

# CONTRIBUTIONS TO THE BRYOPHYTE FLORA OF THE DOBROČSKÝ PRALES NATIONAL NATURE RESERVE (VEPORSKÉ VRCHY MTS, CENTRAL SLOVAKIA)

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**Abstract:** The Dobročský prales National Nature Reserve, situated in the Veporské vrchy Mts in Central Slovakia, represents a valuable preserved fragment of original primeval fir-beech forest within the Western Carpathians. A preliminary survey of the bryophyte flora of the reserve has already been carried out in the past and altogether 84 taxa have been reported from this area. Here, we publish a total of 103 bryophyte species (25 liverworts and 78 mosses), out of which 40 are reported as new for the reserve. Additionally, out of the recorded bryophytes, one species is considered as critically endangered (CR) in Slovakia (*Orthotrichum scanicum*), two as endangered (EN) (*Dicranum viride*, *Uloa drummondii*), two as vulnerable (VU) (*Neckera pennata*, *N. pumila*), five as near threatened (NT) (*Buxbaumia viridis*, *Lewinskya striata*, *Orthotrichum patens*, *Rhynchostegium confertum*, *Uloa bruchii*), and one species is data deficient (DD) (*Pohlia lutescens*).

**Key words:** liverworts, mosses, species of conservation interest

## INTRODUCTION

Bryologically, the Veporské vrchy Mts have so far been poorly investigated and most works dealing with bryophytes from this area are outdated. ŠMARDÁ (1948, 1958), ŠMARDÁ and VANĚK (1955), and PILOUS (1957) published records of some moss species occurring in this mountain range. DUDA (1956, 1962) reported on the liverwort flora from the Veporské vrchy Mts and adjacent Poľana Mts. More comprehensive information on bryophytes from the Veporské vrchy Mts was given by BOROS and VAJDA (1962). Sparse records on liverwort species from the area were published in the series of articles by DUDA and VÁŇA (1969–1990), as well as ŠMARDÁ (1961). Data on some bryophyte species occurring in this region can also be found in certain phytosociological works (JURKO 1961, MIADOK 1983, 1988). BLANÁR and ŠOLTÉS (2000) and HRIVNÁK *et al.* (2004) published the occurrence of several wetland species, some of which are rare in

Slovakia. Šoltés (1996) reported a total of 262 bryophytes from the territory of the Veporské vrchy Mts.

A preliminary survey of the bryophyte flora of the Dobročský prales National Nature Reserve was done by KUBINSKÁ *et al.* (2005), from where they reported 61 bryophyte taxa. Occurrence of one liverwort species (*Sphenolobus minutus*) was published by DUDA and VÁŇA (1984), one moss species (*Neckera pumila*) by VÁŇA and SOLDÁN (1995), and further nine species were reported by SLÁVIK (2002). Unpublished data can also be found by M. Lüth, P. Ódor, Ö. Fritz, and K. van Dort, thus, altogether, 84 taxa of bryophytes are known to occur in the territory of the reserve.

The aim of this work is to supplement knowledge on the bryophyte flora of the Dobročský prales National Nature Reserve.

## MATERIAL AND METHODS

### Description of the investigated area

The study area of the Dobročský prales National Nature Reserve is located in Central Slovakia. Orographically it belongs to the Veporské vrchy Mts situated within the Slovenské Rudohorie Mts and the sub-province of the Inner Western Carpathians (KOČICKÝ and IVANIČ 2011). It lies in the cadastre of Čierny Balog village in the Brezno District. Most of the area of the reserve lies within the Brôtovo valley with the lowest point located at *ca* 720 m a.s.l. and the highest point being the Geravka peak (1,005 m a.s.l.). Geologically, the area is built of compressed granodiorites, granites, and siliceous diorites. The dominant soils are deep cambisols. The area is cold and humid with an average annual temperature of 4.5–5.8 °C and an average annual precipitation of 840–960 mm, in the growing season the average temperature and precipitation are 11°C and 515–600 mm, respectively. The region belongs to the basin of the river Hron (BUČINOVÁ *et al.* 2012, KORPEL 1995, PAROBEKOVÁ *et al.* 2016, 2018).

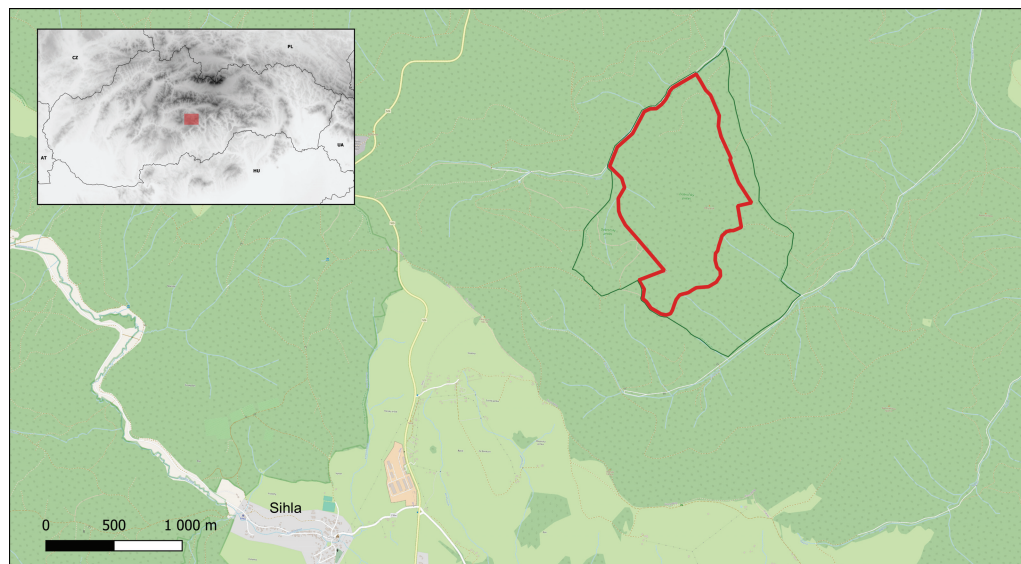
The Dobročský prales National Nature Reserve represents one of the few remnants of original virgin forests in the fir-beech altitudinal zone of the Western Carpathians. This fragment of the Carpathian natural forests is a unique example of the forest ecosystem in the climax stage with all developmental stages and wood species achieving extraordinary dimensions, which has been preserved and nearly untouched at least since it was declared a reserve in 1913. Currently, the total area of the reserve is 103.85 ha with a protective zone of 100.44 ha (Council of Europe 1997, PAROBEKOVÁ *et al.* 2016, 2018). The natural forest is composed primarily of beech (*Fagus sylvatica*) and fir (*Abies alba*) with an admixture of ma-

ples (*Acer platanoides*, *A. pseudoplatanus*), ash (*Fraxinus excelsior*), elm (*Ulmus glabra*), and spruce (*Picea abies*) (SLÁVIK *et al.* 2002, UJHÁZY *et al.* 2009). Areas with a higher proportion of spruce are most likely of secondary origin (BENKO 1978). Understorey plant communities of the reserve belong to the *Dentario enneaphylli-Fagetum* (Oberdorfer ex W. et A. Matuszkiewicz 1960) *salvietosum glutinosae* (Moravec 1974) subassociation of the Fagion (Luquet 1926) alliance (UJHÁZY *et al.* 2013).

### Methods

Fieldwork and collection of bryophyte material were carried out in June 2021, October 2022, and August 2023. Bryophytes were collected from different substrates (main substrate types included soil, rock, tree bark, and decaying wood). The study area is depicted in Figure 1. The map was created using the QGIS software, version 3.22 (Open Source Geospatial Foundation).

The specimens are preserved in the Bryophyte Collection of the Hungarian Natural History Museum, Budapest (BP) and the personal herbarium of P. Širka. Nomenclature of bryophytes follows HODGETTS *et al.* (2020). Threat status of species is given according to the latest red lists of Slovakia (MIŠÍKOVÁ *et al.* 2020, 2021) and Europe (HODGETTS *et al.* 2019c, HODGETTS and LOCKHART 2020).



**Fig. 1.** Studied area of the Dobročský prales National Nature Reserve (red border), green border is the area of the protective zone.

## RESULTS AND DISCUSSION

A total of 103 bryophyte species (25 liverworts and 78 mosses) were recorded within the study area. The complete list of species is presented in the Appendix.

Out of the species found during our fieldwork, one species is regarded as critically endangered (CR) in Slovakia (*Orthotrichum scanicum*), two are endangered (EN) (*Dicranum viride*, *Ulotia drummondii*), two are vulnerable (VU) (*Nekera pennata*, *N. pumila*), five are near threatened (NT) (*Buxbaumia viridis*, *Lewinskya striata*, *Orthotrichum patens*, *Rhynchostegium confertum*, *Ulotia bruchii*), and one species is data deficient (DD) in the country (*Pohlia lutescens*).

Based on the preliminary list of bryophytes occurring in the Dobročský prales National Nature Reserve (DUDA and VÁŇA 1984, KUBINSKÁ *et al.* 2005, SLÁVIK 2002, VÁŇA and SOLDÁN 1995), supplemented by the unpublished records of the working group of M. Lüth, P. Ódor, Ö. Fritz, and K. van Dort, a total of 84 bryophyte taxa were recorded. Here, we report additional 40 species previously not recorded in the examined area: *Alleniella besseri*, *Anomodon viticulosus*, *Bazzania trilobata*, *Brachythecium rivulare*, *Calypogeia neesiana*, *Conocephalum conicum*, *C. salebrosum*, *Dicranodontium denudatum*, *Dicranum tauricum*, *D. viride*, *Eurhynchiastrium pulchellum*, *Fuscocephaloziopsis lunulifolia*, *Grimmia hartmanii*, *Harpanthus scutatus*, *Heterocladium heteropterum*, *Homomallium incurvatum*, *Hypnum andoi*, *Jochenia pallescens*, *Lewinskya speciosa*, *Metzgeria conjugata*, *Orthotrichum pallens*, *O. patens*, *O. pumilum*, *O. scanicum*, *Plagiomnium cuspidatum*, *Plagiothecium cavifolium*, *P. succulentum*, *Platygyrium repens*, *Pohlia lutescens*, *Ptychostomum moravicum*, *Pulvigeria lyellii*, *Pylaisia polyantha*, *Rhynchostegium confertum*, *Scapania undulata*, *Sciuro-hypnum reflexum*, *Serpoleskea confervoides*, *Trichodon cylindricus*, *Ulotia bruchii*, *U. crispa*, and *U. drummondii*.

## Species of conservation interest and other interesting records

*Buxbaumia viridis* (Moug. ex Lam. et DC.) Brid. ex Moug. et Nestl. – The species is included in the EU Habitat Directive and in Slovakia it is evaluated as near threatened (NT). From the Dobročský prales National Nature Reserve it was already reported by KUBINSKÁ *et al.* (2005). The results of the monitoring of *B. viridis* population in 2022 at the Dobročský prales locality revealed a population size of 11 individual-equivalents (colonized dead logs) and a total of approximately 190 sporophytes. However, the species is monitored only within a part (eastern) of the reserve, the overall population is larger. Additionally, in 2023, gemmae were found on one log.

*Dicranum viride* (Sull. et Lesq.) Lindb. – This moss species, listed in the EU Habitat Directive, is considered endangered (EN) in Slovakia. Centre of distri-

bution of this species is in the Bukovské vrchy Mts within the Poloniny National Park (PAPP and ŠIRKA 2023). Recently however, new populations were reported across the country (ŠIRKA *et al.*, unpublished records). Here we report the first finding of *D. viride* from the Veporské vrchy Mts. In the Dobročský prales National Nature Reserve during the monitoring in 2023, it was found on five *Fagus sylvatica* trees with an estimated total population size of ca 55 cm<sup>2</sup>. Although the population at the locality is rather small, for now it is not threatened.

*Lewinskya striata* (Hedw.) F. Lara, Garilleti et Goffinet – It is a boreal, temperate epiphytic species, widespread throughout Europe but with a documented decline in polluted areas (SERGIO *et al.* 2019). In Slovakia, it is regarded as near threatened (NT), in neighbouring Poland it is vulnerable (VU). Here we report the first finding from the Veporské vrchy Mts. In the Dobročský prales National Nature Reserve it grew on bark of *Fagus sylvatica*.

*Neckera pennata* Hedw. – This epiphytic moss species has a circumpolar boreal-montane distribution, in Europe it occurs mainly in the central and northern part of the continent (HODGETTS *et al.* 2019a). In Slovakia, it is assessed as vulnerable (VU) and has a scattered occurrence in the country. In the neighbouring countries it is ‘seriously threatened with extinction’ in Austria, endangered (EN) in Hungary and Poland, and vulnerable (VU) in the Czech Republic. From the Dobročský prales National Nature Reserve it was already reported by KUBINSKÁ *et al.* (2005) and there are also unpublished collections of this species by M. Lüth (29.09.2011) and P. Ódor (29.09.2011, conf. B. Papp. and P. Širka, deposited in BP). During our fieldwork it was found growing on *Fagus sylvatica* trees and fallen logs.

*Neckera pumila* Hedw. – It is a suboceanic-temperate epiphytic species distributed primarily in Western and Central Europe (SIM-SIM 2019). In Slovakia, it is scattered and evaluated as vulnerable (VU). In the neighbouring countries it is considered as regionally extinct (RE) in the Czech Republic, endangered (EN) in Austria and Poland, and data deficient (DD) in Hungary. It was already reported from the Dobročský prales National Nature Reserve by VÁŇA & SOLDÁN (1995), and an unpublished record from this locality is also known by P. Ódor (29.09.2011, conf. B. Papp. and P. Širka, deposited in BP). From the Veporské vrchy Mts, it is also known from the Klenovský Vepor National Nature Reserve (M. Lüth *et al.*, unpubl.) and Lubietová (Tri vody) (KAŤKOVÁ 1988). In the examined area, it was found on *Fagus sylvatica* bark.

*Orthotrichum patens* Bruch ex Brid. – According to the latest redlist of Slovakia, this species is near-threatened (NT). However, it seems to be spreading, as there are several recent reports, e.g. from the Bukovské vrchy Mts (PAPP and ŠIRKA 2023), the Krupinská planina Plateau (23.06.2021, leg. P. Širka, det. P. Širka and B. Papp), and the Slanské vrchy Mts (28.09.2011, leg. and det. M. Lüth). In the study area it was found on *Fagus* bark.



*Orthotrichum scanicum* Grönvall – This Eurosiberian southern-temperate epiphytic species is relatively widespread in the Mediterranean region, but becomes rarer in Central and Northern Europe (HODGETTS *et al.* 2019b). It is critically endangered (CR) in Slovakia and the Czech Republic, endangered (EN) in Poland, data deficient (DD) in Hungary, and regionally extinct (RE), but refound in Austria. In Slovakia, it was recorded only in the High Tatra Mts, the Vtáčnik Mts, and the Muránska planina Plateau (PLÁŠEK *et al.* 2016). This is the first finding from the Veporské vrchy Mts. In the studied Dobročský prales National Nature Reserve, a small patch of the species was collected from bark of *Fagus sylvatica*.

*Pohlia lutescens* (Limpr.) H. Lindb. – It is a primarily European, temperate terrestrial species with a center of occurrence in Central Europe (SABOVLJEVIĆ 2019). Due to its minuteness its distribution is insufficiently known and it is data-deficient (DD) in several countries, including the Czech Republic, as well as Slovakia, where it is known only from the Záhorská nížina Lowland (ŠMARDA 1953, 1954). In the study area it was found growing on bare soil accompanied by *Pogonatum aloides* and *Trichodon cylindricus*.

*Rhynchostegium confertum* (Dicks.) Schimp. – This palearctic moss grows epixylically on natural or man-made rocks or on the bases of broadleaved trees (BAUDRAZ and SCHNYDER 2019). It is widely distributed throughout Europe, but in some countries, it is red-listed, e.g. it is near threatened (NT) in Hungary and Slovakia. In Slovakia, old record exists only from the Danubian Flat (ŠMARDA 1954). In the examined area, a small patch of this moss was collected from rock, where it grew together with *Brachytheciastrum velutinum*.

*Ulota bruchii* Hornsch. ex Brid. – In Slovakia, this species is assessed as near threatened (NT). Recently, it was reported only from the Poloniny National Park (PLÁŠEK 2007; PAPP and ŠIRKA 2023). In the Dobročský prales National Nature Reserve it was found on *Fagus sylvatica* tree.

*Ulota crispula* Bruch – This species was not included in the checklist of Slovakia (MIŠÍKOVÁ *et al.* 2020) as it was previously synonymized with *U. crispula* s. l. (CAPARRÓS *et al.* 2016). Its distribution in Slovakia is insufficiently known, our record is only the second published data. Recently, it was reported only from the Bukovské vrchy Mts in the Poloniny National Park (PAPP and ŠIRKA 2023). In our study, it was found growing on *Fagus sylvatica* bark.

*Ulota drummondii* (Hook. et Grev.) Brid. – It is a suboceanic boreal-montane epiphytic moss widely distributed in the western part of Europe and in the mountains of Central Europe (HALLINGBÄCK 2019). However, in several European countries it is threatened, e.g. it is endangered (EN) in Poland and Slovakia and it could be regionally extinct (RE) in the Czech Republic. In Slovakia, distribution of this species is poorly known. Existing records are old and dubious, and the only reliable specimen revised is reported from the Malá Fatra Mts by PILOUS (1997).

Our finding is new for the whole Slovenské Rudohorie Mts, in the Dobročský prales National Nature Reserve we recorded it on freshly fallen beech log.

## CONCLUSIONS

The Dobročský prales National Nature Reserve represents a unique remnant of the original Carpathian beech-fir old-growth forests, relatively untouched for more than a century since it was established. Although the reserve was already bryologically examined, the knowledge on bryophytes from this area is still not complete. This is evident by a rather high number of new species reported in this paper. During fieldwork we recorded several species of regional and even European conservation concern, especially epiphytic ones. The paper contributes to the overall knowledge of the bryophyte flora of the whole Veporské vrchy Mts.

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**Összefoglaló:** A Dobrocsi Óserdő Nemzeti Tájvédelmi Körzet a Vepor hegységben található Szlovákia középső részén. A Nyugati-Kárpátok fenyves-bükkös őserdeinek értékes, fennmaradt töredéke. A korábbi mohászati kutatások 84 taxont mutattak ki a területről. Jelen cikkben 103 fajt (25 májmoha, 78 lombosmoha) közlünk a 2022 és 2023-ban végzett vizsgálataink eredményeként, amelyek közül 40 fajt először találtunk meg a területen. Ezenkívül számos faj jelentős természetvédelmi értéket képvisel a Szlovák Moha Vörös Lista alapján, mint a kiemelten veszélyeztetett *Orthotrichum scanicum*, a veszélyeztetett *Dicranum viride* és *Uloa drummondii*, a sérülékeny *Neckera pennata*, *N. pumila*, a veszélyeztetettséghez közeli kategóriába sorolt *Buxbaumia viridis*, *Lewinskya striata*, *Orthotrichum patens*, *Rhynchostegium confertum* és *Uloa bruchii*. Egy faj, a *Pohlia lutescens* pedig adathiányos, azaz csak 50 évnél régebbi adata volt az országban.

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### Appendix. Complete list of bryophyte records.

Abbreviations: dv = dead vegetation/litter; dw = decaying wood; e = epiphytically on tree bark; eb = epiphytically on bases of trees; f = fungi; r = rocks; s = soil; sr = soil on rock

#### Liverworts

- Bazzania trilobata* (L.) Gray – s
- Blepharostoma trichophyllum* (L.) Dumort. – dw, r
- Calypogeia azurea* Stotler et Crotz – r
- Calypogeia muelleriana* (Schiffn.) Müll. Frib. – dw
- Calypogeia neesiana* C. Massal. et Carestia) Müll. Frib. – dw
- Cephalozia bicuspidata* (L.) Dumort. – dw
- Conocephalum conicum* (L.) Dumort. – s, r
- Conocephalum salebrosum* Szweyk., Buczk. et Odrzyk. – s, r
- Frullania dilatata* (L.) Dumort. – dw, e
- Fuscocephaloziopsis lunulifolia* (Dumort.) Váňa et L. Söderstr. – dw
- Harpanthus scutatus* (F. Weber et D. Mohr) Spruce – dw
- Lepidozia reptans* (L.) Dumort. – dw
- Lophocolea heterophylla* (Schrad.) Dumort. – dw, e, eb, r
- Metzgeria conjugata* Lindb. – r
- Metzgeria furcata* (L.) Corda – dw, e, eb
- Nowellia curvifolia* (Dicks.) Mitt. – dw
- Plagiochila asplenoides* (L.) Dumort. – s
- Plagiochila porelloides* (Torr. ex Nees) Lindenb. – dw, e, r

*Porella platyphylla* (L.) Pfeiff. – e  
*Ptilidium pulcherrimum* (Weber) Vain. – dw, e, eb  
*Radula complanata* (L.) Dumort. – e, eb, r  
*Riccardia palmata* (Hedw.) Carruth. – dw  
*Scapania undulata* (L.) Dumort. – r, s  
*Schistochilopsis incisa* (Schr.) Konstant. – dw  
*Tritomaria exsecta* (Schmidel) Schiffn. ex Loeske – dw

### Mosses

*Alleniella besseri* (Lobarz.) S. Olsson, Enroth et D. Quandt – r  
*Alleniella complanata* (Hedw.) S. Olsson, Enroth et D. Quandt – dw, e  
*Amblystegium serpens* (Hedw.) Schimp. – dw, e  
*Anomodon longifolius* (Schleich. ex Brid.) Hartm. – e  
*Anomodon viticulosus* (Hedw.) Hook. et Taylor – e  
*Atrichum undulatum* (Hedw.) P. Beauv. – dw, s  
*Brachytheciastrum velutinum* (Hedw.) Ignatov et Huttunen – dw, eb, r, s  
*Brachythecium rivulare* Schimp. – r, s  
*Brachythecium rutabulum* (Hedw.) Schimp. – dw, e, f, r, s  
*Brachythecium salebrosum* (Hoffm. ex F. Weber et D. Mohr) Schimp. – dv, dw, e  
*Buxbaumia viridis* (Moug. ex Lam. et DC.) Brid. ex Moug. et Nestl. – dw  
*Dicranodontium denudatum* (Brid.) E. Britton – dw  
*Dicranum montanum* Hedw. – dw, e, eb, r  
*Dicranum scoparium* Hedw. – dw, e, eb, r, s  
*Dicranum tauricum* Sapjegin – e  
*Dicranum viride* (Sull. et Lesq.) Lindb. – e  
*Eurhynchiastrum pulchellum* (Hedw.) Ignatov et Huttunen – s  
*Eurhynchium angustirete* (Broth.) T. J. Kop. – dw, e, eb, r, s  
*Exsertotheca crispa* (Hedw.) S. Olsson, Enroth et D. Quandt – e  
*Grimmia hartmanii* Schimp. – e  
*Herzogiella seligeri* (Brid.) Z. Iwats. – dw, r, s  
*Heterocladium heteropterum* (Brid.) Schimp. – r  
*Homalia trichomanoides* (Hedw.) Brid. – e  
*Homalothecium sericeum* (Hedw.) Schimp. – e  
*Homomallium incurvatum* (Schr.) ex Brid.) Loeske – r  
*Hylocomiadelphus triquetrus* (Hedw.) Ochyra et Stebel – dw  
*Hylocomium splendens* (Hedw.) Schimp. – dw, r  
*Hypnum andoi* A. J. E. Sm. – dw, e  
*Hypnum cupressiforme* Hedw. – dv, dw, e, eb, f, r, s  
*Isothecium alopecuroides* (Lam. ex Dubois) Isov. – dv, dw, e, eb, f, r, s  
*Jochenia pallescens* (Hedw.) Hedenäs, Schlesak et D. Quandt – dw, e, eb  
*Leucodon sciuroides* (Hedw.) Schwägr. – dw, e  
*Lewinskya affinis* (Schr.) ex Brid.) F. Lara, Garilleti et Goffinet – dw, e  
*Lewinskya speciosa* (Nees) F. Lara, Garilleti et Goffinet – dw, e

- Lewinskya striata* (Hedw.) F. Lara, Garilletei et Goffinet – dw, e  
*Neckera pennata* Hedw. – dw, e  
*Neckera pumila* Hedw. – e  
*Orthotrichum pallens* Bruch ex Brid. – e  
*Orthotrichum patens* Bruch ex Brid. – e  
*Orthotrichum pumilum* Sw. ex anon. – e  
*Orthotrichum scanicum* Grönvall – e  
*Orthotrichum stramineum* Hornsch. ex Brid. – dw, e  
*Paraleucobryum longifolium* (Hedw.) Loeske – dw, e, r  
*Plagiomnium affine* (Blandow ex Funck) T. J. Kop. – dw, eb, r, s  
*Plagiomnium cuspidatum* (Hedw.) T. J. Kop. – dw, s  
*Plagiomnium rostratum* (Schrad.) T. J. Kop. – eb  
*Plagiomnium undulatum* (Hedw.) T. J. Kop. – s, sr  
*Plagiothecium cavifolium* (Brid.) Z. Iwats. – dw, r, s  
*Plagiothecium curvifolium* Schlieph. ex Limpr. – dw, e, eb, r, s, sr  
*Plagiothecium denticulatum* (Hedw.) Schimp. – dw, e, eb, r  
*Plagiothecium laetum* Schimp. – dw, eb  
*Plagiothecium nemorale* (Mitt.) A. Jaeger – dw, s, r  
*Plagiothecium succulentum* (Wilson) Lindb. – dw, eb  
*Platygyrium repens* (Brid.) Schimp. – dw, e  
*Pleurozium schreberi* (Willd. ex Brid.) Mitt. – dw  
*Pogonatum aloides* (Hedw.) P. Beauv. – s  
*Pohlia lutescens* (Limpr.) H. Lindb. – s  
*Pohlia nutans* (Hedw.) Lindb. – s  
*Polytrichum formosum* Hedw. – s  
*Pseudoamblystegium subtile* (Hedw.) Vanderp. et Hedenäs – e  
*Pseudoleskeella nervosa* (Brid.) Nyholm – dw, e  
*Pterigynandrum filiforme* Hedw. – dw, e, eb, f  
*Ptychostomum moravicum* (Podp.) Ros et Mazimpaka – dw, e, eb  
*Pulviger a lyellii* (Hook. et Taylor) Plášek, Sawicki et Ochyra – dw  
*Pylaisia polyantha* (Hedw.) Schimp. – dw  
*Rhizomnium punctatum* (Hedw.) T. J. Kop. – dw, e, r, s, sr  
*Rhynchostegium confertum* (Dicks.) Schimp. – r  
*Sanionia uncinata* (Hedw.) Loeske – dw, eb  
*Sciuro-hypnum populeum* (Hedw.) Ignatov et Huttunen – dw, e, r  
*Sciuro-hypnum reflexum* (Starke) Ignatov et Huttunen – e, r  
*Serpoleskea confervoides* (Brid.) Schimp. – r  
*Tetraphis pellucida* Hedw. – dw  
*Thuidium tamariscinum* (Hedw.) Schimp. – dw, r, s  
*Trichodon cylindricus* (Hedw.) Schimp. – s  
*Uloa bruchii* Hornsch. ex Brid. – e  
*Uloa crispa* (Hedw.) Brid. – dw, e  
*Uloa crispula* Bruch – e  
*Uloa drummondii* (Hook. et Grev.) Brid. – dw