

TOWARDS A RED LIST OF THE ALBANIAN BRYOPHYTES

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Among the SE European countries Albania has the least known bryophyte flora. A bryophyte red list is lacking as well. Since it is not yet possible to use the IUCN criteria guidelines proposed for bryophytes, the aim of the present contribution is to compile a list of the bryophyte taxa from Albania with, wherever possible, the inclusion of conservational values, according to the European Bryophyte Red Data Book or other regional red lists (*e.g.* those existing for Serbia, Montenegro, Bulgaria and Romania). Hence, 16 liverwort species (*ca* 17% of the total) and 64 moss species (*ca* 18%) are taken into account. For an improved red list of the bryophytes of Albania extensive exploration and collecting is greatly needed in the country. The hereby presented account should be considered as a tentative one. This preliminary version of a red list is provided with the aim to highlight the “national red list candidate” bryophyte species, which might need to be included in further natural heritage conservation initiatives in Albania. Even until then it is clear that there is an urgent need for the protection of the bryophytes in Albania.

Key words: conservation, liverworts, mosses, SE Europe

INTRODUCTION

Among the SE European countries Albania has the least known bryophyte flora, a situation that may be attributed to the long isolation of the country and lack of both funding for bryology and trained local bryologists (SABOVLJEVIĆ *et al.* 2001, 2011, SÖDERSTRÖM *et al.* 2002, COLACINO and SABOVLJEVIĆ 2006). This is reflected by the limited number of local collections and publications and by the fact that up to 2008 only 219 moss taxa (SABOVLJEVIĆ *et al.* 2008) and 91 liverworts (SABOVLJEVIĆ and NATCHEVA 2006) were reported, based only on *ca* 400 and 500 records, respectively (COLACINO and SABOVLJEVIĆ 2006). Yet, the situation is changing – presently both local and foreign bryologists are paying more attention to the bryophyte flora of this country, as shown by a greater number of collections and publications (*e.g.* the number of moss species recorded

has increased up to 341) (COLACINO and MARKA 2009, PAPP *et al.* 2010, MARKA and SABOVLJEVIĆ 2011, MARKA and XHULAJ 2011). Still, no red list of bryophytes exists for Albania. To assemble a red list according to the IUCN criteria is still impossible for the country, because of the lack of data on species distribution, threats, population sizes, frequencies, habitat conditions and changes, etc. According to NATCHEVA *et al.* (2006): “red-listing is a continuous process. With the accumulation of new data some species may change their threat status, others may be excluded from the list, or new species may be included, if their habitats become threatened and their populations decline rapidly”. This paper, therefore, has to be considered as a “working document”, a starting point that hopefully leads towards the preparation of a bryophyte red list for Albania.

MATERIALS AND METHODS

Since it is not yet possible to use the IUCN criteria guidelines proposed for bryophytes (HALLINGBÄCK *et al.* 1995, 1998), we had to limit our goals to provide an indirect evaluation of the threatened species of the bryophytes of Albania. Available red lists from nearby countries were used to select candidate species for this Albanian preliminary red list. The following literature sources were used: the European red data book of bryophytes (ECCB 1995), the bryophyte red list of Serbia and Montenegro (SABOVLJEVIĆ *et al.* 2004), the red list of the bryophytes of Bulgaria (NATCHEVA *et al.* 2006), the checklist and the red list of the bryophytes of Romania (ȘTEFĂNUȚ and GOIA 2012) and, in a few instances, SCHUMACKER and VÁŇA (2005) for the liverworts of Europe. To prepare our red list, each bryophyte species reported for Albania, and also occurring in any of the above mentioned lists, was considered. Subsequently, each species was carefully analysed according to the existing data. Eventually, other species were added (recently described taxa, recent records for the Balkans, species with a limited distribution and taxa possibly in need of conservation). The nomenclature for liverworts follows GROLLE and LONG (2000), for mosses HILL *et al.* (2006) with the exception of *Grimmia sessitana*, which follows MAIER (2002). In the various red lists there are slight differences with respect to the threat categories used and conservation status. Their symbols are as follows: for the European red data book of bryophytes (ECCB 1995) and SCHUMACKER and VÁŇA (2005): Ex = extinct, Ev = vanished, E = endangered, V = vulnerable, R = rare, K = insufficiently known, T = taxonomically ill-defined taxa, RT = regionally threatened species and NT = not threatened. In the bryophyte red list of Serbia and Montenegro (SABOVLJEVIĆ *et al.* 2004): EX = extinct, CR = critically endangered, EN = endangered, VU = vulnerable, LR = lower risk or near threatened and DD = data deficient; in the red list of the bryophytes of Bulgaria

(NATCHEVA *et al.* 2006) and Romania (ȘTEFĂNUȚ and GOIA 2012): CR = critically endangered, EN = endangered, VU = vulnerable, NT = near threatened, DD = insufficiently known and NE = not evaluated. Furthermore, in addition to the quoted references, where possible, vouchers of some old or single records deposited in the Bryophyte Collection of the Hungarian Natural History Museum (BP) were checked. Several of the records based on a single specimen reported by SZEPESFALVI (1926) and KÁRPÁTI and VAJDA (1961) were checked, and after revision, *Tortula canescens* was excluded from the list.

RESULTS AND DISCUSSION

In total, 29 liverworts and 98 moss taxa are reported for Albania that are also mentioned in red lists of nearby countries (Serbia, Montenegro, Bulgaria and Romania). However, not all these were selected for the preliminary list. The exclusion of several taxa was based on the authors' data on their distribution in Albania (*e.g.* *Corsinia coriandrina*, *Gymnostomum viridulum*, etc.), areal type (Mediterranean elements, *e.g.* *Mannia androgyna*, *Scorpiurium circinatum*, etc.), or – in a few instances – based on the experience of the contributors in their bryological surveys in SE Europe (*e.g.* *Pedinophyllum interruptum*, *Syntrichia norvegica*). Eventually, 13 liverworts (*Barbilophozia hatcheri*, *Calypogeia fissa*, *Cephaloziella rubella*, *Cololejeunea rosettiana*, *Corsinia coriandrina*, *Jungermannia gracillima*, *Mannia androgyna*, *Pedinophyllum interruptum*, *Porella baueri*, *Radula lindenbergiana*, *Riccia crystallina*, *R. glauca* and *Scapania aequiloba*) and 42 mosses (*Amphidium mougeotii*, *Anomodon longifolius*, *Aulacomnium androgynum*, *Brachythecium mildeanum*, *Bryum algovicum*, *B. gemmiparum*, *B. radiculosum*, *B. rubens*, *B. torquescens*, *Dicranella rufescens*, *Didymodon ferrugineus*, *Entosthodon muhlenbergii*, *Fissidens gracilifolius*, *F. pusillus*, *Fontinalis antipyretica*, *Grimmia montana*, *G. muehlenbeckii*, *Gymnostomum viridulum*, *Hygroamblystegium tenax*, *Hypnum vaucheri*, *Orthotrichum obtusifolium*, *O. pumilum*, *Oxyrrhynchium pumilum*, *O. schleicheri*, *Physcomitrium pyriforme*, *Plagiothecium succulentum*, *Pterygoneurum ovatum*, *Ptychodium plicatum*, *Racomitrium elongatum*, *Rhynchostegiella tenella*, *Rhynchostegium confertum*, *Schistidium brunnescens*, *Scleropodium touretii*, *Scorpiurium circinatum*, *Syntrichia norvegica*, *S. ruralis* var. *ruraliformis*, *S. virescens*, *Thuidium delicatulum*, *Timmia austriaca*, *Tortella nitida* and *Weissia longifolia*) were excluded from this list.

In addition, a limited number of species not included in the red lists of the neighbouring countries, were also included; these are mainly recently described taxa (*e.g.* *Schistidium subflaccidum*), those that have recently been recorded for the Balkan Peninsula (*e.g.* *Brachytheciastrum dickii*, *Pseudoleskeella rupestris*), or

taxa which are known from just a few SE European countries (*e.g. Orthotrichum alpestre, Scorpiurium deflexifolium, Sematophyllum substrumulosum*).

Finally, sixteen liverworts (17% of the total number) and 64 moss species (19% of the total number) were selected for the preliminary red list of Albanian bryophytes. About half of these were reported before 1980, while the others during the last ten years. Moreover, 75% of these reports are based on a single specimen. It is difficult to make an assessment with so few data; therefore, here we simply propose a list of possibly threatened species, without assigning any specific category to them. In the list the distribution in SE Europe is indicated.

LIST OF THE THREATENED SPECIES

Liverworts

Athalamia hyalina (Sommerf.) Hatt. – CR for Montenegro; VU for Bulgaria – Not reported from Serbia (ROS *et al.* 2007). There are three records for Albania, one from Mt Ostrovica, Korça region (PETROV 1960) and two from the Shkodra region (PETROV 1962, MEYER and GROLLE 1968).

Athalamia spathysii (Lindenb.) S. Hatt. – R in the Red data book of European bryophytes – From the SE European countries only reported from Greece and the European part of Turkey (ROS *et al.* 2007). There is only one record from Albania, from the region of Vlora (BISCHLER *et al.* 1980).

Barbilophozia floerkei (Web. et Mohr) Loeske – LR for Montenegro – From SE Europe it was reported only from Bosnia-Herzegovina, Greece, Croatia and the European part of Turkey (SABOVLJEVIĆ and NATCHEVA 2006). It was recently recorded for Albania from one locality, Vithkuq, in the region of Korça (PAPP *et al.* 2009).

Bazzania tricrenata (Wahlenb.) Lindb. – EN for Serbia – Not reported from Montenegro (ROS *et al.* 2007). There is only one old record from Albania, Bushtrica, region of Dibra (SZEPESFALVI 1926).

Calypogeia muelleriana (Schiffn.) K. Müll. – CR for Serbia – However, it has several recent records from some mountain areas including Kopaonik Mts (PAPP *et al.* 2004) and Golija Studenica Biosphere Reserve (PAPP and ERZBERGER 2005). Not reported from Montenegro (ROS *et al.* 2007). It was recently recorded for Albania from one locality, Shishtavec, region of Kukës (MARKA and SABOVLJEVIĆ 2011).

Cephaloziella turneri (Hook.) Müll. Frib. – VU for Montenegro; CR for Bulgaria – Not reported from Serbia (ROS *et al.* 2007). There are two records from Albania, both from the region of Tirana (BISCHLER *et al.* 1980).

Fossombronia angulosa (Dicks.) Raddi – EN for Bulgaria – Not reported from Serbia (ROS *et al.* 2007). It was recorded for Albania from two localities, in the regions of Tirana and Fieri (BISCHLER *et al.* 1980).

Frullania fragilifolia (Tayl.) Gott. *et al.* – CR for Serbia; VU for Bulgaria – It was recently reported from Montenegro (PAPP and ERZBERGER 2010). There is only one record from Albania, from the region of Tirana (BISCHLER *et al.* 1980).

Frullania inflata Gott. – V, according to the Red data book of European bryophytes and SCHUMACKER and VÁÑA (2005) – Not reported from Serbia and Bulgaria (ROS *et al.* 2007). A variety of this species (*var. illyrica*) has been recently discovered in Montenegro in two mountain-

ous areas (PAPP and ERZBERGER 2007). *Frullania inflata* var. *illyrica* was known as an Albanian endemic (BISANG *et al.* 1988) differing from the type variety by fewer and larger oil bodies, but this character was considered by GROLLE and LONG (2000) to be variable, and therefore var. *illyrica* was synonymised with var. *inflata*. There is one record for Albania, from the region of Gjirokastra (MEYER and GROLLE 1968).

Mannia triandra (Scop.) Grolle – R in the Red data book of European bryophytes; LR for Serbia; EN for Bulgaria; VU for Romania – Not known from Montenegro (ROS *et al.* 2007). There are three records for Albania, one from the region of Shkodra (BAUMGARTNER 1915) and two from Tirana (BISCHLER *et al.* 1980).

Marchantia paleacea Bertol. – K in the Red data book of European bryophytes; VU for Serbia – Not reported from Bulgaria (ROS *et al.* 2007). There are two records for Albania, from the regions of Tirana and Vlora (BISCHLER *et al.* 1980).

Ptilidium ciliare (L.) Hampe – EN for Bulgaria – There is only one old record from Albania, from Mt Gjallica, in the region of Kukës (SZEPESFALVI 1926).

Riccardia multifida (L.) S. Gray – VU for Bulgaria – Not reported from Montenegro (ROS *et al.* 2007). There is only one record from Albania, from the region of Gjirokastra (BISCHLER *et al.* 1980).

Riccia trabutiana Steph. – R in the Red data book of European bryophytes – In the SE European countries it was reported only from Greece and the European part of Turkey (ROS *et al.* 2007), but recently it was also discovered in Montenegro (PAPP and ERZBERGER 2007). There are two records for Albania, from the regions of Lezha and Gjirokastra (BISCHLER *et al.* 1980).

Scapania calcicola (Arnell et J. Persson) Ingh. – VU for Serbia – It was recently reported from Montenegro (PAPP and ERZBERGER 2010). There is only one record from Albania, from the region of Korça (PETROV 1960).

Scapania compacta (A. Roth) Dum. – EN for Bulgaria – Not reported from Serbia. There are two records for Albania, from the regions of Tirana and Vlora (BISCHLER *et al.* 1980).

Mosses

Brachythecium dieckii (Röll) Ignatov et Huttunen – This is a Mediterranean element. It seems to be rare in SE Europe or at least its distribution is still not well known. In ORGAZ *et al.* (2010) only one record is mentioned from Crete, the others are from Turkey (non-European part) and Cyprus. There is only one record from Albania, from the region of Gjirokastra, verified after revision (BP 64508, rev. Orgaz, J. D., 2009) of the specimen originally reported as *B. velutinum* (KÁRPÁTI and VAJDA 1961).

Brachythecium geheebii Milde – Endemic species for Europe; R in the Red data book of European bryophytes; LR for Montenegro; EN for Bulgaria; CR for Romania – There is one recent record for Albania, from Lura, in the region of Dibra (MARKA and XHULAJ 2011).

Bryum canariense Brid. – VU for Bulgaria; LR for Montenegro – Not reported from Serbia (SABOVLJEVIĆ *et al.* 2008). There are three records for Albania, two from the region of Shkodra (HÖHNEL 1893, BAUMGARTNER 1915) and one from that of Korça (PETROV 1960).

Bryum creberrimum Taylor – DD for Serbia, Montenegro and Bulgaria; EN for Romania – There is one recent record for Albania, from the Morava Mts, in the region of Korça (PAPP *et al.* 2010).

Bryum kunzei Hornsch. – VU for Bulgaria; EN for Romania – Not reported from Serbia (SABOVLJEVIĆ *et al.* 2008). There are two records for Albania, one from Mt Dajti, in the region of Tirana (KÁRPÁTI and VAJDA 1961) and the other one from Dardha, in the region of Korça (PAPP *et al.* 2010).

Buxbaumia aphylla Hedw. – EN for both Montenegro and Bulgaria – Not reported from Serbia (SABOVLJEVIĆ *et al.* 2008). There is one old record for Albania, from Bicaj, in the region of Kukës (SZEPESFALVI 1926).

Buxbaumia viridis (Moug. ex Lam. et DC.) Brid. ex Moug. et Nestl. – V in the Red data book of European bryophytes; CR for Serbia and Montenegro, NT for Bulgaria; EN for Romania – There is one record for Albania, from the region of Vlora (PETROV 1962).

Campyliadelphus elodes (Lindb.) Kanda – VU for Serbia; NE for Bulgaria; EN for Romania – There is one revised old record for Albania, from Velipoja, in the region of Shkodra (PAPP *et al.* 2009).

Cheilothela chloropus (Brid.) Broth. – DD for Serbia; VU for Bulgaria – Recently reported from Montenegro (PAPP *et al.* 2008). There is one old record from Albania, from the region of Shkodra (HÖHNEL 1893).

Coscinodon cribrosus (Hedw.) Spruce – VU for Bulgaria; NT for Romania – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one old record for Albania, from the region of Lezha (MARKGRAF 1931).

Dichodontium palustre (Dicks.) M. Stech – LR for Serbia – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, from Buzëmadhe, in the region of Kukës (MARKA and SABOVLJEVIĆ 2011).

Dicranum brevifolium (Lindb.) Lindb. – DD for Bulgaria; CR for Romania – Not reported from Serbia and Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, from Lura, in the region of Dibra (MARKA and XHULAJ 2011).

Dicranum majus Sm. – LR for Serbia and Montenegro; NT for Romania – Not reported from Bulgaria (SABOVLJEVIĆ *et al.* 2008). There is one old record for Albania, from Mt Gjallica, in the region of Kukës (SZEPESFALVI 1926).

Drepanocladus polygamus (Schimp.) Hedenäs – VU category for Serbia, Montenegro, Bulgaria and Romania – There is one recent record for Albania, from Gërmenj, in the region of Korça (PAPP *et al.* 2010).

Encalypta alpina Sm. – LR for Serbia and Montenegro; VU for Romania – There is one record for Albania, from Mt Ostrovica, in the region of Korça (PETROV 1960).

Encalypta ciliata Hedw. – VU for Serbia and Montenegro – There are four records for Albania, one from the region of Dibra (SZEPESFALVI 1926) and three from the region of Korça (PETROV 1960, PAPP *et al.* 2010).

Ephemerum serratum (Hedw.) Hampe – VU for Serbia and Montenegro; DD for Bulgaria; EN for Romania – There is one recent record for Albania, from Novoselë-Shishtavec, in the region of Kukës (MARKA and SABOVLJEVIĆ 2011).

Fabronia pusilla Raddi – VU for Bulgaria; CR for Romania – Not reported from Serbia (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, from Gërmenj, in the region of Korça (PAPP *et al.* 2010).

Fissidens curvatus Hornsch. – K in the Red data book of European bryophytes – Reported from Bulgaria, Croatia, Greece and Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, from Dardha, in the region of Korça (PAPP *et al.* 2010).

Grimmia crinita Brid. – VU for Bulgaria and Romania – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one old record for Albania, from Mt Gjallica, in the region of Kukës (SZEPESFALVI 1926).

Grimmia decipiens (Schultz) Lindb. – VU category for Bulgaria; EN for Romania – There are two recent records for Albania, from Voskopoja, Korça region (PAPP *et al.* 2010) and Lura, in the region of Dibra (MARKA and XHULAJ 2011).

Grimmia longirostris Hook. – VU category for Bulgaria – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, from Voskopoja, in the region of Korça (PAPP *et al.* 2010).

Grimmia sessitana De Not. – RT in the Red data book of European bryophytes; EN for Romania (as *G. reflexidens*) – Reported also from Bulgaria, the Former Yugoslav Republic of Macedonia and Serbia (SABOVLJEVIĆ *et al.* 2008). Recently found in Greece (PAPP *et al.* 2011). There is one recent record for Albania, from Voskopoja, in the region of Korça (PAPP *et al.* 2010).

Homalothecium aureum (Spruce) H. Rob. – NE for Bulgaria – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). Being a Mediterranean element (DÜLL 1985) we expected to find more localities for this species during our field trips in southern Albania, but at the moment there are only three old records for Albania, from the regions of Gjirokastra, Tirana and Durrësi (KÁRPÁTI and VAJDA 1961).

Hymenostylium recurvirostrum (Hedw.) Dixon – This is a boreal-dealpine species (DÜLL 1984). Although reported from almost all of SE Europe except Serbia, the Former Yugoslav Republic of Macedonia and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008), its occurrence seems to be sporadic, *e.g.* one record from Montenegro in DRAGIĆEVIĆ and VELJIĆ (2006), a few records from three regions of Greece (DÜLL 1995), a few old records and only one recent data from Croatia, in the Bryophyte Collection of the Hungarian Natural History Museum (PAPP, unpublished). There is one old record from Albania, from the region of Shkodra (BAUMGARTNER 1915).

Hypnum revolutum (Mitt.) Lindb. – VU for Bulgaria; EN for Romania – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, from Voskopoja, in the region of Korça (PAPP *et al.* 2010).

Isothecium myosuroides Brid. – CR for Bulgaria – There is one recent record for Albania, from Liqenas, in the region of Korça (PAPP *et al.* 2010).

Neckera cephalonica Jur. et Unger – K in the Red data book of European bryophytes – In the SE European countries reported also from Greece (SABOVLJEVIĆ *et al.* 2008). There is only one record from Albania, from the region of Vlora (PETROV 1962).

Orthothecium rufescens (Dicks. ex Brid.) Schimp. – VU for Bulgaria – There is only one record from Albania, from the region of Shkodra (PETROV 1962).

Orthotrichum alpestre Bruch et Schimp. – This subarctic-subalpine species (DÜLL 1985) is reported from Bosnia-Herzegovina (DÜLL *et al.* 1999), Greece (one old doubtful record (DÜLL 1995)), Montenegro (one record (DRAGIĆEVIĆ and VELJIĆ 2006)), Romania (VU) and mentioned from the Former Yugoslav Republic of Macedonia (SABOVLJEVIĆ *et al.* 2008). There is one recent record from Albania, from the Moraves Mts, in the region of Korça (PAPP *et al.* 2010).

Orthotrichum gymnostomum Bruch ex Brid. – VU for Bulgaria; CR for Romania – Also reported from Slovenia (SABOVLJEVIĆ *et al.* 2008). There is one recent record from Albania, Drilon National Park, in the region of Pogradeci (STEVENSON 2012).

Paraleucobryum longifolium (Hedw.) Loeske – VU for Serbia – Known from almost all SE countries except Greece and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is only one record from Albania, from Kukës (SZEPESFALVI 1926).

Philonotis caespitosa (Brid.) Blockeel et A. J. E. Sm. – DD for Serbia and Montenegro; VU for Bulgaria – There is one recent record for Albania, from Voskopoja, in the region of Korça (PAPP *et al.* 2010).

Philonotis marchica (Hedw.) Brid. – EN for Bulgaria; NT for Romania – There is one old record for Albania, from Mt Korab, Radmirë, in the region of Dibra (SZEPESFALVI 1926).

Plagiobryum zieri (Hedw.) Lindb. – LR for Serbia and Montenegro; VU for Bulgaria – There is one recent record for Albania, from Voskopoja, in the region of Korça (PAPP *et al.* 2009).

Pseudoleskea radicata (Mitt.) Macoun et Kindb. – LR for Montenegro; NT for Bulgaria and Romania – There are three records for Albania, from Mt Ostrovica in the region of Korça, from Mt Jezerca from the region of Shkodra (PETROV 1960) and from Lura in the region of Dibra (MARKA and XHULAJ 2011).

Pseudoleskea saviana (De Not.) Latzel – RT in the Red data book of European bryophytes; CR for Romania – There are three records for Albania, two of them from the region of Dibra (one from Çermenika (MARKGRAF 1927) and the other one from Lura (MARKA and SABOVLJEVIĆ 2011)) and one from Korça region, Mt Morava (PAPP *et al.* 2010). However, this taxon is not rare in the Balkan Peninsula (PAPP *et al.* 2010).

Pseudoleskeella rupestris (Berggr.) Hedenäs et L. Söderstr. – This species was recently reported for the Balkan Peninsula, from Albania, from Dardha, in the region of Korça (PAPP *et al.* 2010); previously it was treated as a variety of *P. nervosa* (HILL *et al.* 2006). Due to the lack of knowledge about this species we assign it tentatively to the NE category, but this taxon needs to be studied not only in Albania, but in the whole Balkans.

Pseudoleskeella tectorum (Funck ex Brid.) Kindb. ex Broth. – DD for Bulgaria and Romania – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, from Dardha, in the region of Korça (PAPP *et al.* 2010).

Ptilium crista-castrensis (Hedw.) De Not. – LR for Serbia; EN for Bulgaria – Not reported from Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one old record for Albania, from Mt Gjallica, from the region of Kukës (SZEPESFALVI 1926).

Racomitrium ericoides (Brid.) Brid. – VU for Bulgaria; EN for Romania – In SE Europe not reported from Croatia, Bosnia-Herzegovina, the Former Yugoslav Republic of Macedonia and Greece (SABOVLJEVIĆ *et al.* 2008). There is one old record for Albania, from the region of Shkodra (BAUMGARTNER 1915). Another record by SZEPESFALVI (1926), after revision, belongs to *R. canescens*.

Rbizomnium pseudopunctatum (Bruch et Schimp.) T. J. Kop. – LR for Serbia – There is one recent record for Albania, from Shishtavec (Kukës) (MARKA and SABOVLJEVIĆ 2011).

Schistidium agassizii Sull. et Lesq. – VU for Montenegro; EN for Romania – It was included in the preliminary red list of Bulgaria (GANEVA 1998), but excluded in the latest edition (NATCHEVA *et al.* 2006). Not reported from Croatia, Bosnia-Herzegovina and Greece. There is only one record from Albania, from the region of Shkodra, Mt Jezerca (PETROV 1960).

Schistidium atrofuscum (Schimp.) Limpr. – NT for Bulgaria and Romania – There is one recent record for Albania, from Voskopoja, in the region of Korça (PAPP *et al.* 2010).

Schistidium flaccidum (De Not.) Ochyra – NT for Bulgaria; CR for Romania – Not reported from Croatia, Montenegro, the Former Yugoslav Republic of Macedonia and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There are several records for Albania, all from Voskopoja, in the region of Korça (PAPP *et al.* 2010).

Schistidium papillosum Culm. – K in the Red data book of European bryophytes – Reported from many SE European countries, *e.g.*, Bulgaria, Greece, Romania, Slovenia, Serbia (SABOVLJEVIĆ *et al.* 2008), Montenegro (ERZBERGER *et al.* 2008), the Former Yugoslav Republic of Macedonia (PAPP and ERZBERGER 2012). There is one record for Albania, from Lura, in the region of Dibra (MARKA and XHULAJ 2011).

Schistidium subflaccidum (Kindb.) H. H. Blom – Recently discovered in Russia, the Caucasus (BLOM *et al.* 2006), and in the Austrian Alps (KÖCKINGER *et al.* 2008), this species seems to occur in high mountains. It was recently collected in Voskopoja and Dardha, in the region of Korça (PAPP *et al.* 2010). Our records were new for the Balkan Peninsula. Due to the lack of knowledge about this species it has been tentatively assigned to the NE category, but more studies of this taxon are needed in the whole Balkans.

Sciuro-hypnum glaciale (Schimp.) Ignatov et Huttunen – VU for Bulgaria – Reported from Bulgaria, Montenegro, Romania and Slovenia (SABOVLJEVIĆ *et al.* 2008). There is only one record from Albania, Mt Ostrovica, in the region of Korça (PETROV 1960).

Scorpiurium deflexifolium (Solms) M. Fleisch. et Loeske – This Mediterranean element (DÜLL 1985) seems to be rare and threatened in SE Europe. It is reported from Bosnia-Herzegovina and Slovenia by DÜLL *et al.* (1999) and Montenegro (only from two localities (PAPP and ERZBERGER 2007)). There are several records from various parts of Greece (DÜLL 1995, ERZBERGER 2006). As an aquatic species, it is vulnerable to pollution and to water regime changes predicted in the Mediterranean area due to global climate fluctuations. There is only one record from Albania, from the region of Gjirokastra (PETROV 1960).

Seligeria recurvata (Hedw.) Bruch et Schimp. – LR for Montenegro; NT for Bulgaria – Not reported from Serbia (SABOVLJEVIĆ *et al.* 2008). There are two recent record for Albania, from Dardha, in the region of Korça (PAPP *et al.* 2010).

Sematophyllum substrumulosum (Hampe) E. Britton – This Atlantic- Mediterranean species (DÜLL 1985) is rare in SE Europe. It has single records from Croatia (DÜLL *et al.* 1999), Montenegro (an old record from Herceg Novi (DRAGIĆEVIĆ and VELJIĆ 2006)) and Greece (Ionian Islands (DÜLL 1995)). There is one recent record from Albania, from Karavasta, in the region of Fieri (COLACINO and MARKA 2009).

Sphagnum auriculatum Schimp. – VU for Serbia and Romania – Reported from almost all SE European countries except the Former Yugoslav Republic of Macedonia and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania, Shishtavec, from the region of Kukës (MARKA and SABOVLJEVIĆ 2011).

Sphagnum contortum Schultz – VU for Serbia – Known from almost all SE European countries except Bosnia-Herzegovina and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is one recent record for Albania from Novoselë-Shishtavec in the region of Kukës (MARKA and SABOVLJEVIĆ 2011).

Sphagnum palustre L. – VU for Serbia – Reported from all SE European countries except the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is one record for Albania, from the region of Kukës (MARKGRAF 1931).

Sphagnum subnitens Russow et Warnst. – VU for Montenegro and Bulgaria – In SE Europe reported from all countries except Bosnia-Herzegovina, Greece and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is one record for Albania from Novoselë-Shishtavec, in the region of Kukës (MARKA and SABOVLJEVIĆ 2011).

Sphagnum teres (Schimp.) Ångstr. – VU for Serbia – In SE Europe not reported from Croatia, Montenegro and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). Recently it was also reported from Bosnia-Herzegovina (SABOVLJEVIĆ *et al.* 2010). There is one recent record for Albania from Novoselë-Shishtavec, in the region of Kukës (MARKA and SABOVLJEVIĆ 2011).

Syntrichia laevipila Brid. – VU for Bulgaria; CR for Romania – Not reported from Bosnia-Herzegovina and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There are two records for Albania, one from Karavasta, in the region of Fieri (COLACINO and MARKA 2009) and the other one from the Lake of Prespa, in the region of Korça (PAPP *et al.* 2010).

Timmia bavarica Hessel. – VU for Montenegro – Not reported only from the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There are several records for Albania, all from Mt Morave, in the region of Korça (PAPP *et al.* 2010).

Tortella humilis (Hedw.) Jenn. – CR for Bulgaria; NT for Romania – Reported from all SE Europe except the Former Yugoslav Republic of Macedonia (SABOVLJEVIĆ *et al.* 2008). There are three records for Albania, one from Karavasta, in the region of Fieri (COLACINO and MARKA 2009) and the other two from Gërmenji, in the region of Korça (PAPP *et al.* 2010).

Tortula cuneifolia (Dicks.) Turner – VU for Bulgaria – In SE Europe not reported from Bosnia-Herzegovina, the Former Yugoslav Republic of Macedonia, Romania, Slovenia and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is one very old record for Albania, from the region of Shkodra (HÖHNEL 1893).

Tortula marginata (Bruch et Schimp.) Spruce – DD for Montenegro – In SE Europe not known from the Former Yugoslav Republic of Macedonia, Romania, Slovenia and Serbia (SABOVLJEVIĆ *et al.* 2008). There is one record for Albania, from Butrinti, in the region of Vlora (PETROV 1960).

Tortula obtusifolia (Schwägr.) Mathieu – LR for Montenegro; EN for Romania – Known also from Bulgaria, the Former Yugoslav Republic of Macedonia, Montenegro and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is only one record from Albania, Mt Ostrovica, in the region of Korça (PETROV 1960).

Tortula solmsii (Schimp.) Limpr. – R in the Red data book of European bryophytes – Known only from Greece and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). There is one very old record for Albania, from the region of Shkodra (HÖHNEL 1893).

Warnstorffia fluitans (Hedw.) Loeske – NT for Bulgaria – Reported from all SE European countries except Montenegro (SABOVLJEVIĆ *et al.* 2008). There is one old record for Albania, Mt Korab, in the region of Dibra (SZEPESFALVI 1926).

CONCLUSIONS

In order to improve the preliminary red list of the bryophytes of Albania presented hereby, there is a great need for further extensive explorations and specimen collecting in the country. The present list should be considered as a tentative one and used as a first contribution. One of its goals is to draw attention of the various authorities towards bryophytes and assist bryophyte conservation within the framework of developing strategies for the protection of the natural heritage of Albania. With the help of this preliminary list and its updated versions to follow, it will be possible to develop effective action plans and the necessary legislation for conserving this important group of plants in Albania. It is also hoped that this first account can serve as the basis for efforts of monitoring threatened plant species in Albania.

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