

## THE STUDY OF CORTICOLOUS BRYOPHYTES COMMUNITIES FROM THE ARIEȘUL MARE BASIN

*Irina GOIA*<sup>1</sup>, *René SCHUMACKER*<sup>2</sup>

<sup>1</sup> Universitatea “Babeș-Bolyai”, Facultatea de Biologie și Geologie, Catedra de Taxonomie și Ecologie,  
str. Republicii, nr. 42, RO-400015 Cluj Napoca

<sup>2</sup> Université de Liège, 620 Becco, B-4910 Theux

**Abstract:** The present study reveals the existence of 9 corticolous bryophyte associations from the Arieșul Mare basin, classified into 3 classes, 4 orders, 4 alliances and 3 suballiances. *Brachythecietum populei* Phil. 1972 is first time recorded from Romania. *Orthotrichetum pallentis* Ochn. 1928 and *Brachythecio salebrosi* - *Drepanocladetum uncinati* Marst. 1989 has been recorded only once from Romania. Three associations - *Orthotrichetum pallentis* Ochn. 1928, *Pylaisietum polyanthae* Felf. 1941 and *Pterigynandretum filiformis* Hil. 1925 - are the indicators of clean air. Most of these communities are recorded from the *Fagus* bark, three associations has been identified from the *Salix* trunks. Less proper for bryophyte communities richness are *Picea*, *Fraxinus* and *Malus*, because, probably, their bark contains more tanins and/or resins.

### Introduction

Arieșul Mare watershed is located in the Western Romanian Carpathians (Apușeni Mountains) at altitudes between 565–1849 m a. s. l. (Biharia Peak). The studied area covers 420 km<sup>2</sup>. The climate is a temperate mountainous one, with a multiannual average temperature of 7.46°C and average rainfalls of 724.4 mm in Câmpeni (city located at the lowest altitudinal limit). The vegetation is represented mainly by beech, spruce and mixed forests, while along the valleys alder- and willow-groves hardly subsist to the villages development or agricultural needs.

A large part of the left side of the Arieș river belongs to the Natural Park of Apușeni Mountains, a relatively young one. Several studies of bryoflora contribute to the database for this protected area [2, 13, 15, 17, 18, 19, 21, 22, 23, 25, 26, 27]. Very few publications about higher plant communities [3, 7, 24] mention some bryophytes, too.

Bryophyte communities are important components of the forests, representing one of the less studied components of  $\beta$ -diversity. The only study published from the studied area [12] deals with decaying wood communities.

The paper contributes to a better knowledge of the studied area, in the benefit of the Natural Park, too. Even if we know that the epiphyte communities show a relative independence on phorophyte species [14], we can consider how important is to know which are the host tree species and their distribution. This information will assign a proper forest management, considering all the biodiversity components and taking into account bryophyte's high sensibility to environmental changes.

### Materials and Methods

A total of 39 epiphytic relevés has been carried out according to the methodology of the Central European school. Bryophyte communities have been inventoried on living trees of different ages and species: *Fagus sylvatica*, *Picea abies*, *Salix alba*, *Fraxinus excelsior*, *Malus domestica*.

The sample area varied between 40 cm<sup>2</sup> and 0.5 m<sup>2</sup> depending on the bark surface phytocoenosis cover. The following parameters were recorded in each of relevés: aspect,

inclination of the sample surface, altitude, general coverage, species of the host tree<sup>1</sup>, as well as target tree location (under the forest canopy, at the forest edge or in the open habitats). The abundance-dominance has been assigned for each species, according to the Braun-Blanquet scale modified by Tüxen and Ellenberg [6]. We adopted the coenotaxonomical system published by Marstaller [20].

The bryophyte associations have been presented from the ecological point of view - the reference criteria has been the indicator species value, established by comparing the indices proposed by Düll (1992), Orban (1993) and the ecological significance proposed by Boros (1968), respectively [13]. The phytogeographical analysis has been accomplished based on the phytogeographical elements proposed by Düll [8, 9, 10, 11]. The species nomenclature has been updated according to [16] for liverworts, Corley et al. (1981) and Corley et Crundwell (1991) for mosses. Patronym abbreviation follow Brummit et Powell (1992).

## Results

The present study reveals the existence of 9 bryophytes associations in the Arieșul Mare basin, which are classified within three suballiances, four alliances, four orders and three classes:

### I. FRULLANIO-LEUCODONTETEA SCIUROIDIS Mohan 1978 em. Marst. 1985

**Orthotrichetalia** Had. in Kl. et Had. 1944

**Ulotion crispae** Barkm. 1958

1. *Orthotrichetum pallentis* Ochn. 1928

2. *Pylaisietum polyanthae* Felf. 1941

- *orthotrichetosum obtusifoliae* Marst. 1985

### II. NECKERETEA COMPLANATAE Marst. 1986

**Neckeretalia complanatae** Jez. et Vondr. 1962

**Neckerion complanatae** Šm. et Had. 1944

***Pseudoleskeello nervosae* - *Homomallienion incurvati*** Marst. 1992

3. *Pterigynandretum filiformis* Hil. 1925

4. *Homalothecio sericeae* - *Porelletum platyphyllae* Størm. 1938

***Brachythecio populei* - *Homalienion trichomanoidis*** Marst. 1992

5. *Brachythecietum populei* Phil. 1972

6. *Isothecietum myuri* Hil. 1925

***Neckerenion complanato* - *besseri*** Marst. 1992

7. *Anomodonto viticulosi* - *Leucodontetum sciuroidis* Wisn. 1930

### III. CLADONIO - LEPIDOZIETEA REPTANTIS Jez. et Vondr. 1962 em. Marst. 1993

**Dicranetalia scoparii** Barkm. 1958

**Dicrano scoparii - Hypnion filiformis** Barkm. 1958

8. *Orthodicrano montani* - *Hypnetum filiformis* Wisn. 1930

**Brachythecietalia rutabulo - salebrosi** Marst. 1981

**Bryo - Brachythecion** Lec. 1975 em. Marst. 1987

9. *Brachythecio salebrosi* - *Drepanocladetum uncinati* Marst. 1989

*Frullanio-Leucodontetea sciuroidis* Mohan 1978 em. Marst. 1985 class is represented by the only order *Orthotrichetalia* Had. in Kl. et Had. 1944, the only alliance *Ulotion crispae* Barkm. 1958 and the two associations *Orthotrichetum pallentis* Ochn. 1928 and *Pylaisietum polyanthae* Felf. 1941 (Tab. 1). Both associations are corticolous pioneer communities. *Orthotrichetum pallentis* Ochn. 1928 has an atypical composition, dominated by pleurocarpous species, being identified at higher altitude, only in one locality - along Gârda Seacă Valley. This

<sup>1</sup> **Sampled tree species:** **F** = isolated beech; **FP** = beech from the grove; **FR** = beech from glades; **SI** = isolated willow; **M** = spruce; **MAI** = isolated apple-tree.

is the second record from Romania. The strong xerophilous character, frequent occurrence of the differential species *Pseudoleskeella nervosa* are good supporting arguments. From the ecological point of view this community has an micro-mesothermal character, euryionic species are dominants, however, the weak-acidophilous ones are well represented. From the phytogeographical point of view, temperate elements exhibit relatively high presence, followed by the subboreal ones.

**Table 1: 1 - Ass. *Orthotrichetum pallentis* Ochn. 1928; 2 - 6 Ass. *Pylaisietum polyanthae* Felf. 1941 - *orthotrichetosum obtusifoliae* Marst. 1985**

Relevé number	1	2	3	4	5	6
Relevé code	280	443	460	332	445	459
Altitude (m)	1460	860	800	860	840	800
Aspect	ENE	N	S	NW	SE	N
Slope (°)	90	85	90	90	90	85
Surface (dm <sup>2</sup> )	0,4	4	15	8	3	1
Cover (%)	100	80	80	80	90	100
Host tree	F	SI	SI	FR	MAI	SI
<i>Orthotrichum pallens</i>	2	.	.	.	.	.
<i>D-Pseudoleskeella nervosa</i>	2	.	.	.	.	.
<i>Pylaisia polyantha</i>	.	2	4	2	4	2
<b>Ulotion</b>						
<i>Orthotrichum speciosum</i>		3	.	.	+	+
<i>Orthotrichum stramineum</i>		.	.	.	+	.
<b>Orthotrichetalia</b>						
<i>Leucodon sciuroides</i>	3	.	2	2	+	3
<b>Frullanio-Leucodontetea</b>						
<i>Frullania dilatata</i>	.	.	+	.	3	+
<i>Radula complanata</i>	.	.	.	1	.	.
<b>Neckeretalia</b>						
<i>Amblystegiella subtilis</i>	.	.	.	.	.	+
<i>D-Bryum subelegans</i>	.	.	.	.	.	+
<i>D-Brachythecium velutinum</i>	.	.	.	.	.	+
<i>Metzgeria furcata</i>	+	.	.	.	.	.
<b>Brachythecio populei-Homalienion</b>						
<i>Isothecium alopecuroides</i>	+	.	.	.	.	.
<b>Dicranetalia (optim)</b>						
<i>Hypnum cupressiforme</i>		.	1	.	.	2
<b>Cladonio-Lepidozietea</b>						
<i>Cladonia coniocraea</i>		+	.	.	.	.
<b>Însoțitoare</b>						
<i>Orthotrichum obtusifolium</i>		.	.	.	+	2
<i>Pterigynandrum filiforme</i>	+	.	.	.	+	+
<i>Sanionia uncinata</i>		1	1	.	.	.
<i>Tortula virescens</i>	+	.	.	.	.	.
<i>Anaptychia ciliaris</i>		.	.	+	.	.
<i>Collema flaccidum</i>	2					
<i>Hypogymnia tubulosa</i>		1	.	.	.	.
<i>Gyalecta ulmi</i>	1	.	.	.	.	.

**Localities and data of the relevés - 280:** Gârda Seacă Valley, 8.08.1996; **332:** Cobleș Valley, 10.08.1996; **443, 445:** Buciniș Valley, 13.09.1996; **460, 459:** between Măgura Valley and Obârșia Valley; 27.09.1996;

The *Pylaisietum polyanthae* Felf. 1941 phytocoenoses are dominated by pleurocarpous bryophytes. From the ecological point of view, this phytocoenosis doesn't demand such xerophilous conditions as previous association. In relation to temperature, micro-mesothermal species are dominant. Phytogeographically, temperate elements dominate, but are represented almost all elements.

The class *Neckeretea complanatae* Marst. 1986 is the best represented in the Arieşul Mare basin, it is covered by only one order - *Neckeretalia complanatae* Jez. et Vondr. 1962, one alliance - *Neckerion complanatae* Šm. et Had. 1944 - with three suballiances, one by one, requesting higher soil and air humidity.

The suballiance *Pseudoleskeello nervosae* – *Homomallienion incurvati* Marst. 1992 comprises two associations (Tab. 2) occurring only on beech trunks. The *Pterigynandretum filiformis* Hil. 1925 phytocoenosis has an xero-mesophilous character. Xerophilous species are well represented. Micro-mesothermal and euryionic species predominate. From the phytogeographical point of view temperate elements are well represented, which, in addition to boreal and subboreal ones, endow this association with a temperate-subboreal character. The bryocoenoses belonging to *Homalothecio sericei* – *Porelletum platyphyllae* Størm. 1938 association are similar according temperature and substrate needs, but they require a mesophilous substrate, and the temperate character is stronger.

The suballiance *Brachythecio populei* – *Homalienion trichomanoidis* Marst. 1992 (Tab. 3) comprises mesophilous to meso-hygrophilous associations. *Brachythecietum populei* Phil. 1972 is first time recorded from Romania, on Buciniş Valley. Usually the phytocoenosis belonging to this association occur on saxicolous substrate. The only phytocoenosis has been recorded on the *Fagus* bark and it exhibits an xero-mesophilous, micro-mesothermal and euryionic character.

The association *Isothecietum myuri* Hil. 1925 (Tab. 3) has been identified on the beech bark, strong pleurocarpous mosses are dominant species, two layers being delimited: one of mosses adherent to the substratum - *Metzgeria furcata*, *Porella platyphylla*, *Hypnum cupressiforme* var. *filiforme* - and another one of pleurocarpous mosses with ascending ramifications - *Anomodon attenuatus*, *Leucodon sciuroides*, *Isothecium alopecuroides*, *Homalothecium sericeum*. This community is more pretentious for humidity - reflected in the predominance of mesophytes, while from the phytogeographical point of view boreal elements are better represented.

The suballiance *Neckerenion complanato* - *besseri* Marst. 1992 exhibit a higher soil and air humidity; is represented in the Arieşul Mare basin by only one association - *Anomodonto viticulosi* - *Leucodontetum sciuroidis* Wisn. 1930, frequent on beech bark, with a lower occurrence on willow. From the ecological point of view, this community has an mesophilous, micro-mesothermal, euryionic character, favoured by a mineral rich bark. The phytocoenoses belonging to this association have the largest phytogeographical spectrum occurrence, with high frequency of temperate elements. Comparing with other associations of the same classes is the richest in oceanic and suboceanic species, but the subcontinental species are also well represented.

The class *Cladonio* - *Lepidozieta reptantis* Jez. et Vondr. 1962 em. Marst. 1993 comprises predominantly saprolognicolous communities, but they can also be identified on trees with more acid bark (as those belonging to the order *Dicranetalia scoparii* Barkm. 1958 and to the alliance *Dicrano scoparii* - *Hypnion filiformis* Barkm. 1958) or on humus and minerals rich soils (*Brachythecietalia rutabulo* - *salebrosi* Marst. 1981, *Bryo* - *Brachythecion* Lec. 1975 em. Marst. 1987).

Table 2: 1-13 Ass. *Pterigynandretum filiformis* Hil. 1925, 14 Ass. *Homalothecio sericeae-Porelletum platyphyllae* Storm. 1938

Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Relevé code	348b	292	414	452	347b	351	456	455	352b	454	353	458	342	350
Altitude (m)	1100	1000	980	980	1180	1080	1000	1000	1050	1000	1070	980	1000	1080
Aspect	W	N	SW	SW	N	NW	N	SE	N	SE	W	N	NE	NW
Slope (°)	90	90	85	90	45	85	90	10	90	90	90	90	90	90
Surface (dm <sup>2</sup> )	6	30	22,5	18	4	4,5	25	2,1	1,5	10	15	50	25	50
Cover (%)	90	80	100	95	90	90	95	100	60	80	100	85	100	98
Host tree	FP	FP	FP	FP	F	FP	FP	F	F	FP	FP	F	FP	FP
<i>Pterigynandrum filiforme</i>	4	3	+	4	1	+	3	4	+	4	3	+	+	+
<i>Pseudoleskeella nervosa</i>	.	.	.	.	+	3	4	3	3	1	.	2	4	+
<i>Porella platyphylla</i>	.	.	.	.	.	.	.	.	.	.	.	+	2	+
<i>Homalothecium sericeum</i>	.	.	+	.	2	2	.	.	+	.	.	.	+	3
<b>Brachythecio populei - Homalienion</b>														
<i>Isothecium alopecuroides</i>	+	.	.	.	+	+	.	.	.	1	+	+	.	2
<b>Neckeretalia</b>														
<i>Amblystegiella subtilis</i>	+	1	.	.	.	.	.	.	+	+	.	1	+	.
<i>Metzgeria furcata</i>	.	+	1	.	+	2	.	.	2	+	1	1	+	+
<b>Ulotion</b>														
<i>Orthotrichum speciosum</i>	.	+	.	.	.	.	.	.	.	.	.	.	.	.
<i>Orthotrichum stramineum</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.
<b>Orthotrichetalia</b>														
<i>Leucodon sciuroides</i>	1	.	.	.	.	.	.	.	.	.	4	3	2	.
<i>Pylaisia polyantha</i>	.	.	.	.	.	.	.	.	.	.	+	.	.	.
<b>Frullanio-Leucodontetea</b>														
<i>Frullania dilatata</i>	.	.	.	.	.	.	.	.	.	.	+	+	+	.
<i>Radula complanata</i>	.	2	2	1	+	.	.	.	.	.	+	2	+	+
<b>Brachythecietalia</b>														
<i>D-Brachythecium reflexum</i>	.	.	+	.	.	.	+	.	.	2	.	.	.	.
<i>D-Brachythecium velutinum</i>	.	+	+	.	.	.	.	.	.	.	.	.	.	.
<i>D-Bryum subelegans</i>	.	.	.	.	+	.	.	.	+	.	.	.	.	.
<b>Dicranetalia (optim)</b>														
<i>Dicranum scoparium</i>	.	+	1	.	.	.	.	.	.	.	.	.	.	.
<i>Hypnum cupressiforme</i>	1	.	.	.	+	+	.	1	.	.	.	.	.	2
<b>Cladonio-Lepidozieta</b>														
<i>Lophocolea heterophylla</i>	.	.	.	.	.	.	.	+	.	.	.	.	.	.
<b>Însoțitoare</b>														
<i>Apometzgeria pubescens</i>	+	.	+	.	.	.	.	.	.	.	.	.	.	.
<i>Anomodon attenuatus</i>	.	.	.	.	.	.	.	+	.	.	.	.	.	.
<i>Eurhynchium angustirete</i>	.	.	.	.	+	.	.	.	.	.	.	.	.	.
<i>Hypnum cupressiforme</i> var. <i>filiforme</i>	+	.	.	.	.	+	.	.	+	.	.	.	.	.
<i>Hypnum fertile</i>	.	.	1	.	.	.	.	.	.	.	.	.	.	.
<i>Lescurea mutabilis</i>	.	.	.	.	.	.	1	.	.	.	.	.	.	.
<i>Neckera complanata</i>	.	.	.	.	4	.	.	.	.	.	.	.	+	.
<i>Neckera pennata</i>	.	.	.	.	.	.	.	.	.	.	.	.	+	.
<i>Orthotrichum pallens</i>	.	.	.	+	.	.	.	.	.	.	.	+	2	.
<i>Paraleucobryum longifolium</i>	.	.	.	.	.	.	1	.	.	.	.	.	.	.
<i>Plagiochila porelloides</i>	.	.	.	.	+	1	.	.	.	.	.	.	.	.
<i>Sanionia uncinata</i>	.	+	4	.	.	.	.	1	.	.	.	.	.	.
<i>Tortella tortuosa</i>	.	.	.	.	+	.	.	.	.	.	.	.	.	.
<i>Cetraria commixta</i>	+	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Cladonia fimbriata</i>	+	.	.	.	.	.	.	.	.	.	.	.	.	.

Localities and data - 292: Gârda Seacă Valley, 8.08.96; 342: between Gârda Valley and Scărișoara cave, 11.08.1996; 350, 351, 353: Scărișoara cave, 11.08.1996; 347b, 348b, 352b: Ordâncușa Valley, 11.08.1996; 414: Galbena Valley, 12.09.1996; 452, 454, 455, 456, 458: between Măgura and Obârșia Valley; 27.09.1996;

**Table 3: 1 Ass. *Brachythecietum populei* Phil. 1972, 2-5 Ass. *Isothecietum myuri* Hil. 1925, 6-14 *Anomodonto viticulosi - Leucodontetum sciuroidis* Wisn. 1930**

Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Relevé code	441	343	312	274	314	355b	447	464	462	463	461	333	447b	440
Altitude (m)	890	1100	1300	1035	1320	1060	700	700	700	700	700	860	700	890
Aspect	NE	NE	N	NE	SE	N	N	NE	WNW	WNW	WNW	N	N	N
Slope (°)	90	90	90	85	80	75	90	90	90	90	90	80	90	90
Surface (dm <sup>2</sup> )	15	25	21	25	20	50	25	4	25	50	25	7	25	18
Cover (%)	90	100	100	80	100	100	70	100	100	100	85	90	70	60
Host tree	F	FP	FP	FP	F	FP	F	FR	FR	FR	FR	SI	F	F
<i>Anomodon viticulosus</i>	.	.	.	.	.	4	.	.	.	.	.	.	.	.
<i>Leucodon sciuroides</i>	+	+	.	.	.	.	1	4	2	2	5	3	1	3
<i>D-Neckera complanata</i>	.	.	.	.	.	1	.	.	.	.	.	.	.	.
<i>Brachythecium populeum</i>	3_4	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Isothecium alopecuroides</i>	.	4	2	4	3	2	.	.	.	.	.	.	.	.
<b>Neckerion complanatae</b>														
<i>Amblystegiella subtilis</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	.
<i>Homalothecium sericeum</i>	2	.	.	+	.	.	.	.	.	.	.	.	.	.
<i>Metzgeria furcata</i>	.	+	+	.	.	+	+	.	.	.	.	.	.	.
<i>Porella platyphylla</i>	.	.	+	.	.	+	3	1	1	4	+	.	.	.
<b>Ulotion</b>														
<i>Orthotrichum speciosum</i>	+	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Orthotrichum stramineum</i>	+	.	.	.	.	.	.	+	.	.	.	.	+	+
<b>Frullanio-Leucodontetea</b>														
<i>Frullania dilatata</i>	2	.	.	.	.	.	.	.	.	.	+	.	2	.
<i>Radula complanata</i>	.	+	.	.	.	+	.	+	+	1	+	.	.	.
<b>Dicranetalia (optim)</b>														
<i>O-Dicranum scoparium</i>	.	.	+	.	.	.	.	.	.	.	.	.	.	.
<i>Hypnum cupressiforme</i>	.	2	4	2	+	1	.	+	4	+	+	2	1	.
<b>Brachythecietalia</b>														
<i>Brachythecium salebrosum</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.
<i>D-Amblystegium serpens</i>	.	.	.	.	.	.	+	.	.	.	.	2	.	.
<i>D-Bryum subelegans</i>	.	.	.	.	.	.	.	.	+	.	.	+	.	.
<i>D-Brachythecium velutinum</i>	.	.	+	+	.	.	.	.	.	.	.	.	.	.
<b>Cladonio-Lepidozietea</b>														
<i>Cladonia coniocraea</i>	.	.	2	+	.	.	.	.	.	.	.	.	.	.
<b>Însoțitoare</b>														
<i>Frullania tamarisei</i>	.	.	+	.	.	+	.	.	.	.	.	.	.	.
<i>Hypnum cupressiforme</i> var. <i>filiforme</i>	.	.	.	.	1	.	1	.	.	.	.	.	.	.
<i>Paraleucobryum longifolium</i>	.	.	.	1	4	.	.	.	.	.	.	.	.	.
<i>Plagiochila porelloides</i>	.	.	+	+	.	.	.	.	.	.	.	.	.	.
<i>Pseudoleskeella nervosa</i>	.	2	.	.	.	+	+	+	+	1	1	.	.	.
<i>Pterigynandrum filiforme</i>	+	1	+	2	.	.	.	.	.	.	.	+	1	2
<i>Tortula ruralis</i>	.	.	.	.	.	.	.	3	.	1	.	.	.	.

*Anomodon attenuatus* 447 (2); *Apometzgeria pubescens* 440 (1); *Bryum capillare* 333 (+); *Homalothecium philippeanum* 355b (1); *Lejeunea cavifolia* 355b (+); *Metzgeria fruticulosa* 333 (+); *Orthotrichum obtusifolium* 333 (+); *Platygyrium repens* 440 (+); *Polytrichum formosum* 312 (1); *Cetraria commixta* 343 (+); *Cladonia fimbriata* 312 (1); 314 *Platismatia glauca* (1);

**Localities and data** -274: Gârda Seacă Valley 7.08.1996; 312: Pârâul Gogii Valley, 9.08.96; 314: Cobleș Valley, 9.08.1996; 333: Cobleș Valley, 11.08.96; 343: between Gârda Valley and Scărișoara Cave, 11.08.1996; 355b: Ordâncușa Valley, 11.08.1996; 440, 441: Buciniș Valley, 13.09.1996; 461, 462, 463, 464, 447, 447b: between Măgura Valley and Obârșia Valley; 27.09.1996;

Table 4: 1-4 Ass. *Orthodicrano montani* - *Hypnetum filiformis* Wisn. 1930; 5 Ass. *Brachythecio salebroși* - *Drepanocladetum uncinati* Marst. 1989

Relevé number	371	315	372	437	334
<b>Relevé code</b>	371	315	372	437	334
<b>Altitude (m)</b>	780	1320	730	1070	860
<b>Aspect</b>	NE	N	E	V	N
<b>Slope (°)</b>	90	85	85	90	80
<b>Surface (dm<sup>2</sup>)</b>	1.5	18	6	25	7
<b>Cover (%)</b>	100	95	90	100	90
<b>Host tree</b>	M	F	M	M	SI
Dicranum montanum	+	1	3	4	.
Hypnum cupressiforme var. filiforme	.	+	.	.	.
Brachythecium salebrosum	.	.	.	.	3
Sanionia uncinata	.	.	.	.	1
<b>Dicranetalia (optim)</b>					
Hypnum cupressiforme	5	1	.	.	2
Dicranum scoparium	.	.	2	2	.
<b>Cladonio-Lepidozietalia</b>					
Blepharostoma trichophyllum	.	+	2	.	.
Lepidozia reptans	.	.	2	.	.
<b>Cladonio-Lepidozietea</b>					
Lophocolea heterophylla	.	+	+	.	.
Plagiothecium laetum	.	3	.	.	.
Cladonia coniocraea	.	.	.	+	.
<b>Frullanio-Leucodontetea</b>					
Frullania dilatata	.	.	.	.	2
Radula complanata	1	.	.	.	.
<b>Ulotion</b>					
Orthotrichum stramineum	.	.	.	.	+
<b>Însoțitoare</b>					
Pterigynandrum filiforme	.	+	.	.	+
Cladonia fimbriata	.	+	.	+	.
Platismatia glauca	.	1	.	+	.
Hypnum fertile 437 (1), Metzgeria fruticulosa 334 (1), Paraleucobryum longifolium 315 (2), Platygyrium repens 334 (2), Polytrichum juniperinum 437 (+), Sanionia uncinata 437 (+), Scapania nemorea 372(+), Pseudevernia furfuracea (+)					

**Localities and data of the relevés :** **315:** between Cobleș Valley and Galbena Valley, 9.08.1996; **334:** Cobleș Valley close to spring, 10.08.96; **371, 372:** between Mățișești and Șaua Ursoaia;

In the Arieșul Mare basin two associations have been identified on tree bark (Tab. 4). The association *Orthodicrano montani* - *Hypnetum filiformis* Wisn. 1930 settles on isolated spruce and beech - into lighter biotopes which are slightly drier. From the ecological point of view, the bryocoenoses of this association have a mesophilous, micro-mesothermal to microthermal, and acidophilous character.

The association *Brachythecio salebroși* - *Drepanocladetum uncinati* Marst. 1989 has been revealed in only one record, on the willow bark. Physiognomically, this bryocoenoses is dominated by strong pleurocarpous species which cover another layer dominated by liverworts. It has a mesophilous, micro-mesothermal to microthermal, euryionic to moderate acidophilous character.

Deciduous species of tree are the most important, hosting most of the bryophyte communities (Fig. 1). The most important tree species is *Fagus silvatica* (seven associations has been identified on its bark), the forests edified by beech covering large areas in the Arieşul Mare basin. *Salix* and *Fraxinus* bark are hosting less communities, but usually they are more species, especially of acrocarpous ones.

The most wide-spread associations (Fig. 2), without any “preference” for a host tree species are *Anomodonto viticulosi* - *Leucodontetum sciuroidis* Wisn. 1930 and *Pylaisietum polyanthae* Felf. 1941, both occurring on three tree species. *Orthodicrano montani* - *Hypnetum filiformis* Wisn. 1930 occur on two tree species. All other associations has been identified only on one host tree species.

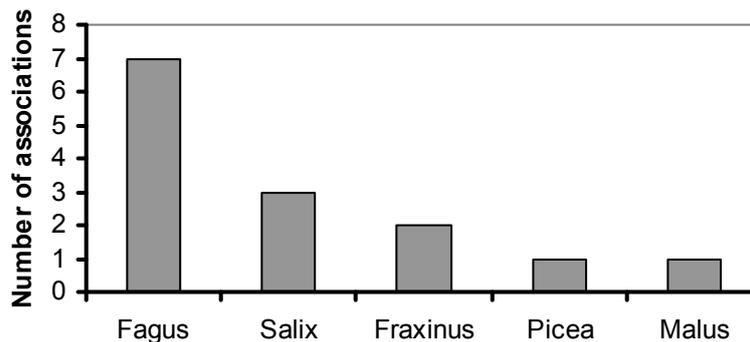


Fig. 1: The relations between tree species and number of bryophyte associations

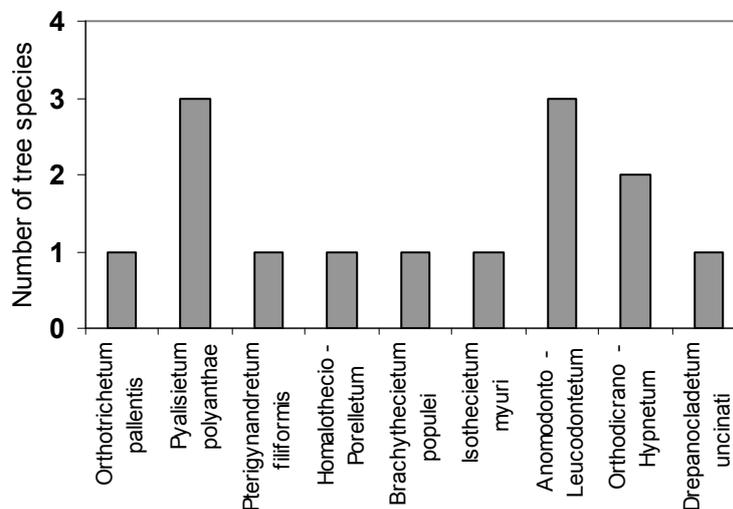


Fig. 2 The dependence of bryophyte communities on a certain host tree

### Conclusions

Our researches reveal a rich number of bryophyte communities, as compared to other similar studies from Romania. *Brachythecietum populei* Phil. 1972 is recorded for the first time from Romania. *Orthotrichetum pallentis* Ochs 1928 and *Brachythecio salebrosi* - *Drepanocladetum uncinati* Marst. 1989 has been recorded only once from Romania.

Three associations - *Orthotrichetum pallentis* Ochs 1928, *Pylaisietum polyanthae* Felf. 1941 and *Pterigynandretum filiformis* Hil. 1925 - are good indicators of clean air. Eight

bryophyte associations has been identified from the Natural Park area: *Orthotrichetum pallentis* Ochs. 1928, *Pylaisietum polyanthae* Felf. 1941, *Pterigynandretum filiformis* Hil. 1925, *Homalothecio sericei - Porelletum platyphyllae* Störm. 1938, *Isothecietum myuri* Hil. 1925, *Anomodonto viticulosi - Leucodontetum sciuroidis* Wisn. 1930, *Orthodicrano montani - Hypnetum filiformis* Wisn. 1930, *Brachythecio salebroși - Drepanocladetum uncinati* Marst. 1989, but many forests have been disturbed, become officialy preserved.

#### REFERENCES

1. Brummit, R.K., Powell, C.E., 1992, Authors of plant names, Kew.
2. Boros, Á., Vajda, L., 1974, *Bryologische Forschungen im Karstgebiet des Bihor - Gebirges*, Acta Bot. Acad. Sci. Hung., **I**, 20 (1-2), 3-11.
3. Coldea, G., 1995-1996, *Contribuții la studiul vegetației României*, Contrib. Bot. (Cluj - Napoca), 1-8.
4. Corley, M. F. V., Crundwell, A. C., Düll, R., Hill, M. O., Smith, A. J. E., 1981, Mosses of Europe and the Azores; an annotated list of species, with synonyms from the recent literature, *J. Bryol.*, **11**: 609-689.
5. Corley, M. F. V., Crundwell, A. C., 1991, Additions and amendments to the mosses of Europe and Azores, *J. Bryol.*, **16**: 337-356.
6. Cristea, V., 1993, *Fitocenologie și vegetația României*, (litogr.) Univ. Babeș-Bolyai, Cluj-Napoca.
7. Csürös, Ș., Csürös - Káptalan, M., 1966, Vegetationsforschungen in der Umgebung der Gemeinden Vidra und Avram Iancu (Rayon Cîmpeni), *Stud. Univ. "Babeș-Bolyai"*, **2**: 21-34.
8. Düll, R., 1983, Distribution of the European and Macaronesian Liverworts (Hepaticophytina), *Bryologische Beiträge*, **2**: 1-114.
9. Düll, R., 1984, Distribution of European and Macaronesian Mosses (Bryophytina). Part I, *Bryologische Beiträge*, **4**: 1-113.
10. Düll, R., 1985, Distribution of European and Macaronesian Mosses (Bryophytina). Part II, *Bryologische Beiträge*, **5**: 110-132.
11. Düll, R., 1992, *Distribution of European and Macaronesian Mosses (Bryophytina)*, Annotations and Progress, *Bryologische Beiträge*, **8/9**: 1-223.
12. Goia, I., 2000, Moosgesellschaften des faulen Holzes im oberen Arieș Becken, *Beiträge zur Naturwissenschaftlichen Forschung über Siebenbürgen*, **VI**, Böhlau Verlag, Köln, Weimar, Wien: 107-122.
13. Goia, I., 2001, *Brioflora de pe substrat lemnos din bazinul superior al Arieșului. Studii briotaxonomice, corologice, ecologice și cenologice (Teză de doctorat)*, Univ. „Babeș-Bolyai” Cluj-Napoca.
14. Goia, I., Gafta, D., 2004, How porophyte-specific are the corticolous bryophyte communities, *Braun-Blanquetia*, **34**, 123-127.
15. Goia, I., Schumacker, R., 2002, *The bryophytes from rotten wood in the Arieșului Mare basin*, *Contribuții Botanice*, **37**: 85-94.
16. Grolle, R., 1983, Hepatics of Europe, including the Azores: an annotated list of species with synonyms from the recent literature, *J. Bryol.*, **12**: 403-459.
17. Györfly, I., 1904, Bryologische Daten zur Kenntnis des Florengbietes von Siebenbürgen, *Magyar Bot. Lapok*, **3**: 118-132.
18. Györfly, I., 1909, Enumeratio muscorum frondosum rariorum in Transilvania, *Magyar Bot. Lapok*, **8**: 51-53.
19. Györfly, I., 1910, Über die Pohlia carnea (L) Lindb. fil. aus Siebenbürgen, *Magyar Bot. Lapok*, **9**: 120-126.
20. Marstaller, R., 1993, Systematische Übersicht über die Moosgesellschaften Zentraleuropas, *Herzogia*, **9** (3-4): 513-541.
21. Papp C., 1942, Contribuții la flora briologică a României, *Bul. Grăd. Bot. (Cluj)*, **22** (1-4): 50-54.
22. Péterfy, M., 1908, Adatok a Biharhegység Mohaflórajának ismeretehez, *Math. Termeszet. Közl.*, **3**: 261-332.
23. Plămadă, E., 1998, *Flora briologică a României, Musci*, **I**, 1, Ed. Presa Universitară Clujană, Cluj-Napoca.
24. Pop, I., Hodișan, I., 1967, Aspecte de vegetație din Cheile Ordâncușii (Munții Bihorului), *Stud. Univ. "Babeș-Bolyai", Biol.*, **2**: 7-20.
25. Schiffner, V., 1909, Lebermoose aus Ungarn und Siebenbürgen, *Magyar Bot. Lapok*, **8**: 24-33.
26. Schiffner, V., 1914, Lebermoose aus Ungarn und Croatien, *Magyar Bot. Lapok*, **13**: 302-309.
27. Ștefureac, T. I., 1958, Contribuții la cunoașterea și răspândirea speciilor genului Sphagnum L. în brioflora țării, *Contrib. Bot. (Cluj - Napoca)*: 91-115.

## STUDIUL COMUNITĂȚILOR DE BRIOFITE CORTICOLE DIN BAZINUL ARIEȘULUI MARE

## (Rezumat)

În bazinul Arieșului Mare au fost identificate 9 asociații corticole edificate de briofite, încadrate în trei clase, patru ordine, patru alianțe și trei subalianțe, număr mare de comunități, în comparație cu alte studii similare din țară. Este semnalată pentru prima dată din România asociația *Brachythecium populei* Phil. 1972. *Orthotrichetum pallentis* Ochn. 1928 și *Brachythecio salebroși - Drepanocladetum uncinati* Marst. 1989 sunt semnalate pentru a doua oară în literatura de specialitate. *Orthotrichetum pallentis* Ochn. 1928, *Pylaisietum polyanthae* Felf. 1941 și *Pterigynandretum filiformis* Hil. 1925 sunt considerate bioindicatori ai unei bune calități a aerului. De pe cuprinsul Parcului Natural Munții Apuseni au fost identificate opt asociații: *Orthotrichetum pallentis* Ochn. 1928, *Pylaisietum polyanthae* Felf. 1941, *Pterigynandretum filiformis* Hil. 1925, *Homalothecio sericei - Porelletum platyphyllae* Størm. 1938, *Isothecium myuri* Hil. 1925, *Anomodonto viticulosi - Leucodontetum sciuroidis* Wisn. 1930, *Orthodicrano montani - Hypnetum filiformis* Wisn. 1930, *Brachythecio salebroși - Drepanocladetum uncinati* Marst. 1989, dar multe dintre pădurile în care au fost identificate aceste asociații erau puternic rărite în perioada premergătoare declarării Parcului Natural.

Cele mai multe dintre asociațiile identificate (7 asociații) preferă ca specie de arbore gazdă fagul, aspect datorat pe de-o parte umidității atmosferice mai ridicate din etajul montan, iar pe de altă parte predominării făgetelor. Trei asociații au fost identificate pe ritidomul sălciilor. Mai puțin propice dezvoltării comunităților de briofite este ritidomul coniferelor, de frasin și măr (câte un releveu), aspect datorat probabil conținutului de taninuri și rășini.