

CONTRIBUTIONS TO THE BRYOPHYTE FLORA OF CENTRAL AND SOUTHERN ALBANIA

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Abstract: 213 bryophyte taxa were recorded during a field trip leading to various sites of central and southern Albania. Nine species (*Bryum ruderales*, *Fissidens adianthoides*, *F. crassipes*, *Grimmia fuscolutea*, *G. meridionalis*, *Orthotrichum patens*, *O. philibertii*, *Tortella fasciculata*, *T. inflexa*) were collected for the first time in Albania. 31 species found have conservation interest; rare on the Balkans or even in Europe or/and candidates of the new European bryophyte red-list.

Key words: liverworts, mosses, new national records, species of conservation interest, the Balkans

INTRODUCTION

It has been mentioned in many publications how poorly known the bryophyte flora of Albania is (MARKA *et al.* 2018, SABOVLJEVIĆ *et al.* 2008, SABOVLJEVIĆ & NATCHEVA 2006). Thus far 464 moss taxa (MARKA *et al.* 2018, MARKA 2014) and *ca.* 120 liverworts (MARKA *et al.* 2018, SABOVLJEVIĆ & NATCHEVA 2006) were reported. The total number of bryophyte taxa has recently been increased considerably (to *ca.* 585), and is already comparable to the species diversity of other countries in the Balkan Peninsula (SABOVLJEVIĆ *et al.* 2011); this is due to a rise of interest and several collecting trips and publications during the last decade (*e.g.* MARKA *et al.* 2018, MARKA 2014, VAN ZANTEN 2013, PAPP *et al.* 2010a). The most investigated areas have been in the Albanian Alps and Korça region, in northern and southeastern Albania, respectively. However, still much of Albanian territory is not even superficially investigated for bryophytes. In this paper data are presented mainly from central and southern Albania, in the districts of Librazhd, Skrapar, Përmet, Gjirokastër, Sarandë and Vlorë.

MATERIAL AND METHODS

Description of the investigated area

The geographical area investigated in this paper is very broad and continuous from the central to the southernmost part of Albania, which makes it inappropriate to give very detailed descriptions for each of the areas. Albania is divided in 4 major geographical areas, which are subdivided in 47 smaller units. From four major geographical areas two – the Central Mountainous Region and the Southern Mountainous Region – were investigated for bryophytes in various sites. However, herein geographical data will be limited for the most representative smaller units that were investigated. The information on this section is mainly based on the monograph of KABO (1991).

Polis Mountains

The Polis Mts are located in the Central Mountainous Region of Albania, specifically in the mountain ranges between Shkumbini valley and Devolli valley, starting from the Shkumbini gorges in the north up to Sopot and Shpellë in the south. The Polis Mts start from 200 m a. s. l. up to 1800 m a. s. l., with prevailing elevation above 1000 m a. s. l. It is mainly composed of calcareous and magmatic rocks. Due to karstic development it has sparse vegetation. However, the vegetation is denser in the surroundings of the carbonate plates, where the humidity is also higher, and it is mainly composed of beech forests, especially in the slopes.

Osumi valley

Osumi valley is one of the longest valleys in Albania; in this study only the middle part is considered, which is part of the Southern Mountainous Region. Osumi valley has layers of carbonates and flysch/schist, and it is characterized by erosion and terraces as well. Its vegetation is composed of types of the Mediterranean vegetation belt, with shrubs like *Quercus ilex*, *Phillyrea* spp., *Pistacia lentiscus*, *Arbutus unedo*, *Erica arborea*, etc. However, the valley is under the impact of anthropogenic activities, agriculture, and tourism.

Lengarica valley

Lengarica valley, southeast of Osumi valley, which is a part of the Southern Mountainous Region, breaks through between two mountain areas, Dangëllia and Leskoviku. It goes through various lithological substrates, mainly carbonates and terrigenous rocks. Lengarica is also known for its thermal springs. Its

vegetation is again composed of types of the Mediterranean vegetation belt, as mentioned for Osuni valley.

Zagoria valley

Zagoria valley is situated between Dhëmbeli Mts eastward and Lunxhëri Mts westward, in the Southern Mountainous Region. It is composed of flysch and quaternary sediments. The bottom of the valley is about 700 m a. s. l. at the upper part and about 200 m a. s. l. at its outlet. The erosive processes are powerful especially in its right side slope, and terraces are developed as well. The valley is penetrated by numerous shallow and dry streams. It has a cold climate in the winter, and with enduring snow due to cold winds. The vegetation of the valley is relatively sparse due to long anthropogenic pressure. It is composed of vegetation types of the oak belt, with various *Quercus* species, *Carpinus orientalis*, *Coryllus avellana*, *Juniperus*, etc.

The gorge of Suha

The gorge of Suha is situated between the Lunxhëri Mts and the Bureto Mts, in the Southern Mountainous Region. The average altitude is about 500 m a.s.l., it is dominated by calcareous substrates and the vegetation the same as mentioned for Zagoria valley.

Blue Eye

Blue Eye (Syri i Kaltër) is located in the Delvina depression at the bottom of the Mali i Gjerë Mts, and its karstic spring is the main source of Bistrice River. The geological substrates are of the calcareous type. Blue Eye is a protected area in Albania in the category of Natural Monument (AKZM 2018). It is surrounded by a dense vegetation of evergreen maquis with shrubs and trees like *Pistacia lentiscus*, *Arbutus unedo*, *Laurus nobilis*, *Juniperus oxycedrus*; there are also old *Platanus orientalis* trees around the spring and along water courses.

Mursia and Vrina plane and their surrounding hills

Mursia and Vrina were formerly marshlands, as a consequence of floods from the Pavlla River. After the regulation of the Pavlla River and construction of the artificial lake of Mursia, these fields became highly productive agricultural fields. Mursia plane is surrounded by low hills (50–100 m), which are composed of clays and calcareous substrates, and covered by dry grasslands and phryganes.

Palermo bay

Palermo bay is located in the upper part of the Ionic Riviera with a typical Mediterranean climate and vegetation (maquis and phryganes). Geologically it is a calcareous area.

Methods

Our collecting trip was made in October 2010. Various habitat types, such as wetlands, streams and riverbanks, calcareous and siliceous rock formations, grasslands, shrubberies, forests were investigated, and bryophytes collected from different substrates (soil, exposed and shaded rocks, tree bark, and decaying wood). The collecting sites can be seen in Figure 1.



Fig. 1. Location of collecting sites

The specimens are stored in the Herbarium of the Hungarian Natural History Museum, Budapest (BP), in the Herbarium of the Botanic Garden and Botanical Museum, Berlin-Dahlem (B), and in the JM collection at the Department of Biology (University of Tirana).

Nomenclature of bryophytes follows HODGETTS (2015), but for *Bartramia aprica*, MÜLLER (2014), for *Didymodon tophaceus* subsp. *sicculus*, KUČERA *et al.* (2018), for *Fissidens bambergeri*, AHRENS (2000), and for *Tortula muralis* var. *aestiva*, AHRENS & NEBEL (2000) were followed.

If species distributions are indicated for SE Europe, the following abbreviations are used: ALB – Albania, BG – Bulgaria, BIH – Bosnia and Herzegovina, GR – Greece, HR – Croatia, MK – Macedonia, MNE – Montenegro, RO – Romania, SLO – Slovenia, SRB – Serbia, TR – European part of Turkey. Abbreviations of red list categories are as follows: CR – critically endangered, EN – endangered, VU – vulnerable, NT – near threatened, DD – data deficient, DD* – data deficient, newly recorded. Country distributions, national red list categories in SE Europe and indication of candidates for the new European red-list are taken from HODGETTS (2015), with updates where relevant.

Site and collecting details

- 1) Albania, District of Librazhd (Rrethi i Librazhdit), Polis Mts, above village Polis, on the ridge between the valley of brook "Sut Kukit" and river Shkumbin; in bushland, N 41.154500°, E 20.252472°, 575 m, 12.10.2010.
- 2) Albania, District of Librazhd (Rrethi i Librazhdit), Polis Mts, above Vilan village, N 41.095694°, E 20.293333°, 1385 m, 12.10.2010.
- 3) Albania, District of Librazhd (Rrethi i Librazhdit), Polis Mts, at Gurrëshpat village, in a Fagetum N 41.114083°, E 20.269805°, 1075 m, 12.10.2010.
- 4) Albania, District of Librazhd (Rrethi i Librazhdit), Polis Mts, in village Polis; on limestone outcrop, N 41,144444°, E 20,251638°, 360 m, 12.10.2010.
- 5) Albania, District of Librazhd (Rrethi i Librazhdit), next to the bridge over river Shkumbin, between villages Goshtimë and Mirakë, N 41.163361°, E 20.230277°, 190 m, 12.10.2010.
- 6) Albania, District of Skrapar (Rrethi i Skraparit), at river Osum next to Çorovode, N 40.500055°, E 20.227055°, 195 m, 13.10.2010.
- 7) Albania, District of Skrapar (Rrethi i Skraparit), above the gorge of river Osum next to Dhorës village; in open bushland, N 40.474361°, E 20.254277°, 400 m, 13.10.2010.
- 8) Albania, District of Skrapar (Rrethi i Skraparit), in the gorge of river Osum near village Lapan (Zabërzan), N 40.428388°, E 20.287111°, 370 m, 13.10.2010.
- 9) Albania, District of Përmet (Rrethi i Përmetit), Lengarica valley, above the gorge of stream (at hot springs Linxha uji thermale); in bushland, N 40.244388, E 20.432555°, 350 m, 14.10.2010.
- 10) Albania, District of Përmet (Rrethi i Përmetit), Lengarica valley, at the brook përroi i Benjës at the junction towards village Benjë, N 40.241055°, E 20.422472°, 375 m, 14.10.2010.
- 11) Albania, District of Përmet (Rrethi i Përmetit), Lengarica valley, Mali i Bardhë, around the restaurant along the way from Petran to hot springs Linxha Uji thermale; at the spring and on the rock wall at the roadside, N 40.220555°, E 20.406861°, 320 m, 14.10.2010.

- 12) Albania, District of Përmet (Rrethi i Përmetit), Lengarica valley, at the limestone cliff next to village Petran, at the confluence of river Vjosë and Lengaricë stream, N 40.209722°, E 20.412916°, 300 m, 14.10.2010.
- 13) Albania, District of Përmet (Rrethi i Përmetit), at the river Vjosë, below village Badelonjë, N 40.207694°, E 20.387833°, 260 m, 14.10.2010.
- 14) Albania, District of Përmet (Rrethi i Përmetit), Uji i Ftohtë in Gryka e Këlcyrës; around karstic springs, N 40.296277°, E 20.161638°, 175 m, 14.10.2010.
- 15) Albania, District of Gjirokastrë (Rrethi i Gjirokastrës), Zagoria valley, from village Hoshtevë down to Zagori river, N 40.216888°, E 20.244888° and N 40.214277°, E 20.236583°, 735-545 m, 15.10.2010.
- 16) Albania, District of Gjirokastrë (Rrethi i Gjirokastrës), Gryka e Suhës near village Selcë; limestone and conglomerate rocks, N 40.105444°, E 20.303638°, 470 m, 16.10.2010.
- 17) Albania, District of Gjirokastrë (Rrethi i Gjirokastrës), Gryka e Suhës near village Selcë; downstream on Suhë stream, N 40.097277°, E 20.298000°, 395 m, 16.10.2010.
- 18) Albania, District of Sarandë (Rrethi i Sarandës), around the karstic spring Syri i Kaltër, N 39.923805°, E 20.192472°, 170 m, 16.10.2010.
- 19) Albania, District of Sarandë (Rrethi i Sarandës), Mt Maja e Dhema, between village Ksamil and Pasqyrë; on limestone rocks in phrygana dominated by *Euphorbia dendroides*, N 39.789500°, E 20.008416°, 65 m, 17.10.2010.
- 20) Albania, District of Sarandë (Rrethi i Sarandës), along canal Kanal i Butrintit N of village Vrinë; in saline habitat, N 39.742833°, E 20.018000°, 5 m, 17.10.2010.
- 21) Albania, District of Sarandë (Rrethi i Sarandës), on the slope of Mt. "Xtoi" 271.5 m, between villages Çiflig and Shkallë; in grased grassland, N 39.685194°, E 20.122555°, 30 m, 17.10.2010.
- 22) Albania, District of Vlorë (Rrethi i Vlorës), around spring Burimi Borshit (Restaurant Ujëvara), in village Borsh, N 40.061833°, E 19.858138° 100 m, 18.10.2010.
- 23) Albania, District of Vlorë (Rrethi i Vlorës), on Palermo peninsula near the military station; in rocky grassland on limestone, N 40.048694°, E 19.795361°, 90 m, 18.10.2010.
- 24) Albania, District of Vlorë (Rrethi i Vlorës), at lake Liqeni i Nartës near village Panaja; in saline grassland, N 40.521472°, E 19.460666°, 3 m, 18.10.2010.
- 25) Albania, Malësi e Madhe District (Rrethi i Malësisë së Madhe), in the S part of town Koplík; small pond at the roadside, N 42.198083°, E 19.450888°, 50 m, 19.10.2010.

RESULTS AND DISCUSSION

213 bryophyte taxa (26 liverworts and 187 mosses) were recorded during our field trip. The complete list of the species can be found in the Appendix. Nine species are reported for the first time from Albania. 31 species have conservation interest; rare on the Balkans or even in Europe or/and candidates of the new European bryophyte red-list.

Species new to the Albanian bryophyte flora

Bryum ruderale Crundw. & Nyholm – This is a subatlantic species (DÜLL 1985). In SE Europe it is known only from BG (DD*), HR, GR, RO (CR), SRB, and TR. It is widely distributed in Europe, but under-recorded due to its small size. It was collected in a saline grassland in SW Albania.

Fissidens adianthoides Hedw. – This subboreal species (DÜLL 1984) is widely distributed in Europe, it is known in all SE European countries except ALB. In MNE it is DD*, because it has been reported recently from the Durmitor Mts (PAPP & ERZBERGER 2010). In Albania it was collected in a wet site along a rivulet in the Polis Mts above 1000 m a. s. l.

Fissidens crassipes Wilson ex Bruch & Schimp. – This subatlantic-sub-Mediterranean aquatic species (DÜLL 1984) is known from almost all SE European countries except ALB, MK, and TR. It is redlisted in BG (VU) and RO (EN). In Northern and Central Europe it is also red-listed in many countries like Norway (CR), Sweden, Austria, Poland, Slovakia (EN), Czech Republic (DD), Germany (not evaluated due to the lack of knowledge of this taxon), and Latvia (EN). It seems that this species can tolerate wide trophic range of the water; e.g. it is a characteristic species of mesosaprobic sections of the Danube (PAPP & RAJCZY 1995, PAPP *et al.* 2006). It was found on limestone rock at a stream in Southern Albania.

Grimmia fuscolutea Hook. – This species is a candidate for the new European Bryophyte Red List. In SE Europe it is known only in BG (NT), MK, MNE, and RO (CR). It has a scattered distribution in Europe. Where it occurs it is often red-listed, e.g. Finland (EN), Sweden (VU), Germany (not evaluated due to the lack of knowledge of this taxon), Slovakia (DD), and Switzerland (VU). It was collected from conglomerate flysch sediment in the Polis Mts in Central Albania.

Grimmia meridionalis (Müll. Hall.) E. Maier – This species is also a candidate for the new European Bryophyte Red List. In SE Europe it is reported only from BG and GR. In Europe it is known from the Western Mediterranean countries, Cyprus and Germany (DD). It was also found in conglomerate flysch sediment in the Polis Mts in Central Albania.

Orthotrichum patens Bruch ex Brid. – This subatlantic species (DÜLL 1985) is a candidate for the new European Bryophyte Red List. It is known from almost all SE European countries except ALB, TR, and doubtful in GR. It is red-listed in RO (VU) and BG (NT). It is distributed all over Europe, but red-listed in many European countries. In Hungary it is vulnerable (VU) according to the national bryophyte red-list of 2010 (PAPP *et al.* 2010b), but since then several new records have been discovered, and it seems it is expanding (PAPP & SZURDOKI 2017, 2018). It was found on tree bark in Zagoria valley in Southern Albania.

Orthotrichum philibertii Venturi – This Atlantic-Mediterranean species (DÜLL 1985) is a candidate for the new European Bryophyte Red List. In SE Europe it is known only from GR, RO (CR), and SRB (EN). In Europe it is also reported from Norway, Balearic Islands, Corsica, Cyprus, France, Italy, Portugal (DD), Sardinia, Sicily (NT), and Spain (VU). It was found on *Sorbus* bark in Zagoria valley in Southern Albania.

Tortella fasciculata (Culm.) Culm. – According to KÖCKINGER & HEDENÄS (2017) *Tortella bambergeri* (Schimp.) Broth. consists of two independent species: *Tortella fasciculata* (Culm.) Culm. and *T. pseudofragilis* (Thér.) Köckinger & Hedenäs. *T. fasciculata* is a thermophilous moss and can be characterized as a suboceanic-sub-Mediterranean floristic element in Europe. It was collected from limestone rocks in two sites in the Polis Mts in Central Albania.

Tortella inflexa (Bruch) Broth. – This Atlantic-Mediterranean species (DÜLL 1984) is known from almost all SE European countries except ALB, RO, and TR. It is red-listed in SLO (VU) and BG (DD), because it has recently been reported from the Strandzha Mts (PAPP *et al.* 2011). It is widely distributed in the Western Mediterranean, it is also known in Great Britain, Belgium, Germany (extremely rare), and the Netherlands (susceptible). It was found on limestone rock along a river in Southern Albania.

Species of conservation interest

Liverworts

Clevea spathysii (Lindenb.) Müll. Frib. – This southern Atlantic-Mediterranean species (DÜLL 1984) is a candidate for the new European Bryophyte Red List. In SE Europe it is known only from GR, Crete, and ALB (DD). In Europe it is also reported from the Balearic Islands, Canary islands, Corsica, France, Italy (CR), Portugal, Sicily, and Spain.

Oxymitra incrassata (Brot.) Sérgio & Sim-Sim – This submediterranean species (DÜLL 1984) is a candidate for the new European Bryophyte Red List. In SE Europe it is known only from ALB (DD), BG, GR, HR, MNE, RO (VU), and SRB. It is red-listed in many other European countries, where it occurs, e.g. in Hungary (NT), Austria (CR), Czech Republic (EN), Poland (EN), Slovakia (CR), Switzerland (VU), and Italy (CR).

Radula lindenbergiana Gottsche ex C.Hartm. – It is a submediterranean, montane species (DÜLL 1984). It is known from almost all SE European countries except MK, but it is not frequent in the Balkans. It is red-listed in BG (VU). In Europe it is also red-listed in Hungary (DD), Italy (NT), Czech Republic (VU), Germany (DD), and Finland (VU).

Mosses

Bryum canariense Brid. – This Atlantic, Mediterranean species (DÜLL 1985) is data-deficient (DD) in Albania as only very old records exist. It is known from almost all SE European countries except RO. It has recently been reported from SRB (PAPP *et al.* 2014a). It is red-listed in BG (VU) and in SLO (DD).

Bryum klinggraeffii Schimp. – This subatlantic species (DÜLL 1985) has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2018) from Valbona valley. In SE Europe it is known only from BG (DD*), GR, MK, RO (EN), and SLO (DD). This tiny moss is surely over-looked and under-collected in the Balkans.

Cryphaea heteromalla (Hedw.) D. Mohr – This is a subatlantic, Mediterranean species (DÜLL 1985). It has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2013) on the basis of four specimens collected in different parts of Albania. This (loc. 18.) is the southernmost locality in the country. In SE Europe it is also known from HR, GR, MNE, RO (CR), SLO (DD), and TR.

Didymodon tophaceus subsp. *sicculus* (M. J. Cano, Ros, García-Zam. & J. Guerra) Kučera – This species has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2013) on the basis of the specimen found at loc. 20. In SE Europe it is also known from BG (DD*), GR, MNE, SRB, SLO (DD*), and TR.

Drepanocladus polygamus (Schimp.) Hedenäs – This boreal wetland species (DÜLL 1985) is a candidate for the new European Bryophyte Red List. It is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is also known from many SE European countries, but it is often red-listed: BG (VU), MK, MNE (VU), RO (VU), SRB (VU), and SLO (VU).

Entosthodon mublenbergii (Turner) Fife – This sub-Mediterranean, subatlantic, montane species (DÜLL 1985) is a candidate for the new European Bryophyte Red List. It is DD in Albania as only very old records exist. It is known from all SE European countries except TR. Red-listed in RO (VU).

Entosthodon pulchellus (H. Philib.) Brugués – This sub-Mediterranean, subatlantic, montane species (DÜLL 1985) is also a candidate for the new European Bryophyte Red List. It is DD* in Albania as it was recently reported by ERZBERGER (2007). It is known from all SE European countries except BG, RO, and TR. It is also red-listed in SLO (DD*).

Ephemerum recurvifolium (Dicks.) Boulay – This sub-Mediterranean species (DÜLL 1984) is also a candidate for the new European Bryophyte Red List. It has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2013) on the basis of the specimen found at loc. 20. In SE Europe it is known from a few countries and often red-listed in high categories in BG (CR), GR (Crete), HR, MNE (VU), and RO (CR).

Fabronia pusilla Raddi – This sub-Mediterranean species (DÜLL 1985) is also a candidate for the new European Bryophyte Red List. It is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is known from almost all SE European countries except BIH, SRB, and TR, but it is frequently red-listed, e.g. BG (VU), MNE (DD), RO (CR), and SLO

(DD). However, in Albania it seems to be quite common and abundant even in city centres (MARKA & ZALOSHINJA 2017).

Fissidens curvatus Hornsch. – This Atlantic, Mediterranean species (DÜLL 1984) is included in the Red Data Book of European Bryophytes (ECCB 1995) and a candidate for the new European Bryophyte Red List. It is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is known only from BG (DD*), HR, GR, and MNE (DD).

Grimmia decipiens (Schultz) Lindb. – This subatlantic, montane species (DÜLL 1984) is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is known from almost all SE European countries except BIH and SLO, but it is not frequent. It is red-listed in BG (VU) and RO (EN).

Imbricbryum mildeanum (Jur.) J. R. Spence – This subatlantic species (DÜLL 1985) is a candidate for the new European Bryophyte Red List. It has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2018). In SE Europe it is known from BIH, BG (EN), HR, GR, RO (EN), SRB, and SLO.

Isothecium myosuroides Brid. – This is a subatlantic species (DÜLL 1985) with sub-Mediterranean character. It is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is known from almost all SE European countries except MK. It is red-listed in BG (CR).

Orthotrichum alpestre Bruch & Schimp. – This subarctic, subalpine species (DÜLL 1985) is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). In SE Europe it is known only from BIH, GR, MK, MNE, and RO (VU).

Orthotrichum shawii Wilson – This is a candidate for the new European Bryophyte Red List. It is DD* in Albania, but it seems that it is not rare in the country evidenced by historical and recent collections (KÁRPÁTI & VAJDA 1961, PAPP *et al.* 2010a, MARKA 2014). In SE Europe it is also known from GR. It has recently been reported from MK (PAPP *et al.* 2016).

Philonotis caespitosa Jur. – This boreal species (DÜLL 1985) is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is also known from all SE European countries, but often red-listed, *e.g.* BG (VU), MNE (DD), SRB (DD), and SLO (VU).

Philonotis capillaris Lindb. – This subatlantic species (DÜLL 1985) has recently been reported as new to the Albanian bryophyte flora by MARKA *et al.* (2013) based on the specimen found at loc. 1. It is known from almost all SE European countries except HR and TR, but often red-listed, *e.g.* BG (VU), MNE (DD), RO (EN), SRB (DD), and SLO (NT).

Philonotis marchica (Hedw.) Brid. – This sub-Mediterranean species (DÜLL 1985) is a candidate for the new European Bryophyte Red List. It is known from

almost all SE European countries except HR, but often red-listed, e.g. ALB (DD), BG (EN), RO (NT), and SLO (NT).

Pseudoleskeella rupestris (Berggr.) Hedenäs & L. Söderstr. – This species is also a candidate for the new European Bryophyte Red List. It has recently been reported from many SE European countries, like ALB (PAPP *et al.* 2010a), HR (ALEGRO *et al.* 2015), GR (PAPP & TSAKIRI 2017), MK (PAPP *et al.* 2016), MNE (DRAGIĆEVIĆ *et al.* 2008), and SRB (PAPP *et al.* 2014b).

Rhynchostegiella teneriffae (Mont.) Dirkse & Bouman – This Atlantic, sub-Mediterranean, montane species (DÜLL 1985) is included in the Red Data Book of European Bryophytes (ECCB 1995) and a candidate for the new European Bryophyte Red List. It has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2013) on the basis of the specimen found at loc. 18. It is known from almost all SE European countries except MK and TR, but often red-listed, e.g. BG (DD*), RO (CR), and SLO (VU).

Schistidium atrofusum (Schimp.) Limpr. – It is DD* in Albania since it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is known from almost all SE European countries except TR. It is NT in BG and RO.

Schistidium flaccidum (De Not.) Ochyra – It is DD* in Albania as it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is known from almost all SE European countries except HR, MNE, and TR. It is red-listed in BG (NT) and RO (CR).

Schistidium helveticum (Schkuhr) Deguchi – This species is a candidate for the new European Bryophyte Red List. It is DD* in Albania since it has recently been reported for the first time from the country (PAPP *et al.* 2010a). It is known from almost all SE European countries except SLO. It is also DD* in BG; in RO it cannot be evaluated (NE) due to the lack of knowledge. It seems that this is a frequent species in the Balkans on exposed limestone rocks.

Schistidium papillosum Culm. – This species is a candidate for the new European Bryophyte Red List. It is DD* in Albania as it has recently been reported for the first time from the country (MARKA & XHULAJ 2011). In SE Europe it is also known from BG (DD*), GR, MK, MNE (DD*), RO, SRB, and doubtful in SLO.

Scorpiurium sendtneri (Schimp.) M. Fleisch. – This sub-Mediterranean, subatlantic species (DÜLL 1985) is a candidate for the new European Bryophyte Red List. It has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2013) based on two specimens; one of them is the record from loc. 18. In SE Europe it is known only from ALB, HR, GR, MNE, and SLO (EN).

Seligeria pusilla (Hedw.) Bruch & Schimp. – This species of the temperate zone of Europe (DÜLL 1984) has recently been reported as new to the Albanian bryophyte flora in MARKA *et al.* (2018) from Valbona valley. It is known from

almost all SE European countries except TR. It is red-listed in BG (VU) and SRB (VU).

Syntrichia laevipila Brid. – This Atlantic, submediterranean species (DÜLL 1984) is DD* in Albania, but it has already many records (COLACINO & MARKA 2009; PAPP *et al.* 2010b; VAN ZANTEN 2013; MARKA 2014; MARKA & ZALOSH-NJA 2017), hence its DD* status could be revised. It is known from almost all SE European countries except BIH and TR. It is red-listed in BG (VU), RO (CR), and SLO (VU).

Syntrichia montana Nees var. *calva* (Durieu & Sagot ex Bruch & Schimp.) J. J. Amann – This taxon occurring in the temperate zone of Europe (DÜLL 1984) is known only from ALB, GR, MK, and SRB in SE Europe.

CONCLUSIONS

In spite of the recent improvement in the exploration of the bryophyte flora of Albania still each field trip can add several new taxa to the bryoflora of the country. The present paper with new national records of mainly (sub)Atlantic–(sub)Mediterranean species can contribute to the checklist of bryophytes of Albania. Besides this, several valuable records of species of European conservation interest or rare, threatened taxa on the Balkans are also reported. Most of them are also characterised by (sub)Atlantic–(sub)Mediterranean distribution.

* * *

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Összefoglaló: Számos korábbi publikáció következtetése között szerepel, Albánia mohafldrája kevésé feltárt. Az utóbbi évek intenzív mohászati kutatásainak, expedícióknak köszönhetően az országból kimutatott mohataxonok száma mára már mintegy 585, mely szám már összevethető a Balkán-félsziget más országaiban ismert mohadiverzitással. Albánia északi és délkeleti részének (Albán Alpok, Korça régió) mohafldrája jelenleg jobban feltárt, sok más vidékről azonban nagyon kevés adat áll rendelkezésre. Jelen cikkben egy 2010-es expedíció során Közép- és Dél-Albánia vidékein, Librazhd, Skrapar, Përmet, Gjirokastër, Sarandë és Vlorë régiókban gyűjtött anyag feldolgozásából született eredményeket közöljük.

Összesen 213 mohataxont találtunk, amelyek közül 9 fajt (*Bryum ruderale*, *Fissidens adianthoides*, *F. crassipes*, *Grimmia fuscolutea*, *G. meridionalis*, *Orthotrichum patens*, *O. philibertii*, *Tortella fasciculata*, *T. inflexa*) először közlünk Albánia területéről. 31 faj pedig ritka, veszélyeztetett a Balkánon vagy egész Európában és a készülő új Európai Moha Vörös Lista potenciális tagja.

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Appendix
Complete list of bryophyte records

The numerals following the species names refer to the collection sites described above.

Liverworts

- Cephaloziella baumgartneri* Schiffn. – 11, 15: limestone rock
Cephaloziella divaricata (Sm.) Schiffn. – 1: conglomerate flysch sediment; 3: limestone rock; 15: at a rivulet; 21: limestone grassland
Clevea spathysii (Lindenb.) Müll. Frib. – 12: limestone rock
Cololejeunea rossettiana (C. Massal.) Schiffn. – 18: limestone rock
Fossombronia caespitiformis (Raddi) De Not. ex Rabenh. – 6: limestone rock; 9: soil among limestone rocks; 15: soil
Frullania dilatata (L.) Dumort. – 1: bark of tree; 3: *Fagus* bark; 9: bark of *Phillyrea* and *Arbutus unedo*; 11: *Platanus* bark; 15: *Quercus* bark; 18: bark of *Phillyrea*
Lejeunea cavifolia (Ehrh.) Lindb. – 3, 18: limestone rock; 15: *Platanus* bark
Lophocolea heterophylla (Schrad.) Dumort. – 1: soil
Lophocolea minor Nees – 3: limestone rock
Lunularia cruciata (L.) Dumort. ex Lindb. – 6, 9, 12, 15: limestone rock; 8, 10, 16: soil; 18: limestone rock at the spring; 19: soil among limestone rocks; 20: saline grassland; 21: limestone grassland
Mannia androgyna (L.) A. Evans – 9: limestone rock; 18: soil among limestone rocks
Mesoptychia turbinata (Raddi) L. Söderstr. & Váňa – 7, 10: limestone rock; 15: at a rivulet
Oxymitra incrassata (Brot.) Sérgio & Sim-Sim – 23: limestone grassland
Pellia endiviifolia (Dicks.) Dumort. – 10: soil; 11: limestone rock; 22: limestone rock at a spring
Plagiochasma rupestre (J. R. Forst. & G. Forst.) Steph. – 19: limestone rock; 23: limestone grassland
Plagiochila porelloides (Torr. ex Nees) Lindenb. – 3: limestone rock
Porella platyphylla (L.) Pfeiff. – 3, 18: limestone rock; 11: *Platanus* bark
Radula complanata (L.) Dumort. – 1: bark of tree; 2: bottom of *Fagus*; 3: limestone rock and *Fagus* bark; 7: bark of a shrub; 11, 17: *Platanus* bark; 15: bark of *Ostrya carpinifolia*; 18: limestone rock and *Platanus* bark
Radula lindenbergiana Gottsche ex C. Hartm. – 18: limestone rock

- Reboulia hemisphaerica* (L.) Raddi – 2: limestone rock and soil among limestone rocks; 5, 9, 12, 16, 19: limestone rock; 18: soil among limestone rocks; 21: limestone grassland
- Riccia ciliata* Hoffm. aggr. – 21: limestone grassland (conf. Sérgio, C.)
- Riccia sorocarpa* Bisch. – 9: limestone rock (conf/det. Sérgio, C.); 13: soil among calcareous conglomerate rocks (conf./det. Sérgio, C.)
- Southbya nigrella* (De Not.) Henriq. – 9, 11, 12: limestone rock; 15: at a rivulet; 16: calcareous conglomerate rock
- Southbya tophacea* (Spruce) Spruce – 6, 7, 9, 10, 11: limestone rock; 15: at a rivulet
- Targionia hypophylla* L. – 18: limestone rock; 21: limestone grassland
- Targionia lorbeeriana* Müll. Frib. – 12, 15: limestone rock; 13, 16: calcareous conglomerate rock; 21, 23: limestone grassland

Mosses

- Abietinella abietina* (Hedw.) M. Fleisch. – 2: soil among limestone rocks
- Alleniella besseri* (Lobarz.) S. Olsson, Enroth & D. Quandt – 3: limestone rock
- Alleniella complanata* (Hedw.) S. Olsson, Enroth & D. Quandt – 3: limestone rock and *Fagus* bark; 10: bottom of *Platanus* tree; 11, 15, 18: *Platanus* bark; 15: bark of *Ostrya carpinifolia*
- Aloina aloides* (Koch ex Schultz) Kindb. – 6, 7, 9: limestone rock; 12: limestone rock and flysch; 15: soil; 24: saline grassland
- Aloina ambigua* (Bruch & Schimp.) Limpr. – 9, 11: limestone rock
- Amblystegium serpens* (Hedw.) Schimp. – 11: limestone rock
- Amphidium mougeotii* (Schimp.) Schimp. – 3: siliceous rock
- Anomodon viticulosus* (Hedw.) Hook. & Taylor – 7, 12, 16: limestone rock; 10, 15, 17, 18: *Platanus* bark
- Barbula unguiculata* Hedw. – 2, 4, 6, 7, 9, 11, 19: limestone rock; 15: soil; 18: soil among limestone rocks; 20: saline grassland; 21, 23: limestone grassland; 24: saline grassland
- Bartramia aprica* Müll. Hal. – 12: limestone rock; 21: limestone grassland
- Brachytheciastrum velutinum* (Hedw.) Ignatov & Huttunen – 1, 2: conglomerate rock; 3, 15: limestone rock
- Brachythecium glareosum* (Bruch ex Spruce) Schimp. – 1: conglomerate flysch sediment; 2: soil among limestone rocks
- Brachythecium mildeanum* (Schimp.) Schimp. – 2: along a rivulet
- Brachythecium rivulare* Schimp. – 17: limestone rocks at the stream
- Brachythecium rutabulum* (Hedw.) Schimp. – 2: along a rivulet; 10, 16: soil
- Bryoerythrophyllum recurvirostrum* (Hedw.) P. C. Chen – 2: limestone rock

- Bryum argenteum* Hedw. – 1: conglomerate flysch sediment; 2: conglomerate rock; 7, 9, 12: limestone rock; 15: soil
- Bryum canariense* Brid. – 18: limestone rock (conf. Schröder, W.)
- Bryum dichotomum* Hedw. – 1: conglomerate flysch sediment; 2: conglomerate rock; 6: limestone rock (det. Schröder, W.); 23: limestone grassland
- Bryum elegans* Nees – 2: conglomerate rock
- Bryum klinggraeffii* Schimp. – 22: soil at a spring
- Bryum ruderale* Crundw. & Nyholm – 20: saline grassland
- Calliergonella cuspidata* (Hedw.) Loeske – 2: along a rivulet
- Campyliadelphus chrysophyllus* (Brid.) R. S. Chopra – 10, 16: soil
- Campylidium calcareum* (Crundw. & Nyholm) Ochyra – 10: bottom of *Platanus* tree; 15: soil and bottom of *Quercus*
- Campylium protensum* (Brid.) Kindb. – 3: in a moist site
- Ceratodon purpureus* (Hedw.) Brid. – 1: conglomerate flysch sediment; 2: soil among limestone rocks
- Cheilothela chloropus* (Brid.) Broth. – 16: soil; 21: limestone grassland
- Cinclidotus aquaticus* (Hedw.) Bruch & Schimp. – 14: limestone rock in the water; 18, 22: limestone rock at the spring
- Cinclidotus fontinaloides* (Hedw.) P. Beauv. – 6: limestone rock; 13: calcareous conglomerate rock; 17: limestone rocks at the stream
- Cirriphyllum crassinervium* (Taylor) Loeske & M. Fleisch. – 3: in a moist site; 15: limestone rock and *Platanus* bark; 16: limestone rock; 17: limestone rocks at the stream
- Cratoneuron filicinum* (Hedw.) Spruce – 2: along a rivulet; 7: limestone rock; 10: soil; 18, 22: limestone rock at the spring
- Crossidium squamiferum* (Viv.) Jur. – 2: conglomerate rock; 6, 9, 15, 16: limestone rock; 13: calcareous conglomerate rock
- Cryphaea heteromalla* (Hedw.) D. Mohr – 18: bark of *Ligustrum vulgare*
- Ctenidium molluscum* (Hedw.) Mitt. – 3, 6, 9, 15, 16: limestone rock; 10: soil
- Dialytrichia mucronata* (Brid.) Broth. – 9: limestone rock; 12: limestone rock; bark of *Juglans* and *Platanus*; 16: calcareous conglomerate rock and *Platanus* bark; 17: limestone rocks at the stream and *Platanus* bark; 18: *Platanus* bark
- Dicranella heteromalla* (Hedw.) Schimp. – 21: limestone grassland
- Dicranella howei* Renauld & Cardot – 2: conglomerate rock; 6, 7, 9, 11, 12, 19: limestone rock; 15: soil; 16: calcareous conglomerate rock; 20: saline grassland; 21: limestone grassland; 24: saline grassland
- Dicranella varia* (Hedw.) Schimp. – 2: along a rivulet; 10: soil; 11: limestone rock; 15: at a rivulet
- Dicranoweisia cirrata* (Hedw.) Lindb. – 15: bark of tree

- Dicranum scoparium* Hedw. – 1: conglomerate flysch sediment; 2: soil among limestone rocks
- Didymodon acutus* (Brid.) K. Saito – 1: conglomerate flysch sediment; 2, 4, 7, 9: limestone rock; 13: calcareous conglomerate rock; 15: soil
- Didymodon fallax* (Hedw.) R. H. Zander – 6, 7, 9: limestone rock; 15: soil at a rivulet and *Platanus* bark
- Didymodon insulanus* (De Not.) M. O. Hill – 12: limestone rock; 15: sandstone rock
- Didymodon luridus* Hornsch. – 2: conglomerate rock (det. Schröder, W.); 6, 9, 11, 12, 19: limestone rock; 15: soil; 17: limestone rocks at the stream
- Didymodon sinuosus* (Mitt.) Delogne – 16: limestone rock; 17: at the stream; 18: limestone rock at the spring
- Didymodon tophaceus* (Brid.) Lisa subsp. *tophaceus* – 6: limestone rock; 15: at a rivulet
- Didymodon tophaceus* subsp. *sicculus* (M. J. Cano, Ros, García-Zam. & J. Guerra) Kučera – 11: limestone rock; 20: saline grassland
- Didymodon vinealis* (Brid.) R. H. Zander – 6, 9: limestone rock; 10: soil; 12: limestone rock and flysch; 15: soil; 24: saline grassland
- Ditrichum flexicaule* (Schwägr.) Hampe – 16: limestone rock
- Ditrichum gracile* (Mitt.) Kuntze – 16: limestone rock
- Ditrichum pusillum* (Hedw.) Hampe – 1: conglomerate flysch sediment
- Drepanocladus aduncus* (Hedw.) Warnst. – 25: in a pond
- Drepanocladus polygamus* (Schimp.) Hedenäs – 15: at a rivulet
- Encalypta rhapsocarpa* Schwägr. – 9: limestone rock
- Encalypta streptocarpa* Hedw. – 2: bottom of *Fagus*; 16: limestone rock
- Encalypta vulgaris* Hedw. – 16: limestone rock
- Entosthodon muhlenbergii* (Turner) Fife – 12: limestone rock
- Entosthodon pulchellus* (H. Philib.) Brugués – 9: limestone rock; 12: flysch
- Ephemerum recurvifolium* (Dicks.) Boulay – 20: saline grassland; 21: limestone grassland
- Eucladium verticillatum* (With.) Bruch & Schimp. – 6, 9, 10, 11, 12: limestone rock; 15: at a rivulet
- Eurhynchiastrum pulchellum* (Hedw.) Ignatov & Huttunen – 3, 9: soil among limestone rocks
- Exsertotheca crispa* (Hedw.) S. Olsson, Enroth & D. Quandt – 3: limestone rock; 18: base of tree
- Fabronia pusilla* Raddi – 12: *Juglans* bark; 15: sandstone rock
- Fissidens adianthoides* Hedw. – 3: in a moist site

- Fissidens bambergeri* Schimp. (*F. viridulus* var. *bambergeri* (Schimp.) Waldh.) – 1: conglomerate flysch sediment; 6, 7: limestone rock; 16: calcareous conglomerate rock
- Fissidens bryoides* Hedw. – 4, 9, 10, 18, 19: soil among limestone rocks; 15: soil; 21: limestone grassland
- Fissidens crassipes* Wilson ex Bruch & Schimp. – 10: limestone rock
- Fissidens curvatus* Hornsch. – 3, 9: soil among limestone rocks
- Fissidens dubius* P. Beauv. – 1: conglomerate flysch sediment; 2, 3, 4, 9, 10, 15, 16: limestone rock
- Fissidens taxifolius* Hedw. – 1: conglomerate flysch sediment; 2: along a rivulet; 10: soil; 11, 18: limestone rock; 15: at a rivulet
- Fissidens viridulus* (Sw. ex anon.) Wahlenb. – 6: limestone rock; 15, 16: soil; 18, 19: soil among limestone rocks; 20: saline grassland; 21, 23: limestone grassland
- Funaria hygrometrica* Hedw. – 6: limestone rock; 23: limestone grassland
- Grimmia decipiens* (Schultz) Lindb. – 1: conglomerate flysch sediment (rev. Maier, E.)
- Grimmia dissimulata* E. Maier – 1: conglomerate flysch sediment (conf. Maier, E.); 7, 9: limestone rock (all conf. Maier, E.); 16: limestone rock
- Grimmia fuscolutea* Hook. – 1: conglomerate flysch sediment (rev. Maier, E.)
- Grimmia laevigata* (Brid.) Brid. – 1: conglomerate flysch sediment (conf. Maier, E.); 2: conglomerate rock
- Grimmia meridionalis* (Müll. Hall.) E. Maier – 1: conglomerate flysch sediment (conf. Maier, E.)
- Grimmia orbicularis* Bruch ex Wilson – 5: limestone rock; 9: limestone rock (conf. Maier, E.)
- Grimmia ovalis* (Hedw.) Lindb. – 2: conglomerate rock (conf. Maier, E.)
- Grimmia pulvinata* (Hedw.) Sm. – 1: conglomerate flysch sediment; 2: conglomerate rock (conf. Maier, E.); 6, 16: limestone rock; 9: limestone rock (conf. Maier, E.); 13: calcareous conglomerate rock; 15: limestone and sandstone rocks; 21: limestone grassland
- Grimmia tergestina* Tomm. ex Bruch & Schimp. – 2: conglomerate rock (conf. Maier, E.), limestone rock (conf. Maier, E.) and acidic rock; 4, 7, 9: limestone rock (all conf. Maier, E.); 5, 6: limestone rock; 13: calcareous conglomerate rock (conf. Maier, E.); 15: sandstone rock and limestone rock (conf. Maier, E.)
- Gymnostomum calcareum* Nees & Hornsch. – 10, 12: limestone rock
- Gymnostomum viridulum* Brid. – 2, 6, 7, 9, 11, 12: limestone rock; 15: limestone rock and soil at a rivulet
- Gyroweisia tenuis* (Hedw.) Schimp. – 5, 9, 11, 12: limestone rock; 15: at a rivulet

- Habrodon perpusillus* (De Not.) Lindb. – 9: bark of *Phillyrea*, *Carpinus*, and *Arbutus unedo*; 15: bark of tree and *Quercus*; 16: bark of *Fraxinus* and *Juglans regia*; 17: *Platanus* bark
- Homalothecium lutescens* (Hedw.) H. Rob. – 2, 3, 7: soil among limestone rocks; 12: flysch; 15: soil and bottom of *Ostrya carpinifolia*; 16: soil; 18: *Platanus* bark
- Homalothecium sericeum* (Hedw.) Schimp. – 2: conglomerate and limestone rocks, bark of *Juniperus* and bottom of *Fagus*; 3: limestone rock; 7: bark of a shrub and *Quercus*; 9: limestone rock and bark of *Phillyrea*; 10: bottom of *Platanus* tree; 11, 16, 18: *Platanus* bark; 15: sandstone rock, bark of *Platanus* and *Quercus*; 21: limestone grassland
- Hygrohypnum luridum* (Hedw.) Jenn. – 3: in a moist site
- Hylocomium splendens* (Hedw.) Schimp. – 3: soil among limestone rocks
- Hypnum cupressiforme* Hedw. – 1: conglomerate flysch sediment; 2: soil among limestone rocks; 3, 16: limestone rock; 9: *Quercus* bark; 10: bottom of *Platanus* tree; 15: soil
- Hypnum cupressiforme* Hedw. var. *lacunosum* Brid. – 1: conglomerate flysch sediment; 2: conglomerate rock; 7, 9: limestone rock
- Imbricbryum alpinum* (Huds. ex With.) N. Pedersen – 1: conglomerate flysch sediment; 15: limestone rock
- Imbricbryum mildeanum* (Jur.) J. R. Spence – 2: conglomerate rock (conf. Schröder, W.); 15: soil (cf. det. Meinunger, L.)
- Isothecium alopecuroides* (Lam. ex Dubois) Isov. – 3: limestone rock
- Isothecium myosuroides* Brid. – 18: bark of tree
- Leptodictyum riparium* (Hedw.) Warnst. – 18: at the spring
- Leptodon smithii* (Hedw.) F. Weber & D. Mohr – 7: bark of tree; 9: bark of *Phillyrea*, *Arbutus unedo*, *Pistacia*, and *Quercus*; 10: bottom of *Platanus* tree; 15: *Quercus* bark; 16: bark of *Juglans regia*; 12, 18: *Platanus* bark
- Leucodon sciuroides* (Hedw.) Schwägr. – 1: bark of tree; 2: *Carpinus* bark; 3: bark of *Malus* (var. *morensis*) and limestone rock; 7: bark of tree; 15: *Quercus* bark
- Microeurhynchium pumilum* (Wilson) Ignatov & Vanderp. – 10, 18: soil among limestone rocks
- Mnium stellare* Hedw. – 3: limestone rock; 15: *Platanus* bark
- Nogopterium gracile* (Hedw.) Crosby & W. R. Buck – 9: limestone rock, bark of *Pistacia*, *Quercus*, and *Arbutus unedo*; 7: bark of a shrub; 12, 16: limestone rock
- Orthotrichum affine* Schrad. ex Brid. – 3: *Fagus* bark; 9: bark of *Phillyrea* and *Arbutus unedo*; 15: bark of *Platanus* and *Sorbus*; 17: *Platanus* bark
- Orthotrichum alpestre* Bruch & Schimp. – 3: *Fagus* bark

- Orthotrichum anomalum* Hedw. – 2: conglomerate and limestone rocks; 4, 7, 9, 16: limestone rock; 15: conglomerate rock; 17: *Platanus* bark
- Orthotrichum cupulatum* Hoffm. ex Brid. – 2, 16: limestone rock; 12: limestone rock (conf. Garilleti, R.); 13: calcareous conglomerate rock
- Orthotrichum cupulatum* Hoffm. ex Brid. var. *riparium* Huebener – 17: limestone rocks at the stream
- Orthotrichum diaphanum* Schrad. ex Brid. – 12: *Juglans* bark; 15: bark of tree and *Quercus*
- Orthotrichum lyellii* Hook. & Taylor – 7: bark of tree; 15: *Quercus* bark
- Orthotrichum pallens* Bruch ex Brid. – 3: *Fagus* bark; 15: bark of tree
- Orthotrichum patens* Bruch ex Brid. – 15: bark of tree
- Orthotrichum philibertii* Venturi – 15: *Sorbus* bark
- Orthotrichum rupestre* Schleich. ex Schwägr. – 1: bark of tree; 3: limestone rock and *Fagus* bark; 15: limestone rock
- Orthotrichum shawii* Wilson – 3: *Fagus* bark
- Orthotrichum speciosum* Nees – 2: bark of *Juniperus* and *Fagus*; 7: bark of a shrub
- Orthotrichum stramineum* Hornsch. ex Brid. – 3: *Fagus* bark
- Orthotrichum striatum* Hedw. – 3: *Fagus* bark; 15: *Platanus* bark
- Orthotrichum tenellum* Bruch ex Brid. – 15: *Sorbus* bark (conf. Garilleti, R.); 17: *Platanus* bark (conf. Garilleti, R.)
- Oxyrrhynchium hians* (Hedw.) Loeske – 2: along a rivulet; 4, 6, 11: limestone rock; 10, 15: soil; 22: limestone rock at a spring
- Oxyrrhynchium schleicheri* (R. Hedw.) Röhl – 10: soil
- Philonotis caespitosa* Jur. – 6: limestone rock
- Philonotis capillaris* Lindb. – 1: conglomerate flysch sediment; 3: soil among limestone rocks; 6: limestone rock
- Philonotis marchica* (Hedw.) Brid. – 22: limestone rock at a spring
- Plagiomnium affine* (Blandow ex Funck) T. J. Kop. – 21: limestone grassland
- Plagiomnium undulatum* (Hedw.) T. J. Kop. – 10, 16: soil; 15: at a rivulet; 18: limestone rock and rock at the spring
- Plasteurhynchium striatulum* (Spruce) M. Fleisch. – 15, 16: limestone rock; 18: bark of tree; 21: limestone grassland
- Pogonatum aloides* (Hedw.) P. Beauv. – 3: limestone rock
- Pogonatum urnigerum* (Hedw.) P. Beauv. – 3: siliceous rock
- Pohlia melanodon* (Brid.) A. J. Shaw – 6, 11: limestone rock; 10: soil; 15: at a rivulet
- Pohlia wahlenbergii* (F. Weber & D. Mohr) A. L. Andrews – 7: limestone rock; 15: at a rivulet
- Polytrichum juniperinum* Hedw. 2: soil among limestone rocks
- Pseudoleskeella rupestris* (Berggr.) Hedenäs & L. Söderstr. – 2: decaying wood

- Pseudoscleropodium purum* (Hedw.) M. Fleisch. – 1: conglomerate flysch sediment; 3: limestone rock; 15: at a rivulet; 16: soil
- Pterigynandrum filiforme* Hedw. – 3: limestone rock and *Fagus* bark; 15: sandstone rock
- Ptychostomum capillare* (Hedw.) Holyoak & N. Pedersen – 1: conglomerate flysch sediment; 6, 12: limestone rock; 10: bottom of *Platanus* tree; 24: saline grassland
- Ptychostomum donianum* (Grev.) Holyoak & N. Pedersen – 12: limestone rock; 15: soil (conf. Schröder, W.); 16: soil
- Ptychostomum imbricatum* (Müll. Hal.) Holyoak & N. Pedersen (*Bryum caespiticium*) – 6, 11: limestone rock
- Ptychostomum pseudotriquetrum* (Hedw.) J. R. Spence & H. P. Ramsay – 2: along a rivulet; 9, 12: limestone rock; 10: soil
- Ptychostomum rubens* (Mitt.) Holyoak & N. Pedersen – 20: saline grassland
- Ptychostomum torquescens* (Bruch & Schimp.) Ros & Mazimpaka – 6: limestone rock; 23: limestone grassland
- Racomitrium canescens* (Hedw.) Brid. – 1: conglomerate flysch sediment (conf. Bednarek-Ochyra, H.); 2: conglomerate rock (conf. Bednarek-Ochyra, H.)
- Rhynchostegiella curviseta* (Brid.) Limpr. – 6: limestone rock; 15: at a rivulet; 17: limestone rocks at the stream; 18: limestone rock
- Rhynchostegiella tenella* (Dicks.) Limpr. – 9, 12: limestone rock; 18: *Platanus* bark; 23: limestone grassland
- Rhynchostegiella teneriffae* (Mont.) Dirkse & Bouman – 18: limestone rock
- Rhynchostegium confertum* (Dicks.) Schimp. – 15: soil and limestone rock; 17: limestone rocks at the stream; 18: limestone rock at the spring and bark of *Ligustrum vulgare*
- Rhynchostegium megapolitanum* (Blandow ex F. Weber & D. Mohr) Schimp. – 2, 16, 18, 19: soil among limestone rocks; 21, 23: limestone grassland
- Rhynchostegium riparioides* (Hedw.) Cardot – 3, 15: at a rivulet; 18, 22: limestone rock at a spring
- Rhytidiadelphus triquetrus* (Hedw.) Warnst. – 3: limestone rock
- Saelania galuicensis* (Hedw.) Broth. – 2: conglomerate rock
- Schistidium apocarpum* (Hedw.) Bruch & Schimp. – 3: siliceous rock
- Schistidium atrofusum* (Schimp.) Limpr. – 2: limestone rock
- Schistidium brunnescens* Limpr. subsp. *griseum* (Nees & Hornsch.) H. H. Blom – 2: conglomerate rock (conf. Schröder, W.); 13: calcareous conglomerate rock
- Schistidium crassipilum* H. H. Blom – 2, 3, 7, 6, 9, 11, 16: limestone rock; 13: calcareous conglomerate rock; 15: limestone and conglomerate rocks; 17: limestone rocks at the stream

- Schistidium flaccidum* (De Not.) Ochyra – 2: acidic rock
- Schistidium helveticum* (Schkuhr) Deguchi – 1: conglomerate flysch sediment; 2: conglomerate rock; 4, 5: limestone rock
- Schistidium papillosum* Culm. – 1: conglomerate flysch sediment
- Sciuro-hypnum populeum* (Hedw.) Ignatov & Huttunen – 3: limestone rock
- Scleropodium touretii* (Brid.) L. F. Koch – 12: flysch; 15: sandstone rock; 16: soil; 21: limestone grassland
- Scorpiurium circinatum* (Bruch) M. Fleisch. & Loeske – 4, 6, 7, 9, 12, 15, 19: limestone rock; 10: soil; 13, 16: calcareous conglomerate rock; 14: on limestone rock in the water; 17: limestone rocks at the stream; 18: limestone rock and *Platanus* bark; 20: saline grassland; 21, 23: limestone grassland
- Scorpiurium sendtneri* (Schimp.) M. Fleisch. – 18: *Platanus* bark
- Seligeria pusilla* (Hedw.) Bruch & Schimp. – 12: limestone rock
- Streblotrichum commutatum* (Jur.) Hilp. – 1: conglomerate flysch sediment
- Streblotrichum convolutum* (Hedw.) P. Beauv. – 2: limestone rock; 15: soil
- Syntrichia laevipila* Brid. – 10: *Platanus* bark; 12: bark of *Phillyrea*; 15: *Quercus* bark
- Syntrichia montana* Nees – 1: conglomerate flysch sediment; 2: conglomerate and limestone rocks; 4, 5, 6, 7, 9, 16: limestone rock; 12: limestone rock and *Juglans* bark; 13: calcareous conglomerate rock; 21: limestone grassland
- Syntrichia montana* Nees var. *calva* (Durieu & Sagot ex Bruch & Schimp.) J. J. Amann – 2: conglomerate and limestone rocks; 5: limestone rock
- Syntrichia ruralis* (Hedw.) F. Weber & D. Mohr – 1: conglomerate flysch sediment; 2: conglomerate rock; 3, 7: limestone rock; 15: soil and sandstone rock; 16: soil
- Syntrichia virescens* (De Not.) Ochyra – 2: bottom of *Fagus*; 11: limestone rock; 15: bark of tree and *Quercus*
- Thamnobryum alopecurum* (Hedw.) Gangulee – 18: limestone rock at the spring
- Timmiella barbuloidea* (Brid.) Mönk. – 19: limestone rock; 21: limestone grassland
- Tortella fasciculata* (Culm.) Culm. – 3, 4: limestone rock
- Tortella inclinata* (R. Hedw.) Limpr. – 2: conglomerate and limestone rocks; 5: limestone rock
- Tortella inflexa* (Bruch) Broth. – 12: limestone rock
- Tortella nitida* (Lindb.) Broth. – 16, 18, 19: limestone rock; 21, 23: limestone grassland
- Tortella squarrosa* (Brid.) Limpr. – 1: conglomerate flysch sediment; 4, 18: soil among limestone rocks; 7, 9, 12, 15: limestone rock; 16: soil
- Tortella tortuosa* (Hedw.) Limpr. – 2: conglomerate rock and bottom of *Fagus*; 3: limestone rock and *Fagus* bark; 9, 16: limestone rock

- Tortella tortuosa* (Hedw.) Limpr. var. *fragilifolia* (Jur.) Limpr. – 2: conglomerate rock
- Tortula inermis* (Brid.) Mont. – 2: conglomerate and limestone rocks; 9: limestone rock; 11: *Platanus* bark; 12: flysch; 15: at a rivulet
- Tortula muralis* Hedw. var. *muralis* – 1: conglomerate flysch sediment; 2: conglomerate rock; 6, 9, 11, 12: limestone rock; 15: sandstone rock; 21, 23: limestone grassland
- Tortula muralis* Hedw. var. *aestiva* Hedw. – 2: bark of *Juniperus*; 11: limestone rock
- Tortula subulata* Hedw. – 1: conglomerate flysch sediment; 3: limestone rock; 15: soil
- Trichostomum brachydontium* Bruch – 1: conglomerate flysch sediment; 9, 16, 18, 19: limestone rock
- Trichostomum crispulum* Bruch – 5, 6, 7, 9, 10, 12, 16, 18, 19: limestone rock; 13: calcareous conglomerate rock; 15: soil at a rivulet; 17: limestone rocks at the stream; 21, 23: limestone grassland
- Weissia brachycarpa* (Nees & Hornsch.) Jur. – 21: limestone grassland
- Weissia condensa* (Voit) Lindb. – 2, 4, 5, 6, 9, 16: soil among limestone rocks; 23: limestone grassland
- Weissia controversa* Hedw. – 1: conglomerate flysch sediment
- Zygodon rupestris* Schimp. ex Lorentz – 7: bark of a shrub; 11: limestone rock; 10, 15, 16: *Platanus* bark