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Aneura maxima (Schiffn.) Steph. (Aneuraceae, Marchantiophyta): A new species for Romania

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Résumé – *Aneura maxima* (Schiffn.) Steph. (Aneuraceae, Marchantiophyta), est signalé pour la première fois en Roumanie. Les spécimens ont été prélevés dans la tourbière de Lacul Tătarilor, près des monts Făgăraş et de la vallée Iad, monts Apuseni. Les localités les plus proches de cette espèce se situent en République Slovaque et en Pologne. Ainsi, cette nouvelle découverte montre une expansion de cette espèce vers l'Europe du Sud-Est. Les préférences écologiques et une carte montrant la localisation de l'espèce en Europe sont fournies.

***Aneura* / Hépatiques / Distribution / Nouveau report / Roumanie**

Abstract – *Aneura maxima* (Schiffn.) Steph. (Aneuraceae, Marchantiophyta) is reported for the first time from Romania. The specimens were collected from the Lacul Tătarilor Peatbog, near Făgăraş Mountains and Iad Valley, Apuseni Mountains. The nearest localities of this species are in the Slovak Republic and Poland. Therefore, this new record shows an expansion of this species' range towards South-East Europe. Habitat preferences and distribution map of the plant in Europe are given.

***Aneura* / Liverworts / Distribution / New Record / Romania**

INTRODUCTION

In 2011 I did some research on bryophytes in the peatbogs area south of Arpaşu de Sus, Sibiu County, Romania, exploring the distribution of *Pallavicinia lyellii* (Hook.) Carruth. in these peatbogs, but also to check some samples of *Aneura* that I suspected to belong to *A. maxima* (Schiffn.) Steph.

I had collected *Aneura* in 2004, but they were not conclusive and I could not accurately determine whether they belonged to *A. maxima* or were a form of *A. pinguis* (L.) Dumort. As a result, these samples were included in *A. pinguis* and I intended to make new investigations in order to clarify this. A picture of these specimens appears on the book cover of the *Hornwort and Liverwort Atlas of Romania* (Ştefănuţ, 2008).

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MATERIALS AND METHODS

Bryophyte specimens collected from the peatbogs of Arpaşu de Sus and Iad Valley were examined, measured and photographed. The collected material was stored in the BUCA herbarium. All *Aneura* samples stored in BUCA were reviewed, especially those collected by myself in 2004 from Lacul Tătarilor Peatbog [BUCA *B3313*]. The liverwort nomenclature is according to Ştefănuţ (2008) and moss nomenclature according to Hill *et al.* (2006).

RESULTS

The research conducted on 29 March 2011 in Lacul Tătarilor Peatbog, the same place as in 2004, resulted in the identification of mature specimens of *Aneura*, which proved to be *Aneura maxima* (Schiffn.) Steph. (Fig. 1). In this area, on a surface of 25 square meters I found both male and female specimens with archegonia and sporophytes. In the Lacul Tătarilor Peatbog, *A. maxima* grows close to the water level, among specimens of *Sphagnum*.

The vegetation is typical for a peatbog, represented by ass. *Sphagnetum magellanici* (Malcuit 1929) Kastner *et* Flosner 1933 with *Sphagnum magellanicum* Brid. and *Eriophorum vaginatum* L. (dominant species), along with *Betula pubescens* Ehrh. subsp. *carpathica* (Waldst. *et* Kit. *ex* Willd.) Asch. *et* Graeb., *Eriophorum gracile* W.D.J. Koch, *E. angustifolium* Honck., *Menyanthes trifoliata*

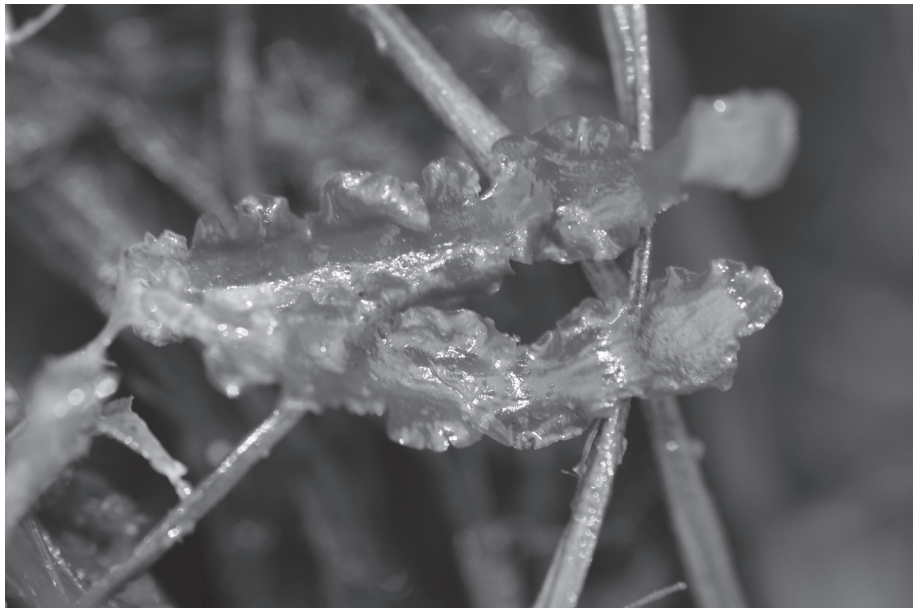

Fig. 1. Female plants of *Aneura maxima* (Schiffn.) Steph. from Lacul Tătarilor Peatbog, Romania.

L., *Bruckenthalia spiculiflora* (Salisb.) Rchb., *Vaccinium vitis-idaea* L., *V. myrtillus* L., *Carex lasiocarpa* Ehrh., *Drosera rotundifolia* L., *Epilobium palustre* L., *Thelypteris palustris* Schott, *Sphagnum compactum* Lam. *et* DC., *Aulocomnium palustre* (Hedw.) Schwägr., *Pleurozium schreberi* (Willd. *ex* Brid.) Mitt., *Polytrichum strictum* Menzies ex Brid., *Plagiothecium denticulatum* (Hedw.) Schimp., *Riccardia multifida* (L.) Gray, *Cephalozia connivens* (Dicks.) Lindb., *C. pleniceps* (Austin) Lindb., *Calypogeia fissa* (L.) Raddi, *Lophocolea bidentata* (L.) Dumort. and *Aneura maxima.*

On the edge of Lacul Tătarilor Peatbog the vegetation is represented by alderwood forest (*Caltho-Alnetum*).

The Lacul Tătarilor Peatbog has a depth of 16 m, of which approximately 13.5 m is composed of peat. Studies of the vegetation history of this peatbog have been done recently. The pollen analysis showed that the peatbog is over 10,000-year-old (Farcaş *et al.*, 2004; Tațău *et al.*, 2009, 2010).

An area of four hectares of Lacul Tătarilor Peatbog is protected by law, being included in the European network of protected areas *NATURA 2000* as ROSCI0112 - Mlaca Tătarilor (The Romanian Law no. 47 from 7 April 2011).

During this trip I found in the peatbog located north to the Lacul Tătarilor, at 45°43'23.80"N / 24°38'43.10"E, some male plants of *Pallavicinia lyellii* (Hook.) Carruth., on 29.03.2011, *leg. & det.* S. Ştefănuț [BUCA *B4286*]. Although I've searched for this species in 2002, 2003, 2004 and 2006 so far it has not been found since the first report in 2001 (Ştefănuț, 2003).

On 8 June 2011 I found *Aneura maxima* at another locality in Romania, Iad Valley, Apuseni Mountains. In this area, *A. maxima* grows along *Preissia quadrata* (Scop.) Nees, *Conocephalum salebrosum* Szweyk., Buczkowska *et* Odrzykoski, *Blasia pusilla* L., *Lejeunea cavifolia* (L.) Dumort., *Cololejeunea rossettiana* (C. Massal.), *Frullania jackii* Gottsche, *Plagiomnium undulatum* (Hedw.) T.J. Kop., *Bryum pseudotriquetrum* (Hedw.) P. Gaertn., E. Mey *et* Schreb., *Fissidens adianthoides* Hedw., *Rhabdoweisia crenulata* (Mitt.) H. Jameson, *Rhytidiadelphus squarosus* (Hedw.) Warnst., *Alnus incana* (L.) Moench, *Fagus sylvatica* L., *Coryllus avellana* L., *Salix caprea* L., *Solanum dulcamara* L., *Caltha palustris* L., *Clematis alpina* (L.) Mill., *Dryopteris filix-mas* (L.) Schott, *Impatiens noli-tangere* L., *Myosotis scorpioides* L., *Petasites albus* (L.) Gaertn., *Ranunculus repens* L., *Rubus idaeus* L., *Veronica urticifolia* L., in alderwood forest (*Carici brizoides-Alnetum* subass. *syringetosum josikaeae*).

The area with *A. maxima* from Iad Valley, Apuseni Mountains, is under legal protection and included in the ROSCI0002 *Apuseni* NATURA 2000 Site (The Romanian Law no. 47 from 7 April 2011).

In Poland, *Aneura maxima* was reported from alderwood *Carici elongatae-Alnetum*, marshy spruce forest *Sphagno girgensohnii-Piceetum* (Buczkowska & Bączkiewicz, 2006), and from meadow bog-spring *Valeriano-Caricetum flavae,* forest bog-spring *Caltha laeta-Cherophyllum hirsutum* and alderwood forest *Caltho-Alnetum* (Mierzeńska & Vončina, 2010).

Aneura maxima was dicovered in Europe in Belgium only recently in the last decade of the 20th Century by Andriessen *et al.* (1995). The European range of this species is now: France (Sotiaux & Sotiaux, 1996), Finland (Fhram, 1997), Denmark (Thingsgaard, 2002), Luxemburg (Werner, 2003), Czech Republic (Kučera, 2004; Loskotová, 2006), Poland (Schumacker & Váňa, 2000, 2005; Buczkowska & Bączkiewicz, 2006; Vanderpoorten *et al.*, 2006; Mierzeńska & Vončina, 2010), Slovak Republic (Loskotová, 2006), Portugal and Spain (Sergio & Garcia, 2009), Corsica (Sotiaux *et al.*, 2007), Norway (Frahm, 2011), Belgium and Romania (Fig. 2).

Fig. 2. The distribution of *Aneura maxima* (Schiffn.) Steph. in Europe.

Studied specimens of *Aneura* from Romania

Aneura maxima (Schiffn.) Steph.

Făgăraş Depression, Lacul Tătarilor Peatbog, Sibiu County, 45°42'53,9"N / 24°39'02,4"E, 546 m *alt*., female plants, 29.03.2011, *leg.* & *det.* S. Ştefănuţ, *conf*. K. Buczkowska [BUCA *B4274*], male plants, 29.03.2011, *leg.* & *det.* S. Ştefănuţ [BUCA *B4275*], male plants, 9.06.2011, *leg.* & *det.* S. Ştefănuţ [BUCA *B4315*]. Lacul Tătarilor Peatbog, female plants, 30.10.2004, *leg.* & *det.* S. Ştefănuţ, sub *Aneura pinguis* (L.) Dumort., *rev.* S. Ştefănuţ in 2011 [BUCA *B3313*] (Ştefănuţ, 2008).

Apuseni Mountains, Iad Valley, Bihor County, 46°43'07,4"N / 22°34'29,6"E, 820 m *alt*., on rock, male plants, 8.06.2011, *leg.* & *det.* S. Ştefănuţ [BUCA *B4303, B4304, B4307*, *B4308*, *B4311*].

Aneura pinguis (L.) Dumort.

Braşov County, Hărman Peatbog, 45°43'4.67"N / 25°40'6.84"E, 518 m *alt*., female plants, 30.03.2011, *leg.* & *det.* S. Ştefănuţ [BUCA *B4290*], male plants, 9.06.2011, *leg.* & *det.* S. Ştefănuţ [BUCA *B4316*].

Prahova County, Breaza Gorges, 15.05.2008, *leg.* & *det.* Ştefănuţ S. (Ştefănuţ, 2008).

Bucegi Massif, Lăptici Peatbog, 45°22'26"N / 25°26'23"E, 1470 m *alt.*, male plants, 28.07.2005, *leg.* & *det.* Ştefănuţ S. [BUCA *B3244, B3255*], female plants [BUCA *B3245, B3254*], Peştera Hermitage, 45°23'17"N / 25°26'26"E, 1540 m *alt.*, 7.09.2006, female plants, *leg*. & *det.* Ştefănuţ S. [BUCA *B3574*, *B3576*] (Ştefănuţ, 2008).

Piatra Craiului Mountains, Gura Râului, 45°33'03"N / 25°17'56"E, 860 m *alt.*, 7.07.2003, *leg.* & *det.* Ştefănuţ S. [BUCA *B2730, B2753*] (Ştefănuţ & Pop O.G., 2006; Ştefănuţ, 2008).

Dâmbovița County, Corbii Ciungi, 6.05.1998, *leg.* & *det.* Ştefănuţ S. [BUCA *B3375, B3376*] (Ştefănuţ, 2008).

DISCUSSION

The presence of *Aneura maxima* in Romania, especially in the peatbogs of Arpaşu de Sus is not a surprise. This species and *Pallavicinia lyellii* are very vulnerable to anthropogenic impact, especially by draining peatbogs, being included as CR – *critically endangered*, IUCN 2010 category, for Romania.

The discovery of *A. maxima* and *P. lyellii* species within just a few hundred meters of each other increases the conservation value of the area and requires the enlargement of the protected area in order to include the peatbog located north of Lacul Tătarilor in the ROSCI0112 *Mlaca Tătarilor* NATURA 2000 Site.

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