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CONTRIBUTIONS TO THE BRYOPHYTE FLORA OF THE ORJEN MTS, MONTENEGRO

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Documentation of bryophytes carried out in July 2007 in the Orjen Mts, Montenegro revealed 163 taxa (20 liverworts and 143 mosses). 10 of these bryophytes are reported for the first time in Montenegro.

Key words: bryophytes, Montenegro, new records

INTRODUCTION

In spite recent efforts to document the bryophytes of the country, the exploration of the bryophyte flora of Montenegro is far from complete. Most recently, knowledge of the bryophytes of Montenegro has been summarised in the checklist of DRAGIĆEVIĆ and VELJIĆ (2006), which contains 729 taxa embracing 569 species, 9 subspecies, 121 varieties and 30 forms (among them 102 species, 3 subspecies, 10 varieties and 1 form are liverworts, while 467 species, 6 subspecies, 111 varieties and 29 forms are mosses). Soon it was followed by two publications that added new data: ERZBERGER and PAPP (2007) show 29 species (10 liverworts and 19 mosses) recorded for the first time in Montenegro, and PAPP and ERZBERGER (2007) discussing the material collected in the southern part of Montenegro reports on 3 additional liverworts recorded for the first time from Montenegro. With the present paper about the collected material in the Orjen Mts we continue publishing the results of our collecting trips organised by the Hungarian Natural History Museum in collaboration with the Natural History Museum of Montenegro.

Historically, the bryophyte flora of the Orjen Mts was investigated by several bryologists (GLOWACKI 1906, SCHIFFNER 1915, 1916, WEISS 1866), but also recently (CVETIĆ and SABOVLJEVIĆ 2004). Data retrieved from these papers were included in the checklist of DRAGIĆEVIĆ and VELJIĆ (2006).

MATERIALS AND METHODS

The investigated area

The Orjen Mts are a Dinaric Mediterranean limestone mountain range in Montenegro and Bosnia-Herzegovina. Its peak, Zubački kabao (1,894 m) is the highest peak in the sub-Adriatic Dinarides. The massif of Orjen lies to the northwest of Risan town in the Bay of Kotor (Boka Kotorska) (Fig. 1). At the main summit of the Orjen Mts and the surrounding ridges and high plateaus the influence of quaternary glaciation is evident. Long valley glaciers from Orjen to the Bay of Kotor hollowed U-shaped valleys and cirques in their course. Glaciers also shaped jagged peaks and ridges. Glacial and karst type relief combine now in a unique coastal scenery. In the Mediterranean zone only a few places show similar phenomena.

The Orjen Mts are completely built up of folded Cretaceous limestone. Weather conditions are determined by the situation of the Orjen Mts influenced by Mediterranean and continental climatic conditions. While summers are hot and sunny, the autumns, winters and springs are rainy. The lowest temperatures are usually measured in January (as low as –30 °C) and the hottest ones during July and August (up to 33 °C). A peculiarity of the littoral Dinarides is the precipitation regime. The Orjen Mts receive Europe's most heavy precipitation. Crkvice village is the place with the greatest precipitation in Europe (about 8,000 mm) (KOMAR 1995). Similar to monsoon rains the precipitation is seasonally distributed, *i.e.* in November thunderstorms sometimes pour extreme amounts of water within just a few days, while August is frequently completely dry.

The vegetation varies with climate and altitude. While the sub-Adriatic range exhibits Mediterranean-sub-Mediterranean maquis at lower elevations and evergreen or deciduous forests higher up; with increasing elevation the vegetation gradually changes into temperate and montane mixed forests, conifer stands and subalpine meadows. The ridges also have a variety of Mediterranean alpine vegetation – oro-Mediterranean pastures. There are stony meadows in the karst that contrast with the stony slopes and rocky scrubland all round. Higher altitudes are characterised by *Fagus sylvatica* forests with occasional open grassy pastures. On the northern slopes *Abies alba* accompanies the stands of *Fagus*. Above the belt of *Abieti-Fagetum* there are scattered pure stands of *Abies alba* and *Pinus heldreichii*.

At lower elevations, and in the southern parts of the massif even at higher ranges, a number of Tertiary relicts survived the Ice Ages, including *Acer heldreichii*, *Amphoricarpus neumayeri*, *Corylus colurna*, *Moltkia petraea*, *Paeonia mascula*, *Pinus heldreichii*, *Taxus baccata* (KOMAR 1995).

Methods

Fieldwork was organised in July 2007 into two main habitat types such as forests and grasslands. The bryophytes were collected from various substrates: soil, exposed and shady rocks, tree barks and decaying wood.

The specimens were shared and now preserved in the Herbarium of the Hungarian Natural History Museum, Budapest (BP), in the Herbarium of the Botanical Museum, Berlin Dahlem (B) and in the Herbarium of the Natural History Museum of Montenegro.



Fig. 1. Location of the Orjen Mts (BiH = Bosnia-Herzegovina, MO = Montenegro, SE = Serbia, Al = Albania).

Nomenclature of the species follows GROLLE and LONG (2000) and HILL *et al.* (2006). New floristical results for the country are analysed according to the new checklist of Montenegro (DRAGIĆEVIĆ and VELJIĆ 2006) and the new checklists of SE Europe (SABOVLJEVIĆ and NATCHEVA 2006, SABOVLJEVIĆ *et al.* 2008).

Site details

1. Montenegro, Orjen Mts, around Vrbanje, limestone rocks in *Fagetum*, 1,005 m, N 42° 33' 29.6", E 18° 30' 30.7", 13 and 16.07.2007.
2. Montenegro, Orjen Mts, from Orjen sedlo to Zubački kabao (Orjen peak), limestone rocks in *Pinetum heldreichii*, 1,600–1,900 m, N 42° 33' 27.3", E 18° 33' 06.6" and N 42° 34' 09.2", E 18° 32' 38.6", 14.07.2007.
3. Montenegro, Orjen Mts, around Kruševice, 665 m, N 42° 32' 04.8", E 18° 29' 40.0", 15.07.2007.
4. Montenegro, Orjen Mts, between Vrbanje and Kruševice, limestone rocks, 1,015 m, N 42° 33' 00.0", E 18° 30' 21.9", 15 and 16.07.2007.
5. Montenegro, Orjen Mts, between Orjen sedlo and Crkvice, around Reovac north of Velji Kabao, 1,240 m, N 42° 33' 46.4", E 18° 35' 38.4", 16.07.2007.
6. Montenegro, Orjen Mts, between Orjen sedlo and Crkvice, Reovci, grassland with dolinas, 1,215 m, N 42° 34' 09.2", E 18° 35' 4.9", 16.07.2007.

RESULTS AND DISCUSSION

Altogether 163 bryophyte taxa (20 liverworts and 143 mosses) have been recorded, of which 10 taxa are reported for the first time in Montenegro.

Lophozia sudetica (Nees ex Huebener) Grolle – It is a boreal-montane species (DÜLL 1983). In SE Europe it has been reported from Bulgaria, Romania, Macedonia, Serbia and Slovenia (SABOVLJEVIĆ and NATCHEVA 2006).

Cheilothela chloropus (Brid.) Broth. – It is an Atlantic-Mediterranean element (DÜLL 1984). In SE Europe it is known from many countries, *viz.* Albania, Bulgaria, Greece, Bosnia-Herzegovina, Croatia, Serbia, and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008). Its occurrence in Montenegro at the seacoast at low elevation was not a surprise.

Orthotrichum acuminatum H. Philib. – It is a sub-Mediterranean-montane element (DÜLL 1985). In SE Europe it is known only from Greece, Bosnia-Herzegovina and Croatia (SABOVLJEVIĆ *et al.* 2008).

Pogonatum nanum (Hedw.) P. Beauv. – It is a sub-Atlantic-sub-Mediterranean element (DÜLL 1984). It has been reported from all other SE European countries except Albania and Montenegro (SABOVLJEVIĆ *et al.* 2008).

Pterigynandrum filiforme Hedw. var. *majus* (De Not.) De Not. – This taxon was reported in SE Europe from Slovenia and Greece (DÜLL 1995, MARTINČIČ 2003).

Schistidium dupreti (Thér.) W. A. Weber – In SE Europe it is known from Romania (SABOVLJEVIĆ *et al.* 2008), Macedonia, and Greece (BLOM 1996).

Syntrichia virescens (De Not.) Ochyra – It is a species of the temperate zones of Europe (DÜLL 1984). In SE Europe it is known from many countries, *viz.* Bulgaria, Greece, Romania, Slovenia, Bosnia-Herzegovina, Croatia, Serbia, and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008).

Taxiphyllum wisgrillii (Garov.) Wijk et Margad. – It is a sub-Atlantic element (DÜLL 1985). In SE Europe it is known from almost all countries, *viz.* Bulgaria, Greece, Romania, Slovenia, Bosnia-Herzegovina, Croatia, Serbia, and the European part of Turkey (SABOVLJEVIĆ *et al.* 2008).

Trematodon ambiguus (Hedw.) Hornsch. – It is a boreal-montane species (DÜLL 1984). In SE Europe it is reported only from Bulgaria, Romania and Slovenia (SABOVLJEVIĆ *et al.* 2008).

Weissia controversa var. *crispata* (Nees et Hornsch.) Nyholm (= *Weissia fallax* Sehlm.) – It is a sub-Mediterranean-montane Holarctic taxon. It has been recorded in Bosnia-Herzegovina, Croatia, Macedonia, Serbia and Slovenia (DÜLL *et al.* 1999, MARTINČIČ 2003). It is considered a good taxon at species level by some bryologists (MEINUNGER and SCHRÖDER 2007, SCHLÜSSLMAYR 2005).

List of the species collected

Following the species name, the numbers of the localities and the substrates are given.

Hepaticae

Barbilophozia hatcheri (A. Evans) Loeske – 2: on limestone rock (conf. J. Váňa)
Cephaloziella divaricata (Sm.) Schiffn. – 1, 2, 3, 6: on limestone rock (conf. J. Váňa)

Cololejeunea calcarea (Lib.) Schiffn. – 4: on limestone rock
Frullania dilatata (L.) Dumort. – 1: on bark of *Fagus* and *Robinia*; 3: on bark of *Quercus* and *Tilia*
Leiocolea collaris (Nees) Schljakov – 2, 4, 5, 6: on limestone rock (conf. J. Váňa)
Lejeunea cavifolia (Ehrh.) Lindb. – 4: on limestone rock
Lophozia excisa (Dicks.) Dumort. – 6: on soil among limestone rocks (conf./rev. J. Váňa)
Lophozia sudetica (Nees ex Huebener) Grolle – 6: on limestone rock
Metzgeria furcata (L.) Dumort. – 3: on bark of *Quercus*; 4, 5: on limestone rock
Pedinophyllum interruptum (Nees) Kaal. – 2, 5: on limestone rock
Plagiochila porelloides (Torrey ex Nees) Lindenb. – 1, 2, 4, 5, 6: on limestone rock
Porella platyphylla (L.) Pfeiff. – 1, 4: on limestone rock; 3: on bark of *Quercus*
Preissia quadrata (Scop.) Nees – 5, 6: on limestone rocks
Radula complanata (L.) Dumort. – 1: on bark of *Fagus*; 2, 3, 4, 5: on limestone rock; 3: on bark of *Carpinus orientalis*; 4: on bark of *Ostrya carpinifolia*
Reboulia hemisphaerica (L.) Raddi – 2, 3, 5: on soil among limestone rocks
Riccia crozalsii Levier – 1, 6: on soil among limestone rocks (conf./rev. C. Sérgio)
Scapania aequiloba (Schwägr.) Dumort. – 2, 6: on limestone rock (conf. J. Váňa)
Scapania aspera Bernet et M. Bernet – 1, 2, 4, 5, 6: on limestone rock (conf./det. J. Váňa)
Scapania calcicola (Arnell et J. Perss.) Ingham – 2, 4: on soil among limestone rocks (det. L. Meinunger)
Scapania nemorea (L.) Grolle – 1, 5: on limestone rock (conf. J. Váňa)

Musci

Anomodon viticulosus (Hedw.) Hook. et Taylor – 1, 4: on limestone rock
Atrichum undulatum (Hedw.) P. Beauv. – 5: on the base of *Fagus* trunk
Barbula convoluta Hedw. – 3, 6: on soil among limestone rocks
Barbula unguiculata Hedw. – 2: at a small pond
Bartramia ithyphylla Brid. – 6: on limestone rock
Brachytheciastrum velutinum (Hedw.) Ignatov et Huttunen – 2, 3, 5, 6: on limestone rock
Brachythecium albicans (Hedw.) Schimp. – 1: on limestone rock
Brachythecium glareosum (Bruch ex Spruce) Schimp. – 2: on limestone rock
Brachythecium rutabulum (Hedw.) Schimp. – 1, 3, 5: on limestone rock
Brachythecium tommasinii (Sendtn. ex Boulay) Ignatov et Huttunen – 1, 5, 6: on limestone rock
Bryoerythrophyllum recurvirostrum (Hedw.) P. C. Chen – 1, 3: on limestone rock
Bryum alpinum Huds. ex With. – 1, 2, 6: on limestone rock
Bryum archangelicum Bruch et Schimp. – 2, 6: on soil among limestone rocks
Bryum caespiticium Hedw. – 1, 2, 3: on soil among limestone rocks
Bryum capillare Hedw. – 1, 2, 3, 4: on limestone rock; 2: on bark of *Pinus heldreichii*
Bryum dichotomum Hedw. – 6: on soil among limestone rocks
Bryum elegans Nees – 2, 6: on limestone rock

Bryum pseudotriquetrum (Hedw.) P. Gaertn. *et al.* – 2: at a small pond
Bryum schleicheri DC. – 2: at a small pond
Campyliadelphus chrysophyllus (Brid.) R. S. Chopra – 1, 2, 3, 5, 6: on limestone rock
Campylophyllum calcareum (Crundw. et Nyholm) Hedenäs – 2: on soil among limestone rocks
Campylophyllum halleri (Hedw.) M. Fleisch. – 5, 6: on limestone rock
Ceratodon purpureus (Hedw.) Brid. – 2: on limestone rock; 6: on soil among limestone rocks
Cheilothela chloropus (Brid.) Broth. – 3: on soil among limestone rocks
Cirriphyllum crassinervium (Taylor) Loeske et M. Fleisch. – 3, 4, 5, 6: on limestone rock
Cratoneuron filicinum (Hedw.) Spruce – 4: on limestone rock
Ctenidium molluscum (Hedw.) Mitt. – 1, 2, 3, 4, 5, 6: on limestone rock
Dicranella howei Renauld et Cardot – 3: on soil among limestone rocks
Dicranum scoparium Hedw. – 2, 4, 5, 6: on soil among limestone rocks
Didymodon acutus (Brid.) K. Saito – 1, 3: on soil among limestone rocks
Didymodon insulanus (De Not.) M. O. Hill – 3: on soil among limestone rocks
Didymodon luridus Hornsch. – 1, 3: on limestone rock
Didymodon rigidulus Hedw. – 1, 3, 4, 6: on limestone rock
Distichium capillaceum (Hedw.) Bruch et Schimp. – 2, 4, 5, 6: on limestone rock
Ditrichum flexicaule (Schwägr.) Hampe – 1, 2, 3, 6: on soil among limestone rocks
Ditrichum gracile (Mitt.) Kuntze – 4: on limestone rock
Encalypta streptocarpa Hedw. – 1, 2, 3, 5: on limestone rock
Encalypta vulgaris Hedw. – 4: on soil overlying limestone rocks
Entosthodon muhlenbergii (Turner) Fife – 3: on soil among limestone rocks
Entosthodon pulchellus (H. Philib.) Brugués – 3: on soil among limestone rocks
Eurhynchiastrum pulchellum (Hedw.) Ignatov et Huttunen var. ***diversifolium*** (Schimp.) Ochyra et Zarnowiec – 2: on limestone rock
Eurhynchium striatum (Hedw.) Schimp. – 3: on soil among limestone rocks
Fabronia pusilla Raddi – 4: on limestone rock
Fissidens bryoides Hedw. – 2, 5: on soil among limestone rocks
Fissidens dubius P. Beauv. – 1, 2, 3, 4, 5, 6: on limestone rock
Grimmia dissimulata E. Maier – 4: on limestone rock (conf. E. Maier)
Grimmia orbicularis Bruch ex Wilson – 3: on limestone rock
Gymnostomum aeruginosum Sm. – 2, 4, 5, 6: on limestone rock
Gymnostomum calcareum Nees et Hornsch. – 4: on limestone rock
Gyroweisia tenuis (Hedw.) Schimp. – 3: on soil among limestone rocks
Habrodon perpusillus (De Not.) Lindb. – 1: on bark of *Fagus*; 3: on bark of *Quercus* and *Robinia*
Homalothecium lutescens (Hedw.) H. Rob. – 1, 6: on soil among limestone rocks
Homalothecium philippeanum (Spruce) Schimp. – 2, 5, 6: on limestone rock
Homalothecium sericeum (Hedw.) Schimp. – 1, 2, 3, 4, 6: on limestone rock; 1: on bark of *Robinia*; 3: on bark of *Quercus*
Homomallium incurvatum (Schrad. ex Brid.) Loeske – 5: on limestone rock

Hypnum cupressiforme Hedw. – 1, 4: on limestone rock; 4: on bark of *Ostrya carpinifolia*
Hypnum cupressiforme Hedw. var. ***lacunosum*** Brid. – 3: on soil among limestone rocks
Isopterygiopsis pulchella (Hedw.) Z. Iwats. – 5: on limestone rock
Isothecium alopecuroides (Lam. ex Dubois) Isov. – 1, 4, 5: on limestone rock
Leptodon smithii (Hedw.) F. Weber et D. Mohr – 1: on limestone rock; 3: on bark of *Quercus*
Leucodon sciuroides (Hedw.) Schwägr. – 3: on bark of *Quercus*
Mnium marginatum (Dicks.) P. Beauv. – 5: on limestone rock
Mnium stellare Hedw. – 5: on limestone rock
Mnium thomsonii Schimp. – 1, 4: on limestone rock
Myurella julacea (Schwägr.) Schimp. – 1, 2, 4, 5, 6: on limestone rock
Neckera besseri (Lobarz.) Jur. – 1, 4: on limestone rock
Neckera complanata (Hedw.) Huebener – 1, 4, 5: on limestone rock
Neckera crispa Hedw. – 1, 3: on limestone rock
Neckera pumila Hedw. – 1, 4: on limestone rock
Orthothecium intricatum (Hartm.) Schimp. – 4, 5, 6: on limestone rock
Orthothecium rufescens (Dicks. ex Brid.) Schimp. – 2, 4, 6: on limestone rock
Orthotrichum acuminatum H. Philib. – 3: on bark of *Tilia* (conf. R. Garilleti)
Orthotrichum affine Schrad. ex Brid. – 3: on bark of *Robinia, Quercus* and *Tilia*; 4: on bark of *Ostrya carpinifolia* and *Acer pseudoplatanus*
Orthotrichum anomalum Hedw. – 1, 3: on limestone rock
Orthotrichum cupulatum Hoffm. ex Brid. – 1, 3, 4: on limestone rock
Orthotrichum lyellii Hook. et Taylor – 1: on bark of *Robinia*; 3: on bark of *Quercus, Robinia* and *Tilia*
Orthotrichum pallens Bruch ex Brid. – 1: on bark of *Fagus, Quercus* and *Robinia*; 3: on bark of *Quercus* and *Tilia*
Orthotrichum pumilum Sw. – 1: on bark of *Robinia*; 3: on bark of *Quercus*
Orthotrichum rupestre Schleich. ex Schwägr. – 1: on bark of *Fagus, Quercus* and *Robinia*; 3: on bark of *Tilia*; 4: on bark of *Ostrya carpinifolia* and *Acer pseudoplatanus*
Orthotrichum speciosum Nees – 1: on bark of *Fagus*
Orthotrichum striatum Hedw. – 1: on bark of *Fagus* and *Quercus*; 3: on bark of *Tilia*; 4: on bark of *Acer pseudoplatanus* and *Ostrya carpinifolia*
Oxyrrhynchium hians (Hedw.) Loeske – 2, 3: on soil among limestone rocks; 5: on limestone rock in a cave
Oxyrrhynchium schleicheri (R. Hedw.) Röll – 3, 4: on soil among limestone rocks
Philonotis caespitosa Jur. – 6: on soil among limestone rocks
Plagiobryum zieri (Hedw.) Lindb. – 4, 5: on limestone rock
Plagiomnium ellipticum (Brid.) T. J. Kop. – 4: on limestone rock
Plagiomnium rostratum (Schrad.) T. J. Kop. – 5: on limestone rock
Plagiopus oederianus (Sw.) H. A. Crum et L. E. Anderson – 4: on limestone rock
Plagiothecium denticulatum (Hedw.) Schimp. – 2: on limestone rock
Plasteurhynchium striatulum (Spruce) M. Fleisch. – 1, 3, 4: on limestone rock
Pleuridium acuminatum Lindb. – 6: on soil among limestone rocks

Pleurochaete squarrosa (Brid.) Lindb. – 3: on soil among limestone rocks
Pogonatum nanum (Hedw.) P. Beauv. – 6: on soil
Pohlia andalusica (Höhn.) Broth. – 6: on soil
Pohlia cruda (Hedw.) Lindb. – 2, 5, 6: on limestone rock
Polytrichastrum formosum (Hedw.) G. L. Sm. – 2: on limestone rock
Polytrichum commune Hedw. var. ***perigoniale*** (Michx.) Hampe – 6: on soil among limestone rocks
Polytrichum juniperinum Hedw. – 1, 6: on soil overlying limestone rock
Polytrichum piliferum Hedw. – 6: on soil among limestone rocks
Pseudocrossidium hornschuchianum (Schultz) R. H. Zander – 3: on soil among limestone rocks
Pseudoleskea incurvata (Hedw.) Loeske – 2, 5, 6: on limestone rock
Pseudoleskeella catenulata (Brid. ex Schrad.) Kindb. – 6: on limestone rock
Pseudoscleropodium purum (Hedw.) M. Fleisch. – 2, 3, 4: on soil among limestone rocks
Pterigynandrum filiforme Hedw. – 1: on limestone rock and on bark of *Fagus*; 4: on bark of *Ostrya carpinifolia*
Pterigynandrum filiforme Hedw. var. ***majus*** (De Not.) De Not. – 2: on bark of *Pinus heldreichii*
Pterogonium gracile (Hedw.) Sm. – 4: on limestone rock
Rhynchostegium murale (Hedw.) Schimp. – 2, 5, 6: on limestone rock
Saelania glaucescens (Hedw.) Broth. – 2, 5, 6: on limestone rock
Sanionia uncinata (Hedw.) Loeske – 6: on limestone rock
Schistidium atrofuscum (Schimp.) Limpr. – 2: on limestone rock (conf./det. W. Schröder)
Schistidium brunnescens Limpr. subsp. ***brunnescens*** – 6: on limestone rock (conf. W. Schröder)
Schistidium brunnescens Limpr. subsp. ***griseum*** (Nees et Hornsch.) H. H. Blom – 2, 6 (conf./det. W. Schröder): on limestone rock
Schistidium crassipilum H. H. Blom – 1, 2, 3, 4 (conf. W. Schröder), 5: on limestone rock
Schistidium dupretii (Thér.) W. A. Weber – 2: on limestone rock (conf. W. Schröder)
Schistidium elegantulum H. H. Blom subsp. ***elegantulum*** – 1 (det./rev. W. Schröder), 3 (conf./rev. W. Schröder): on limestone rock
Schistidium elegantulum H. H. Blom subsp. ***wilsonii*** H. H. Blom – 1: on limestone rock (conf./det. W. Schröder)
Schistidium helveticum (Schkuhr) Deguchi – 1, 6: on limestone rock (conf. W. Schröder)
Schistidium robustum (Nees et Hornsch.) H. H. Blom – 1, 6 (conf. W. Schröder): on limestone rock
Scorpiurium circinatum (Bruch) M. Fleisch. et Loeske – 3: on soil among limestone rocks
Syntrichia calcicola J. J. Amann – 6: on limestone rock
Syntrichia laevipila Brid. – 1: on bark of *Robinia*; 3: on bark of *Quercus*
Syntrichia montana Nees – 1, 3, 4: on limestone rock
Syntrichia norvegica F. Weber – 2: on limestone rock
Syntrichia papillosa (Wilson) Jur. – 3: on bark of *Quercus*
Syntrichia ruralis (Hedw.) F. Weber et D. Mohr – 2, 3, 5, 6: on limestone rock

Syntrichia virescens (De Not.) Ochyra – 1: on bark of *Robinia*
Taxiphyllum wissgrillii (Garov.) Wijk et Margad. – 5: on limestone rock
Thamnobryum alopecurum (Hedw.) Gangulee – 1, 4, 5: on limestone rock
Thuidium assimile (Mitt.) A. Jaeger – 4: on limestone rock
Thuidium delicatulum (Hedw.) Schimp. – 4: on limestone rock
Tortella fragilis (Hook. et Wilson) Limpr. – 1, 6: on limestone rock
Tortella inclinata (R. Hedw.) Limpr. – 1, 2, 3, 6: on soil among limestone rocks
Tortella tortuosa (Hedw.) Limpr. var. ***fragilifolia*** (Jur.) Limpr. – 1: on limestone rock
Tortella tortuosa (Hedw.) Limpr. var. ***tortuosa*** – 2, 3, 4, 5, 6: on limestone rock
Tortula muralis Hedw. – 1, 3: on limestone rock
Tortula subulata Hedw. – 2, 3: on soil among limestone rocks
Trematodon ambiguus (Hedw.) Hornsch. – 6: on soil among limestone rocks
Trichostomum brachydontium Bruch – 3: on soil among limestone rocks; 4: on limestone rock
Trichostomum crispulum Bruch – 2, 3: on soil among limestone rocks
Weissia condensa (Voit) Lindb. – 2, 3: on soil among limestone rocks
Weissia controversa Hedw. var. ***controversa*** – 1, 2, 4: on soil among limestone rocks
Weissia controversa Hedw. var. ***crispata*** (Nees et Hornsch.) Nyholm – 1, 2: on soil among limestone rocks
Zygodon rupestris Schimp. ex Lorentz – 1: on bark of *Fagus*; 3: on bark of *Quercus*

Conservation merits of the bryophyte flora of the Orjen Mts

In spite that no European red listed species was found (ECCB 1995), based on the red list of Serbia and Montenegro (SABOVLJEVIĆ *et al.* 2004) several species recorded by us have regional conservation importance.

Lophozia collaris is a vulnerable (VU) liverwort. *Barbilophozia hatcheri*, *Myurella julacea*, *Plagiobryum zierii*, *Syntrichia norvegica* are in the category of lower risk (LR), while *Fabronia pusilla*, *Neckera pumila* and *Philonotis caespitosa* are in the data deficient category (DD).

CONCLUSIONS

The conservational importance of the area was recognised long time ago. Plans of declaring the Orjen Mts as a national park were formulated previously but the disintegration of Yugoslavia, the turmoil of civil war and standstill of tourism halted their realisation. UNESCO has declared the Natural and Cultural-Historical Region of Kotor a World Heritage site.

Krivošije plateau, part of the Orjen, is situated within the boundaries of this site. Further evaluation and nomination of a greater part of Orjen as a national park has good chances: its unique flora, fauna and relief certainly deserve greater legal protection. Our investigation on the bryophyte flora adds new details and contributes to the broader recognition of the botanical richness of the area.

Although several bryologists have published data on the bryophyte flora of the Orjen Mts (GLOWACKI 1906, SCHIFFNER 1915, 1916, WEISS 1866, CVETIĆ and SABOVLJEVIĆ 2004), a single field trip has revealed 10 taxa, which represent first records in Montenegro. This is only one reflection of the high diversity of the bryophytes in spite the geological uniformity of the Orjen Mts being a limestone massif. As cryptogam research has not been among the priorities in Montenegro, new contributions to the knowledge of the cryptogam flora are inevitably necessary to improve the scientific background for the development of nature conservational action plans specifically for this unique place.

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