

CONTRIBUTIONS TO THE BRYOPHYTE FLORA OF MONTENEGRO

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Field research carried out in October 2003 in Montenegro revealed 217 bryophyte taxa (48 liverworts and 169 mosses), among them 14 taxa (8 liverworts and 6 mosses) are reported for the first time from Montenegro. These contain one taxon included in the Red data book of European bryophytes (ECCB 1995); *Frullania inflata* var. *illyrica* is a European endemism categorised as rare (R).

Key words: bryophytes, Montenegro, new and redlisted species

INTRODUCTION

The first checklists of bryophytes of Montenegro were published by SABOVLJEVIĆ (2000) and SABOVLJEVIĆ and STEVANOVIĆ (1999), which mention 447 species (80 hepatics and 367 mosses) found in the country. Then from 1997 on, Dragičević investigates intensively the bryophyte flora of Montenegro, and between 2001 and 2006 published several new records for the territory. The present state of knowledge has been summarised in a checklist (DRAGIČEVIĆ and VELJIĆ 2006).

MATERIALS AND METHODS

The investigated area

The collection localities (Rumija Mts, Lake Skadar, Lovćen Mts, Gulf of Kotor) are situated in the southern, coastal part of Montenegro (Fig. 1).

The Rumija Mts – as well as the Lovćen Mts – belong to the Dinaric range and are composed of Triassic and Jurassic limestone. The Rumija Mts, with a maximum elevation 1,593 m, are situated between the Mediterranean coast and Lake Skadar near the border to Albania.

Lake Skadar (6 m above sea level) is shared by Montenegro and Albania, and is the largest lake in the Balkan Peninsula. Its full area can vary between 370 and 530 km². The lake is filled by the Morača River and drained into the Adriatic Sea by the 41-kilometre-long Buna/Bojana River, which forms the international border on the lower half of its length. The Montenegrin part of the lake and its surrounding area was declared a national park in 1983. It is one of the largest bird reserves in Europe, hosting 270 bird species, among which are some of the last pelicans in Europe. In 1996 it was included in the Ramsar list of wetlands of international importance.

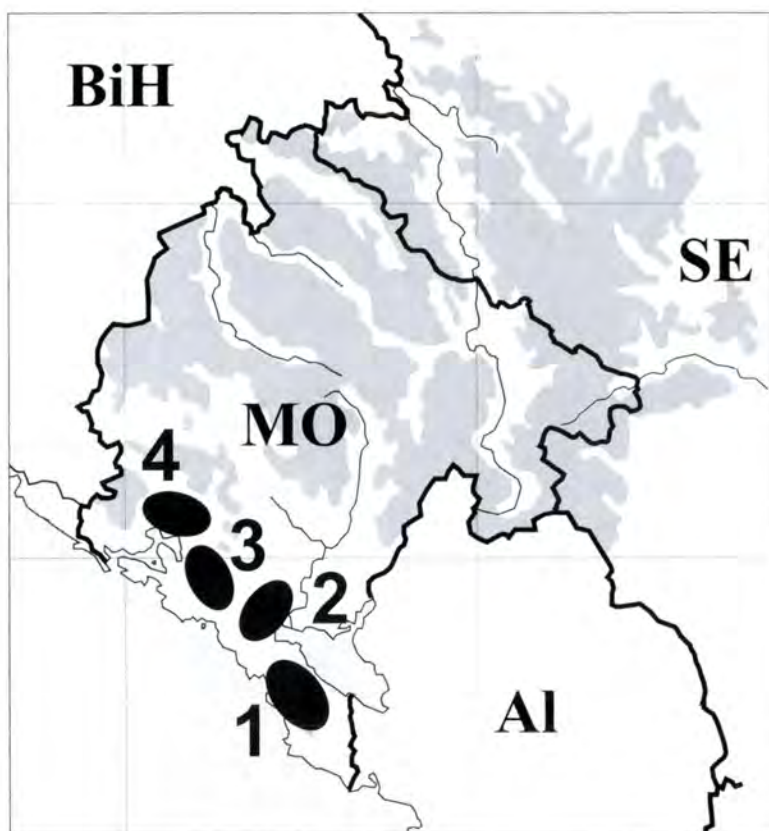


Fig. 1. Locations of the investigated areas. (1 = Rumija Mts, 2 = Lake Skadar, 3 = Lovćen Mts, 4 = Gulf of Kotor) (BiH = Bosnia-Herzegovina, MO = Montenegro, SE = Serbia, Al = Albania)

The Lovćen Mts rise from the borders of the Adriatic basin closing the long and twisting bays of Boka Kotorska. They are protected as a national park, covering 64 km² with an altitude range of 985 m to 1,749 m. In these mountain ranges, Mediterranean climate meets the moderately continental climate of the mountain belt. The carboniferous rocks of the Lovćen Mts appear in many special karst formations.

The Gulf of Kotor, sometimes called Europe's southernmost fjord, is in fact a submerged river canyon of the disintegrated Bokelj River, which used to run from the high mountain plateaus of Mt Orjen. The gulf is composed of several smaller broad gulfs, united by narrower channels, forming one of the finest natural harbours in Europe. The gulf inlet formerly was a river system, then very intensive tectonics and karstification processes led to the disintegration of this river. The length of the gulf is 28 km and its water surface is 87 km². The Gulf of Kotor lies within the Mediterranean climate belt: while summers are hot and sunny, the autumn, winter and spring are the rainy seasons. A peculiarity of the littoral Dinarids is the precipitation regime: at the Gulf of Kotor, Mt Orjen receives Europe's most heavy rainfall (4–5,000 mm per year). Just as the monsoon rain in other parts of the world is seasonally distributed, in November thunderstorms sometimes pour 2,000 l/m² of water in several days, while August is frequently completely dry, leading to forest fires. Strong, cold downslope winds of the Bora type arrive in winter. Gusts reach 250 km/h and can lead to a significant fall of temperatures in few hours with freezing temperatures that cause damage in most Mediterranean agricultural fields (*e.g.* orchards). The coastal area of the Gulf of Kotor is on the UNESCO List of Cultural and Natural Heritage.

METHODS

The collecting trip was made in October 2003. All main habitat types such as forests, grasslands, stream valleys were visited, and bryophytes were collected from different substrates (soil, exposed and shady rocks, tree barks and decaying wood).

The specimens are deposited in the Hungarian Natural History Museum, Budapest (BP) and in the Botanical Museum, Berlin Dahlem (B).

Nomenclature of the species follows GROLLE and LONG (2000) and HILL *et al.* (2006). New floristical results for the country were analysed using the new bryophyte checklist of Montenegro (DRAGIČEVIĆ and VELJIĆ 2006).

Site details

1. At the border of Bosnia-Herzegovina and Montenegro at Hum, at river Tara, 450 m, 43° 20' 53.9" N, 18° 50' 40.7" E, 07.10.2003.
2. Montenegro, between Nikšić and Podgorica, 1–2 km before the road to Zagorak, 275 m, 42° 37' 50.9" N, 19° 00' 34.1" E, 07.10.2003.
3. Montenegro, Rumija Mts, at Skadarsko jezero, at Vučedabici village near Virpazar, 458 m, 42° 07' 40.1" N, 19° 13' 28.7" E, 08.10.2003.
4. Montenegro, Rumija Mts, at Skadarsko jezero, at the border of Albania near Ostros village, 450–480 m, 42° 03' 52.2" N, 19° 22' 31.2" E and 42° 03' 21.7" N, 19° 20' 28.4" E, 08.10.2003.
5. Montenegro, Rumija Mts, at Vladimir village near Šasko jezero lake, maquis, 28 m, 41° 59' 12.4" N, 19° 19' 29.4" E, 08.10.2003.
6. Montenegro, Rumija Mts, near Limljani village, at a stream, 557, 42° 10' 14.4" N, 19° 06' 17.7" E, 09.10.2003.
7. Montenegro, Rumija Mts, at the mountain pass along the road from Virpazar to Bar, around the ruins of a castle, 930 m, 42° 09' 27.8" N, 19° 06' 37.3" E, 09.10.2003.
8. Montenegro, Stari Bar town, 10 m, 42° 05' 37.9" N, 19° 08' 05.8" E, 09.10.2003.
9. Montenegro, at the northwestern part of Skadarsko jezero, near Mihaljevići village, 110–135 m, 42° 18' 13.6" N, 19° 02' 56.6" E and 42° 19' 05.9" N, 19° 02' 59.4" E, 10.10.2003.
10. Montenegro, at the northwestern part of Skadarsko jezero, at Rijeka Crnojevića village, 10 m, 42° 21' 10.1" N, 19° 02' 07.9" E, 10.10.2003.
11. Montenegro, Lovćen Mts, near Njeguši village, along the road to the Mausoleum of Njegoš, Fagetum, 1,030 m, 42° 25' 18.2" N, 18° 48' 20.8" E, 11.10.2003.
12. Montenegro, Lovćen Mts, along the road from Njeguši village to the Mausoleum of Njegoš, 1,100 m, 42° 24' 53.3" N, 18° 48' 43.5" E, 11.10.2003.
13. Montenegro, Lovćen Mts, along the road from Njeguši village to the Mausoleum of Njegoš, at a stream, 1,300 m, 42° 22' 50.8" N, 18° 49' 37.0" E, 11.10.2003.
14. Montenegro, Lovćen Mts, near Dolovi village, 1,255 m, 42° 22' 17.5" N, 18° 49' 24.1" E, 11.10.2003.
15. Lovćen Mts, along the road from Njeguši village to Kotor, 350–370 m, 42° 23' 57.6" N, 18° 46' 12.5" E and 42° 23' 50.1" N, 18° 45' 59.6" E, 12–13.10.2003.
16. Montenegro, on the peninsula west of Kotor, near Trojica fortress, maquis at a south-west facing slope, 290 m, 42° 24' 23.5" N, 18° 45' 22.8" E, 12.10.2003.
17. Montenegro, Kotor, town walls and fortress, 0–100 m, 42° 25' 33.3" N, 18° 46' 23.6" E, 13.10.2003.

18. Montenegro, along the road from Kotor to Perast, at the pension Stari Mlini before Perast, stream, 0–10 m, 14.10.2003.
19. Montenegro, along the road from Perast to Herceg-Novi, at Kostanjica village after Morinj, *Quercetum* and *Castanetum* on a north facing slope, 70–170 m, 42° 29' 08.8" N, 18° 39' 07.9" E and 42° 29' 02.2" N, 18° 39' 23.9" E, 14.10.2003.
20. Montenegro, Lovćen Mts, southeast of Njeguši village, around a cave and dolina, 900–1,138 m, 42° 25' 36.2" N, 18° 49' 53.0" E and 42° 25' 09.9" N, 18° 51' 02.7" E, leg. Barina, Z., Pifkó, D., 12.10.2003.

RESULTS

The full list of our records of bryophytes contains 217 taxa (48 liverworts and 169 mosses), including 14 (8 liverworts and 6 mosses), which are reported for the first time in Montenegro. These are the following.

Hepaticae

Barbilophozia barbata (Schreb.) Loeske is a boreal, montane species (DÜLL 1983). It is known from all other SE European countries except the European part of Turkey (SABOVLJEVIĆ and NATCHEVA 2006).

Cephaloziella divaricata (Sm.) Schiffn. is a species characteristic of the temperate zone of Europe (DÜLL 1983). It is recorded in all other SE European countries except the European part of Turkey (SABOVLJEVIĆ and NATCHEVA 2006).

Fossombronia pusilla (L.) Nees is a Mediterranean, sub-Atlantic element (DÜLL 1983). In SE Europe it is reported from many countries, *i.e.* Bulgaria, Croatia, Greece, Macedonia, Romania, Serbia, Slovenia, Turkey (SABOVLJEVIĆ and NATCHEVA 2006).

Frullania inflata Gottsche var. *illyrica* (Grolle) R. M. Schust. is a relict Mediterranean-montane species according to DÜLL (1983), while var. *inflata* is a relict sub-Mediterranean-montane hepatic. *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*. Our material shows the characteristics of var. *illyrica*, and we prefer keeping this name pending further

research. In Europe, *F. inflata* is known from 7 countries (Albania, Austria, Czech Republic, Hungary, Italy, Slovenia). It was rated vulnerable by the Red data book of European bryophytes (ECCB 1995), but is presently considered near threatened only, since about 15 recent localities are known from Austria (VÁŇA 2001), and a new locality has also been detected in Hungary (PAPP and ERZBERGER 2006). The present records from Montenegro are therefore very significant on a European scale.

Lophocolea minor Nees is a species of the temperate zone of Europe (DÜLL 1983). It was reported from all other SE European countries except the European part of Turkey (SABOVLJEVIĆ and NATCHEVA 2006).

Riccia glauca L. is a sub-Mediterranean species (DÜLL 1983) known from almost all SE European countries except Macedonia and the European part of Turkey (SABOVLJEVIĆ and NATCHEVA 2006).

Riccia macrocarpa Levier is a sub-Atlantic, Mediterranean element (DÜLL 1983). This species was reported in SE Europe only from Albania, Croatia and Greece (SABOVLJEVIĆ and NATCHEVA 2006).

Riccia trabutiana Steph. is an Atlantic, Mediterranean element (DÜLL 1983). This species was known in SE Europe only from Albania and Greece (SABOVLJEVIĆ and NATCHEVA 2006).

Musci

Grimmia dissimulata E. Maier was recently described (MAIER 2002). Its distribution is as follows: Africa: Morocco; Asia: Syria, Turkey; Europe: Austria, Belgium, Cyprus, France, Germany, Great Britain, Greece, Hungary, Italy, Spain, Switzerland (MAIER 2002, PORLEY 2004 and ERZBERGER and PAPP 2004).

Schistidium brunnescens Limpr. subsp. *griseum* (Nees et Hornsch.) H. H. Blom is closely related to *S. brunnescens* subsp. *brunnescens*, but apparently much rarer in parts of Central and Eastern Europe (BLOM 1996). It occurs from Southern Scandinavia to South Europe and Turkey. In SE Europe it has been collected in Croatia, Bosnia-Herzegovina, Bulgaria and Greece (BLOM 1996).

Schistidium helveticum (Schkuhr) Deguchi has a Mediterranean distribution (South-Europe, North-Africa, West-Asia, BLOM 1996). In SE

Europe it is known from Greece (DÜLL 1995) and Serbia (SABOVLJEVIĆ 2003).

Scorpiurium deflexifolium (Solms) M. Fleisch. et Loeske is a Mediterranean element (DÜLL 1985). In SE Europe it is known from Bosnia-Herzegovina, Slovenia (DÜLL *et al.* 1999), Greece (DÜLL 1995) and Albania (COLACINO and SABOVLJEVIĆ 2006).

Syntrichia handelii (Schiffn.) S. Agnew et Vondr. is an East Mediterranean, continental element (DÜLL 1984). In SE Europe it is recorded only in Greece (DÜLL 1995).

Weissia longifolia Mitt. var. *angustifolia* (Baumgartner) Crundw. et Nyholm is an Atlantic, sub-Mediterranean taxon (DÜLL 1984). In SE Europe it is reported only from Croatia (DÜLL *et al.* 1999).

List of the species collected

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

Hepaticae

Barbilophozia barbata (Schmidel ex Schreb.) Loeske – 11: limestone rocks

Cephalozia bicuspidata (L.) Dumort. – 6: limestone rocks at the stream

Cephaloziella baumgartneri Schiffn. – 6: limestone rocks at the stream

Cephaloziella divaricata (Sm.) Schiffn. – 5, 16: on soil in maquis

Cololejeunea calcarea (Lib.) Schiffn. – 20: shaded calcareous rocks

Cololejeunea minutissima (Sm.) Schiffn. – 19: on the bark of *Laurus nobilis* (rev. Váňa)

Cololejeunea rosettiana (C. Massal.) Schiffn. – 14, 19: shaded limestone rocks

Conocephalum conicum (L.) Dumort. – 9: limestone rocks at the stream; 20: limestone rocks

Fossombronina husnotii Corb. – 5: on soil in maquis

Fossombronina pusilla (L.) Nees – 3: base-rich rock in *Quercetum*

Frullania dilatata (L.) Dumort. – 3: on the bark of *Carpinus* and *Quercus*, 6: on tree bark; 7: on the bark of *Acer*; 11: on the bark of *Fagus*; 15: on the bark of *Cupressus*; 16: on the bark of *Quercus*

Frullania inflata Gottsche var. *illyrica* (Grolle) R. M. Schust. – 7, 15: limestone rocks (conf. Váňa)

Leiocolea collaris (Nees) Schljakov – 1: limestone rocks at the stream; 12, 14: shaded limestone rocks (conf. Váňa)

Leiocolea turbinata (Raddi) H. Buch – 6: limestone rocks at the stream (conf./det. Váňa)

- Lejeunea cavifolia* (Ehrh.) Lindb. – 6: limestone rocks at the stream; 19: limestone rocks and on the bark of *Quercus* and of *Laurus nobilis*
- Lophocolea heterophylla* (Schrad.) Dumort. – 19: limestone rocks
- Lophocolea minor* Nees – 14: on soil among limestone rocks
- Lunularia cruciata* (L.) Lindb. – 9, 10: limestone rocks at the stream; 19: soil among limestone rocks
- Mannia androgyna* (L.) A. Evans – 15: on soil among limestone rocks
- Marchantia polymorpha* L. subsp. *polymorpha* – 20: limestone rocks
- Marchantia polymorpha* L. subsp. *ruderalis* Bisch. et Boisselier – 9: limestone rocks at the stream
- Metzgeria furcata* (L.) Dumort. – 14: shaded calcareous rock; 16: on the bark of *Quercus*; on decaying wood; 19: on the bark of *Quercus* and of *Laurus nobilis*
- Pedinophyllum interruptum* (Nees) Kaal. – 1: moist limestone rocks at the riverbank; 20: shaded limestone rocks
- Pellia endiviifolia* (Dicks.) Dumort. – 6, 9: limestone rocks at the stream; 20: limestone rocks
- Plagiochasma rupestre* (J. R. Forst. et G. Forst.) Steph. – 17: walls of the fortress
- Plagiophila porelloides* (Torrey ex Nees) Lindenb. – 11, 12, 14: limestone rocks
- Porella cordaeana* (Huebener) Mohr – 7, 11, 12, 14: limestone rocks
- Porella platyphylla* (L.) Pfeiff. – 4, 7: shaded limestone rocks
- Preissia quadrata* (Scop.) Nees – 6, 9: on calcareous soil; 12, 14: on soil among limestone rocks
- Radula complanata* (L.) Dumort. – 1: limestone rocks at the stream; 3: on the bark of tree; 6, 7: limestone rocks and on the bark of *Acer*; 11: on the bark of *Fagus*; 14, 19: limestone rocks; 16: on the bark of *Quercus*
- Reboulia hemisphaerica* (L.) Raddi – 2, 3, 9, 10, 14, 15, 19: on soil among rocks; 5, 16: on soil in maquis; 8: walls of town fortification; 17: walls of the fortress
- Riccia ciliata* Hoffm. – 5: on soil in maquis (det./conf. Sérgio)
- Riccia ciliifera* Link ex Lindenb. – 14: on soil among limestone rocks (det. Sérgio)
- Riccia crozalsii* Levier – 12, 14: on soil among limestone rocks (det. Sérgio)
- Riccia glauca* L. – 14, 16: on soil in maquis (det./conf. Sérgio)
- Riccia macrocarpa* Levier – 5, 16: on soil in maquis (det./conf. Sérgio)
- Riccia michelii* Raddi – 12: on soil among limestone rocks (conf. Sérgio)
- Riccia papillosa* Moris – 5: on soil in maquis (conf. Sérgio)
- Riccia sorocarpa* Bisch. – 12, 16: on soil among limestone rocks (det./conf. Sérgio)
- Riccia trabutiana* Steph. – 16: on soil in maquis (det. Sérgio)
- Scapania aequiloba* (Schwägr.) Dumort. – 14: shaded limestone rocks (det. Váňa)
- Scapania aspera* Bernet et M. Bernet – 3, 11, 12, 14: shaded limestone rocks (conf. Váňa)
- Scapania compacta* (A. Roth) Dumort. – 19: on soil (det./conf. Váňa)
- Scapania nemorea* (L.) Grolle – 3, 11, 12, 14, 20: limestone rocks
- Southbya nigrella* (De Not.) Henriq. – 2, 9, 15, 16: on basic soil of perpendicular conglomerate rocks

Southbya tophacea (Spruce) Spruce – 10: limestone rocks at the lake

Targionia hypophylla L. – 10: limestone rocks at the stream; 12: on soil among limestone rocks

Targionia lorbeeriana Müll. Frib. – 4: exposed conglomerate rocks; 8: walls of the fortress

Musci

Abietinella abietina (Hedw.) M. Fleisch. – 11, 12, 14: soil among limestone rocks

Aloina aloides (Koch ex Schultz) Kindb. – 4: exposed conglomerate rocks

Aloina ambigua (Bruch et Schimp.) Limpr. – 2: exposed conglomerate rocks

Anomodon attenuatus (Hedw.) Huebener – 1: limestone rocks at the stream

Anomodon viticulosus (Hedw.) Hook. et Taylor – 1: limestone rocks at the stream; 7, 14, 19: limestone rocks

Atrichum angustatum (Brid.) Bruch et Schimp. – 19: on soil

Barbula convoluta Hedw. – 12, 15: on soil among limestone rocks

Barbula unguiculata Hedw. – 2: exposed conglomerate rocks, 11: on soil among limestone rocks

Bartramia stricta Brid. – 19: limestone rocks

Brachytheciastrum velutinum (Hedw.) Ignatov et Huttunen – 6, 11, 19: limestone rocks

Brachythecium glareosum (Bruch ex Spruce) Schimp. – 14: on soil among limestone rocks

Brachythecium rivulare Schimp. – 6, 9, 13: limestone rocks at the stream

Brachythecium rutabulum (Hedw.) Schimp. – 6, 9, 10: limestone rocks at the stream; 11, 15, 19: limestone rocks; 11: on the bark of *Fagus*

Bryoerythrophyllum recurvirostrum (Hedw.) P. C. Chen – 1: limestone rocks at the stream; 14: limestone rocks

Bryum argenteum Hedw. – 11, 12: on soil near limestone rocks

Bryum caespitium Hedw. – 17: walls of the fortress

Bryum capillare Hedw. – 4, 7, 10, 12, 14, 16, 20: limestone rocks and calcareous soil; 13: limestone rocks at the stream

Bryum elegans Nees – 14: limestone rocks

Bryum moravicum Podp. – 14: limestone rocks

Bryum pseudotriquetrum (Hedw.) P. Gaertn. *et al.* – 6, 9, 10, 13: limestone rocks at the stream

Bryum torquescens Bruch et Schimp. – 16: on soil in maquis

Calliergonella cuspidata (Hedw.) Loeske – 10: limestone rocks at the lake; 15, 19: on soil

Campyliadelphus chrysophyllus (Brid.) R. S. Chopra – 6, 10: limestone rocks at the stream; 11, 12, 14: limestone rocks

Campylophyllum calcareum (Crundw. et Nyholm) Hedenäs – 11: limestone rocks

Ceratodon purpureus (Hedw.) Brid. – 14: on soil among limestone rocks

Cinclidotus aquaticus (Hedw.) Bruch et Schimp. – 9, 18: limestone rocks at the stream

Cinclidotus fontinaloides (Hedw.) P. Beauv. – 1, 9, 10, 15, 18: limestone rocks at the streams; 10: on the bark of *Fraxinus* at the stream and on concrete at the shore of the lake

- Cinclidotus riparius* (Host ex Brid.) Arn. – 9: limestone rocks at the stream
- Cirriphyllum crassinervium* (Taylor) Loeske et M. Fleisch. – 1: limestone rocks at the stream; 6, 15: limestone rocks at the stream; 7, 11, 14, 19: limestone rocks
- Cratoneuron filicinum* (Hedw.) Spruce – 1, 6, 9, 10, 13, 15: limestone rocks at the stream; 20: limestone rocks
- Crossidium squamiferum* (Viv.) Jur. – 2, 4, 16: exposed conglomerate rocks
- Cryphaea heteromalla* (Hedw.) D. Mohr – 10: on the bark of timber in the port
- Ctenidium molluscum* (Hedw.) Mitt. – 1, 6, 10, 15: limestone rocks at the stream; 3, 5, 7, 11, 12, 14, 19, 20: limestone rocks
- Dicranella howei* Renauld et Cardot – 4: exposed conglomerate rocks; 11, 15, 19: on soil among limestone rocks
- Dicranella schreberiana* (Hedw.) Dixon – 1: limestone rocks at the stream
- Dicranella varia* (Hedw.) Schimp. – 1, 6: limestone rocks at the stream
- Dicranum scoparium* Hedw. – 11, 14, 20: limestone rocks
- Didymodon acutus* (Brid.) K. Saito – 4: exposed conglomerate rocks; 6: limestone rocks at the stream; 16: on soil in maquis
- Didymodon fallax* (Hedw.) R. H. Zander – 1: limestone rocks at the stream
- Didymodon ferrugineus* (Schimp. ex Besch.) M. O. Hill – 1: limestone rocks at the stream
- Didymodon insulanus* (De Not.) M. O. Hill – 1, 9: limestone rocks at the stream
- Didymodon luridus* Hornsch. – 2, 4, 16: exposed conglomerate rocks; 9, 10, 15: limestone rocks at the stream; 11, 19: limestone rocks
- Didymodon rigidulus* Hedw. – 1: limestone rocks at the stream; 14: limestone rocks
- Didymodon sinuosus* (Mitt.) Delogne – 10: limestone rocks at the stream
- Didymodon tophaceus* (Brid.) Lisa – 6: limestone rocks at the stream
- Didymodon vinealis* (Brid.) R. H. Zander – 1, 6, 9, 10: limestone rocks at the stream or lake, resp.; 11: shaded limestone rocks
- Diphyscium foliosum* (Hedw.) D. Mohr – 19: on soil
- Distichium capillaceum* (Hedw.) Bruch et Schimp. – 14, 20: limestone rocks
- Ditrichum flexicaule* (Schwägr.) Hampe – 1: limestone rocks at the stream; 12, 14, 20: limestone rocks
- Ditrichum gracile* (Mitt.) Kuntze – 12, 14, 20: limestone rocks
- Ditrichum pusillum* (Hedw.) Hampe – 14: on soil among limestone rocks; 16: on soil in maquis
- Encalypta streptocarpa* Hedw. – 1, 6: limestone rocks at the stream; 3, 7, 12, 14: limestone rocks
- Encalypta vulgaris* Hedw. – 15: limestone rocks at the stream
- Entodon concinnus* (De Not.) Paris – 6: limestone rocks at the stream; 14: limestone rocks
- Entosthodon pulchellus* (H. Philib.) Brugués – 3: basic soil
- Eucladium verticillatum* (With.) Bruch et Schimp. – 6, 9, 10, 15: limestone rocks at the stream; 17: walls of the fortress
- Eurhynchiastrum pulchellum* (Hedw.) Ignatov et Huttunen – 14: limestone rocks
- Eurhynchium striatum* (Hedw.) Schimp. – 15: limestone rocks at the stream; 19: soil among limestone rocks

- Fissidens bryoides* Hedw. – 15: on soil among limestone rocks at the stream; 11, 19: on soil
- Fissidens crassipes* Wilson ex Bruch et Schimp. subsp. *crassipes* – 17: limestone rocks at the stream
- Fissidens crassipes* Wilson ex Bruch et Schimp. subsp. *warnstorffii* (M. Fleisch.) Brugg.-Nann. – 9: limestone rocks at the stream
- Fissidens dubius* P. Beauv. – 1, 6, 10, 15: limestone rocks at the stream; 2: exposed conglomerate rocks; 3, 5, 7, 11, 12, 14, 19, 20: limestone rocks
- Fissidens taxifolius* Hedw. – 5, 16: on soil in maquis; 12: on soil among limestone rocks; 6, 15: on soil among limestone rocks at the stream
- Fissidens viridulus* (Sw. ex anon.) Wahlenb. – 15: on soil among limestone rocks at the stream; 16: on soil in maquis
- Fontinalis hypnoides* C. Hartm. – 9, 10: limestone rocks in the stream
- Grimmia dissimulata* E. Maier – 3, 6, 7, 10: limestone rocks (conf./det. E. Maier)
- Grimmia orbicularis* Bruch ex Wilson – 6, 10: limestone rocks (det. E. Maier)
- Grimmia pulvinata* (Hedw.) Sm. – 4, 16: exposed conglomerate rocks; 6: limestone rocks at the stream; 7, 10, 12: limestone rocks
- Gymnostomum aeruginosum* Sm. – 1, 6, 10, 15: limestone rocks at the stream; 14: limestone rocks
- Gymnostomum calcareum* Nees et Hornsch. – 9, 10: 14: limestone rocks at the stream
- Gyroweisia tenuis* (Hedw.) Schimp. – 2, 4, 16, 17, 18: exposed conglomerate rocks; 9: calcareous soil; 17: on moist walls of fortress; 18: on limestone rock in stream bed
- Habrodon perpusillus* (De Not.) Lindb. – 3: on tree bark; 15: on the bark of *Cupressus sempervirens*; 16, 19: on the bark of *Fraxinus* and *Quercus*
- Homalothecium lutescens* (Hedw.) H. Rob. – 3, 11, 12: soil among limestone rocks; 11, 14, 15: on limestone rocks; 16: on soil in maquis
- Homalothecium philippeanum* (Spruce) Schimp. – 12, 14: shaded limestone rock
- Homalothecium sericeum* (Hedw.) Schimp. – 1, 15: limestone rocks at the stream; 2: exposed conglomerate rocks; 3, 5, 6, 7: limestone rocks; 3: on the bark of *Carpinus* and *Quercus*; 11: on the bark of *Fagus*; 16: on the bark of *Quercus*
- Hygrohypnum luridum* (Hedw.) Jenn. – 1, 6, 13: limestone rocks at the stream
- Hylocomium splendens* (Hedw.) Schimp. – 1: limestone rocks at the stream; 11, 12, 14: limestone rocks
- Hypnum cupressiforme* Hedw. var. *cupressiforme* – 1: limestone rocks at the stream; 3, 5, 16: on the bark of trees; 7: on the bark of *Quercus*; 6, 11, 19: on limestone rocks and on soil; 16: on soil in maquis
- Hypnum cupressiforme* Hedw. var. *lacunosum* Brid. – 6: limestone rocks at the stream; 12, 14: on soil among limestone rocks; 17: walls of the fortress
- Isopterygiopsis pulchella* (Hedw.) Z. Iwats. – 20: limestone rocks
- Isothecium alopecuroides* (Lam. ex Dubois) Isov. – 3, 11, 19: limestone rocks; 6: limestone rocks at the stream; 11: on the bark of *Fagus*
- Kindbergia praelonga* (Hedw.) Ochyra – 12, 19: on limestone rocks and on soil

- Leptodon smithii* (Hedw.) F. Weber et D. Mohr – 3: on the bark of *Carpinus* and *Quercus*; 7: on the bark of *Acer*; 15: on the bark of *Cupressus*; 16, 19: on the bark of *Quercus*; 6, 19: limestone rocks
- Leucodon sciuroides* (Hedw.) Schwägr. – 3, 6: on the bark of *Carpinus* and *Quercus*; 7: on the bark of *Acer*; 10: on the bark of timber in the port; 16: on the bark of *Quercus*
- Mnium marginatum* (Dicks.) P. Beauv. – 1: limestone rocks at the stream; 14, 20: limestone rocks
- Mnium stellare* Hedw. – 1: limestone rocks at the stream; 11, 12, 14: limestone rocks
- Mnium thomsonii* Schimp. – 1: limestone rocks at the stream
- Myurella julacea* (Schwägr.) Schimp. – 1: limestone rocks at the stream; 14: limestone rocks
- Neckera besseri* (Lobarz.) Jur. – 7: limestone rocks
- Neckera complanata* (Hedw.) Huebener – 3: on the bark of tree; 5, 6, 7, 9, 14, 19: limestone rocks; 11: on the bark of *Fagus*; 19: on the bark of *Quercus*
- Neckera crispa* Hedw. – 6, 16: limestone rocks at the stream; 7, 11, 14, 19, 20: shaded limestone rocks; 11: on the bark of *Fagus*
- Neckera menziesii* Drumm. – 14: shaded limestone rocks
- Orthothecium intricatum* (Hartm.) Schimp. – 14: shaded limestone rocks
- Orthotrichum affine* Schrad. ex Brid. – 7 on the bark of *Quercus*; 11: on the bark of *Fagus*
- Orthotrichum anomalum* Hedw. – 4, 5, 7, 11, 12: limestone rocks
- Orthotrichum cupulatum* Hoffm. ex Brid. – 5, 7, 9, 11, 12, 16: on limestone rocks; 6, 13, 15: limestone rocks at the stream
- Orthotrichum lyellii* Hook. et Taylor – 3: on the bark of *Carpinus* and *Quercus*; 7, 16: on the bark of *Quercus*; 15: on the bark of *Cupressus sempervirens*
- Orthotrichum pallens* Bruch ex Brid. – 10: on tree bark; 16: on a tree trunk in maquis
- Orthotrichum pumilum* Sw. ex anon. – 3: on the bark of *Quercus*
- Orthotrichum rupestre* Schleich. ex Schwägr. – 7: on tree bark; 11: on the bark of *Fagus*; 12: on the bark of *Acer pseudoplatanus*
- Orthotrichum stramineum* Hornsch. ex Brid. – 11: on the bark of *Fagus*
- Orthotrichum striatum* Hedw. – 3, 7 on the bark of *Quercus*; 11: on the bark of *Fagus*; 12: on the bark of *Acer pseudoplatanus*; 16: on tree bark
- Oxyrrhynchium hians* (Hedw.) Loeske – 6, 14, 15: limestone rocks at the stream; 19: on soil; 20: limestone rocks
- Oxyrrhynchium pumilum* (Wilson) Loeske – 19: limestone rocks
- Oxyrrhynchium schleicheri* (R. Hedw.) Röhl – 19: limestone rocks
- Palustriella commutata* (Hedw.) Ochyra – 6, 9: limestone rocks at the streams
- Philonotis arnellii* Husn. – 11, 19: on soil among limestone rocks
- Philonotis fontana* (Hedw.) Brid. – 6: on soil among limestone rocks at the stream; 14: on soil
- Plagiomnium affine* (Blandow ex Funck) T. J. Kop. – 5: on soil in maquis; 14: on soil among limestone rocks; 19: on soil
- Plagiomnium elatum* (Bruch et Schimp.) T. J. Kop. – 19: on soil
- Plagiomnium ellipticum* (Brid.) T. J. Kop. – 14: limestone rocks

- Plagiomnium rostratum* (Schrad.) T. J. Kop. – 1: limestone rocks at the stream; 11, 14, 19, 20: shaded limestone rocks
- Plagiomnium undulatum* (Hedw.) T. J. Kop. – 9, 10: limestone rocks at the stream; 19: on soil; 15, 20: limestone rocks
- Plagiopus oederianus* (Sw.) H. A. Crum et L. E. Anderson – 14: limestone rocks
- Plasteurhynchium striatulum* (Spruce) M. Fleisch. – 5, 7, 14, 19: limestone rocks; 18: limestone rocks at the stream
- Platyhypnidium riparioides* (Hedw.) Dixon – 6, 13, 15: limestone rocks at the streams
- Pleurochaete squarrosa* (Brid.) Lindb. – 4: exposed conglomerate rocks; 9, 15: limestone rocks at the stream; 16: on soil in maquis; 17: walls of the fortress
- Poblia cruda* (Hedw.) Lindb. – 11, 12, 14: limestone rocks
- Poblia melanodon* (Brid.) A. J. Shaw – 1, 6, 11: limestone rocks at the streams
- Poblia wahlenbergii* (F. Weber et D. Mohr) A. L. Andrews – 20: limestone rocks
- Polytrichum juniperinum* Hedw. – 14: on soil among limestone rocks
- Pseudoleskea incurvata* (Hedw.) Loeske – 14: limestone rocks
- Pseudoleskeella catenulata* (Brid. ex Schrad.) Kindb. – 1: limestone rocks at the stream; 14: limestone rocks
- Pseudoleskeella nervosa* (Brid.) Nyholm – 1: limestone rocks at the stream
- Pseudoscleropodium purum* (Hedw.) M. Fleisch. – 1, 10, 15: limestone rocks at the stream; 3, 11, 14: limestone rocks; 19: on soil
- Pterigynandrum filiforme* Hedw. – 7, 16: on the bark of *Quercus*; 11: on the bark of *Fagus*; 12: on the bark of *Acer pseudoplatanus*
- Pterogonium gracile* (Hedw.) Sm. – 3, 19: limestone rocks; 6, 10, 15: limestone rocks at the streams
- Rhynchostegiella curviseta* (Brid.) Limpr. – 15, 18: limestone rocks at the stream; 19: basic soil
- Rhynchostegiella tenella* (Dicks.) Limpr. – 5, 19: limestone rocks; 8, 17: walls of the fortress; 18: limestone rocks at the stream
- Rhynchostegium confertum* (Dicks.) Schimp. – 5, 19: limestone rocks; 7: on the bark of *Acer*; 10, 13: limestone rocks at the stream; 16: on soil in maquis
- Rhynchostegium murale* (Hedw.) Schimp. – 1: limestone rocks at the stream; 7: limestone rocks
- Rhytidiadelphus squarrosus* (Hedw.) Warnst. – 14: shaded limestone rocks
- Rhytidiadelphus triquetrus* (Hedw.) Warnst. – 1: limestone rocks at the stream; 14: limestone rocks
- Rhytidium rugosum* (Hedw.) Kindb. – 12, 14: limestone rocks
- Sanionia uncinata* (Hedw.) Loeske – 14: shaded limestone rocks
- Schistidium brunnescens* Limpr. subsp. *griseum* (Nees et Hornsch.) H. H. Blom – 13: limestone rocks near stream (det. Schröder)
- Schistidium crassipilum* H. H. Blom – 6, 13: limestone rocks near streams; 3, 7, 11, 12: limestone rocks; 16: on rocks in maquis (conf./det. Schröder)
- Schistidium elegantulum* H. H. Blom – 7: shaded limestone rocks (conf. Schröder)

- Schistidium helveticum* (Schkuhr) Deguchi – 2: exposed conglomerate rocks (conf. Schröder)
- Sciuro-hypnum populeum* (Hedw.) Ignatov et Huttunen – 1: limestone rocks at the stream; 19: limestone rocks
- Scleropodium touretii* (Brid.) L. F. Koch – 19: limestone rocks
- Scorpiurium circinatum* (Bruch) M. Fleisch. et Loeske – 3, 7, 19: limestone rocks; 8: walls of the fortress; 9, 15, 18: limestone rocks at the stream; 10: on the bark of *Fraxinus* and on soil at the shore of the lake; 5, 16: on soil in maquis
- Scorpiurium deflexifolium* (Solms) M. Fleisch. et Loeske – 9, 10, 18: limestone rocks at the stream
- Scorpiurium sendtneri* (Schimp.) M. Fleisch. – 18: limestone rocks at the stream; 19: on the bark of *Laurus nobilis*
- Syntrichia handelii* (Schiffn.) S. Agnew et Vondr. – 14: limestone rocks (conf. Kučera)
- Syntrichia laevipila* Brid. – 3: limestone rocks; 19: on the bark of *Quercus*
- Syntrichia montana* Nees – 2, 4, 16: exposed conglomerate rocks; 3, 7: limestone rocks; 6, 10, 18: limestone rocks at the stream; 17: walls of the fortress
- Syntrichia papillosa* (Wilson) Jur. – 16: on the bark of *Quercus*
- Syntrichia ruralis* (Hedw.) F. Weber et D. Mohr var. *ruralis* – 2, 16: exposed conglomerate rocks; 7, 12, 14, 20: limestone rocks
- Syntrichia ruralis* (Hedw.) F. Weber et D. Mohr var. *ruraliformis* (Besch.) Delogne – 4: exposed conglomerate rocks
- Thamnobryum alopecurum* (Hedw.) Gangulee – 6, 10: limestone rocks at the stream; 14, 19, 20: limestone rocks
- Thuidium assimile* (Mitt.) A. Jaeger – 11, 14: limestone rocks
- Thuidium recognitum* (Hedw.) Lindb. – 11, 19: limestone rocks
- Timmia austriaca* Hedw. – 14: limestone rocks
- Tortella inclinata* (R. Hedw.) Limpr. – 2: exposed conglomerate rocks; 6: limestone rocks at the stream; 12: limestone rocks
- Tortella nitida* (Lindb.) Broth. – 3, 4, 16: exposed conglomerate rocks; 5, 7, 19: limestone rocks; 6, 10, 18: limestone rocks at the stream; 17: walls of the fortress
- Tortella tortuosa* (Hedw.) Limpr. – 2: exposed conglomerate rocks, 3, 7, 11, 12, 14, 19: limestone rocks; 6: limestone rocks at the stream
- Tortula inermis* (Brid.) Mont. – 2: exposed conglomerate rocks; 6: limestone rocks at the stream
- Tortula muralis* Hedw. – 4: exposed conglomerate rocks; 10: limestone rocks at the stream; 12: limestone rocks; 17: walls of the fortress
- Tortula subulata* Hedw. – 2: exposed conglomerate rocks; 11: soil among limestone rocks
- Trichostomum brachydontium* Bruch var. *brachydontium* – 2, 5, 16: on soil in maquis; 6, 15: limestone rocks at the stream; 19: limestone rocks
- Trichostomum brachydontium* Bruch var. *cuspidatum* (Braithw.) L. I. Savicz – 8: on the walls of the fortress
- Trichostomum crispulum* Bruch var. *crispulum* – 1, 6, 9, 10, 15: limestone rocks at the stream; 2, 4, 16: exposed conglomerate rocks in maquis

Trichostomum crispulum Bruch var. *angustifolium* Bruch et Schimp. – 5: exposed conglomerate rocks in maquis; 7: limestone rocks

Weissia brachycarpa (Nees et Hornsch.) Jur. – 11: limestone rocks; 16: on soil in maquis

Weissia condensa (Voit) Lindb. – 2, 4: exposed conglomerate rocks; 16: on soil in maquis

Weissia controversa Hedw. – 16: on soil in maquis

Weissia longifolia Mitt. var. *angustifolia* (Baumgartner) Crundw. et Nyholm – 16: on soil in maquis

Zygodon rupestris Schimp. ex Lorentz – 3: on the bark of tree; 19: on the bark of *Quercus*

CONCLUSIONS

In spite of the fact that we visited some of the bryologically best-studied parts of Montenegro, such as the Gulf of Kotor and Rijeka Crnojevića (DRAGIČEVIĆ and VELJIĆ 2006), several species are new records for the country. This reflects the fact that the exploration of the bryophyte flora of Montenegro is still incomplete, and future field studies are greatly needed to extend the knowledge on the distribution of bryophytes in Southeast Europe.

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