (1982). It occurs with two subspecies in North America (70-72, 74-78).

*Frullania muscicola* Steph. is erroneously reported from several places in the treated area (Portugal, Spain, Azores, Madeira, Canary Is.). Most Macaronesian specimens belong to *F. azorica* and none is true *F. muscicola*, which is confined to East Asia (30, 31, 36, 38, 40).

*Frullania obscurifolia* Mitt. is given for the Canary Islands but the specimen belongs to *F. azorica* (Grolle and Long 2000)

*Herbertus sakuraii* (Warnst.) S.Hatt. is given from Europe but this is due to synonymisation with *H. borealis*. We prefer to keep them as separate species pending further studies. *H. sakuraii* occurs in Asia (30, 31, 36, 38) and North America (70, 71, 73).

*Lophozia schusterana* Schljakov is noted from Svalbard (as *L. groenlandica* sensu R.M.Schust.) but this taxon has never been found in Europe. It is known only from North America (70, 72, 74, 75).

*Marsupella emarginata* subsp. *tubulosa* (Steph.) N.Kitag. occurs in North America (75, 78) and eastern Asia (30?, 31, 36, 38) with a doubtful record from the eastern slope of Ural. The latter record is the source for reports from Europe.

*Metahygrobiella lucens* (A.Evans) H.A.Miller is reported from Italy by Rodegher (1896; as *Cephaloziella lucens* (A.Evans) Steph.) but this is rejected by Aleffi and Schumacker (1995). It is confined to Hawaii (63).

*Metzgeria densiseta* Steph. is given for the Canary Islands by Kuwahara (1984) but this is probably an error. The taxon occurs in Australia and the Pacific (50, 60).

*Plagiochila javanica* (Sw.) Nees et Mont. is reported from the Canary Islands but this is rejected by Inoue (1965). It is confined to southeast Asia, Australia and the Pacific (36, 40, 41, 50, 60).

*Porella navicularis* (Lehm. et Lindenb.) Pfeiff. is an American taxon reported from Europe a few times in the 19<sup>th</sup> century. All reports are based on specimens of other *Porella* species.

*Riccia concava* Bisch. is erroneously reported from the Canary Islands (Perold 1989). It is confined to South Africa (26).

*Riccia limbata* Bisch. ex Krauss is reported from the Canary Islands under the synonym *R. capensis* Steph., but the record is *R. nigrella*. *R. limbata* occurs in Africa (24, 27). Reports from Australia (50) are *R. inflexa* Taylor (Jovet-Ast 2000).

*Riella parisii* Gottsche is rejected from Spain and thus the whole region by Casas (1998). Only known from North Africa (20).

## Taxa occurring just outside the area

This list includes taxa occurring in Cape Verde Islands, North Africa, Asian part of Turkey, Transcaucasus, Asian part of Kazakhstan, Western Siberia and Greenland, but not yet found in the region treated here.

*Acrolejeunea emergens* (Mitt.) Steph. var. *emergens* [Cape Verde Is., 22-23, 25-26, 29, 79, 80, 82, 84].

*Calycularia laxa* Lindb. et Arnell [Western Siberia, 30, 31, 70, 71].

*Cephaloziella mammillifera* R.M.Schust. et Damsh. [Greenland].

*Cephaloziella violacea* Schljakov [Western Siberia].

*Cyathodium cavernarum* Kunze [Cape Verde Is., 22-23, 25-27, 35, 36, 38, 40-42, 80, 84].

*Fossombronia alaskana* Steere et Inoue [Western Siberia, Greenland, 31, 70].

*Fossombronia intestinalis* Taylor [Algeria, 27, 50, 51].

*Fossombronia mauretanica* Raddi nom. nud. [Algeria]. Grolle (1976) could not find any specimen and doubt its specific value.

*Frullania socotrana* Mitt. ex Balfour [Cape Verde Is., 23-27, 29, 35].

*Frullania spongiosa* Steph. [Cape Verde Is., 22-23, 25-27].

*Gymnocolea fascinifera* Potemkin [Western Siberia, 70].

*Jungermannia caucasica* Váňa [Georgia, Turkey].

*Jungermannia evansii* Váňa [Greenland, 70, 71, 73, 75, 78].

*Jungermannia lignicola* Grolle [Turkey].

*Jungermannia pyriflora* Steph. [Greenland, 75, 78, 30 ?31, 36, 38, 40].

*Jungermannia subtilissima* (Schiffn.) Grolle [Turkey].

*Lejeunea caespitosa* Lindenb. [Cape Verde Is., 22-23, 25-27, 29, 42, 60, 78, 81].

*Lophozia alboviridis* R.M.Schust. [Western Siberia, Greenland, 31, 70].

*Lophozia schusterana* Schljakov [Greenland, 70, 72, 74, 75].

*Lophozia subapiculata* R.M.Schust. et Damsh. [Greenland].

*Mannia atlantica* (Trab.) Jel. nom. inval. [Algeria].

*Marchantia debilis* K.I.Goebel [Morocco, Egypt, 22-27, 29].

*Marchantia pappeana* Lehm. subsp. *pappeana* [Cape Verde, 22-27, 29].

*Metacalypogeia schusteriana* S.Hatt. et Mizut. (syn. *Eocalypogeia schusteriana* (S.Hatt. et Mizut.) R.M. Schust.) [Greenland, 31, 70, 72].

*Nardia assamica* (Mitt.) Amakawa [Georgia, 31, 36, 38, 40, 42].

*Plagiochasma eximium* (Steph.) Steph. [Cape Verde, 22-27, 29, 35].

*Plagiochila africana* Steph. [Libya, 22-23].

*Prasanthus jamalicus* Potemkin [Western Siberia].

*Pseudolepicolea fryei* (Perss.) Grolle et Ando [Western Siberia, 31, 70].

*Radula prolifera* Arnell [Western Siberia, 30, 31, 70, 71].

*Riccia aculeata* Trab. nom. nud. [Algeria]. Possibly *R. crozalzii* fide Jovet-Ast in Grolle (1976).

*Riccia battandieri* Trab. nom. nud. [Algeria]. Nomen dubium fide Jovet-Ast in Grolle (1976).

*Riccia campbelliana* M.Howe subsp. *campbelliana* [Ka-zachstan, 27, 74, 76-79].

*Riccia chinensis* Herzog [Algeria?, 36].

*Riccia chudoana* Steph. [“Sahara”]. A doubtful taxon.

*Riccia congoana* Steph. (=*R. aegyptica* S.W.Arnell) [Egypt, 22-27].

*Riccia convexa* Steph. [Algeria, 36].

*Riccia echinatula* Trab. nom. nud. [Algeria]. Nomen dubium fide Jovet-Ast in Grolle (1976; possibly *R. ciliifera*).

*Riccia mamillata* Trab. [Algeria]. A. doubtful taxon.

*Riccia munita* Trab. nom. nud. [Algeria]. Nomen dubium fide Jovet-Ast in Grolle (1976; possibly *R. sorocarpa*).

*Riccia polycarpa* (Trab.) Jel. [Algeria]. A doubtful taxon.

*Riccia riatensis* Trab. nom. nud. [Morocco]. Nomen dubium fide Jovet-Ast in Grolle (1976; possibly *R. lamellosa*).

*Riella bialata* Trab. [Algeria].

*Riella cyrenaica* Maire [Libya].

*Riella numidica* Trab. nom. nud. [Morocco, Algeria, Tunisia].

*Riella parisii* Gottsche [Algeria, Tunisia (excluded from Europe)].

*Riella paulsenii* Porsild [Kazachstan, 32, erroneously from Caucasus].

*Scapania invisa* R.M.Schust. [Greenland]. May be a synonym to *S. zemljae* (Konstantinova et al. 1992, Potemkin 1993).

*Scapania personii* R.M.Schust. [Greenland, 70].

*Scapania pseudocalcicola* R.M.Schust. [Greenland, 72].

*Scapania pulcherrima* R.M.Schust. [Greenland]. Potemkin (1993) treats it as a synonym of *S. tundrae*.

*Scapania serrulata* R.M.Schust. [Greenland, 70, 72].

## New combinations

*Gymnocolea inflata* subsp. *acutiloba* (Schiffn.) R.M.Schust. et Damsh. ex Söderström et Váňa, comb. nov. [R.M. Schust. et Damsh., Beih. Nova Hedwigia 92: 104, 1988, nom. inval. (Art. 33.2)]. Basionym: *Lophozia acutiloba* Schiffn., Hedwigia 48: 187, 1908.

*Pleurocladula albescens* var. *islandica* (Nees) Söderström et Váňa, comb. nov. Basionym: *Jungermannia islandica* Nees, Naturg. Europ. Leberm. 2:29, 1836.

## Recent synonyms

The following synonyms are names used by Grolle (1983), Düll (1983) or Konstantinova et al. (1992), as well as some names used in later publications but not adopted in this list.

*Anthoceros mandonii* Steph. = *A. caucasicus*

*Aphanolejeunea teotonii* V. Allorge et Ast = *A. sintenisii*

*Asterella elegans* auct. eur. = *A. africana*

*Athalamia hyalina* var. *suecica* (Lindb.) S.Hatt. = *A. hyalina*

*Barbilophozia hatcheri* var. *grandiretis* Lammes = *B. rubescens*

*Blepharostoma arachnoideum* auct. eur. = *B. trichophyllum* subsp. *brevirete*

*B. trichophyllum* var. *brevirete* Bryhn et Kaal. = *B. t.* subsp. *brevirete*

*Calypogeia fusca* (Lehm.) Steph. = *Mnioloma fuscum*

*Cephaloziella arctica* Bryhn et Douin = *C. varians*

*Chiloscyphus coadunatus* (Sw.) J.J.Engel et R.M. Schust. = *Lophocolea bidentata* var. *bidentata*

*C. integrifolius* Lehm. & Lindenb. (excluded)

*C. latifolius* (Nees) J.J.Engel et R.M.Schust. = *Lophocolea bidentata* var. *rivularis*

*C. minor* (Nees) J.J.Engel et R.M.Schust = *Lophocolea minor*

*C. profundus* (Nees) J.J.Engel et R.M.Schust. = *Lophocolea heterophylla*

*Cololejeunea azorica* V.Allorge et Ast = *Aphanolejeunea azorica*

*C. madeirensis* Schiffn. = *Aphanolejeuna madeirensis*

*Cephalozia hibernica* Spruce = *C. crassifolia*

*C. lammersiana* (Huebener) Carringt. = *C. bicuspis-data* subsp. *lammersiana*

*Cephaloziella arctica* Bryhn et Douin = *C. varians*

*C. divaricata* var. *scabra* (M.Howe) S.W.Arnell = *C. d.* var. *asperifolia*

*C. rubella* subsp. *arctogena* (R.M.Schust.) R.M. Schust. et Damsh. = *C. arctogena*

*C. rubella* var. *arctogena* R.M.Schust. = *C. arctogena*

- C. rubella* var. *sullivantii* (Austin) Müll.Frib. = *C. rubella* subsp. *rubella*  
*C. subdentata* Warnst. = *C. spinigera*  
*Chandonanthus filiformis* Steph. = *Tetralophozia filiformis*  
*C. setiformis* (Ehrh.) Lindb. = *Tetralophozia setiformis*  
*Chiloscyphus fragilis* (A.Roth) Schiffn. = *C. pallescens* var. *fragilis*  
*C. rivularis* (Schrad.) Hazsl. = *C. polyanthos* var. *rivularis*  
*Crossocalyx hellerianus* (Lindenb.) Meyl. = *Anastrophyllum hellerianum*  
*Crossogyna autumnalis* (DC.) Schljakov = *Jamesoniella autumnalis*  
*C. undulifolia* (Nees) Schljakov = *Jamesoniella undulifolia*  
*Dichiton integrerrimum* (Lindb.) H.Buch = *Cephalozilla integrerrima*  
*Dicranolejeunea johnsoniana* (Mitt.) Grolle = *Acantholeus aberrans* var. *laevis* (Kruijt 1988, Gradstein, pers. comm.)  
*Diplophyllum taxifolium* var. *macrostictum* H.Buch = *D. taxifolium*  
*Exormotheca bullosa* auct. = *E. welwitschii*  
*Fossombronia crispa* Nees (excluded).  
*F. mittenii* Tindall = *F. wondraczekii*  
*F. zeyheri* auct. eur. = *F. foveolata*  
*Frullania davurica* Hampe (excluded)  
*F. eboracensis* Gottsche (excluded)  
*F. muscicola* Steph. (excluded)  
*F. obscurifolia* auct. eur. = *F. azorica*  
*F. tamarisci* var. *nervosa* Mont. = *F. tamarisci* subsp. *tamarisci*  
*Gymnocolea acutiloba* (Schiffn.) Müll.Frib. = *G. inflata* subsp. *acutiloba*  
*G. inflata* var. *heterostipa* (Carringt. et Spruce) Müll.Frib. = *G. inflata*  
*Harpalejeunea ovata* (Dicks.) Schiffn. = *Douinia ovata*  
*H. ovata* auct. = *H. molleri*  
*Herbertus sakuraii* auct. eur. = *H. borealis*  
*Isopaches birenatus* (Hoffm.) H.Buch = *Lophozia birenata*  
*I. decolorans* (Limpr.) H.Buch = *Lophozia decolorans*  
*Jungermannia caucasica* Váňa (excluded)  
*J. eucordifolia* Schljakov = *J. exsertifolia* subsp. *cordifolia*  
*Lejeunea laetevirens* auct. eur. = *L. canariensis*  
*Leiocolea alpestris* (F.Weber) Isov. = *L. collaris*  
*L. borealis* (Frisvoll et Moen) Söderström = *Gymnocolea borealis*  
*Lejeunea holtii* Spruce = *L. eckloniana*  
*L. ulicina* (Taylor) Gottsche = *Microlejeunea ulicina*  
*Liochlaena lanceolata* Nees = *Jungermannia leiantha*  
*L. subulata* (A.Evans) Schljakov = *Jungermannia subulata*  
*Lophocolea bidentata* auct. (incl. Konstantinova et al. 1992) = *L. bidentata* var. *rivularis*  
*L. cuspidata* (Nees) Limpr. = *L. bidentata* var. *bidentata*  
*Lophozia badensis* (Gott sche) Schiffn. = *Leiocolea badensis*  
*L. bantriensis* (Hook.) Steph. = *Leiocolea bantriensis*  
*L. confertifolia* Schiffn. = ?*L. wenzelii*  
*L. confertifolia* sensu Konstantinova et al. 1992 = *L. ventricosa*  
*L. borealis* Frisvoll et Moen = *Gymnocolea borealis*  
*L. excisa* var. *jurensis* (Meyl.) Müll.Frib. = *Lophozia excisa*  
*L. gillmanii* (Austin) R.M.Schust. = *Leiocolea gillmannii*  
*L. groenlandica* auct. = *L. wenzelii*  
*L. groenlandica* sensu R.M.Schust. = *L. schusterana* (excluded)  
*L. guttulata* (Lindb. et Arnell) A.Evans = *L. longiflora*  
*L. heterocolpos* (Hartm.) M.Howe = *Leiocolea heterocolpos*  
*L. h. var. *arctica** (S.W.Arnell) R.M.Schust. et Damsh. = *Leiocolea heterocolpos* var. *arctica*  
*L. h. var. *harpanthoides** (Bryhn et Kaal.) R.M.Schust. = *Leiocolea heterocolpos* var. *harpanthoides*  
*L. heteromorpha* R.M.Schust. et Damsh. = *L. groenlandica*  
*L. iremelensis* Schljakov = *L. wenzelii*  
*L. jurensis* Müll.Frib. = *L. excisa*  
*L. longiflora* auct. (incl. Düll 1983) = *L. ventricosa* var. *uliginosa*  
*L. major* (C.E.O.Jensen) Schljakov = *L. polaris*  
*L. murmanica* Kaal. = *L. groenlandica*  
*L. rufescens* Schljakov = *L. sudetica*  
*L. rufescens* auct. = *L. wenzelii* var. *lapponica*  
*L. rutheana* (Limpr.) M.Howe = *Leiocolea rutheana*  
*L. schusterana* Schljakov (excluded)  
*L. silvicola* H.Buch = *L. ventricosa* subsp. *silvicola*  
*L. silvicola* var. *grandiretis* H.Buch et S.W.Arnell = *L. savicziae*  
*L. turbinata* (Raddi) Steph. = *Leiocolea turbinata*  
*L. ventricosa* sensu Schljakov = *L. silvicola*  
*L. ventricosa* var. *grandiretis* (H.Buch et S.W.Arnell) R.M.Schust. et Damsh. = *L. savicziae*  
*Marchantia alpestris* (Nees) Burgeff = *M. polymorpha* subsp. *montivagans*  
*M. aquatica* (Nees) Burgeff = *M. polymorpha* subsp. *polymorpha*  
*M. polymorpha* auct. = *M. polymorpha* subsp. *ruderalis*  
*M. polymorpha* var. *aquatica* Nees = *M. polymorpha* var. *polymorpha*  
*Marsupella aquatica* (Lindenb.) Schiffn. = *M. emarginata* subsp. *aquatica*  
*M. badensis* Schiffn. = *M. funckii*  
*M. emarginata* subsp. *tubulosa* (Steph.) N.Kitag. (excluded)

- M. emarginata* var. *aquatica* (Lindenb.) Dumort. = *M. emarginata* subsp. *aquatica*  
*M. emarginata* var. *pearsonii* (Schiffn.) M.Corley = *M. emarginata* subsp. *aquatica*  
*M. revoluta* (Nees) Dumort. = *Apomarsupella revoluta*  
*M. boeckii* var. *stableri* (Spruce) R.M.Schust. = *M. stableri*  
*M. tubulosa* Steph. = *M. emarginata* subsp. *tubulosa* (excluded)  
*Massularia capitata* (Hook.) Schljakov = *Lophozia capitata*  
*M. elegans* (R.M.Schust.) Schljakov = *Lophozia excisa* var. *elegans*  
*M. grandiretis* (Kaal.) Schljakov = *Lophozia grandiretis*  
*M. hyperarctica* (R.M.Schust.) Schljakov = *Lophozia hyperarctica*  
*M. incisa* (Schrad.) Schljakov = *Lophozia incisa*  
*M. laxa* (Lindb.) Schljakov = *Lophozia laxa*  
*M. opacifolia* (Meyl.) Schljakov = *Lophozia opacifolia*  
*Metzgeria conjugata* subsp. *simplex* (Lorb.) R.M. Schust. = *M. simplex*  
*M. densiseta* Steph. (excluded)  
*Nardia assamica* (Mitt.) Amakawa (excluded)  
*Orthocaulis atlanticus* (Kaal.) H.Buch = *Barbilophozia atlantica*  
*O. attenuatus* (Mart.) A.Evans = *Barbilophozia attenuata*  
*O. binsteadii* (Kaal.) H.Buch = *Barbilophozia binsteadii*  
*O. floerkei* (F.Weber et D.Mohr) H.Buch = *Barbilophozia floerkei*  
*O. hyperboreus* (R.M.Schust.) H.Buch = *Barbilophozia hyperborea*  
*O. kunzeanus* (Huebener) H.Buch = *Barbilophozia kunzeana*  
*O. quadrilobus* (Lindb.) H.Buch = *Barbilophozia quadriloba*  
*Plagiochila allorgei* Herzog et Perss. = *P. longispina*  
*P. arctica* var. *subarctica* (Jørg.) Inoue = *P. poreolloides* var. *subarctica*  
*P. corniculata* (Dumort.) Dumort. = *P. exigua*  
*P. killarniensis* Pearson = *P. bifaria*  
*P. sharpii* H.L.Bломq. = *P. retorsa*  
*P. pitardii* Steph. = *P. spinulosa*  
*Plectocolea hyalina* (Lyell) Mitt. = *Jungermannia hyalina*  
*P. obovata* (Nees) Lindb. = *Jungermannia obovata*  
*Pleurocladula islandica* (Nees) Grolle = *P. albescens* var. *islandica*  
*Porella navicularis* (Lehm. et Lindenb.) Pfeiff. (excluded)  
*P. platyphylloidea* (Schwein.) Lindb. = *P. platyphylla*  
*Protolophozia debiliformis* (R.M.Schust.) Konstantinova = *Lophozia debiliformis*  
*P. elongata* (Steph.) Schljakov = *Lophozia elongata*  
*Radula complanata* subsp. *lindbergiana* (Gottscche) R.M.Schust. nom. inval. = *R. lindbergiana*  
*Riccia canescens* Steph. = *R. crinita*  
*R. capensis* Steph. = *R. limbata* (excluded)  
*R. dalslandica* S.W.Arnell = *R. ciliata*  
*R. glauca* var. *subinermis* (Lindb.) Warnst. = *R. g. var. ciliaris*  
*R. pseudopapillosa* Steph. = *R. papillosa*  
*R. trichocarpa* Howe = *R. crinita*  
*Riella parisii* Gottscche (excluded).  
*Saccobasis polita* (Nees) H.Buch = *Tritomaria polita*  
*S. polymorpha* (R.M.Schust.) Schljakov = *Tritomaria polymorpha*  
*Scapania calcicola* var. *ligulifolia* (R.M.Schust.) Damsh. et D.G.Long = *S. ligulifolia* (excluded)  
*S. degenii* Schiffn. ex. Müll.Frib. = *S. brevicaulis*  
*S. ligulifolia* R.M.Schust. (excluded)  
*S. massalongi* (Müll.Frib.) Müll.Frib. = *S. carinthiaca* var. *massalongi*  
*S. paradoxa* R.M.Schust. = *S. obcordata*  
*S. parvifolia* Warnst. = *S. scandica*  
*Solenostoma caucasicum* (Váňa) Konstantinova = *Jungermannia caucasicum*  
*S. caespiticium* (Lindenb.) Steph. = *Jungermannia caespiticia*  
*S. confertissimum* (Nees) Schljakov = *Jungermannia confertissima*  
*S. gracillimum* (Sm.) R.M.Schust. = *Jungermannia gracillima*  
*S. handelii* (Schiffn.) Müll.Frib. = *Jungermannia handelii*  
*S. pusillum* (C.E.O.Jensen) Steph. = *Jungermannia jenseniana*  
*S. sphaerocarpum* (Hook.) Steph. = *Jungermannia sphaerocarpa*  
*Phenolobus cavifolius* (H.Buch et S.W.Arnell) Müll.Frib. = *Anastrophyllum cavifolium*  
*Phenolobus hellerianus* (Nees) Steph. = *Anastrophyllum hellerianum*  
*S. minutus* (Schreb.) Berggr. = *Anastrophyllum minutum*  
*S. minutus* var. *minutus* auct. (incl. Düll 1983) = *Anastrophyllum minutum* var. *weberi*  
*S. minutus* var. *grandis* (Lindb.) Frye et L.Clark = *A. minutum* var. *minutum*  
*S. saxicola* (Schrad.) Steph. = *Anastrophyllum saxicola*  
*T. polymorpha* (R.M.Schust.) Grolle = *Tritomaria polita* subsp. *polymorpha*  
*T. quinquedentata* var. *grandiretis* H.Buch et S.W.Arnell = *T. quinquedentata* subsp. *quinquedentata*

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## Note added in proof (May 2002)

Since the submission of the manuscript, we have seen some new and some earlier overlooked reports. The following updates to the table are needed: *Aneura pinguis* (confirmed for Sa), *Apomarsupella revoluta* (add Fr), *Barbilophozia hatcheri* (add 77), *B. hyperborea* (add? for Po), *B. rubescens* (add 31), *Calypogeia arguta* (confirmed for Sa), *C. fissa* (add 91), \**C. fissa* ssp. *neogaea* R.M.Schust. (add Po), *C. neesiana* (add Sa), *Cephaloziella dentata* (confirmed for Sa), *C. hampeana* (add Sa), *Diplophyllum albicans* (add Sa), *Jungermannia atrovirens* (confirmed for Sa), *J. gracillima* (add Sa), *Lejeunea lamacerina* (add Sa), *Lophocolea fragrans* (add De), *Lophozia longiflora* (add AtL), \**L. silvicolooides* (add Rn and Re), *Marchantia polymorpha* ssp. *polymorpha* (add Sa), *Marsupella sparsifolia* (add 73), *Nowellia curvifolia* (add Rw), *Pedinophyllum interruptum* (add Sa), *Plagiochila dubia* (all records from Macaronesia belongs to \**P. virginica* A. Evans), \**P. papillifolia* Steph (add Az), *P. punctata* (confirmed for De), \**P. stricta* Lindenb. (add Cn), *Radula lindenbergiana* (add Be), *R. nudicaulis* (add 80), *Riccardia chamaedryfolia* (confirmed for Gr), *Riccia crystallina* (add 91), *Scapania calcicola* (add Yu), *Sphaerocarpus texanus* (add Gr), *Targionia lorbeeriana* (add 29), (*Tritomaria quinquedentata* (add Yu). Taxa marked with a \* are new to Europe and Macaronesia. Table 1 is without these changes.

## Erratum

Ejrnæs, R. and Poulsen, R.S. 2001. Trends in the bryophyte and lichen flora of Danish seminatural grassland over the last 50 years. – Lindbergia 26: 115–120.

Figure 1 in the article was unfortunately incomplete. The correct figure is printed below.

Ed.

