Portugaliae Acta Biol. **20**: 65-74. Lisboa, 2002

CONTRIBUTION TO THE BRYOFLORA OF SERBIA: A BRYOPHYTE COLLECTION FROM 1996

Marko Sabovljevic[1] & Cecília Sérgio[2]
[1]Department of Plant Ecology and Phytogeography, Institute of Botany and Botanical Garden, Faculty of Biology, University of Belgrade, Takovska 43, YU - 11000 Belgrade. Yugoslavia, Email: marko@belgrade.co.yu
[2] Jardim Botânico (M.N.H.N.) / Centro de Ecologia e Biologia Vegetal (FCUL), Rua da Escola Politécnica 58, 1250 - 102, Lisboa, Portugal.
Email: csergio@fc.ul.pt

Sabovljevic, M. & Sérgio, C. (2002). Contribution to the bryoflora of Serbia: a bryophyte collection from 1996. *Portugaliae Acta Biol.* **20**: 65-74.

The bryoflora of Serbia is poorly known. Many widespread species are known from just one locality. This study presents a contribution to the Serbian bryophyte flora. Eight species have been collected for the first time in Serbia.

Keywords: Bryophytes, liverworts, mosses, Serbia, flora.

Sabovljevic, M. & Sérgio, C. (2002). Contribuição para a brioflora da Sérvia. Uma colecção de briófitos de 1996. *Portugaliae Acta Biol.* **20**: 65-74.

A brioflora da Sérvia é mal conhecida. Muitas espécies de distribuição generalizada são conhecidas de uma única localidade. Este estudo corresponde a uma nova contribuição para a brioflora da Sérvia onde são referidas oito espécies ainda não indicadas para este país.

Palavras chaves: Briófitos, hepaticas, musgos, Sérvia, flora.

INTRODUCTION

The region of the Balkan peninsula has been very poorly bryologically investigated in the past, and there is still very little bryophyte research taking place. However, some bryophyte collections have been made recently and some bryological research has been conducted. One bryophyte collection was made in Serbia in 1996, by the first author. To date, 423 species of mosses (SABOVLJEVIC & STEVANOVIC 1999) and 78 species of liverworts (SABOVLJEVIC 2000) have been recorded in Serbia. Many of the records even for the common species have not more then two references in the literature, and there are no bryophyte herbaria in the region. It is therefore not unusual to make

many new records (eg. SABOVLJEVIC 1998; SABOVLJEVIC 1999) of bryophytes, considering that most of the territory has never been investigated previously.

METHODS

The bryophyte specimens were collected in several different localities in Serbia (Fig. 1):

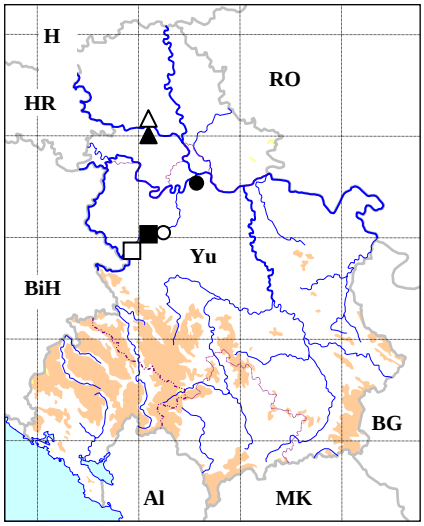

Figure 1. The investigated localities in 1996. The map present the Federal Republic of Yugoslavia, and all investigated areas are in Serbia.
Localities are presented with simbols:
- Loc. 1; - Loc.2; ○ - Loc. 3; ● - Loc. 4; △- Loc. 5; ▲ - Loc. 6.
The grey represents areas above 1000m altitude. Abreviations: **YU** - the Federal Republic of Yugoslavia; **Al** - Albania; **MK** - Macedonia; **BG** - Bulgaria; **RO** - Romania; **H** - Hungary; **HR**- Croatia; **BiH** -Bosnia and Herzegovina.

Loc. 1 - Gorge of the river Gradac, near the town of Valjevo (W. Serbia); UTM: 34TDQ01; ca. 200 m above sea level; 29.06.1996.

Loc. 2 - Povlen Mt. (W. Serbia); UTM: 34TDP08; 1000 - 1200 m above sea level; 27.07.1996.

Loc. 3 - Petnica near the town of Valjevo (W. Serbia); UTM: 34TDQ01; 200 m above sea level; 29.06.1996.

Loc. 4 - Košutnjak near Belgrade; UTM: 34TDQ64; 200 m above sea level; 21.04.1996.

Loc. 5 - Petrovaradin fort, city of Novi Sad, Vojvodina (N. Serbia); UTM: 34TDR11; 80 m above sea level; 17.04.1996.

Loc. 6 - Vrdnik sourrounding, in Fruška Gora Mt., Vojvodina (N. Serbia); UTM: 34TDQ90; 300 m above sea level; 30.05.1996.

The distribution of some interesting species within the Federal Republic of Yugoslavia is presented in the maps (Fig. 2 - 10), which are overlaid with 100x100 km UTM grid squares.

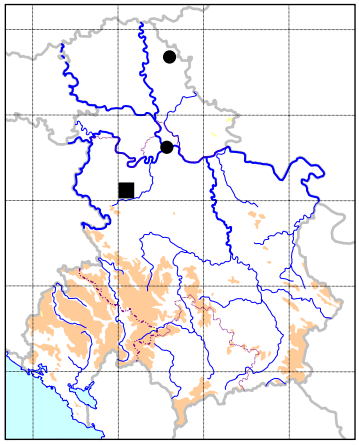

Figure 2. Distribution of *Mannia fragrans* in the Federal Republic of Yugoslavia. ( ) represent a new locality in Yugoslavia. Localities:
SERBIA: Topcider by Belgrade (UTM: 34TDQ16 cited by Jurisic, 1900); Banat: Ruska Mandra (UTM: 34TDR3 citrd by Pancic, 1861).
NEW: Serbia: gorge of the river Gradac (UTM: 34TDQ01).

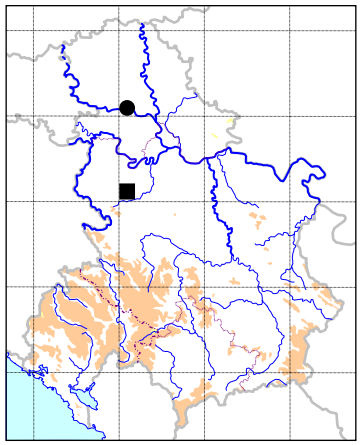

Figure 3. Distribution of *Bryum subapiculatum* (●) and *Bryum laevifilum* ( ) in the Federal Republic of Yugoslavia.
Bryum subapiculatum (●).
NEW: Serbia: Petrovaradin fort by the city of Novi Sad (UTM:34TDR00).
Bryum laevifilum ( ).
NEW: Serbia: gorge of the river Gradac (UTM: 34TDQ01).

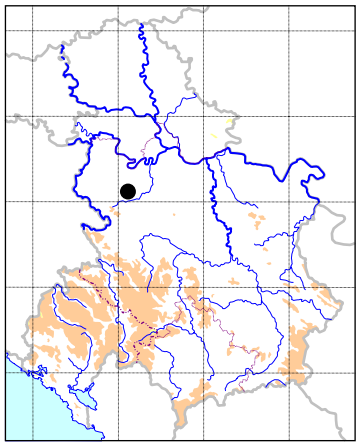

Figure 4. Distribution of *Plagiothecium latebricola* and *Plagiothecium succulentum* in the Federal Republic of Yugoslavia.
NEW: Serbia: gorge of the river Gradac (UTM: 34TDQ01).
NOTE: *Plagiothecium succulentum* has been previously reported by Martincic, 1968 for Serbia, but there is no exact data on localities within Serbia.

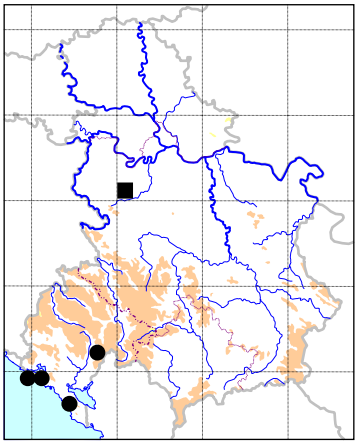

Figure 5. Distribution of *Rhynchostegiella tenella* in the Federal Republic of Yugoslavia
Known Localities (●):
MONTENEGRO: Skaljari by Kotor (UTM: 34TCN01 cited by Glowacki, 1907); Obota and Komovi (UTM: 34TCN4 cited by Höhnel, 1983); Kumbor and Savine by Hercegnovi (UTM: 34TBN91 cited by Velenovsky, 1901); Budva (UTM: 34TCM23 cited by Latzel, 1931).
NEW ( ): Serbia: gorge of the river Gradac (UTM: 34TDQ01).

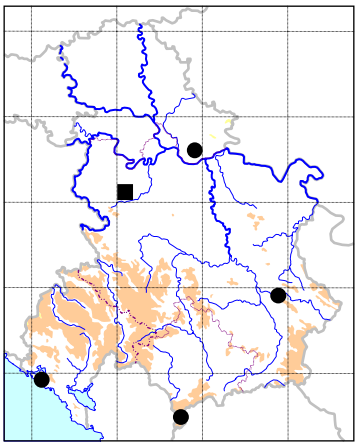

Figure. 6. Distribution of *Tortella inclinata* in the Federal Republic of Yugoslavia.
Known Localities (●):
SERBIA: Deliblato (UTM: 34TEQ06 cited by Soska, 1949); Sv Petka by the city of Nis (UTM: 34TEN74 cited by Podpera, 1911); Sara Mt.: Ljuboten (UTM: 34TDM75 cited by Martincic, 1980).
MONTENEGRO: Hercegnovi (UTM: 34TBN09 cited by Latzel, 1931).
NEW ( ): Serbia: gorge of the river Gradac (UTM 34TDQ01).

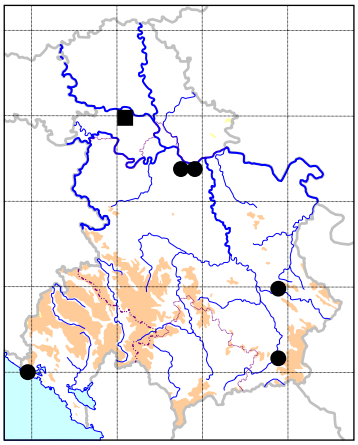

Figure. 7. Distribution of *Amblystegium varium* in the Federal Republic of Yugoslavia.
Known Localities (●):
SERBIA: Around the town of Smederevo (UTN: 34TDQ94 cited by Jurisic, 1900); Vranjska Banja (UTM: 34TDQ71 cited by Podpera, 1911); Ripanj by Smederevo (UTM: 34TDQ74 cited by Soska, 1949); Sv. Petka near the city of Nis (UTM: 34TEN74 cited by Podpera, 1911).
MONTENEGRO: Hrecegnovi (UTM: 34TBN09 cited by Latzel, 1931).
NEW ( ): Serbia: Petrovaradin fort by the city of Novi Sad (UTM: 34TDR11).

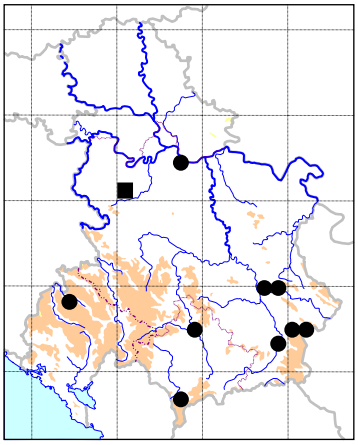

Figure 8. Distribution of *Mnium stellare* in the Federal Republic of Yugoslavia.
Known Localities (●):
SERBIA: Kosovska Mitrovica (UTN: 34TDN04 cited by Szepesfalvi, 1926); Ripanjska lipovica (UTM: 34TDQ64 cited by Soska, 1949); Nis sourounding (UTM: 34TDN97 cited by Katic, 1907); Vranjska Banja (UTM: 34TDQ71 cited by Podpera, 1911); Vrla Reka by Surdulica (UTM: 34TEN94 cited by Podpera, 1911); Vlasina (UTM: 34TNF02 cited by Podpera, 1911); Sara Mt.: Kobilica (UTM:34TDM76 cited by Martincic, 1980).
MONTENEGRO: Durmitor Mt.: Savin Kuk, Crijepuljina poljana (UTM: 34TCN47 cited by Martinic, 1964) and Susica (UTM: 34TCN47 cited by Kürschner & Parolly, 1997).
NEW ( ): Serbia: gorge of the river Gradac (UTM: 34TDQ01).

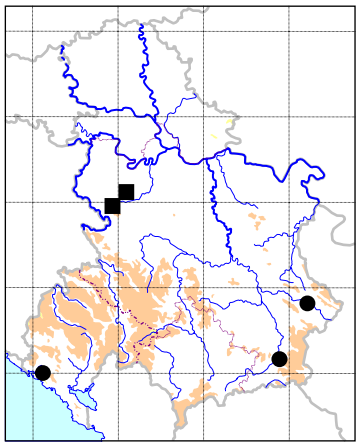

Figure 9. Distribution of *Brachythecium glareosum* in the Federal Republic of Yugoslavia.
Known Localities (●):
SERBIA: Belava by Pirot (UTM: 34TFN37 cited by Matouschek, 1899); Vranjska Banja (UTM: 34TDQ71 cited by Podpera, 1911).
MONTENEGRO: Dobrota by Kotor (UTM: 34TCN01 cited by Glowacki, 1907).
NEW ( ): Serbia: gorge of the river Gradac (UTM: 34TDQ01); Serbia: Povlen Mt. (UTM: 34TDP08).

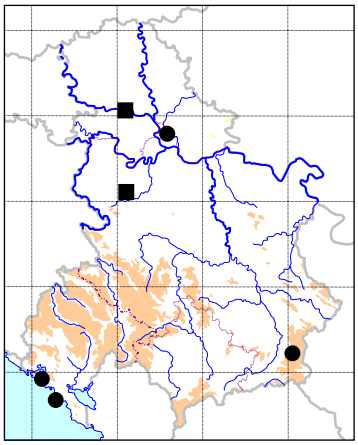

Figure 10. Distribution of *Brachythecium glareosum* in the Federal Republic of Yugoslavia.
Known Localities (●):
SERBIA: Rakovica by Belgrade (UTM:34TDQ64 cited by Jurisic, 1900); Gornji Milanovac (UTM: 34TDP97 cited by Simic, 1900); Vlasina (UTM: 34TNF02 cited by Katic, 1910).
MONTENEGRO: Boka Kotorska: Meljine (UTM: 34TCN01 cited by Weiss, 1866).
NEW ( ): Serbia: gorge of the river Gradac (UTM: 34TDQ01); Petrovaradin fort by the city of Novi Sad (UTM:34TDQ00).

The nomenclature follows SABOVLJEVIC & STEVANOVIC (1999) for mosses and SABOVLJEVIC (2000) for liverworts. Newly recorded species follow CORLEY *et al.* (1981) and CORLEY & CRUNDWELL (1991) for mosses and GROLLE & LONG (2000) for liverworts.

The specimens are deposed in LISU as well as in the private herbarium of the first author. The identification of the specimens took place in Lisbon Botanical Garden.

The specimens were collected from different habitat conditions. The climates are described according to STEVANOVIC & STEVANOVIC (1995) as follows: the Gorge of the river Gradac (locality 1) is middle continental with influence from the Mediterranean; Povlen Mt. (locality 2) is continental montane; Petrovaradin fort (locality 5) is continental with steppic influence; the other localities (3, 4 and 6) are continental – temperate.

RESULTS

The present collection contains 83 specimens and 52 bryophyte species (Table 1), 8 of which are reported for the first time for Serbia. All the 52 species are cited from the new localities, bearing in mind that bryophyte research has never taken place at these localities. All the specimens were collected by MS, and determined by CS and MS in 2000 in LISU. *Campylopus subulatus* has been confirmed by J. P. Frahm, 2000, and *Cirriphyllum ornellanum* by R. Ochyra, 2000.

DISCUSSION AND CONCLUSION

Bryology has been neglected for decades in Serbia of the Federal Republic of Yugoslavia, resulting in a region with one of the lowest levels of bryophyte knowledge in Europe. Any further bryological contribution is therefore very welcome.

In this 1996 bryophyte collection, 8 of 52 species were newly recorded for Serbia. These are: *Bryum laevifilium, B. subapiculatum, Plagiothecium latebricola, Rhynchostegiella tenella, Schistidium crassipilum, S. singerense, Campylopus subulatus* and *Cirriphyllum ornellanum.*

From the distribution maps (Figs. 2 to 10) it is clear that most of the species have been recorded from just a few localities in a country that covers more than 102.000 km^2, and that has all the main European biomes. Maps (Figs. 2 to 10) show the distribution pattern, as far as is known, of some species. There is an urgent need for further bryological investigation in Serbia. All previous reports have been made before 1960, but there are no bryophyte herbaria in the country and so there is no possibility to check specimens or previous records.

Table 1. The list of species from the 1996 collection (MS= herbarium of M. Sabovljevic and LISU) from Serbia, with localities, ecology, and other relevant data.

Species	Loc.	Ecology	No
MOSSES			
Amblystegium serpens (Hedw.) B., S. & G.	5	on dry wall, full light	116
Amblystegium varium (Hedw.) Lindb.	5	on dry wall, full light	115
Anomodon attenuatus (Hedw.) Hub.	1	on limestone rocks, in shade	123, 151, 171, 180
	6	on limestone rocks, in shade	
Atrichum undulatum (Hedw.) P. Beauv.	3	on forest floor	135
	6	on forest floor	121
Barbula convoluta Hedw.	1	on dry ground, in shade	138
	3	in limestone rock crevices, dry, light	146
Brachythecium glareosum (Spruce) B., S. & G.	1	on ground and tree base, in shade, wet	168
	2	on rocks in *Fagetum montanum*	184
Brachythecium salebrosum (Web. & Mohr) B., S. & G.	1	on trunk bark, in shade	141
Brachythecium velutinum (Hedw.) B., S. & G.	6	on forest floor, in shade	121a
Bryum argenteum Hedw.	5	on dry wall, full light	117, 118
Bryum caespiticium Hedw.	5	on dry wall, full light	109
Bryum capillare Hedw. var. *capillare*	1	on limestone and ground, dry, in shade	152
Bryum laevifilum Syed.	1	on the trunk bark, in shade	142
Bryum subapiculatum Hampe	5	on the brick wall, dry, full light	97a
Campylopus subulatus Schimp.	2	on the slate rock, dry	186
Ceratodon purpureus (Hedw.) Brid.	1	on the trunk bark, in shade	139
Cirriphyllum ornellanum (Mol.) Loeske	2	on limestone rocks in *Fagetum montanum*, in shade	183
Ctenidium molluscum (Hedw.) Mitt.	3	limestone rocks, in shade, forest	133
Dicranella heteromalla (Hedw.) Schimp.	4	base tree in the *Querco –Carpinetum*	95
	6	ground in decidous forest, in shade	119
Encalypta vulgaris Hedw.	5	on dry wall, full light	108
Eurhynchium striatum (Hedw.) Schimp.	1	on the limeston rock, dry, in shade	150
	5	on dry wall, full light	107, 116
Grimmia pulvinata (Hedw.) Sm.	5	on dry wall, full light	105
Homalothecium lutescens (Hedw.) Robins.	5	on dry wall, full light	98
Homalothecium sericeum (Hedw.) B., S. & G.	1	on the limestone rock, dry	161
	5	on the brick wall, dry, full light	101

Table 1 – (cont.)

Species	Loc.	Ecology	No
MOSSES			
Hypnum cupressiforme Hedw.	1	Limestone, tree base and ground, light or in shade, dry	147, 175
Lescurea incurvata (Hedw.) Lawton	1	on the limestone rocks and tree base, in shade	169, 176
Leskea polycarpa Hedw.	1	on the ground	143
Leucodon sciuroides (Hedw.) Schwaegr.	5	on dry wall, full light	114
	6	on the rocks, in shade	179
Mnium stellare Hedw.	1	on the limestone and stumps, in shade	129, 171
Neckera complanata (Hedw.) Hueb.	1	on the limestone rocks, in shade	130
Plagiomnium affine (Bland.) T. Kop.	1	on the ground, in shade	164, 165
Plagiomnium rostratum (Schrad.) T. Kop.	1	on the ground, wet, in shade	170, 177, 164
Plagiothecium denticulatum (Hedw.) B., S. & G.	1	on tree base and ground, in shade	175
Plagiothecium latebricola B., S. & G.	1	wet limestone and ground, in shade	128, 131
Plagiothecium succulentum (Wils.) Lindb.	1	on the bark of oak trunk, in shade	140
Pohlia elongata Hedw.	6	on the ground and tree base, in shade	120, 121
Polytrichum piliferum Hedw.	2	on the slate rocks, dry	185
Pseudoleskeella nervosa Brid. (Nyh.)	5	on dry wall, full light	113
Rhynchostegiella tenella (Dicks.) Limpr.	1	on the trunk, decaying wood and limestone, in shade, wet to dry	124, 149, 166
Rhynchostegium riparioides (Hedw.) C. Jens.	1	in the fresh clean water, on the limestone rock, in shade	122
	3		134
Schistidium crassipilum Blom	1	on the limestone rocks, dry, in shade	144, 157
	3	boulder in the forest	136a
Schistidium singerense (Schiffn.) Laz.	3	on dry wall, full light	136b
	5	boulder in the forest	111
Thuidium delicatulum (Hedw.) Mitt.	1	on the ground and limestone rocks	167
Tortella inclinata (Hedw. f.) Limpr.	1	on the limestone rocks, dry	155, 160
Tortella tortuosa (Hedw.) Limpr.	1	on the limestones and ground, dry	154, 159
	2	on the slate rocks, dry	187
Tortula muralis Hedw.	5	on the walls, concretes, and rocks, dry, full light	97, 100, 102, 104, 118, 103
Tortula ruralis (Hedw.) Gaertn., Meyer & Scherb.	5	on dry wall, full light	99, 181
	6	on the rocks, in shade	180, 181
Trichostomum crispulum Bruch.	1	on the limestone rocks, dry	163

Table 1 – (cont.)

Species	Loc.	Ecology	No
LIVERWORTS			
Conocephalum conicum (L.) Lindb.	1	river bank, limestone rocks and ground	126
Mannia fragrans (Balb.) Freye & L. Clark	1	fissure in the limestone, on ground, dry	153
Metzgeria furcata (L.) Dum.	1	limestone rock and ground, tree base	127
Pellia endiviifolia (Dicks.) Dum.	3	on the ground and limestone, wet	137
Porella platyphylla (L.) Pfeiff.	1	on the limestone rock, wet	158

ACKNOWLEDGEMENTS

We would like to express our thanks to Dr. R. Ochyra and Dr. J. P. Frahm for confirming the identity of *Cirriphyllum ornellanum* and *Campylopus subulatus*, respectively.

REFERENCES

GLOWACKI, J. (1907). Bryologische Beiträge aus dem Okkupationsgebiete III - IV. *Verh. – Zool. Bot. Ges. Wien* 57: 223 - 244.

HÖHNEL, F. (1893) Beitrag zur Kenntnis der Laubmoosflora des Küsten striches vom Görzer Becken bis Skutari in Albanien. *Österr. Bot. Zeitschr*. 43: 405.

JURIŠIC, Z. (1900). Prilog poznavanju mahovina u Srbiji. *Spomenik Srpske Akademije Nauka* 45: 47-60.

KATIC, D. (1907). Prilog gradji za floru briofita u Srbiji. *Prosvetni Glasnik.*

KATIC, D. (1910) Vlasinska tresava i njezina prošlost. *Spomenik. Srpske Akademije Nauka* 50: 14-56.

KÜRSCHNER, H. & PAROLLY, G. (1997). Additions to the bryophyte flora of the Durmitor National Park (Crna Gora) and a first conspectus of all records. *Willdenovia* 27: 249-264.

LATZEL, A. (1931). Vorarbeiten zu ainer Laubmoosflora Dalmatiens. *Beih. z. Bot. Zentralbl*. 48: 437 -511.

MARTINCIC, A. (1964). Prispevek k poznavanju mahovne flore Jugoslavije I. Durmitor (Crna Gora). (Beiträge zur Kenntnis der Moosflora Jugoslawiens I Durmitor (Montenegro). *Biološki Vestnik* 12: 14-19.

MARTINCIC, A. (1968). *Catalogus Florae Jugoslaviae*. Ljubljana.

MARTINCIC, A. (1980). Prispevek k poznavanju mahovne flore Jugoslavije II. Šar planina. (Beiträge zur Kenntnis der Moosflora Jugoslawiens II. Šar pl.). *Biološki Vestnik* 28 (2): 87-102.

MATOUSCHEK, F. (1899). Beitrag zur Mooskenntnis von Südserbien. *Verh. - Zool. Bot. Ges. Wien*. 49: 386-390.

PANCIC, J. (1861). Zur Moosflora des Nordöstlischen Banates. *Verh. Zool. Bot. Ges. Wien*. 11: 93.

PODPERA, J. (1911). Ein Beitrag zur Moosflora der bulgarischen Hochgebirge. *Beih. Bot. Zentralbl*. 28 (2): 173-224.

SABOVLJEVIC, M. (1998). The Rare Bryophytes of Sara Mountain, Yugoslavia. Planta *Europa* 2: 159-161.

SABOVLJEVIC, M. (1999). *Anastrophyllum minutum* (Schreb.) Schuster, new to Serbia (FR Yugoslavia) and its distribution in the Balkans. *Phytologia Balcanica* 5 (2-3): 93-96.

SABOVLJEVIC, M. (2000). Checklist of hepatics of the Federal Republic of Yugoslavia, *Lindbergia* 25: 37 – 42.

SABOVLJEVIC, M. & STEVANOVIC, V. (1999). Moss Conspectus of the Federal Republic of Yugoslavia. *Flora Mediterranea* 9: 65-65.

SIMIC, M. (1900). Prilog flori mahovina u Srbiji. *Spomenik Srpske Akademije Nauka* 35: 5-46.

SOŠKA, T. (1949). Pregled mahovina i lišajeva u okolini Beograda. *Glasnik prirodnjackog muzeja srpske zemlje B* 1 – 2: 93-112.

STEVANVOVIC, V. & STEVANOVIC, B. (1995). Osnovni klimatski, geoloski i pedoloski cinioci biodiverziteta kopnenih ekosistema Jugoslavije *In:* STEVANOVIC, V. & VASIC, V. (eds.) *Biodiverzitet Jugoslavije sa pregledom vrsta od medjunarodnog znacaja*. Ecolibri i Bioloski Fakultet, Beograd.

SZEPESFALVI, J. (1926). *Bryophyta in Additameta ad Floram Albaniae explorationes. In*: CSIKI, E., JAVORKA, A. & KÜMMERELE, E. B. (ed.).

VELENOVSKY, J. (1901). Ein Beitrag zur Moosflora von Montenegro. *Österr. Bot. Zeitschr*. 51: 254-256.

WEISS, E. (1866). Floristisches aus Istrien, Dalmatien und Arbanien. *Verh. - Zool. Bot. Ges. Wien* 16: 571-584.