BRYOFLORISTICAL DATA FROM THE GUTÂI MOUNTAINS (ROMANIAN EASTERN CARPATHIAN, TRANSYLVANIA)

Andrea Sass-Gyarmati

Eszterházy Károly University, Institute of Biology, Department of Botany and Plant Physiology; Eger, Pf. 43, H-3301 Hungary; E-mail: sassgyarmati@gmail.com

Abstract: The main aim of this study was to explore the bryophyte diversity and distribution patterns in the Gutâi Mountains. From our collections hitherto 52 bryophyte species were identified. The 12 Marchantiophyta and 40 Bryophyta species belong to 45 genera of 27 families. *Nardia scalaris* is new for the whole Gutâi Mountains. Among them the vulnerable *Grimmia muehlenbeckii* and the very rare *Riccardia palmata* are worth to be mentioned.

Keywords: bryoflora, rare species, Gutâi Mountains, Romania

INTRODUCTION

First bryological records of the Gutâi (Gutin) Mountains were published at the end of XIXth century (Juratzka 1882) and the investigations continues in the XXth century, which till now is far from complete (Pop 1942; Boros 1943, 1951; Boros and Vajda 1967; Raţiu and Moldovan 1972a, 1972b, 1974; Ştefureac 1974, 1976–1977; Mititelu and Dorca 1983; Coldea and Plămadă 1989). A very detailed floristical and vegetational study is given by Moldovan (1970) and one study was published on saxicolous
lichens from the Gutâi Mountains (Codoreanu 1972). Tamás Pócs with his wife visited and collected in the area during the summer of 1993.

Much less bryological investigations has been done in the past twenty years completing with additional floristical data (Jakab 1999, Ardelean et al. 2008). We started our work in 2018 and our aim is to continue bryological exploration of this area.

**Study area**
The Gutâi Mountains are a mountain range within the Vihorlat – Gutâi area of the inner Eastern Carpathians. Igniş and Gutâi mountains are situated at the western and southern limit of Maramureş Land, they are the oldest sector of the volcanic range in Eastern Carpathians. Separated by mountain passes from the neighbouring units (Huta 587 m, Gutâi 984 m, Neteda 1039 m) they are two separate units distinguished by geoforms originating from different types of volcanic activity: Ignis mountains as andesitic plateau, mostly stratified, with small depressions, an end cliff and residual forms, named rocks (Piatra Săpânţei, Piatra Goală, Piatra Rea etc); Gutâi Mountains with pyroxene andesite, mostly vertical columns with a controversial neck – Creasta Cocoşului and cone shaped summits (*Figure 1*). On the northern limit of the mountains, a piedmont range forms contact with the Maramureş lowland, often associated with the mountain range due to the position of the settlements around the massifs (Ilies et al. 2017). The Gutâi Mountains have several higher regions: Gutâiul Mare (1443 m), Creasta Cocoşului (1395 m), Trei Apostoli (1398 m), Gutâiul Doamnei (1426 m) and Secătura (1390 m). Creasta Cocoşului is a protected area of national interest and is included in the Gutâi-Creasta Cocoşului Natura-2000 site it is a ridge formation about 200 metres in length and located at an average altitude of 1200 metres, surrounded by mixed forests, large beechwood and spruce areas, the peat bog at Tâul Chendroaiei (Chendroaia’s Pond), juniper areas and mountain pastures. The climate of the SE Carpathians is colder and more continental than that of the NW Carpathians (Hajdú-Moharos 1996). The Firiza Lake was established in 1964, when 52 m high dam gates were closed to stem the Firiza water tributary of the Sasar at Baia Mare. The lake has a length of 3 km and a width of 1 km. Built for the Baia Mare city water supply, now the Firiza Lake is used for recreational and
leisure and is one of the favorite places of population in Baia Mare, the landscape is particularly special, with coniferous and deciduous forest around.

Figure 1. View from the Creasta Cocoșului summit (Photo: Róbert Sass-Gyarmati).

MATERIAL AND METHODS

The byophytes enumerated below were collected from the Gutâi Mountains between 8-9 August 2018 by Andrea and Róbert Sass-Gyarmati and identified by Andrea Sass-Gyarmati and the species Grimmia muehlenbeckii identified by Peter Erzberger. The collection was made in various vegetation types: meadows, beech and spruce forests and subalpine belts. The Romanian distribution of mosses was established from Plămadă (1998) and Mohan (1998), while that of the liverworts from Ștefănuț (2008). The nomenclature of liverworts follows Ștefănuț (2008) modified by Söderström et al. (2016), nomenclature of mosses follows Hill et al. (2006), except Racemitrium affine which was recently included to Bucklandiella (F. Weber & D. Mohr) Bednarek-Ochyra & Ochyra (Ochyra et al. 2003). and Racemitrium aquaticum also recently included to Codriophorus (Brid. ex Schrad.) Bedn.-Ochyra & Ochyra,
Bednarek-Ochyra (2006). The classification of liverworts (Marchantiophyta) follows Söderström et al. (2016), while the classification of mosses (Bryophyta) follows Goffinet and Shaw (2009). The species in each family are arranged in alphabetical order. Species names are followed by the collecting site number, and by the substrate on which they were grown. The collected specimens are deposited in the Herbarium of Eger (EGR). The collecting sites are listed in the Appendix.

RESULTS

List of species
During the field study 52 bryophyte species were found in the investigated area. The 12 Marchantiophyta and 40 Bryophyta species belong to 45 genera of 27 families.

Marchantiophyta
Conocephalaceae
Conocephalum conicum (L.) Dumort. – 4: on irrigated rocks

Marchantia polymorpha L. – 4: on irrigated rocks

Aneuraceae
Riccardia palmata (Hedw.) Carruth – 4: on decaying wood

Lophoziaceae
Lophozia ventricosa (Dicks.) Dum. – on decaying wood

Scapaniaceae
Diplophyllum albicans (L.) Dumort. – 5: on soil covered rocks
Scapania undulata (L.) Dumort. – 4: on irrigated volcanic rocks

Gymnomitriaceae
Nardia scalaris Gray – 5: on soil. It was collected also by S. & T. Pócs in 1993 (unpublished).

Marsupella emarginata (Ehrh.) Dumort. – 5: on soil

Radulaceae
Radula complanata (L.) Dumort. – 1, 4: bark of Fagus
Lophocoleaceae

*Chiloscyphus polyanthos* (L.) Corda – 4: on irrigated volcanic rocks

*Lophocolea heterophylla* (Schrad.) Dumort. – 1: on decaying wood

Plagiochilaceae

*Plagiochila porelloides* (Torrey. ex Nees) Lindenb. – 4: on soil

Bryophyta

Andreaeaceae

*Andreaea rupestris* Hedw. – 6: on volcanic rocks

Tetraphidaceae

*Tetrathis pellucida* Hedw. – 6: on decaying wood

Polytrichaceae

*Atrichum undulatum* (Hedw.) P. Beauv. – 1, 4: on soil

*Oligotrichum hercynicum* (Hedw.) Lam. & DC. – 3: on soil

*Pogonatum urnigerum* (Hedw.) P. Beauv. – 3: on soil

*Polytrichastrum alpinum* (Hedw.) G. L. Sm. – 5: on soil

*Polytrichastrum formosum* (Hedw.) G. L. Sm. – 2, 4: on soil

*Polytrichum juniperinum* Hedw. – 6: on rocks

Encalyptaceae

*Encalypta streptocarpa* Hedw. – 5: on soil

Grimmiaceae

*Grimmia muehlenbeckii* Schimp. – 6: on rocks

*Cordiophorus aquaticus* (Brid.) Bednarek-Ochyra & Ochyra. Syn.: *Racomitrium aquaticum* (Hedw.) Brid. – 4: on rocks

*Bucklandiella affinis* (F. Weber & D. Mohr) Bednarek-Ochyra & Ochyra. Syn.: *Racomitrium affine* (F. Weber et D. Mohr) Lindb. – 6: on soil

Ditrichaceae

*Ceratodon purpureus* (Hedw.) – 1: on disturbed soil

Dicranaceae

*Dicranella heteromalla* (Hedw.) Schimp. – 2, 5: on decaying wood

*Dicranoweisia crispula* (Hedw.) Milde – 4, 6: on volcanic rocks
Dicranum flagellare Hedw. – 4: base of Fagus
Dicranum scoparium Hedw. – 1: base of Carpinus
Paraleucobryum longifolium (Hedw.) Loeske – 4: on soil covered rocks, 6: on rocks

Pottiaceae

Bryoerythrophyllum recurvirostrum (Hedw.) P. C. Chen – 5: on soil covered rocks
Didymodon fallax (Hedw.) R. H. Zander – 5: on soil
Gymnostomum calcareum Nees & Hornsch. – 6: on vertical cliff

Bryaceae

Bryum pseudotriquetrum (Hedw.) P. Gaertn. – 3: on irrigated rocks

Mniaceae

Plagiochloa undulata (Hedw.) T. J. Kop. – 4: on soil covered rocks
Rhizomnium punctatunm (Hedw.) T. J. Kop. – 2, 4: on soil

Leskeaceae

Leskea polycarpa Hedw. – 4: on bark
Pseudoleskea nervosa (Brid.) Nyholm – 4: on bark

Amblystegiaceae

Amblystegium serpens (Hedw.) Schimp. – 2, 4: on tree base
Amblystegium subtile (Hedw.) Schimp. – 2: on tree base
Sanionia uncinata (Hedw.) Loeske – 4: on tree base

Hloxomciaceae

Pleurozium schreberi (Willd. ex Brid.) Mitt. – 13: on soil

Pterigynandraceae

Pterigynandrum filiforme Hedw. – 4: on Fagus bark

Thuidiaceae

Abietinella abietina (Hedw.) M. Fleisch. – 1: on soil

Brachytheciaceae

Brachythecium rutabulum (Hedw.) Schimp. – 1: on soil
Brachythecium rivulare Schimp. – 2: on wet soil
Brachythecium salebrosum (Hoffm. ex F. Weber et D. Mohr.) Schimp. – 1,4: on soil

Plagiotheciaceae

Plagiothecium denticulatum (Hedw.) Schimp. – 1: on tree base

Plagiothecium laetum Schimp. – 4: on tree base

Hypnaceae

Ctenidium molluscum (Hedw.) Mitt. – 4, 5: on rocks

Hypnum cupressiforme Hedw. – 1: on rocks

Lembophyllaceae

Isothecium myosuroides Brid. – 1: on tree base

DISCUSSION

The results of this study contributes to the knowledge of the biodiversity in Gutâi Mountains. The main reason for relatively high biodiversity is the variety of habitat types that can be found in this area.

Nardia scalaris Gray – circumboreal, mountain taxon it is not known from the Gutâi Mountains. Based on Mohan checklist occurs in Maramureșului Mountains: Vl. Jâjla, Turcul and several localities from the romanian Carpathians: Iezer Păpușa Mountains, Bihor Mountains, Bucegi Mountains, Retezat Mountains, Cibinului Mountains and Mlaștina turbăria Cristișor.

Riccardia palmata (Hedw.) Carruth. – circumboreal, mountain species, it is reported only from one locality from Gutâi Mountains: Cheile Tătaru at Mara (Boros and Vajda 1967). Other reports from surroundings are from Borșa, Secului Valley, Sighet, Poiana Șarampoiiului Forest, Mara, Runc Valley, Puzdra Mountain, (Boros and Vajda, 1967); between Tocila Valley and Băiuț (Jakab 1999), well distributed in the Romanian Carpathians (Mohan 1998).

Grimmia muehlenbeckii Schimp. – is treated as vulnerable (VU) in Romania (Ștefănuț and Goia 2012), it is known just from few localities in the country: jud. Alba: Vl. Galbina, Mtele Gâina; jud. Gorj: Mţii Parâng; pasul Surduc; jud. Harghita: Munții Hargita; jud. Hunedoara: Deva; jud. Maramureș: Muntele Pietrosul Rodnei; jud.
Suceava: Mtele Ceardac. (Mohan 1998). These findings should enhance the knowledge of bryoflora, the results emphasizes the importance of further research in this highly valuable area.

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APPENDIX

List of collecting sites from the Gutâi Mts:

1. Munții Gutâi (Gutin hegység), Maramureș County. Firiza Lake above Firiza village in acidophyllous *Fagus-Carpinus* forest at 5-600 m alt. 47°43’30.95”N, 23°35’54.45”E. Date: 08. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1801

2. Munții Gutâi (Gutin hegység), Maramureș County. Gutin Pas (Pasul Gutâi). Acidophyllous beech forest (*Luzulo-Fagetum*) at 980 m alt. N47°42’0.02”, E23°47’33.77”. Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1802

3. Munții Gutâi (Gutin hegység), Maramureș County. Spring bogs Poiana Boului (Ökörmező), NE from Baia Sprie (Felsőbánya), at 1055 m alt. N47°41’49.37”, E23°48’13.03”. Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1803

4. Munții Gutâi (Gutin hegység), Maramureș County. Subalpine beech forest below the forest line along the path to Creasta Cocoșului Peak summit between 1100-1200 m alt. N 47°42’14.42”, E 23°50’28.66”. Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1804

5. Munții Gutâi (Gutin hegység), Maramureș County. Subalpine *Vaccinium* dwarf bush on the Creasta Cocoșului (Kakastaréj) summit at 1400-1420 m alt. N 47°42’14.22”, E 23°50’30.55”. Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1805

6. Munții Gutâi (Gutin hegység), Maramureș County. Volcanic rocks above forest line near Creasta Cocoșului (Kakastaréj) crest at 1400 m alt. N47°42’14.55”, E23°50’30.53” Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1806