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The Red Data List of Bryophytes of Valencia County (East Spain)

Abstract

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The Valencia County Regional Administration (Spain) is developing a flora conservation programme which includes bryophytes, with the financial support of the European Union (Life Programme). Revised IUCN Red List categories have been applied following the guidelines proposed by Hallinbäck & al (1998) and Gärdenfors (1996). This Red Data List includes 50 taxa, 32 mosses and 18 liverworts. Threatened categories for Iberian Peninsula and Europe according to others authors and some annotations for each taxon are given. Moreover, two additional lists of those taxa evaluated as Lower Risk near threatened (LRnt) and Data Deficient (DD) are added. The most important species of this Red Data List are *Riella helicophylla, R. cossoniana* and *R. notarisii* since the Valencian populations constitute a high percentage of the European populations. Other species like *Pottia pallida, Pterygoneurum lamellatum* and *P. subsesile*, reported as vulnerable by other authors, are now in a new unthreatened status: Lower Risk, near threatened (LRnt).

Introduction

The evaluation of a species under threatened status should be done in a global context concerning its whole area of distribution. Endemic species exist in very small areas which could be reduced to a country or regional administration limits. Therefore, conservation programmes and legislation should be the scope of national and/or local authorities who claim Red Lists based on IUCN criteria, for regional application.

In the recent years, Red Lists dealing with bryophytes of the Iberian Peninsula (Spain and Portugal) and Europe were published (Sérgio & al., 1994, 1995; ECCB, 1995). Valencia County Regional Administration is developing flora conservation programmes with the financial support of the European Union (Life Programme), which include vascular plants, bryophytes, lichens and mushrooms (Laguna & al., 1998). This paper proposes a Red Data List of Bryophytes of the Valencia County based on the revised IUCN threat categories (1994).

Material and methods

The application area is the Valencia County (East Spain) with an extension of 23,249.74 km^2. Revised IUCN Red List (1994) categories and criteria (A, B, C, and D) were applied following the guidelines proposed by Hallingbäck *& al.* (1998). The Gärdenfors (1996) criteria of downgrading the Threatened category, were applied when the studied taxa were common or abundant in neighbouring areas. Three categories were established in order to estimate the percentage population of each taxa included in the Valencia County territory: I (0-20%), II (21-40%), III (41-100%). The Red Data List includes the Threatened taxa (Regionally Extinct –RE-, Critically Endangered –CR-, Endangered –EN- and Vulnerable –VU-). Those taxa qualified as Lower Risk (near threatened –LRnt-) and Data Deficient (DD) were also added.

Species data were retrieved from literature and official herbaria.

Table 1. Results.

Taxon	Category in the Red Data regional List	Category in the Red Data List of the Iberian Peninsula and Europe	Rate of global population	Annotations
Liverworts				
Athalamia hyalina (Sommerf.) Hatt	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula is insufficiently known.
Calypogeia azurea Stotler & Crotz	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula is insufficiently known.
Calypogeia fissa (L.) Raddi	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula and its sexual reproduction capacity are insufficiently known.
Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dum.	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula and it does not produce sporophytes frequently.
Cololejeunea calcarea Libert.) Schiffn.	*VU* D2	*N* (Sérgio & al. 1994)	I	Populations near our territory are present. It meets the same category because of its low frequency of sexual reproduction.
Diplophyllum albicans (L.) Dum.	*VU* D2	*N* (Sérgio & al. 1994)	I	A diaspore inflow from other populations is remote.
Exormotheca bullosa Link ex Lindenb) Mull	*VU* D2	*R* (Sérgio & al. 1994)	II	It is a rare species in the Iberian Peninsula and its capacity for sexual and asexual reproduction is insufficiently known.

Table 1. (continued).

Exormotheca pustulosa Mitt.	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula. Its capacity for sexual and asexual reproduction (spore and diaspore dispersal) is insufficiently known.
Fossombronia echinata Macvicar	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula.
Frullania fragilifolia (Tayl.) Gott. & al.	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula and its capacity for sexual and asexual reproduction (spore and diaspore dispersal) are insufficiently known.
Lophozia badensis Schiffn	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula.
Phaeoceros bulbiculosus (Brotero) Prosk.	RE	*N* (Sérgio & al. 1994)	-	This appointment belongs to a herbarium sheet BM of Willkomm (Casas & al.1996). It has not been reported since then.
Riccia fluitans L. emend Lobeer.	*VU* B1+2c	N (Sérgio & al. 1994)	I	Threatened habitat has been considered. Urban and Tourism activities have reduced and destroyed its habitat.
Ricciocarpos natans (L.) Corda	*CR* B1+2c	*E* (Sérgio & al. 1994)	I	Its area of distribution is less that 8 Km ^{2}. All individuals are included in a subpopulation that lives in a threatened habitat.
Riella cossoniana Trabut	*CR* B1+2c.	*E* (Sérgio & al. 1994) *E* (ECCB, 1995)	II	Just one location. All individuals are included in a subpopulation that lives in a threatened habitat.
Riella helicophylla (Bory & Mont.) Mont.	*EN* B1+2c	*E* (Sérgio & al. 1994) *E* (ECCB, 1995)	II	Threatened habitat; it is present in just two locations.
Riella notarisii (Mont.) Mont.	*EN* B1+2c	*E* (Sérgio & al. 1994) *E* (ECCB, 1995)	I	Threatened habitat; it is present in just three locations.
Scapania nemorea (L.) Grolle	*VU* D2	*N* (Sérgio & al. 1994)	I	This species is frequent in the Iberian Peninsula but its capacity to form efficient propagula with long distance dispersal is insufficiently known.

Table 1. (continued).

Mosses				
Aloina bifrons (De Not.) Delg.	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula is insufficiently known.
Anomodon attenuatus (Hedw.) Hüb.	*VU* D2	*N* (Sérgio & al. 1994)	I	It forms relict populations in chasms in our territory. The nearest populations are located in the north of Catalonia. Sexual or asexual reproduction (spore or propagula formation) has not been recorded (Granzow de la Cerda, I. 1988.).
Aulacomnium palustre (Hedw.) Schwaegr.	*VU* D2	*N* (Sérgio & al. 1994)	I	The nearest populations are 60 km outside our territory. According to Hallingbäck & al. (1998) a minimum distance between populations greater than 50 km can indicate severe fragmentation, therefore propagula inflow from outside our region has a low probability.
Bryum bornholmense Winkelm. & Ruthe	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula, therefore the diaspore inflow from other populations is doubtful.
Bryum gemmiferum Wilcz. & Demar.	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula is insufficiently known. The diaspore inflow from other populations is doubtful.
Bryum subapiculatum Hampe	*VU* D2	*R* (Sérgio & al. 1994)	I	Its occurrence is rare in Spain.
Crossidium seriatum Crum & Steere	*VU* D2	-	II	This taxon has a reduced distribution area; just two locations in Spain. It has locations in North America and the Spaniards in Albacete and Alicante (Cano & al. 1992). It keeps the category of Vulnerable.
Cynodontium bruntonii (Sm.) B., S. & G.	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula is insufficiently known. The diaspore inflow from other populations is doubtful.

Table 1. (continued).

Didymodon sicculus Cano, Ros & J. Guerra	*VU* D2	-	II	Endemic taxon of the Iberian Peninsula since all populations are in Alicante and Almería (Spain), it grows on gypseous soil, sporophyte is insufficiently known (Cano & al. 1996). The distribution area is smaller than 100 km^2.
Drepanocladus aduncus (Hedw.) Warnst.	*VU* D2	*N* (Sérgio & al. 1994)	I	This species lives in ponds that can be altered by livestock.
Encalypta spathulata C. Müll.	*RE*	*R* (Sérgio & al. 1994)	-	This species has not been recorded since last century, although it has not been intensively sought. We consider it regionally extinct.
Entosthodon hungaricus (Boros) Loeske	*VU* D2	*V* (Sérgio & al. 1994)	I	Vulnerable species in the Iberian Peninsula with reduced populations, living in a very specific habitat. The diaspore inflow from other populations is doubtful.
Ephemerum recurvifolium (Dicks.) Boul.	*VU* D2	*R* (Sérgio & al. 1994)	I	Vulnerable status is the proper assessment for this taxon, since it is a rare species in the Iberian Peninsula and it produces few spores in a cleistocarpic sporophyte. The diaspore inflow from other populations is doubtful.
Fissidens celticus Paton	*VU* D2	-	I	Vulnerable status is the proper assessment for this taxon, since it is a rare species in the Iberian Peninsula. Its capacity for sexual or asexual reproduction (spore and propagula dispersal) is insufficiently known.
Fissidens pusillus (Wils.) Milde	*RE*	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula and its capacity for sexual or asexual reproduction (spores and propagula dispersal) is insufficiently known. It has not been reported since the appointments of Beltrán (1929), so we consider it regionally extinct.

Table 1. (continued).

Fissidens rufulus B., S. & G.	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula and its capacity for sexual or asexual reproduction (spore and diaspore dispersal) is insufficiently known.
Fontinalis hypnoides Hartm.	*VU* D2	*N* (Sérgio & al. 1994)	I	It is not a common species in the Iberian Peninsula and its capacity for sexual or asexual reproduction (spore and diaspore dispersal) is insufficiently known.
Funariella curviseta (Schwaegr.) Sérgio	*VU* D2	*V* (Sérgio & al. 1994)	I	This species is not very frequent in the Iberian Peninsula.
Grimmia anodon B. & S.	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula and its capacity for sexual or asexual reproduction (spore and propagula dispersal) is insufficiently known.
Homalia besseri Lob.	*VU* D2	*N* (Sérgio & al. 1994)	I	Its capacity for sexual or asexual reproduction (spore and propagula dispersal) is insufficiently known.
Leptobarbula berica (De Not.) Schimp.	*VU* D2	*V* (Sérgio & al. 1994)	I	This species is vulnerable in the Iberian Peninsula, with a reduced area of distribution.
Metaneckera menziesii (Drum.) Steere	*VU* D2	*N* (Sérgio & al. 1994)	I	VU is the proper assessment since it is a rare species in the Iberian Peninsula.
Oedipodiella australis (Wag. & Dix.) Dix.	*VU* D2	*R* (Sérgio & al. 1994)	I	VU is the proper assessment since it is a rare species in the Iberian Peninsula.
Phascum cuspidatum Hedw. var. *retortifolium* Guerra y Ros	*VU* D2	-	I	VU is the proper assessment since it is a rare species in the Iberian Peninsula.
Phascum cuynetii Biz. & Pierr.	*VU* D2	*R* (Sérgio & al. 1994)	II	VU is the proper assessment since it is a rare species in the Iberian Peninsula.
Plagiothecium nemorale (Mitt.) Jaeg.	*VU* D2	*N* (Sérgio & al. 1994)	I	Its distribution in the Iberian Peninsula is insufficiently known. In our territory, it is present in just one location.
Pterygoneurum crossidioides Frey, Herrnstadt & Kürschner	*VU* D2	-	II	VU is the proper assessment since it is a rare species in the Iberian Peninsula (Guerra & al., 1995)
Pterygoneurum squamosum Segarra & Kürschner	*VU* D2	-	III	VU is the proper assessment since it is an endemic taxon of the Iberian Peninsula, in just three locations (Segarra & al., 1999).

Table 1. (continued).

Scorpiurium sendtneri (Schimp.) Fleisch.	*VU* D2	*R* (Sérgio & al. 1994)	I	It is a rare species in the Iberian Peninsula, therefore the diaspore inflow from other populations is doubtful.
Sphagnum palustre L.	*VU* D2	*N* (Sérgio & al. 1994)	I	VU is the proper assessment since this species lives in a very specific habitat.
Tortula caninervis Mitt.) Broth. ssp *spuria* Amann) Kramer	*VU* D2	*R* (Sérgio & al. 1994)	I	VU is the proper assessment since this is a rare species in the Iberian Peninsula and its sexual reproduction effort is low.
Weissia papillosissima Laz.	*VU* D2	-	I	VU is the proper assessment since it is a rare species in the Iberian Peninsula First report from Spain (Moya & al. 1995).

Discussion

This Red Data List includes 50 taxa: 32 mosses and 18 liverworts, it represents 11.4% of the bryophyte flora of Valencia County (Puche & al. 1998). A similar percentage of threatened species was reported by Sérgio & al. (1995) for the Iberian Peninsula; ECCB (1995) reported a lower percentage for Europe but they used other criteria to define the threat categories. Table 1 shows the percentage of taxa included in each threatened category in Valencia County, Iberian Peninsula and European Red Data Lists.

Taxa included as Vulnerable in our territory have reduced populations and reproduce mainly by means of vegetative mechanisms; most of them are acidophilous species from mesic and hydric environments. Although these taxa are not threatened in the Iberian Peninsula and in Europe (Sérgio, 1995; ECCB, 1995), they are important for biodiversity conservation in Valencia County, since the absence of sexual reproduction or gemmae makes improbable the natural reintroduction of these species from nearby populations.

Species like *Riella* sp. are very interesting since Valencia populations account for a high percentage of the European population (category II, 21-40%), and their habitat is also threatened by tourism, agriculture and urban activities. *Pottia pallida, Pterygoneurum*

Table 2. Percentage of threatened taxa in Iberian Peninsula, Europe and Valencia County.

	Iberian Peninsula Sérgio & al. 1995	**Europe ECCB 1995**	**Valencia County**
Extinct (E)/Regionally Extinct (RE)	1%	0.3%	0.7%
Critically Endangered (CR)			0.4%
Endangered (EN)	3.6%	2.3%	0.4%
Vulnerable (VU)	6.7%	6.8%	9.8%
Total	11.3%	9.4%	11.3%

lamellatum and *P. subsesile* are reported as vulnerable by Sérgio & al. (1995) and ECCB (1995). However, revised criteria and new records of these species recommend a new unthreatened status in our proposed Red Data List. This gives an example of the dynamism of Red Lists that should be revised when new data or criteria become available. Valencian County conservation program for threatened bryophytes species includes the declaration of special protection areas named "flora micro-reserves" which are an innovative legal protection measure in European Union. The aim of flora micro-reserves is to establish a net of locations in which biodiversity is well represented, with a special attention to endemic, rare and/or threatened species and singular plant assemblages. Their aim is not just the protection but the development of conservation experiences, education or other compatible uses. Actually, twenty locations were proposed as micro-reserves with special bryological interest because of the presence of threatened taxa like *Homalia besseri, Oedopodiella australis, Metaneckera menziesii, Funariella curviseta Phascum cuyneti, Frullania fragilifolia, Cololejeunea calcarea* and *Riella helicophylla.*

Table 3. Lower Risk (near threatened) (LRnt)

Mosses

Amblystegium humile (P. Beauv.) Crundw.
Antitrichia californica Sull.
Antitrichia curtipendula (Hedw.) Brid.
Aschisma carniolicum (Web. & Mohr) Lindb. var. speciosum Limpr.
Atrichum undulatum (Hedw.) P. Beauv.
Bartramia ithyphylla Brid.
Brachythecium populeum (Hedw.) B., S. & G.
Bryoerythrophyllum recurvirostrum (Hedw.) Chen
Bryum canariense Brid.
Bryum klinggraeffii Schimp.
Bryum tenuisetum Limpr.
Bryum versicolor Al. Braun ex B., S. & G.
Campylium stellatum (Hedw.) J. Lange & C. Jens.
Campylopus fragilis (Brid.) B., S. & G.
Cheilothela chloropus (Brid.) Lindb.
Cinclidotus mucronatus (Brid.) Mach.
Cryphaea heteromalla (Hedw.) Mohr
Dichodontium pellucidum (Hedw.) Schimp.
Dichodontium pellucidum (Hedw.) Schimp. var. *propagulifera* Cor.) Cas. Gil
Dicranella heteromalla (Hedw.) Schimp.
Dicranoweisia cirrata (Hedw.) Lindb.
Didymodon cordatus Jur.
Distichium capillaceum (Hedw.) B., S. & G.
Ditrichum crispatissimum (C. Müll.) Par.
Entosthodon attenuatus (Dicks.) Bryhn
Entosthodon fascicularis (Hedw.) C. Müll.
Entosthodon obtusus (Hedw.) Lindb.
Epipterygium tozeri (Grev.) Lindb.

Table 3. (continued).

Eurhynchium striatulum (Spruce) B., S. & G.
Eurhynchium striatum (Hedw.) Schimp.
Fissidens adianthoides Hedw.
Fissidens algarvicus Solms
Fissidens exilis Hedw.
Fontinalis antipyretica Hedw.
Funaria convexa Spruce
Grimmia ovalis (Hedw.) Lindb.
Gyroweisia reflexa (Brid.) Schimp.
Hedwigia stellata Hedenäs
Homalia lusitanica Schimp.
Hygrohypnum luridum (Hedw.) Jenn.
Hylocomium splendens (Hedw.) B., S. & G.
Hypnum jutlandicum Holmen & Warncke
Mnium marginatum (With.) P. Beauv.
*Octodiceras fontanum (*B. Pyl.) Lindb.
Orthothecium intrincatum Dozy & Molk.
Orthotrichum acuminatum Philib.
Orthotrichum obtusifolium Brid.
Orthotrichum speciosum Nees
Orthotrichum tenellum Bruch ex Brid.
Philonotis arnelli Husn.
Philonotis fontana (Hedw.) Brid.
Philonotis marchica (Hedw.) Brid.
Physcomitrium pyriforme (Hedw.) Brid.
Plagiomnium affine (Bland. ex Funck) T. Kop.
Plagiomnium elatum (B., S. & G.) T. Kop.
Pleuridium acuminatum Lindb.
Pleurozium schreberi (Brid.) Mitt.
Pogonatum aloides (Hedw.) P. Beauv.
Pohlia cruda (Hedw.) Lindb.
Pohlia proligera (Kindb. ex Breidl.) Lindb. ex H. Arn.
Polytrichum formosum Hedw.
Polytrichum piliferum Hedw.
Pottia intermedia (Turn.) Fürnr
Pottia pallida Lindb.
Pottia wilsonii (Hook.) B., S. & G.
Pseudoleskeella catenulata (Brid.) Kindb.
Pterygoneurum compactum Cano, J. Guerra & Ros
Pterygoneurum lamellatum (Lindb.) Jur.
Pterygoneurum sampaianum (Mach.) Mach.
Pterygoneurum subsesile (Brid.) Jur.
Racomitrium canescens (Hedw.) Brid.
Rhizomnium punctatum (Hedw.) T. Kop.
Rhynchostegiella curviseta (Brid.) Limpr.

Table 3. (continued).

Rhynchostegium confertum (Dicks.) B., S. & G.
Rhytidiadelphus triquetrus (Hedw.) Warnst.
Rhytidium rugosum (Hedw.) Kindb.
Sanionia uncinata (Hedw.) Loeske
Schistidium atrofuscum (Schimp.) Limpr.
Scorpiurium deflexifolium (Solms) Fleisch. & Loeske
Seligeria acutifolia Lindb.
Seligeria pusilla (Hedw.) B., S. & G.
Taxiphyllum wissgrillii (Garov.) Wijk & Marg.
Thuidium abietinum(Hedw.) B., S. & G. var. *hystricosum* (Mitt.) Loeske
Thuidium recognitum (Hedw.) Lindb.
Timmiella anomala (B., S. & G.) Limpr.
Tortula canescens Mont.
Tortula israelis Bizot & F. Bilewsky
Tortula princeps De Not.
Tortula revolvens (Schimp.) G. Roth
Tortula ruraliformis (Besch.) Grout. *var. subpapillosissima* (Biz. & Pierr.) Kramer
Tortula virescens (De Not.) De Not.
Trichostomopsis australasiae (Hook. & Grev.) Robins
Trichostomopsis trivialis (C. Müll.) H. Robins.
Ulota crispa (Hedw.) Brid.
Weissia levieri (Limpr.) Kindb.
Weissia wimmerana (Sendtn.) B., S. & G.

Liverworts

Barbilophozia hatcheri (Ev.) Loeske
Cephaloziella hampeana (Nees) Schiffn.
Cephaloziella turneri (Hook.) K. Müll.
Corsinia coriandrina (Spreng.) Lindb.
Gongylanthus ericetorum (Raddi) Nees.
Lejeunea patens Lindb.
Lophocolea heterophylla (Schrad.) Dum.
Lophozia collaris (Nees) Dum.
Pellia epiphylla (L.) Corda
Porella arboris-vitae (With.) Grolle.
Porella cordaeana (Hub.) Moore
Riccardia chamaedryfolia (With.) Grolle.
Riccardia multifida (L.) S. Gray
Riccia ciliifera Link.
Riccia crozalssi Lev.
Riccia crustata Trabut
Riccia crystallina L. emend Raddi
Riccia gougetiana Durieu & Mont var. *armatissima* Lev. ex K. Müll
Riccia macrocarpa Levier
Scapania aspera H. Bern.
Scapania compacta (Roth.) Dum.
Scapania curta (Mart.) Dum.
Sphaerocarpos michelii Bell.
Sphaerocarpos texanus Aust.

Table 4- Data deficient (DD)

Mosses

Brachythecium olympicum Jur.
Brachythecium velutinum Hedw.) B., S. & G. var. *salicinum*((B., S. & G.) Mönk.
Bryum argenteum Hedw. var. *lanatum* (P. Beauv.) Hampe
Bryum caespiticium Hedw var. *comense*(Schimp.) Husn.
Bryum canariense Brid. var. *provinciale* (Philib.) Husn.
Bryum capillare Hedw. var. *meridionale* Schimp.
Bryum pseudotriquetrum (Hedw.) Gaertn., Meyer & Scherb. var. *bimum* (Schreb.) Lilj.
Bryum rubens Mitt.
Campylium protensum (Brid.) Kindb.
Cratoneuron filicinum (Hedw.) Spruce *var. atrovirens* (Brid.) Ochyra
Crossidium squamiferum(Viv.) Jur. *var. pottioideum* (De Not.) Mönk.
Entosthodon durieui Mont
Fissidens crassipes Wils. ex B., S. & G var. *warnstorfii* Fleisch.) Brugg.-Nann
Fissidens taxifolius Hedw. ssp. *pallidicaulis*(Mitt.) Mönk.
Fontinalis hypnoides Hartm. var. *duriaei* (Schimp.) Husn.
Hypnum cupressiforme Hedw *var. brevisetum* Schimp.
Hypnum cupressiforme Hedw *var. lacunosum*. Brid
Hypnum cupressiforme Hedw. *var. subjulaceum* Mol.
Leskea polycarpa Hedw.
Orthotrichum affine Brid *var. fastigiatum*(Brid.) Hüb.
Orthotrichum cupulatum Brid var. *riparium* Hüb.
Orthotrichum macrocephalum Lara, Garilleti & Mazimpaka
Orthotrichum rupestre Schleich. & Schwaegr var. *franzonianum* (De Not.) Vent
Pterygoneurum ovatum Hedw.) Dix. var. *incanum* Jur.
Racomitrium aciculare (Hedw.) Brid.
Racomitrium heterostichum (Hedw.) Brid.
Tortella tortuosa Hedw.) Limpr var. *fragilifolia* (Jur.) Limpr.
Tortula intermedia (Brid.) De Not var. *calva* (Dur. & Sag.) Wjk & Marg
Tortula muralis Hedw. var. *aestiva* Brid. ex Hedw.
Tortula subulata Hedw. *var. graeffii* Warnst.
Trichostomum brachydontium Bruch var. *unguiculatum* (Philib.) Corb. & Jah.
Trichostomum brachydontium Bruch. var. *littorale* (Mitt.) C. Jens.
Weissia triumphans(De Not.) H. Müll var. *pallidiseta* (H. Müll.) Husn.

Liverworts

Riccia canaliculata Hoffm
Riccia trichocarpa M. A. Howe
Riccia michelli Raddi
Radula lindenbergiana Gott. ex C. Hartm.
Scapania calcicola (H. Arn. & J. Pers. in H. Arn) Ingham
Scapania aequiloba (Schaegr.) Dum.

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