

## RESEARCHES ON SAXICOLOUS BRYOPHYTES FROM THE NORTH – WESTERN AREA OF LEAOTA MOUNTAINS

**Codruța Mihaela Dobrescu, Magdalin Leonard Dorobăț**

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### INTRODUCTION

Rock surfaces are too hostile to be colonized by vascular plants, but there are numerous species of bryophytes that are adapted to grow on rocks; saxicolous bryophytes represent a group of organisms with specific, physiologic and ecologic adaptations which make the successful in this type of habitat (Goffinet et. Shaw , 2009).

The geomorphologic aspect of Leaota Massif is the result of its geology; approximately three quarters of the Massif's surface is represented by crystalline schist, with a compact, little fragmented aspect (Murătoareanu, 2009; Dorobăț, 2016).

### MATERIALS AND METHODS

Within a wide research carried out on the north-western part of the massif, during 2015, 2016 and 2017, we have collected bryophytes from the saxicolous substratum, limestone or mesometamorphic schists. The areas from which the botanical material was collected were: Valea Popii, Valea Prepeleac, Valea Stanei, Valea Urdărita, Valea Crovului and Valea Bădenilor.

The nomenclature of the species was actualized according to Schumacker & Váňa (2000, 2005) for the representative of the Marchantiophyta Class and according to Hill et al. (2006) for the representatives of the Musci (Bryophyta) Class.

### RESULTS AND DISCUSSIONS

Based on the bryological material collected from the saxicolous substratum from the north-western side of Leaota Massif, we have identified 24 species which, from the taxonomic perspective, are assigned to the two bryophytes classes: Hepaticatae – 5 species (3 families) and Bryatae (Musci) – 19 species (12 families).

The list of the identified species: *Marchantia polymorpha* L., *Preissia quadrata* (Scop.) Nees (*Marchantia quadrata* Scop., *Conocephalum hemisphaericum* Dumort., *Cyathophora commutata* Trevis., *Preissia commutata* Nees, *P. hemisphaerica* Cogn.), *Aneura pinguis* (L.) Dumort. (*Jungermannia*

*pinguis* L.), *Metzgeria furcata* (L.) Dumort. (*Jungermannia furcata* L., *Metzgeria glabra* Raddi), *Plagiochila porelloides* (Torrey ex Nees) Lindenb. (*Jungermannia porelloides* Torrey ex Nees, *Plagiochila asplenioides* var. *minor* Liendenb. and var. *humilis* Liendenb., *P. porelloides* var. *subarctica* (Jörg.) R. M. Schust.), *Encalypta streptocarpa* Hedw., *Grimmia pulvinata* (Hedw.) Sm. (*Dryptodon pulvinatus* (Hedw.) Brid., *G. pulvinata* var. *africana* (Hedw.) Hook.f., *G. pulvinata* var. *obtusata* (Brid.) Huebener), *Schistidium apocarpum* (Hedw.) Bruch & Schimp., *Ceratodon purpureus* (Hedw.) Brid., *Barbula unguiculata* Hedw., *Bryoerythrophyllum recurvirostrum* (Hedw.) P.C.Chen, *Syntrichia ruralis* (Hedw.) F.Weber & D.Mohr (*Tortula ruralis* (Hedw.) P.Gaertn., B.Mey.& Scherb.), *Tortula muralis* Hedw., *Orthotrichum anomalum* Hedw., *Hedwigia ciliata* (Hedw.) P. Beauv., *Pohlia elongata* var. *greenii* (Brid.) A.J.Shaw (*P. elongata* var. *polymorpha* (Hornsch.) Nyholm), *Plagiomnium undulatum* (Hedw.) T.J.Kop., *Amblystegium serpens* (Hedw.) Schimp. (*A. juratzkanum* Schimp.), *Cratoneuron commutatum* (Hedw.) Roth, *Cratoneuron filicinum* (Hedw.) Spruce, *Abietinella abietina* (Hedw.) M. Fleisch. (*Thuidium abietinum* (Hedw.) Schimp.), *Leucodon sciurioides* (Hedw.) Schwäegr., *Hylocomium splendens* (Hedw.) Schimp., *Pleurozium schreberi* (Willd. ex Brid.) Mitt.

An analysis of the bryophytes has been made according to ecological indices - temperature, humidity, luminosity, pH.

The requirements regarding the temperature prove the development of micro-mezo-thermal species (8 species), of the eurythermal ones (4 species), microthermal (3 species), criophyte 1 species, the rest being indifferent.

Bryophytes are generally very sensitive to humidity. The results regarding the exigencies of the species against the humidity factor show the prevalence of the xerophyte 10 species and mezophyte, 9 species, followed by the hygrophite - 3 species, xero-mezophyte and mezzo-hygrophite with a single species. This explains why quite different communities of species can be found on opposite sides of the same wall or rock. Well sheltered places

are fit for colonization with pleurocarpous species, which create mat-forming, while exposed rocks are populated by moss that is specially adapted to the rigidity of the situation, usually acrocarpous, creating cushions.

From the perspective of the luminosity degree, most musci are photophile (11 species), followed by the shade tolerant (7 species) and photo-shade (6 species).

Another basic factor that influences the bryoflora is represented by the pH. From the perspective of the chemical reaction of the substratum, we notice a wide range of species' preferences: acidophilic – 5 species, basophilic – 4 species and calcifile – 3 species. While species such as *G. pulvinata* and *T. muralis* do not have a special preference, the saxicolous bryophytes usually favor

in a strong manner one or another type of rock, acid or base type.

The rest of species (12 species) are represented by the indifferent and the eurionic bryophytes (50%) and, despite of the fact that they do not have an indicating role, they contribute to the growth of the variety of species in the researched field.

Most of the identified bryophytes synusias were located in the cracks of different sizes of the rocks (limestone and shale) (Fig. 1). We also noticed populations of larger bryophytes that covered large areas of rocks or even entire stones (Fig. 2). The identified saxicolous bryophytes have emphasized either as dense bushes (most of the species), less dense bushes (*Schistidium apocarpum*) or as cushions (*Grimmia* sp.) (Fig. 3-8).



Fig. 1. Saxicolous moss communities installed in cracks



Fig. 2. Saxicolous moss communities which cover the substratum partially or totally





Fig. 3. *Metzgeria furcata* (L.) Dumort.



Fig. 4. *Ceratodon purpureus* (Hedw.) Brid



Fig. 5. *Schistidium apocarpum* (Hedw.)  
Bruch&Schimp



Fig. 6. *Abietinella abietina* (Hedw.)  
M. Fleisch. Brid



Fig. 7. *Cratoneuron filicinum* (Hedw.) Spruce



Fig. 8. *Tortula muralis* Hedw



As for the continentality degree, the most are the suboceanic-subcontinental elements, followed by the subcontinental ones, which are a result of the geographic position of Romania.

As for the distribution of the analyzed species according to their preference for the substratum, in the list of identified species, we have found saxicolous elements, terricolous, humicolous or saprolignicolous, independent or in various combinations.

## CONCLUSIONS

In the north-western side of Leaota Massif, we have identified 24 species, all the gained data being cited for the first time for the respective area.

Saxicolous bryophytes identified in the N-W of Leaota Massif can develop on one or more substratums, as following: 15 species prefer a single substratum, 7 species develop on 2 substratums in the following combinations: terri-saxicolous – 4 species; terri-humicolous - 2 species and corti-saxicolous - 1 species, and a single species can grow on three substratums (corti-terri-humicolous).

The diversity of bryophytes encountered can be attributed to the large number of microhabitats present in the scree.

The analysis of the requirements of species against the main ecologic factors emphasizes more features that are specific to the studied region and which allows the framing of a whole image on the report between the bryophytes and the particularities of the substratum. This preliminary data regarding saxicolous bryophytes identified in our interest area will be the basis of a study focused on the relation between the composition of the species of bryophytes, the specific diversity and the communities of bryophytes and the environmental factors in the north-western area of Leaota Mountains.

## ABSTRACT

The paper presents a review of some the saxicolous bryophytes species in the N-V Leaota Mountains, An analysis of the bryophytes has been made according to ecological indices - temperature, humidity, luminosity, pH. We have identified 24 species all the data being cited for the first time for the respective area. The analysis of the species requirements towards the main ecological factors highlights the specific characteristics of the studied region and allows the formation of an overview of

the ratio between the bryophytes and the particularities of the substrate.

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## AUTHORS' ADDRESS

DOBRESCU CODRUȚA MIHAELA, DOROBĂȚ MAGDALIN LEONARD - University of Pitești, Faculty of Science, Department of Natural Science, Târgu din Vale Street, No. 1, Romania, e-mail:[codrutza\\_dobrescu@yahoo.com](mailto:codrutza_dobrescu@yahoo.com); [coltanabe@yahoo.com](mailto:coltanabe@yahoo.com).