

BRYOFLORESTICAL DATA FROM AUSTRIAN PART OF SOPRON HILLS (ÖDENBURGER-GEBIRGE, E-AUSTRIA)

Péter Szűcs^{1*} & *Harald Zechmeister*²

¹*Eszterházy Károly University, Institute of Biology, Department of Botany and Plant Physiology, H-3300 Eger, Leányka u. 6, Hungary;*

²*University of Vienna, Department of Botany and Biodiversity Research, Rennweg 14, 1030 Wien, Austria; *E-mail: szucs.peter@uni-eszterhazy.hu*

Abstract: The Austrian part of Sopron Hills was a neglected area from the point of view of bryophyte floristics. In the investigated area 141 bryophytes were found, out of these 21 liverworts and 120 mosses. There were nine species new to Burgenland: *Jungermannia gracillima*, *Pellia neesiana*, *Campylopus pyriformis*, *Leucobryum juniperoideum*, *Orthotrichum lyellii*, *Pohlia elongata*, *Pohlia prolifera*, *Pseudephemerum nitidum*, *Trichodon cylindricus*.

Some species were detected from the territory which are otherwise rare in Austria, such as: *Fossombronia wondraczekii*, *Riccardia palmata*, *Brachythecium mildeanum*, *Didymodon cordatus*, *Didymodon vinealis*, *Fissidens adianthoides*, *Microbryum davallianum*, *Plagiomnium elatum*, *Pleuridium acuminatum*, *Pleuridium subulatum*, *Pottia intermedia*, *Pseudephemerum nitidum*.

13 species are listed as threatened in the Red Data List of bryophytes in Lower Austria, and so do 11 species in the overall Austrian Red Data list of bryophytes. No species of the Annex II of the FFH-directive were found.

Keywords: bryophytes, rare species, red-list status, Burgenland

INTRODUCTION

To date no significant bryological research has been carried out at the Austrian part of the Sopron Hills, leaving this territory almost unexplored. The overall Burgenland itself has only a very marginal recent bryological examination. The research of Latzel (1941) involved only the Hungarian parts of the Lower Alps. The work of Maurer (1965) on the moss species of the Burgenland presents field data for the Southern part of the Burgenland. Schlüsslmayr (2001) examined the Leithagebirge in northern Burgenland and Zechmeister (2004, 2005a) studied the bryophyte flora of the

Seewinkel. Another research of Zechmeister (2008) involved the peatmoss habitats of the Burgenland. Within the region of these studies only the work of Zechmeister (2005b) describes the serpentine outcrops in the area. Preliminary results for the Sopron Hills have first been published by Szűcs and Szmorad (2009). No checklist or Red Data List can be found for the Burgenland. The Red Data List of Lower Austria, which was based on abundant latest floristical data, has been published only recently (Zechmeister *et al.* 2013). Nevertheless, the Sopron Hills are located beyond the boundaries of the Lower Austria region, which makes the relation and direct comparison of the obtained data difficult.

The proposed article intends to fill this gap in knowledge and provides the latest bryofloristical results for the Sopron Hills.

Study area

The Sopron Hills are the north-eastern and relatively low height (between 600 and 800 m a.s.l.) subrange of the Alps. To the west they are separated from the adjacent, nearly north-south running Rosalia Hills by a saddle above the village of Siegraben (Szmorad 2011).

In aspect of geology the western part of the hills towards the Rosalia Hills is covered with miocene sandy, gravel–clay sediments. In the southern part of the hills (between Ritzing and Neckenmarkt, also south of Kalkgruben) there are penetrations of Leitha limestone, and acidic sandstones located between Neckenmarkt and Harka. In the north-western part of the region, large-scale areas are covered with a Badenian clay formation (Szmorad 2011). The most frequent soil types of the territory are brown forest soils. The hydrographic network of the area consists of small streams. The eastern hill front is warmer and dryer, the western, inner area is much cooler and has higher precipitation. The mean annual temperature varies between 8–9 °C, and the annual precipitation usually between 650–900 mm (Király 2004, Szmorad 2011).

From the phytogeographical point of view the Sopron Hills are situated in the border region of the Eastern Alpine (*Noricum*) and the Pannonian (*Pannonicum*) floristic regions. In the hills the mesophilous and acidophilous deciduous forests are dominant, but there are large-scale areas of secondary coniferous forest stands (Király 2004, Szmorad 2010).

MATERIALS AND METHODS

The fieldwork has been carried out between 2009 and 2014. The main habitats, such as acidophyllous deciduous and mixed forests, planted coniferous forests, wetlands, grasslands, streams, forest roads, lakes, quarries and buildings were investigated based on a subjective site selection. Bryophytes were collected from all available substrates (soil, concrete, tree bark and root, decayed wood, stone and plastic foil).

The nomenclature follows Köckinger *et al.* (2015). The species names are given, as well as the Red Data List status which was given to these species for Lower Austria by Zechmeister *et al.* (2013), number of sampling site(s) and the substrate within. Specimens have been deposited in bryophyte collections of the Eszterházy Károly University in Eger (EGR) and in the private herbarium of Harald Zechmeister at University of Vienna. The site details are listed in the appendix.

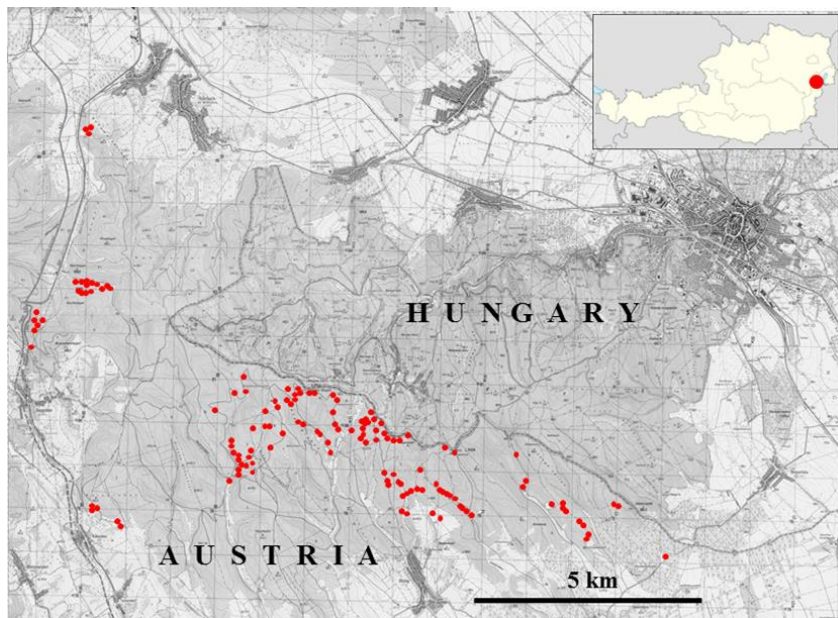


Figure 1. The sampling sites in the investigated area

RESULTS

List of species

In total 141 species were found, out of these were 120 bryophytes and 21 liverworts.

Hepaticeae

Blasia pusilla L. – LC – 79, 80: on soil

Calypogeia fissa (L.) Raddi – LC – 101: on soil

Cephalozia bicuspidata (L.) Dumort. – LC – 98, 101: on soil

Cephaloziella divaricata (Sm.) Schiffn. – LC – 7, 38, 62, 66, 63, 90: on soil

Conocephalum conicum (L.) Dumort. – LC – 46: on soil

Fossombronia wondraczekii (Corda) Lindb. – NT – 79: on soil

Frullania dilatata (L.) Dumort. – LC – 13: bark of *Fagus sylvatica*; 86: bark of *Malus sylvestris*

Jungermannia gracillima Sm. – LC – 63, 66: on soil

Lophocolea bidentata (L.) Dumort. – LC – 75, 67, 84: on soil

Lophocolea heterophylla (Schrad.) Dumort. – LC – 14: root of *Alnus glutinosa*; 16: on bark; 15, 78: on decayed wood; 90: on soil; 108: on rooted *Picea abies* trunk

Lophocolea minor Nees – LC – 33: on soil

Metzgeria furcata (L.) Dumort. – LC – 108: on bark of *Tilia*; 119: on bark of *Fagus sylvatica*

Nowellia curvifolia (Dicks.) Mitt. – LC – 108: on rooted *Picea abies* trunk

Pellia endiviifolia (Dicks.) Dumort. – LC – 4, 79: on soil

Pellia neesiana (Gottsche) Limpr. – LC – 30: on soil

Plagiochila asplenoides (L. emend. Taylor) Dumort. – LC – 46, 108: on soil

Plagiochila porelloides (Torr. ex Nees) Lindenb. – LC – 70, 84: on soil

Ptilidium pulcherrimum (Weber) Vain. – LC – 90: on soil; 91: bark of *Quercus petraea*

Radula complanata (L.) Dumort. – LC – 19: bark of *Acer campestre*; 46: bark of *Acer pseudoplatanus* and *Alnus glutinosa*; 78: bark of *Corylus avellana*; 119: bark of *Fagus sylvatica*

Riccardia palmata (Hedw.) Carruth. – VU – 108: on rooted *Picea abies* trunk

Scapania nemorea (L.) Grolle – LC – 101: on soil

Musci

- Abietinella abietina*** (L. ex Hedw.) M.Fleisch. var. ***abietina*** – LC – 87: on soil
- Amblystegium riparium*** (L. ex Hedw.) Schimp. – LC – 16: on bark and root; 77: on piece of wood
- Amblystegium serpens*** (L. ex Hedw.) Schimp. – LC – 19: bark of *Acer campestre*; 21, 71: on concrete; 74: bark of *Alnus glutinosa*, bark of *Sambucus nigra*; 78: bark of *Corylus avellana*
- Anomodon attenuatus*** (Hedw.) Huebener – LC – 116: on limestone
- Anomodon viticulosus*** (Hedw.) Hook. & Taylor – LC – 116: on limestone
- Atrichum undulatum*** (Hedw.) P.Beauv. – LC – 2, 3, 8, 10, 12, 14, 62, 63, 90: on soil
- Barbula convoluta*** Hedw. – LC – 5: on soil
- Barbula unguiculata*** Hedw. – LC – 44, 77, 89: on soil
- Bartramia pomiformis*** Hedw. – LC – 108: on soil
- Brachytheciastrum velutinum*** (L. ex Hedw.) Ignatov & Huttunen – LC – 1, 14, 16: on decayed wood and soil; 7, 33, 46: on soil; 74: bark of *Alnus glutinosa*
- Brachythecium albicans*** (Neck. ex Hedw.) Schimp. – LC – 39, 42, 87: on soil
- Brachythecium glaerosum*** (Bruch ex Spruce) Schimp. var. ***glareosum*** – LC – 3, 10, 11, 87: on soil
- Brachythecium mildeanum*** (Schimp.) Schimp. – EN – 109: on soil
- Brachythecium rivulare*** Schimp. – LC – 16: on root; 50: stump of *Alnus glutinosa*; 75, 76, 89: on soil; 78, 106: on decayed wood
- Brachythecium rutabulum*** (L. ex Hedw.) Schimp. – LC – 16: on bark; 78: on decayed trunk, on concrete; 4, 39, 42, 77: on soil; 83: on decayed wood
- Brachythecium salebrosum*** (Hoffm. ex F.Weber & D.Mohr) Schimp. – LC – 7: on soil; 14, 74: bark of *Alnus glutinosa*, bark of *Sambucus nigra*
- Bryum argenteum*** Hedw. – LC – 116: on soil
- Bryum capillare*** Hedw. – LC – 104: on soil
- Bryum elegans*** Nees var. ***elegans*** – LC – 73: on soil
- Bryum moravicum*** Podp. – LC – 47: bark of *Fraxinus* sp.; 119: bark of *Fagus sylvatica*
- Bryum rubens*** Mitt. – LC – 62: on soil

- Callierygonella cuspidata*** (L. ex Hedw.) Loeske – LC – 3, 20, 55, 56, 63, 75: on soil; 71: on plastic foil; 78: on concrete, on decayed wood
- Campylopus pyriformis*** (Schultz) Brid. – VU – 53: on soil
- Ceratodon purpureus*** (Hedw.) Brid. – LC – 2, 6, 7, 10, 11, 13, 39, 42, 48, 60, 62, 87, 90: on soil
- Cirriphyllum crassinervium*** (Taylor) Loeske & M.Fleisch. – LC – 116: on limestone
- Cirriphyllum piliferum*** (Schreb. ex Hedw.) Grout – LC – 18, 39, 42, 48, 63, 77: on soil
- Climacium dendroides*** (Hedw.) F.Weber & D.Mohr – LC – 18: on soil
- Cratoneuron filicinum*** (L. ex Hedw.) Spruce – LC – 37, 50, 56, 77, 78: on soil
- Dicranella heteromalla*** (Hedw.) Schimp. – LC – 2, 7, 10, 12, 13, 62, 63, 68, 79, 90: on soil
- Dicranella staphylina*** H.Whitehouse – LC – 39: on soil
- Dicranella varia*** (Hedw.) Schimp. – LC – 77: on soil
- Dicranum montanum*** Hedw. – LC – 10, 12, 15: on decayed wood; 81: on decayed log; 91: bark of *Quercus petraea*; 91: on soil
- Dicranum polysetum*** Sw. ex anon. – LC – 62: on soil
- Dicranum scoparium*** Hedw. – LC – 6: on decayed wood; 13, 38, 42, 90, 91: on soil; 82: stump of *Alnus glutinosa*
- Didymodon cordatus*** Jur. – NT – 111: on soil; 115: surface of calcareous building; 116: on limestone
- Didymodon rigidulus*** Hedw. – LC – 115: surface of calcareous building; 116: on limestone
- Didymodon vinealis*** (Brid.) R.H.Zander – EN – 115: surface of calcareous building
- Drepanocladus aduncus*** (Hedw.) Warnst. – LC – 77: on soil
- Encalypta streptocarpa*** Hedw. – LC – 116: on limestone
- Eurhynchiastrum pulchellum*** (Hedw.) Ignatov & Huttunen var. ***pulchellum*** – LC – 70: on soil
- Eurhynchium angustirete*** (Broth.) T.J.Kop. – LC – 14: decayed wood; 39, 42, 63, 67, 68, 73, 84, 91: on soil
- Fissidens adianthoides*** Hedw. – NT – 57: on soil
- Fissidens bryoides*** Hedw. – LC – 73: on soil
- Fissidens taxifolius*** Hedw. subsp. ***taxifolius*** – LC – 1: on soil
- Funaria hygromertica*** Hedw. – LC – 62, 120: on soil
- Grimmia pulvinata*** (Timm. ex Hedw.) Sm. – LC – 71: on concrete
- Herzogiella seligeri*** (Brid.) Z.Iwats. – LC – 6, 15: on decayed wood

- Heterocladium heteropterum*** (Brid.) Schimp. – LC – 43: on soil
Homalia trichomanoides (Hedw.) Brid. – LC – 49: on root
Homalothecium lutescens (Hedw.) H.Rob. – LC – 3: on soil
Homalothecium philippeanum (Spruce) Schimp. – LC – 47: bark of
Fraxinus sp.; 116: on limestone
Homomallium incurvatum (Schrad. ex Brid.) Loeske – LC – 21: on
concrete; 116: on limestone
Hylocomnium splendens (Hedw.) Schimp. – LC – 18, 91: on soil
Hypnum cupressiforme Hedw. var. ***cupressiforme*** – LC – 1: on
decayed wood and soil; 14: root of *Alnus glutinosa*; 47: bark of
Fraxinus; 78: bark of *Alnus glutinosa*; 8, 38, 84, 90, 91: on soil; 90:
bark of *Malus sylvestris*
Hypnum cupressiforme var. ***lacunosum*** Brid. – LC – 73: on soil
Hypnum lindbergii Mitt. – LC – 71: on plastic foil; 78: on decayed
wood, 4, 39, 48, 84: on soil
Isothecium alopecuroides (Lam. ex Dubois) Isov. – LC – 119: root
swelling of *Fagus sylvatica*
Leskea polycarpa Ehrh. ex Hedw. – LC – 19: bark of *Acer campestre*
Leucobryum glaucum (Hedw.) Ångstr. – LC – 91: on soil
Leucobryum juniperoideum (Brid.) Müll.Hal. – LC – 90, 91: on soil
Leucodon sciuroides (Hedw.) Schwägr. – LC – 86: bark of *Malus*
sylvestris
Microbryum davallianum (Sm.) R.H.Zander – EN – 44: on soil
Mnium hornum Hedw. – LC – 108: root swelling of *Tilia* sp.
Mnium marginatum (Dicks.) P.Beauv. – LC – 115: surface of
calcareous building
Orthotrichum affine Schrad. ex Brid. – LC – 28: bark of *Fraxinus* sp.
Orthotrichum anomalum Hedw. – LC – 21: on concrete; 116: on
limestone
Orthotrichum cupulatum Hoffm. ex Brid. var. ***cupulatum*** – LC –
116: on limestone
Orthotrichum diaphanum Schrad. ex Brid. – LC – 65: bark of
Sambucus nigra
Orthotrichum lyellii Hook. & Taylor – LC – 28: on bark of *Fraxinus*
sp.
Orthotrichum obtusifolium Brid. – LC – 25: on bark of *Fraxinus* sp.
Orthotrichum pallens Bruch ex Brid. – LC – 35: bark of *Fagus*
sylvatica
Orthotrichum speciosum Nees – LC – 35: bark of *Fagus sylvatica*

- Oxyrrhynchium hians* (Hedw.) Loeske var. ***hians*** – LC – 82: root swelling of *Alnus glutinosa*; 89: on soil
- Palustriella commutata* (Hedw.) Ochyra var. ***commutata*** – LC – 57, 109: on soil; 71: on plastic foil
- Phascum cuspidatum* Schreb. ex Hedw. var. ***cuspidatum*** – LC – 44, 45: on soil
- Physcomitrium pyriforme* (Hedw.) Bruch & Schimp. – LC – 60: on soil
- Plagiomnium affine* (Blandow ex Funck) T.J.Kop. – LC – 78: on decayed trunk; 18, 73, 90: on soil
- Plagiomnium cuspidatum* (Hedw.) T.J.Kop. – LC – 16: on root; 18: on soil; 78: on concrete
- Plagiomnium elatum* (Bruch & Schimp.) T.J.Kop. – VU – 68: on soil
- Plagiomnium rostratum* (Schrad.) T.J.Kop. – LC – 106: on decayed wood
- Plagiomnium undulatum* (Hedw.) T.J.Kop. – LC – 21, 68, 75, 78: on soil; 15: on decayed wood; 82: stump of *Alnus glutinosa*
- Plagiothecium cavifolium* (Brid.) Z.Iwats. – LC – 12, 63: on soil
- Plagiothecium denticulatum* (L. ex Hedw.) Schimp. – LC – 12: on soil; 15: on decayed wood
- Plagiothecium laetum* Schimp. var. ***laetum*** – LC – 12, 13, 16: on soil
- Plagiothecium nemorale* (Mitt.) A.Jaeger – LC – 12: on soil
- Plagiothecium succulentum* (Wilson) Lindb. – LC – 16, 63: on soil
- Platygyrium repens* (Brid.) Schimp. – LC – 78: bark of *Alnus glutinosa*
- Pleuridium acuminatum* Lindb. – VU – 2, 62: on soil
- Pleuridium subulatum* (Hedw.) Rabenh. – NT – 5, 63: on soil
- Pleurozium schreberi* (Willd. ex Brid.) Mitt. – LC – 18, 39, 42, 62, 84: on soil
- Pogonatum aloides* (Hedw.) P.Beauv. – LC – 62, 63: on soil
- Pohlia elongata* Hedw. var. ***elongata*** – LC – 12: on soil
- Pohlia melanodon* (Brid.) A.J.Shaw – LC – 1, 89: on soil
- Pohlia nutans* (Hedw.) Lindb. subsp. ***nutans*** – LC – 2, 6, 63, 90: on soil
- Pohlia prolifera* (Kindb.) Lindb. ex Broth. – VU-R – 54: on soil
- Pohlia wahlenbergii* (F.Weber & D.Mohr) A.L.Andrews var. ***wahlenbergii*** – LC – 5: on soil
- Polytrichum formosum* Hedw. – LC – 2, 6, 11, 13, 90: on soil
- Polytrichum juniperinum* Willd. ex Hedw. – LC – 48, 79, 90: on soil

- Polytrichum piliferum*** Schreb. ex Hedw. – LC – 8, 62, 70, 90, 111: on soil
- Pottia intermedia*** (Turner) Fürnr. – VU – 39: on soil
- Pottia truncata*** (Hedw.) Bruch & Schimp. – LC – 35: on soil
- Pseudephemerum nitidum*** (Hedw.) Loeske – EN – 98: on soil
- Pseudeskeella nervosa*** (Brid.) Nyholm – LC – 19: bark of *Acer campestre*
- Pseudoscleropodium purum*** (L. ex Hedw.) M.Fleisch. – LC – 39, 42, 84, 90, 114: on soil
- Pterigynandrum filiforme*** Hedw. var. ***filiforme*** – LC – 119: on bark of *Fagus sylvatica*
- Pylaisia polyantha*** (Hedw.) Schimp. – LC – 19: bark of *Acer campestre*; 74: bark of *Sambucus nigra*; 78: bark of *Corylus avellana*
- Racomitrium canescens*** (Timm. ex Hedw.) Brid. subsp. ***canescens*** – LC – 89: on soil
- Rhizomnium punctatum*** (Hedw.) T.J.Kop. – LC – 16: on root and bark; 74: bark of *Alnus glutinosa*; 15, 83: on decayed wood; 46, 50, 82: stump of *Alnus glutinosa*
- Rhyncostegium murale*** ((Neck. ex Hedw.) Schimp. – LC – 21: on concrete; 115: on calcareous building
- Rhytidiadelphus squarrosus*** (L. ex Hedw.) Warnst. – LC – 18, 42, 84: on soil
- Schistidium crassipilum*** H.H.Blom – LC – 21, 71: on concrete
- Syntrichia ruralis*** (Hedw.) F.Weber & D.Mohr – LC – 86: on concrete
- Tetraphis pellucida*** Hedw. – LC – 16, 106, 113: on decayed wood
- Thuidium assimile*** (Mitt.) A.Jaeger – LC – 39: on soil; 78: on decayed wood
- Thuidium delicatulum*** (Hedw.) Schimp. – LC – 18, 38, 84: on soil
- Thuidium tamariscinum*** (Hedw.) Schimp. – LC – 18, 78: on decayed wood; 42, 68: on soil
- Trichodon cylindricus*** (Hedw.) Schimp. – LC – 1, 17: on soil
- Tortula muralis*** Hedw. var. ***muralis*** – LC – 71: on concrete
- Ulota bruchii*** Hornsch. ex Brid. – LC – 25, 110: bark of *Fraxinus* sp.
- Ulota crispa*** (Hedw.) Brid. – LC – 17: bark of *Betula pendula*

DISCUSSION

On the basis of these results, the bryophyte list of the project area was compared to the national (Grims and Köckinger 1999, Saukel and Köckinger 1999) and regional bryophyte Red Data List (Zechmeister *et al.* 2013) as well as to the Hungarian Red data List (Papp *et al.* 2010) (Table 1).

Table 1. The Red Data List status of bryophytes in Lower Austria (Niederösterreichs) (Zechmeister *et al.* 2013), Austria (Grims and Köckinger 1999, Saukel and Köckinger 1999) and Hungary (Papp *et al.* 2010).

Comments: Red Data List status in Austria: *VU (gefährdet), *reg. VU (r3 gefährdet), *EN (stark gefährdet) (Grims and Köckinger 1999, Saukel and Köckinger 1999).

Species name	Lower Austria	Austria	Hungary
<i>Blasia pusilla</i> (Hepaticaceae)	LC	LC	EN
<i>Calypogeia fissa</i>	LC	LC	NT
<i>Fossombronia wondraczekii</i>	NT	VU*	DD
<i>Jungermannia gracillima</i>	LC	LC	NT
<i>Nowellia curvifolia</i>	LC	LC	VU
<i>Pellia neesiana</i>	LC	LC	unknown
<i>Plagiochila asplenoides</i>	LC	LC	NT
<i>Ptilidium pulcherrimum</i>	LC	LC	NT
<i>Riccardia palmata</i>	VU	LC	NT
<i>Scapania nemorea</i>	LC	LC	VU
<i>Brachythecium mildeanum</i> (Musci)	EN	VU*	LC-att
<i>Brachythecium glaeosum</i> var. <i>glaeosum</i>	LC	LC	NT
<i>Campylopus pyriformis</i>	VU	EN*	DD
<i>Dicranella staphylina</i>	NT	LC	NT
<i>Didymodon cordatus</i>	NT	VU*	LC-att
<i>Didymodon vinealis</i>	EN	VU*	LC
<i>Eurhynchiastrum pulchellum</i> var. <i>pulchellum</i>	LC	LC	NT
<i>Fissidens adianthoides</i>	NT	reg. VU*	NT
<i>Heterocladium heteropterum</i>	LC	LC	unknown
<i>Microbryum davallianum</i>	EN	VU	LC-att
<i>Mnium hornum</i>	LC	LC	NT
<i>Orthotrichum cupulatum</i>	LC	reg. VU*	LC-att
<i>Orthotrichum obtusifolium</i>	LC	LC	NT
<i>Palustriella commutata</i> var. <i>commutata</i>	LC	LC	EN
<i>Plagiomnium elatum</i>	VU	VU	LC-att
<i>Plagiothecium succulentum</i>	LC	VU	LC
<i>Pleuridium acuminatum</i>	VU	LC	LC-att
<i>Pleuridium subulatum</i>	NT	LC	LC-att
<i>Pohlia elongata</i> var. <i>elongata</i>	LC	LC	DD
<i>Pohlia prolifera</i>	VU-R	LC	DD
<i>Pottia intermedia</i>	VU	LC	LC-att
<i>Pseudephemerum nitidum</i>	EN	VU	LC-att
<i>Ulota bruchii</i>	LC	LC	VU
<i>Ulota crispa</i>	LC	LC	NT

No species of the Annex II of the FFH-directive were found in the investigated area. However, *Leucobryum* sp. which is part of the Annex V of the respective directive was found several times (for details see the species list and corresponding site numbers).

The bryophyte flora of the investigated area resembles that of other lowlands in northern or southern Austria and despite its position in eastern Austria it has only a very small number of species typical or widespread in the Pannonian area (e.g. *Didymodon vinealis*). This is due to the fact that most habitats in the Sopron Hills do not represent typical eastern Austrian habitats as natural dry grasslands or vineyards. Furthermore, most of the sites are situated at comparable higher elevation as most of the sites in the east of Austria. In addition the investigated sites represent a wide range of woods and consequence microclimate and soils are more humid than at „typical” Pannonian sites.

Related to its bedrock the flora is dominated by acidophilous species and only a very few species related to calcareous bedrock were found. The large extent of woods in the area favours a wide range of shade tolerant plants, as well as epiphytes and species restricted to dead logs. Compared to other studies in the centre of the Pannonian area of the Burgenland (e.g. Zechmeister 2005b) which is slightly north of the study area, hepatics show a comparable high number in this study, which is mainly a result of the more humid situation in the investigated area.

The number of threatened species is low in our study as the investigated sites were situated within habitats which are neither threatened by human activity and none rare in occurrence, too.

Acknowledgement – The project was financed by the „Ernst Mach-Stipendium der AÖU der Aktion Österreich-Ungarn” and „Stipendium der AÖU für Universitätslehrer der Aktion Österreich-Ungarn” scholarships.

The article was funded by „Társadalmi Megújulás Operatív Program Kutatás, Innováció, Együttműködések – Társadalmi innováció és kutatási hálózatok együttműködésének erősítése az Eszterházy Károly Főiskola, a Bay Zoltán Alkalmazott Kutatási Nonprofit Kft. és az Agria TISZK Közhasznú Nonprofit Kft. együttműködésével” called project (TÁMOP-4.2.1.D-15/1/KONV-2015-0013). The project was supported by the European Union and the European Social Fund co-funded. The authors are grateful to Ferenc Szmorad and Tamás Pócs for their help in literature access and interpretation.

REFERENCES

- GRIMS, F. & KÖCKINGER, H. (1999). *Rote Liste gefährdeter Laubmoose (Musci) Österreichs*. In: NIKLFELD, H. (ed.), *Rote Liste gefährdeter Pflanzen Österreichs*. Austria Medien Service, Wien, pp. 157–171.
- KIRÁLY, G. (ed., 2004). A Soproni-hegység edényes flórája. (Die Gefäßpflanzenflora des Ödenburger Gebirges). *Flora Pannonica* 2(1): 7–12.
- KÖCKINGER, H., SCHRÖCK, C., KRISIAI, R. & ZECHMEISTER, H.G. (2015). Checklist of Austrian bryophytes. <http://131.130.59.133/projekte/moose/> [01.11.2015.]
- LATZEL, A. (1941). Beitrag zur Kenntnis der Moose des Ostralpenrandgebiets. *Beih. Bot. Centralbl.* 61: 211–260.
- MAURER, W. (1965). Die Moose des Südburgenlandes. *Wiss. Arb. Burgenland* 32: 5–40.
- PAPP, B., ERZBERGER, P., ÓDOR, P., HOCK, Zs., SZÖVÉNYI, P., SZURDOKI, E. & TÓTH, Z. (2010). Updated checklist and redlist of Hungarian bryophytes. *Studia botanica hungarica* 41: 31–59.
- SAUKEL, J. & KÖCKINGER, H. (1999). *Rote Liste gefährdeter Lebermoose (Hepaticae) und Hornmoose (Anthocerotae) Österreichs*. In: NIKLFELD, H. (ed.): *Rote Liste gefährdeter Pflanzen Österreichs*, Austria Medien Service, Wien, pp. 172–177.
- SCHLÜSSLMAYR, G. (2001). Die Moosvegetation des Leithagebirges im Burgenland. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 138: 65–93.
- SZMORAD, F. (2010). *A Soproni-hegység erdeinek történeti, növényföldrajzi és cönológiai vizsgálata*. (The historical, phytogeographical and coenological investigations on the forest of the Sopron Hills). PhD dissertation in manuscript, Pécsi Tudományegyetem Biológia Doktori Iskola, Pécs. 128 pp.
- SZMORAD, F. (2011). The Riparian Alder Forests of the Sopron Hills. *Acta Silvatica & Lignaria Hungarica* 7: 109–124.
- SZÜCS, P. & SZMORAD, F. (2009). Ergänzungen zur Moosflora des Ödenburger Gebirges. *Flora Pannonica* 7: 61–72.
- ZECHMEISTER, H.G. (2004). Die Moosflora im Natura 2000 Gebiet "Neusiedlersee", unter besonderer Berücksichtigung der Salzwiesen im Seewinkel. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 141: 43–62.
- ZECHMEISTER, H.G. (2005a). Bryophytes of continental salt meadows in Austria. *Journal of Bryology* 27: 297–302.
- ZECHMEISTER, H.G. (2005b). Die Moosflora der Serpentinrasen im Burgenland. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 142: 9–15.
- ZECHMEISTER, H.G. (2008). Vorkommen und Gefährdung der Torfmoose (Gattung *Sphagnum* L.) im Burgenland. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 145: 97–106.
- ZECHMEISTER, H.G., HAGEL, H., GENDO, A., OSVALDIK, V., PATEK, M., PRINZ, M., SCHRÖCK, C. & KÖCKINGER, H. (2013). Die Rote Liste der Moose Niederösterreichs. *Wissenschaftliche Mitteilungen Niederösterreichisches Landesmuseum* 24: 4–126.

(submitted: 30.11.2015, accepted: 04.01.2016)

APPENDIX

Site details

1. Burgenland, Bezirk Oberpullendorf, Ritzing, Angerwald, near country border, planted *Picea abies* forest (21.10.2009) N47°38'24.7" E16°29'43.9", 477 m. [8364.4]
2. Burgenland, Bezirk Oberpullendorf, Ritzing, Angerwald, near country border, *Fagus sylvatica* forest (22.10.2009) N47°38'21.9" E16°30'4.0", 472 m. [8365.3]
3. Burgenland, Bezirk Oberpullendorf, Ritzing, near village, on gravelly forest road (23.07.2013) N47°38'33.9" E 16°28'19.4", 430 m. [8364.4]
4. Burgenland, Bezirk Oberpullendorf, Ritzing, near village, next to gravelly forest road (23.07.2013) N47°38'34.9" E16°28'17.0", 433 m. [8364.4]
5. Burgenland, Bezirk Oberpullendorf, Ritzing, lake (23.07.2013) N47°38'45.5" E16°28'11.0", 436 m. [8364.4]
6. Burgenland, Bezirk Oberpullendorf, Ritzing, on embankment of forest road (23.07.2013) N47°38'57.7" E16°28'16.7", 478 m. [8364.4]
7. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (23.07.2013) N47°38'57.7" E16°28'16.7", 481 m. [8364.4]
8. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, by forest road (23.07.2013) N47°38'58.1" E16°27'59.0", 525 m. [8364.4]
9. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest (23.07.2013) N47°39'01.1" E16°27'50.2", 552 m. [8364.2]
10. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, by forest road (23.07.2013) N47°39'01.6" E16°27'37.8", 544 m. [8364.2]
11. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (23.07.2013) N47°39'04.2" E16°27'37.0", 543 m. [8364.2]
12. Burgenland, Bezirk Oberpullendorf, Ritzing, on embankment of forest road (23.07.2013) N47°39'01.2" E16°27'32.9", 526 m. [8364.2]
13. Burgenland, Bezirk Oberpullendorf, Ritzing, in old *Fagus sylvatica* forest (23.07.2013) N47°38'57.7" E16°27'33.2", 518 m. [8364.4]
14. Burgenland, Bezirk Oberpullendorf, Ritzing, near lake, by stream (23.07.2013) N47°38'55.20.0" E16°27'28.0", 494 m. [8364.4]
15. Burgenland, Bezirk Oberpullendorf, Ritzing, by stream (23.07.2013) N47°38'52.6" E16°27'30.9", 482 m. [8364.4]
16. Burgenland, Bezirk Oberpullendorf, Ritzing, dried puddles (23.07.2013) N47°38'41.0", E16°27'36.3", 467 m. [8364.4]
17. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (23.07.2013) N47°38'38.5", E16°27'41.7", 459 m. [8364.4]
18. Burgenland, Bezirk Oberpullendorf, Ritzing, grassland (23.07.2013) N47°38'30.8", E16°27'58.2", 415 m. [8364.4]
19. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, by the forest road (23.07.2013) N47°38'24.2", E16°28'6.4", 422 m. [8364.4]
20. Burgenland, Bezirk Oberpullendorf, Ritzing, grassland (23.07.2013) N47°38'17.3" E16°28'10.6", 393 m. [8364.4]
21. Burgenland, Bezirk Oberpullendorf, Ritzing, Waldschule, by the road (23.07.2013) N47°38'33.0" E16°28'32.4", 416 m. [8364.4]
22. Burgenland, Bezirk Oberpullendorf, Ritzing, old *Fagus sylvatica* forest, by the forest road (26.10.2013) N47°38'45.8" E16°28'57.4", 482 m. [8364.4]
23. Burgenland, Bezirk Oberpullendorf, Ritzing, old *Fagus sylvatica* forest (26.10.2013) N47°38'42.7" E16°28'58.6", 491 m. [8364.4]
24. Burgenland, Bezirk Oberpullendorf, Ritzing, Lange Zeile, embankment of forest road (26.10.2013) N47°38'33.1" E16°28'59.0", 486 m. [8364.4]
25. Burgenland, Bezirk Oberpullendorf, Ritzing, Lange Zeile, crossroads (26.10.2013) N47°38'28.0" E16°29'1.40", 486 m.

26. Burgenland, Bezirk Oberpullendorf, Ritzing, border of coniferous forest (26.10.2013) N47°38'25.6" E16°28'50.0", 481 m. [8364.4]
27. Burgenland, Bezirk Oberpullendorf, Ritzing, in coniferous forest (26.10.2013) N47°38'27.1" E16°28'41.1", 449 m. [8364.4]
28. Burgenland, Bezirk Oberpullendorf, Ritzing, in little valley (26.10.2013) N47°38'31.2" E16°28'44.9", 434 m. [8364.4]
29. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of road, in wheel-tack (26.10.2013) N47°38'39.6" E16°28'45.2", 432 m. [8364.4]
30. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of road, in wheel-tack (26.10.2013) N47°38'40.4" E16°28'46.5", 435 m. [8364.4]
31. Burgenland, Bezirk Oberpullendorf, Ritzing, in old *Fagus sylvatica* forest (28.10.2013) N47°38'39.2" E16°29'5.1", 502 m. [8364.4]
32. Burgenland, Bezirk Oberpullendorf, Ritzing, in old *Fagus sylvatica* forest (28.10.2013) N47°38'30.7" E16°29'12.0", 512 m. [8364.4]
33. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, embankment of forest road (28.10.2013) N47°38'9.1" E16°29'6.8", 486 m. [8364.4]
34. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, embankment of forest road (28.10.2013) N47°38'9.1" E16°29'6.8", 472m. [8364.4]
35. Burgenland, Bezirk Oberpullendorf, Ritzing, border of grassland (28.10.2013) N47°37'35.7" E16°29'25.5", 379 m. [8364.4]
36. Burgenland, Bezirk Oberpullendorf, Ritzing, grassland (28.10.2013) N47°37'33.2" E16°29'31.0", 370 m. [8364.4]
37. Burgenland, Bezirk Oberpullendorf, Ritzing, grassland, stream (28.10.2013) N47°37'50.4" E16°29'27.7", 399 m. [8364.4]
38. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, embankment of forest road (28.10.2013) N47°38'2.8" E16°29'9.8", 471 m. [8364.4]
39. Burgenland, Bezirk Oberpullendorf, Ritzing, *Pinus sylvestris* forest, in glade (28.10.2013) N47°37'54.0" E16°29'30.6", 421 m. [8364.4]
40. Burgenland, Bezirk Oberpullendorf, Ritzing, *Pinus sylvestris* forest, in glade (28.10.2013) N47°37'54.1" E16°29'34.6", 444 m. [8364.4]
41. Burgenland, Bezirk Oberpullendorf, Ritzing, *Pinus sylvestris* forest, in glade (28.10.2013) 47°37'54.1" 16°29'34.5", 444 m. [8364.4]
42. Burgenland, Bezirk Oberpullendorf, Ritzing, *Pinus sylvestris* forest, in glade (28.10.2013) N47°37'54.2" E16°29'38.2", 456 m. [8364.4]
43. Burgenland, Bezirk Oberpullendorf, Ritzing, border of *Pinus sylvestris* forest, by forest road (28.10.2013) N47°37'53.0" E16°29'42.9", 450 m. [8364.4]
44. Burgenland, Bezirk Oberpullendorf, Ritzing, arable field (28.10.2013) N47°37'33.9" E16°29'58.2", 398 m. [8364.4]
45. Burgenland, Bezirk Oberpullendorf, Ritzing, arable field (28.10.2013) N47°37'29.9" E16°30'9.4", 395 m. [8365.3]
46. Burgenland, Bezirk Oberpullendorf, Ritzing, valley, by stream (28.10.2013) N47°37'39.1" E16°30'26.2", 367 m. [8365.3]
47. Burgenland, Bezirk Oberpullendorf, Ritzing, valley, by stream (28.10.2013) N47°37'40.4" E16°30'24.1", 368 m. [8365.3]
48. Burgenland, Bezirk Oberpullendorf, Ritzing, gravelly road crossing (28.10.2013) N47°37'43.5" E16°30'22.4", 360 m. [8365.3]
49. Burgenland, Bezirk Oberpullendorf, Ritzing, valley, by stream (28.10.2013) N47°37'44.9" E16°30'17.4", 371 m. [8365.3]
50. Burgenland, Bezirk Oberpullendorf, Ritzing, valley, by stream (28.10.2013) N47°37'45.5" E16°30'12.1", 371 m. [8365.3]
51. Burgenland, Bezirk Oberpullendorf, Ritzing, valley, by stream (28.10.2013) N47°37'47.4" E16°30'10.4", 378 m. [8365.3]
52. Burgenland, Bezirk Oberpullendorf, Ritzing, valley, by stream (28.10.2013) N47°37'48.5" E16°30'08.6", 383 m. [8365.3]

53. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of forest road (28.10.2013) N47°37'53.3" E16°30'08.6", 401 m. [8365.3]
54. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road, little lake (28.10.2013) N47°38'05.8" E16°29'46.5", 449 m. [8364.4]
55. Burgenland, Bezirk Oberpullendorf, Ritzing, wet grassland (28.10.2013) N47°37'59.0" E16°29'20.4", 418 m. [8364.4]
56. Burgenland, Bezirk Oberpullendorf, Ritzing, wet grassland (28.10.2013) N47°38'00.4" E16°29'20.0", 421 m. [8364.4]
57. Burgenland, Bezirk Oberpullendorf, Ritzing, calcareous spring (28.10.2013) N47°38'05.6" E16°29'18.6", 447 m. [8364.4]
58. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (28.10.2013) N47°38'07.3" E16°29'19.9", 510 m. [8364.4]
59. Burgenland, Bezirk Oberpullendorf, Ritzing, Angerwald, near country border, deciduous forest (30.10.2013) N47°38'29.3" E16°29'27.1", 521 m. [8364.4]
60. Burgenland, Bezirk Oberpullendorf, Ritzing, Angerwald, near country border, deciduous forest (30.10.2013) N47°38'31.8" E16°29'34.5", 519 m. [8364.4]
61. Burgenland, Bezirk Oberpullendorf, Ritzing, near country border, embankment of forest road (30.10.2013) N47°38'21.3" E16°30'15.9", 451 m. [8365.3]
62. Burgenland, Bezirk Oberpullendorf, Ritzing, Gruberkreuz, near country border, forest road crossing, little lake (30.10.2013) N47°38'16.9" E16°30'24.0", 445 m. [8365.3]
63. Burgenland, Bezirk Oberpullendorf, Ritzing, abandoned gneis-stone quarry (30.10.2013) N47°38'35.5" E16°31'08.8", 440 m. [8365.3]
64. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of forest road (30.10.2013) N47°38'20.1" E16°31'23.8", 445 m. [8365.3]
65. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (30.10.2013) N47°37'59.4" E16°31'40.0", 345 m. [8365.3]
66. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of forest road (30.10.2013) N47°37'58.2" E16°31'42.5", 365 m. [8365.3]
67. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of forest road (30.10.2013) 47°37'34.6" E16°31'58.2", 330 m. [8365.3]
68. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (30.10.2013) N47°37'41.7" E16°31'45.3", 340 m. [8365.3]
69. Burgenland, Bezirk Oberpullendorf, Ritzing, abandoned quarry, recultivated places (30.10.2013) N47°37'41.7" E16°31'45.3", 340 m. [8365.3]
70. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of forest road (30.10.2013) N47°37'30.1" E16°32'03.1", 325 m. [8365.3]
71. Burgenland, Bezirk Oberpullendorf, Neckenmarkt, fence of garden (30.10.2013) N47°37'10.6" E16°32'27.1", 290 m. [8365.3]
72. Burgenland, Bezirk Oberpullendorf, Neckenmarkt, weekend houses (30.10.2013) N47°37'13.1" E16°32'21.9", 300 m. [8365.3]
73. Burgenland, Bezirk Mattersburg, Marz, near recultivated quarry, by forest road (22.11.2013) N47°42'16.8" E16°23'47.1", 465 m. [8264.3]
74. Burgenland, Bezirk Mattersburg, Siegraben, by stream (22.11.2013) N47°40'22.7" E16°23'54.6", 380 m. [8364.1]
75. Burgenland, Bezirk Mattersburg, Siegraben, wet grassland (22.11.2013) N47°40'22.9" E16°23'55.8", 375 m. [8364.1]
76. Burgenland, Bezirk Mattersburg, Siegraben, wet grassland (22.11.2013) N47°40'22.4" E16°23'58.1", 385 m. [8364.1]
77. Burgenland, Bezirk Mattersburg, Siegraben, wetland and stream (22.11.2013) N47°40'21.9" E16°24'02.3", 380 m. [8364.1]
78. Burgenland, Bezirk Mattersburg, Siegraben, wetland and stream (22.11.2013) N47°40'20.7" E16°24'06.1", 385 m. [8364.1]
79. Burgenland, Bezirk Mattersburg, Siegraben, embankment of forest (22.11.2013) N47°40'18.6" E16°24'03.6", 400 m. [8364.1]

80. Burgenland, Bezirk Mattersburg, Sieggraben, by forest road, little pond (22.11.2013) N47°40'18.8" E16°23'59.5", 395 m. [8364.1]
81. Burgenland, Bezirk Mattersburg, Sieggraben, near forest road (22.11.2013) N47°40'18.6" E16°24'03.6", 395 m. [8364.1]
82. Burgenland, Bezirk Mattersburg, Sieggraben, valley, by stream (22.11.2013) N47°39'36.5" E16°22'53.1", 500 m. [8364.1]
83. Burgenland, Bezirk Mattersburg, Sieggraben, Satterhöhe, valley, by stream (22.11.2013) N47°39'43.5" E16°22'49.3", 470 m. [8364.1]
84. Burgenland, Bezirk Mattersburg, Sieggraben, border of grassland, embankment of forest road (22.11.2013) N47°39'46.7" E16°22'53.2", 455 m. [8364.1]
85. Burgenland, Bezirk Mattersburg, Sieggraben, valley, by stream (22.11.2013) N47°39'40.6" E16°22'52.9", 475 m. [8364.1]
86. Burgenland, Bezirk Mattersburg, Sieggraben, roadside (22.11.2013) N47°39'34.0" E16°22'45.1", 495 m. [8364.1]
87. Burgenland, Bezirk Mattersburg, Kalkgraben, grassland and roadside (22.11.2013) N47°39'40.6" E16°22'52.9", 455 m. [8364.1]
88. Burgenland, Bezirk Mattersburg, Kalkgraben, grassland (22.11.2013) N47°39'40.6" E16°22'52.9", 420 m. [8364.1]
89. Burgenland, Bezirk Oberpullendorf, Neckenmarkt, Millenium Teich, between two lakes (24.06.2014) N47°36'59.1" E16°34'05.0", 235 m. [8365.3]
90. Burgenland, Bezirk Oberpullendorf, Neckenmarkt, embankment of forest road (24.06.2014) N47°37'33.2" E16°33'30.7", 335 m. [8365.3]
91. Burgenland, Bezirk Oberpullendorf, Neckenmarkt, near embankment of forest road, deciduous forest (24.06.2014) N47°37'33.8" E16°33'27.4", 350 m. [8365.3]
92. Burgenland, Bezirk Oberpullendorf, Ritzing, in glade, grass, on soil (30.07.2014) N47°39'07.6" E16°27'20.4", 545 m. [8364.2]
93. Burgenland, Bezirk Oberpullendorf, Ritzing, in mixed forest (30.07.2014) N47°38'54.2" E16°27'03.6", 565 m. [8364.4]
94. Burgenland, Bezirk Oberpullendorf, Ritzing, in mixed forest (30.07.2014) N47°38'46.5" E16°26'56.4", 545 m. [8364.4]
95. Burgenland, Bezirk Oberpullendorf, Ritzing, in glade of planted pine forest, grass (30.07.2014) N47°38'20.1" E16°26'43.2", 440 m. [8364.4]
96. Burgenland, Bezirk Oberpullendorf, Ritzing, next of planted pine forest, by forest road (30.07.2014) N47°38'15.5" E16°26'46.8", 420 m. [8364.4]
97. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (30.07.2014) N47°38'10.2" E16°26'41.7", 405 m. [8364.4]
98. Burgenland, Bezirk Oberpullendorf, Ritzing, wall of road cut (30.07.2014) N47°38'07.9" E16°26'43.7", 420 m. [8364.4]
99. Burgenland, Bezirk Oberpullendorf, Ritzing, in coniferous forest (30.07.2014) N47°38'07.2" E16°26'45.0", 445 m. [8364.4]
100. Burgenland, Bezirk Oberpullendorf, Ritzing, in coniferous forest (30.07.2014) N47°38'07.9" E16°26'42.8", 445 m. [8364.4]
101. Burgenland, Bezirk Oberpullendorf, Ritzing, on embankment of forest road (30.07.2014) N47°38'06.8" E16°26'36.9", 410 m. [8364.4]
102. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (30.07.2014) N47°38'06.1" E16°26'35.4", 410 m. [8364.4]
103. Burgenland, Bezirk Oberpullendorf, Ritzing, on embankment of road (30.07.2014) N47°38'05.2" E16°26'35.3", 410 m. [8364.4]
104. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (30.07.2014) N47°38'08.8" E16°26'33.6", 395 m. [8364.4]
105. Burgenland, Bezirk Oberpullendorf, Ritzing, embankment of forest road (30.07.2014) N47°38'10.1" E16°26'33.2", 405 m. [8364.4]
106. Burgenland, Bezirk Oberpullendorf, Ritzing, in *Alnus glutinosa* marsh (30.07.2014) N47°38'09.9" E16°26'31.8", 400 m. [8364.4]

107. Burgenland, Bezirk Oberpullendorf, Ritzing, by stream, water conversancy building (30.07.2014) N47°38'09.3" E16°26'29.8", 400 m. [8364.4]
108. Burgenland, Bezirk Oberpullendorf, Ritzing, by stream (30.07.2014) N47°38'10.3" E16°26'29.3", 400 m. [8364.4]
109. Burgenland, Bezirk Oberpullendorf, Ritzing, in *Alnus glutinosa* marsh (30.07.2014) N47°38'10.8" E16°26'30.9", 405 m. [8364.4]
110. Burgenland, Bezirk Oberpullendorf, Ritzing, by stream (30.07.2014) N47°38'11.6" E16°26'26.8", 400 m. [8364.4]
111. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (31.07.2014) N47°39'14.7" E16°26'38.9", 495 m. [8364.2]
112. Burgenland, Bezirk Oberpullendorf, Ritzing, by forest road (31.07.2014) N47°39'04.7" E16°26'38.1", 480 m. [8364.2]
113. Burgenland, Bezirk Oberpullendorf, Ritzing, by wet places (31.07.2014) N47°39'1.6" E16°26'26.6", 465 m. [8364.2]
114. Burgenland, Bezirk Oberpullendorf, Ritzing, near planted *Picea abies* forest, by forest road (31.07.2014) N47°38'49.9" E16°26'04.1", 460 m. [8364.4]
115. Burgenland, Bezirk Oberpullendorf, Ritzing, by stream, on milestone (31.07.2014) N47°38'12.5" E16°26'25.6", 405 m. [8364.4]
116. Burgenland, Bezirk Oberpullendorf, Ritzing, by road-crossing, monument (31.07.2014) N47°37'57.6" E16°26'21.3", 385 m. [8364.4]
117. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, couloir (31.07.2014) N47°38'41.2" E16°27'7.3", 525 m. [8364.4]
118. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, (31.07.2014) N47°38'40.1" E16°27'4.8", 515 m. [8364.4]
119. Burgenland, Bezirk Oberpullendorf, Ritzing, in deciduous forest, by forest road (31.07.2014) N47°38'39.9" E16°26'49.6", 530 m. [8364.4]
120. Burgenland, Bezirk Oberpullendorf, Ritzing, in road-crossing (31.07.2014) N47°39'03.4" E16°27'5.9", 540 m. [8364.2]