

## **New data on the presence of some hornworts and liverworts in Romania**

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**Abstract** – *Anthoceros punctatus* L. and *Jungermannia borealis* Damsh. et Váňa have been erroneously reported from Romania and are hereby rejected from the bryophyte checklist of Romania, until new reports. The presence in Romania of *Anthoceros agrestis* Paton, *Cephaloziella massalongi* (Spruce) Müll. Frib., *Cephaloziella spinigera* (Lindb.) Warnst., *Marsupella apiculata* Schiffn., *Scapania cuspiduligera* (Nees) Müll. Frib and *Scapania praetervisa* Meyl. is confirmed, and is commented for *Nardia breidleri* (Limpr.) Lindb.

***Anthoceros / Cephaloziella / Jungermannia / Marsupella / Nardia / Scapania / Romania***

**Résumé** – *Anthoceros punctatus* L. et *Jungermannia borealis* Damsh. et Váňa sont rejetés de la checkliste des bryophytes de Roumanie, jusque de nouvelles récoltes soient faites. La présence en Roumanie de *Anthoceros agrestis* Paton, *Cephaloziella massalongi* (Spruce) Müll. Frib., *Cephaloziella spinigera* (Lindb.) Warnst., *Marsupella apiculata* Schiffn., *Scapania cuspiduligera* (Nees) Müll. Frib. and *Scapania praetervisa* Meyl. est confirmée, et elle est commentée pour *Nardia breidleri* (Limpr.) Lindb.

***Anthoceros / Cephaloziella / Jungermannia / Marsupella / Nardia / Scapania / Roumanie***

### **INTRODUCTION**

In the frame of the SYNTHESIS Programme in 2012, I had the opportunity to check the hornwort and liverwort specimens from the Hungarian National History Museum in Budapest, Hungary (BP Herbarium) collected from Romania. A number of 79 specimens have been reviewed and a large number of chorology data, over 5000 records, was added to the distribution of these species in Romania. Some of these records were previously published, especially by Á. Boros and L. Vajda.

In this paper some of the most interesting data from the BP Herbarium and field research conducted in 2013 are presented.

## MATERIALS AND METHODS

A number of 4833 envelopes with hornwort and liverwort samples collected from Romania were identified in the BP Herbarium, 2992 envelopes in the main herbarium and 1841 envelopes in the Á. Boros Herbarium. In 2013, I made field research in Bistrița-Năsăud County and Climani Mountains, Romania for confirming some species from the BP Herbarium. The samples collected during field research were stored in the Herbarium of the Institute of Biology from Bucharest, Romania (BUCA Herbarium). The bryophyte nomenclature and assignment of species' conservation status is according to Ștefănuț & Goia (2012).

## RESULTS

Checking BP Herbarium samples collected from Romania gave me the opportunity to clarify the presence of some doubtful or very rare species in this country. Two species rejected, two new species added and five very rare species confirmed are the changes done to the Checklist and Red List of Bryophytes of Romania (Ștefănuț & Goia, 2012).

### *Species rejected from Romania bryophyte checklist until new reports*

#### *Anthoceros punctatus* L.

All previous reports of *Anthoceros punctatus* s.l. from Romania were related to *Anthoceros punctatus* L. and the presence of this species in Romania was doubtful and qualified under Data Deficient category (DD) in the conservation status assessment for the Checklist and Red List of Bryophytes of Romania (Ștefănuț & Goia, 2012).

The samples of *Anthoceros punctatus* L. from Romania, Alba County, Valea Lungă, 2.09.1870, leg. & det. J. Barth [BP 357/H], 3.07.1874, leg. & det. J. Barth (BP 358/H) and Neamț County, "peste Recea" Forest, 370 m alt., 25.08.1948, leg. & det. C. Papp (Flora Romaniae Exsiccata no. 3043; BP 26844/H) where revised as *A. agrestis*, rev. S. Ștefănuț, 24.08.2012.

In conclusion, all reports of *Anthoceros punctatus* from Romania will be treated as *A. agrestis* Paton and *A. punctatus* L. will be rejected from the Checklist and Red List of Bryophytes of Romania (Ștefănuț & Goia, 2012).

Also, all *Anthoceros punctatus* samples reported from Hungary in BP Herbarium were checked and have proven to be *A. agrestis*. The distribution of these two hornwort species in Europe should be therefore reevaluated.

#### *Jungermannia borealis* Damsh. et Váňa

The first report of *Jungermannia borealis* was made by R. Düll, who published this species for Romania as *J. borealis* Damsh. et Váňa, but with *J. karl-muelleri* auct. as synonym (Düll, 1983). The only report of *J. karl-muelleri* from Romania was made by L. Vajda, from Făgăraș Mountains, Podragu Valley, 1800-2000 m alt., as *J. karl-muelleri* Grolle (Vajda, 1975; Düll, 1983; Mihai, 1983; Dihoru, 2001; Schumacker & Váňa, 2000, 2005; Söderström *et al.*, 2002; Damsholt, 2002; Frey *et al.*, 2006; Ștefănuț, 2008).

In the BP Herbarium I found two samples of *J. karl-muelleri* Grolle from Făgăraş Mountains, above Podragu Lake, 2100 m *alt.*, 15.07.1966, *leg. & det.* L. Vajda, but these were revised by J. Váňa as *J. polaris* Lindb., *conf.* S. Ştefănuţ 08.2013 [BP 27072/H, 27073/H].

So, the previous report of *Jungermannia borealis* from Romania will be treated as *J. polaris* and *J. borealis* will be rejected from the Checklist and Red List of Bryophytes of Romania (Ştefănuţ & Goia, 2012).

### ***Very rare species confirmed for Romania***

#### ***Anthoceros agrestis* Paton**

**Southern Carpatians**, Retezat Mountains, Brazi, Hunedoara County, 11.10.2010, *leg.* S. Ştefănuţ, *det.* S. Ştefănuţ [BUCA B4222].

This is the first record of *Anthoceros agrestis* from the Southern Carpathians and the first record of *Anthoceros* species after more than 60 years to Romania (Ştefănuţ, 2008). Based on this finding, the conservation status of *Anthoceros agrestis* in Romania is changed from *Critically Endangered* - CR B2ab(ii,iii,iv) (Ştefănuţ & Goia, 2012) to *Vulnerable* - VU B2ab(ii,iii,iv), IUCN 2010 category.

#### ***Cephaloziella massalongi* (Spruce) Müll. Frib.**

**Harghita Mountains**, Pietra Colibei, 19.06.1999, *leg. & det.* G. Jakab, *conf.* S. Ştefănuţ 30.08.2012 [BP 47396/H] (Jakab, 2000).

This is the single record of this species in Romania.

#### ***Cephaloziella spinigera* (Lindb.) Warnst.**

**Suceava County**, Tesna, on rotten woods, 27.06.1972, *leg. & det.* L. Vajda, *conf.* S. Ştefănuţ 30.08.2012 [BP 29314/H].

**Bistriţa-Năsăud County**, Grădiniţa Peatbog, on rotten woods, 27.08.1972, *leg. & det.* L. Vajda, *conf.* B. Cykowska, 09.2010 and S. Ştefănuţ 30.08.2012 [BP 27580/H, 27581/H].

Until now, this species was reported only once from Romania, from Maramureş County, Săpânicioara, common spruce forest, 15-21.06.1997 (Jakab, 1999). With these two localities added, the conservation status of *Cephaloziella spinigera* in Romania is changed from *Critically Endangered* - CR B1ab(ii,iii)+2ab(ii,iii) (Ştefănuţ & Goia, 2012) to *Endangered* - EN B2ab(ii,iii,iv).

#### ***Marsupella apiculata* Schiffn.**

**Călimani Mountains**, Răchitiş Peak, in the upper part of north facing glacial valley, 2000-2020 m *alt.*, 47°05'53" N, 25°14'48" E, on soil over siliceous rocks, 16.07.2011, *leg.* T. Pócs, P. Erzberger & M. Höhn no. 1148/K, *det.* T. Pócs, *conf.* S. Ştefănuţ 09.2012 [EGR 1576; BUCA B4441] (Erzberger *et al.*, 2012); Răchitiş Peak, 2016 m *alt.*, 15.07.2013, *leg. & det.* S. Ştefănuţ [BUCA B4481-B4489].

This is the single locality reported for the distribution of this species in Romania. *Marsupella apiculata* is a new addition to the Checklist and Red List of Bryophytes of Romania (Ştefănuţ & Goia, 2012). The conservation status is *Critically Endangered* - CR B1ab(ii,iii)+2ab(ii,iii).

#### ***Scapania cuspiduligera* (Nees) Müll. Frib.**

**Retezat Mountains**, Radeş Valley, Gura Apei, 1000 m *alt.*, 6.08.1969, *leg. & det.* L. Vajda, *conf.* S. Ştefănuţ 08.2013 [BP 26401/H].

Until now, this species was confirmed from only one massif in Romania, namely Bucegi Massif, Gaura Glacial Ring, 2120-2175 m *alt.*, 8.07.1999, *leg. & det.*

S. Ștefănuț [BUCA B3531, B3355], Mălăiești Glacial Ring, 2110-2260 m *alt.*, 9.07.1999, *leg. & det.* S. Ștefănuț [BUCA B3469, B3470] (Ștefănuț, 2007).

***Scapania praetervisa* Meyl.**

**Retezat Mountains**, Radeș Valley, Gura Apei, 1000 m *alt.*, 6.08.1969, *leg. & det.* L. Vajda, as *S. mucronata* Buch var. *arvenica* Culm., *rev.* S. Ștefănuț 08.2013 [BP 26404/H].

*Scapania praetervisa* Meyl. was published by Jakab G. as new to Romania, from Maramureș County, Covatar Waterfall, near Săpânța, 900 m *alt.*, 15-21.06.1997, *leg. & det.* G. Jakab (Jakab, 1999), but was not included in the bryophyte checklist of Romania, considering that it required further confirmation (Ștefănuț, 2008; Ștefănuț & Goia, 2012). *Scapania praetervisa* is now added to the Checklist and Red List of Bryophytes of Romania (Ștefănuț & Goia, 2012). The conservation status is *Critically Endangered* - CR B2ab(ii,iii,iv).

***Nardia breidlerii* (Limpr.) Lindb.**

The presence of *Nardia breidlerii* (Limpr.) Lindb. in Romania was doubtful and the distribution of this species in Europe, including Romania, presented by N. Konstantinova (2000) is made according to R. Düll (1983) – personal communication by Nadya Konstantinova.

In the BP Herbarium, I found samples of *N. breidlerii* (Limpr.) Lindb. from Rodna Mountains, Laptelui Mountain, 1700-2000 m *alt.*, 27.07.1963, *leg.* Á. Boros, *det.* J. Váňa, these were revised as *Nardia scalaris* S.F. Gray, *rev.* S. Ștefănuț 08.2013 [BP 39064/H].

Reading the manuscript of T. Ștefureac for the book *Alpine pastures of Bucegi Mountains* (Pușcaru *et al.*, 1956), I noticed that many bryophytes species were not published. In addition to table 27 for the association *Agrostidetum rupestris* from Bucegi Mountains, Piatra Arsă, 1760 m *alt.*, Ștefureac noted in his manuscript other bryophytes as *Buxbaumia aphylla* Hedw., *Dicranella varia* (Hedw.) Schimp., *Diphyscium foliosum* (Hedw.) D. Mohr, *Hylocomium spelendens* (Hedw.) Schimp., *Mnium thomsonii* Schimp. as *M. orthorhynchum* Müll. Hal., *Oligotrichum hercynicum* (Hedw.) Lam. et DC., *Pogonatum urnigerum* (Hedw.) P. Beauv., *Pohlia cruda* (Hedw.) Lindb., *P. nutans* (Hedw.) Lindb., *Barbilophozia lycopodioides* (Wallr.) Loeske var. *parvifolia* Schiffn. as *Lophozia*, *Cephaloziella rubella* (Nees) Warnst., *Jungermannia sphaerocarpa* Hook., *Lophozia ventricosa* (Dicks.) Dumort., *Nardia breidlerii* (Limpr.) Lindb., *N. scalaris* S.F. Gray, *Ptilidium ciliare* (L.) Hampe and *Tritomaria exsertiformis* (Breidl.) Loeske as *Sphenolobus*.

Taking into consideration that Düll used the checklist and detailed contribution given by G. Mihai and T. Ștefureac for Romania when publishing the distribution of liverwort species in Europe (Düll, 1983), it is plausible to assume that the only source for the distribution of *N. breidlerii* in Romania was in fact the unpublished data from Ștefureac's manuscript.

Because so far I have not found the herbarium samples collected from the Bucegi Massif, identified by T. Ștefureac as *N. breidlerii* and I have not found any other report, this species requires further confirmation and until new data, and the conservation status of *N. breidlerii* in Romania remains DD (Data Deficient).

## DISCUSSION

The confirmation of the presence in Romania for *Anthoceros agrestis* Paton, *Cephaloziella massalongi* (Spruce) Müll. Frib., *Cephaloziella spinigera*

(Lindb.) Warnst., *Marsupella apiculata* Schiffn., *Scapania cuspiduligera* (Nees) Müll. Frib. and *Scapania praetervisa* Meyl. and the addition of new localities made possible to change the conservation status for some of these species.

The rejection of *Jungermannia borealis* from the liverwort checklist of Romania does not exclude the possibility that this species will be reported in the future, especially from limestone areas of South-Eastern Carpathians, as Rodna Mountains, Bucegi Massif, Piatra Craiului Mountains, Făgăraș Mountains, Parâng Mountains or Retezat Mountains.

The possibility that *Anthoceros punctatus* will be reported from Romania is very low in the future. However, with global warming, this species could increase its distribution area from sub-Mediterranean towards north, therefore increasing the chance to be found in southern Romania or in the eastern part, in Dobruđa.

Some other liverwort specimens that could be new species reports or confirmations of doubtful species from Romania were identified in BP Herbarium, but these proved to be in fact misidentified. For example: *Metzgeria simplex* Orb. ex Müll. Frib. from Cristianul Mare Mountain, 1600 m alt. 10.10.1962, leg. & det. Á. Boros, as *M. conjugata*, rev. L. Vajda, is *M. conjugata* Lindb., rev. S. Ștefănuț 08.2013 [BP 32933/H]; *Lophozia silvicola* H. Buch from Retezat Mountains, Gemenele Valley, Casa Laborator, 5.07.1965, leg. E. Plămadă, det. L. Vajda, is *Lophozia longiflora* (Nees) Schiffn., rev. S. Ștefănuț 08.2013 [BP 35566/H]; *Marsupella alpina* (Gottsche ex Husn.) Bernet from Făgăraș Mountains, Podragu Lake, 2000 m alt., 13.08.1966, leg. & det. L. Vajda, but in the envelope are only *M. commutata* (Limpr.) Bernet. and *Gymnomitrium concinatum* (Lightf.) Corda, rev. J. Váňa 1978, conf. S. Ștefănuț 08.2012 [BP 25590/H]. Probably *M. alpina* has been confused with *M. commutata* because of the same size of the leaf cells in both species.

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