



**8th Conference of
European Committee for Conservation of Bryophytes
Bryophyte Conservation – Follow up on the 2010 Biodiversity Target**

**PROGRAM
and
ABSTRACTS**

Budapest – Hungary

18-21 April 2012

**European Committee for Conservation of Bryophytes
and
The Hungarian Natural History Museum**

Program

18th April	
10.00 - 10.30	<i>Opening of the 8th ECCB Conference</i>
10.00 - 10.05	István Matskási (General Director of HNHM)
10.05 - 10.10	Rozália Szekeres Érdiné (Ministry of Rural Development)
10.10 - 10.15	Hallingbäck, T (Chairman of the ECCB)
10.15 - 10.30	Pócs, T. Checklists, distribution maps and red lists in bryology.
10.30 - 11.30	<i>1. section</i> <i>Chairman: Tamás Pócs</i>
10.30 - 10.50	Hodgetts, N.G. Towards a new bryophyte red List for Europe
10.50 - 11.10	Papp, B. Red List of Hungarian Bryophytes
11.10 - 11.30	Albertos, B. and Garilleti, R. The Spanish Red Book of Bryophytes (ABrA): methodological background
11.30 - 11.50	Coffee break
11.50 - 13.30	<i>2. section</i> <i>Chairman: Tomas Hallingbäck</i>
11.50 - 12.10	Konstantinova, N. Hepatics in regional Red Data Books of European part of Russia
12.10 - 12.30	Uyar, G., Ören, M. and Yasin, H. An Annotated and Updated Checklist of the Mosses of Turkey with Data on Their Distribution
12.30 - 12.50	Papp, B. Towards a Balkan Red List
12.50 - 13.10	Ingerpuu, N. and Vellak, K. The state of bryophyte conservation in Estonia
13.10 - 13.30	Kaufmann, S. and Berg, C. Nature conservation relevance of Bryophytes in Troodos National Forest Park, Cyprus
13.30 - 15.00	Lunch break
15.00 - 16.40	<i>3. Section</i> <i>Chairman: Marko Sabovljević</i>
15.00 - 15.20	Ramsay, M.M., Rowntree, J.K., Smith, P.P., Pressel, S. and Long, D.G. Bryophyte Ex situ Conservation at the Royal Botanic Gardens, Kew: Past, Present and Future.
15.20 - 15.40	Smyth, N., Campbell, C., Douglas, G.C. and Jebb, M. The role of botanic gardens in ex situ conservation of rare bryophytes, experiences from Ireland.
15.40 - 16.00	Campbell, C., Smyth, N. and Kelly, D. Conservation of selected Red Listed & legally protected species in Ireland
16.00 - 16.20	Hassel, K., de Jong, K. and Stenøien, H.K. How does physiological status impact cryopreservation success of bryophytes from two contrasting habitats?
16.40 - 17.00	Coffee break
17.00 - 19.00	<i>Poster section</i>
19.00 -	ECCB Board meeting

19th April	
9.00 - 11.00	4. section Chairman: Nick Hodgetts
9.00 - 9.20	Söderström, L. Early Land Plants Today - a resource for liverworts and hornworts
9.20 - 9.40	Bisang, I. Do hornworts in Switzerland benefit from environmentally-friendly arable farming
9.40 - 10.00	Drehwald, U. The hornworts <i>Notothylas orbicularis</i> and <i>Anthoceros neesii</i> (Anthocerotopsida) in Hessen (Germany)
10.00 - 10.20	Sim-Sim, M., Luís, L., Lobo, C., Fontinha, S., Ruas, S. and Sérgio, C. Towards an Atlas of the threatened bryophytes of Madeira Archipelago
10.20 - 10.40	Fontinha, S., Sim-Sim, M., Lobo, C. and Luís, L. The bryophytes of coastal areas of Madeira – field guide to some species
10.40 - 11.00	Alegro, A., Segota, V. and Szurdoki, E. Sphagnum in Croatia – what is new after 84 years?
11.00 - 11.20	Coffee break
11.20 - 13.00	5. section Chairman: Lars Söderström
11.20 - 11.40	Hodd, R., Bourke, D. and Sheehy Skeffington, M., The ecology and potential climate change response of a rare and threatened montane oceanic bryophyte community
11.40 - 12.00	Lönnell, N., Hylander, K., Jonsson, B.G. and Sundberg, S. Experiments on realized dispersal of <i>Discolium nudum</i>
12.00 - 12.20	Ódor, P., Király, I., Márialigeti, S. Effect of stand structure on the diversity of epiphytic and ground-floor bryophytes assemblages in Hungarian mixed forests.
12.20 - 12.40	Goia, I. and Gaft, D. Bryophyte occurrence patterns on dead wood in montane forests
13.00 - 14.30	Lunch break
14.30 - 16.00	Visit the exhibitions of the Hungarian Natural History Museum
16.00 - 16.30	Coffee break
16.30 - 18.30	Round Table: New European Red Data Book project
18.30 - 19.00	Closing ceremony
20.00 - 23.00	Gala dinner in the Main Hall of the Museum
20th April	
9.00 - 19.00	Excursion to Vértes and Gerecse Mts (visit <i>Asterella saccata</i>, <i>Anomodon rosstratus</i>, <i>Pyramidula tetragona</i> populations)
21st April	
9.00 - 18.00	Excursion to the Great Hungarian Plain (saline and sandy grasslands; <i>Entosthodon hungaricus</i>, <i>Microbryum floerkeanum</i> populations), loess cliffs (<i>Hilpertia velenovskyi</i>, <i>Pterygoneurum compactum</i>, <i>Tortula brevissima</i>).

List of oral presentations

- Albertos, B., Garilleti, R. The Spanish Red Book of Bryophytes (ABrA): methodological background
- Alegro, A., Segota, V., Szurdoki, E. *Sphagnum* in Croatia – what is new after 84 years?
- Bisang, I., Do hornworts in Switzerland benefit from environmentally-friendly arable farming
- Campbell, C., Smyth, N., Kelly, D. Conservation of selected Red Listed and legally protected species in Ireland
- Drehwald, U. The hornworts *Notothylas orbicularis* and *Anthoceros neesii* (Anthocerotopsida) in Hessen (Germany)
- Fontinha, S., Sim-Sim, M., Lobo, C., Luís, L. The bryophytes of coastal areas of Madeira – field guide to some species
- Goia, I., Gafta D. Bryophyte occurrence patterns on dead wood in montane forests
- Hassel, K., de Jong, K., Stenøien, H.K. How does physiological status impact cryopreservation success of bryophytes from two contrasting habitats?
- Hodd, R., Bourke, D., Sheehy Skeffington, M. The ecology and potential climate change response of a rare and threatened montane oceanic bryophyte community
- Hodgetts, N.G. Towards a new bryophyte red List for Europe
- Ingerpuu, N., Vellak, K. The state of bryophyte conservation in Estonia
- Kaufmann, S., Berg, C. Nature conservation relevance of Bryophytes in Troodos National Forest Park, Cyprus
- Konstantinova, N. Hepatics in regional Red Data Books of European part of Russia
- Lönnell, N., Hylander, K., Jonsson, B.G., Sundberg, S. Experiments on realized dispersal of *Discolium nudum*
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- Papp, B. Towards a Balkan Red List
- Papp, B., Erzberger, P., Ódor, P., Hock, Zs., Szövényi, P., Szurdoki, E., Tóth, Z. Red list of Hungarian bryophytes
- Ramsay, M.M., Rowntree, J.K., Smith, P.P., Sylvia Pressel, S., Long, D.G. Bryophyte Ex situ Conservation at the Royal Botanic Gardens, Kew: Past, Present and Future.
- Sim-Sim, M., Luís, L., Lobo, C., Fontinha, S., Ruas, S., Sérgio, C. Towards an Atlas of the threatened bryophytes of Madeira Archipelago
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- Söderström, L. Early Land Plants Today - a resource for liverworts and hornworts
- Uyar, G., Ören, M., Yasin, H. An Annotated and Updated Checklist of the Mosses of Turkey with Data on Their Distribution

List of posters

- Berg, C., Linke, C., Wiehle, W., Vulnerability of bryophytes in Mecklenburg-Vorpommern, northeastern Germany
- Bergamini, A., Hofmann, H., Meier, M., Schnyder, N., Müller, N., Urmi, E. Bryofloristic changes in the last 150 years: On the use of herbarium data
- Cogoni, A., Campisi, P., Aleffi M., Carratello, A., Colacino, C., Dia, M.G., Miserere, L., Privitera, M., Puglisi, M., Sguazzin, F., Tacchi, R. A project for an Italian Red List of bryophytes
- Dragicevic, S., Veljic, M. Some rare and interesting bryophytes from Montenegro
- Erzberger, P. Project plan: Bryophyte mapping of Hungary
- Garcia, C., Sérgio, C., Sim-Sim, M. Evaluation of the influence of climate change in the distribution patterns of some bryophyte species in Portugal.
- Hespanhol, H., Vieira, C., Marques, J. Towards a common methodology for efficient bryophyte and lichen monitoring at species and community level in Portugal
- Holá, E., Těšitel, J., Kučera, J. The comparison of gemma production among the rare hepatic *Lophozia ascendens* and the common *L. ventricosa* and *L. longiflora*
- Jukonienė, I. Characteristics of the red-listed bryophytes of Lithuania
- Kiebacher, T., Bürgi, M., Scheidegger, C., Bergamini, A. Bryophyte diversity of sycamore pastures in the Northern Alps with a special emphasis on *Tayloria rudolphiana*
- Kirmaci, M. Turkish *Sphana*
- Konstantinova, N., Savchenko, A., Vilnet, A. Should endemic hepatics of Caucasus be included in the new Red Data Book of Europe?
- Lockhart, N., Hodgetts, N.G., Holyoak, D. Rare and threatened bryophytes of Ireland
- Manukjanová, A., Štechová, T. Desiccation tolerance of fen bryophytes
- Marka, J., Papp, B., Erzberger, P., Colacino, C., Sabovljevic, M. Towards a Red List of the Albanian bryophytes – the need for extensive exploration, conservation strategies and actions.
- Mitra, S., Poddar-Sarkar, M., Diversity and Lipidome of Mosses of Eastern Himalaya
- Novozámská, E., Holá, E. *Buxbaumia viridis* – an endangered species in the Czech Republic?
- Papp, B. The Hungarian Biodiversity Research Society and some bryological results of the Biodiversity Days in 2011
- Pénzes Kónya, E. Case study of vegetative regeneration: a perspective way for ex situ conservation of bryophytes
- Reriha, I., Rove, I. Maintenance of favourable conservation status of bryophytes in forests of Latvia Within lands managed by the Latvia's State Fore
- Sabovljevic, M., Puche, F., Sabovljevic, A., Segarra-Moragues, J.G., Vujicic, M. In vitro establishment, propagation and conservation of the rare and endangered European endemic moss *Goniomitrium seroi*
- Sabovljevic, M., Rowntree, J., Sabovljevic, A., Ramsay, M., Pressel S., Papp B., Campbell C., Smyth N., Segarra-Moragues, J.G. Ex situ conservation of European bryophytes: state, problems and progress

- Sabovljevic, M., Segarra-Moragues, J.G., Sabovljevic, A., Puche, F. In vitro propagation and conservation of the European endangered liverwort *Riella helicophylla*
- Schnyder, N., Hofmann, H., Müller, N. Monitoring of endangered bryophyte species in Switzerland
- Segota, V., Alegro, A., Sapic, I., Vukelic, J., Papp, B. Distribution of *Buxbaumia viridis* (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl. in Croatia
- Sérgio, C., Garcia, C., Figueira, R., Vieira, C., Hespanhol, H., Stow, S., Sim-Sim, M. Threatened status of Portuguese bryophytes and assessment of important areas for bryophyte conservation
- Stefanut, S. The most threatened liverworts in Romania
- Szurdoki, E., Márton, O., Szövényi, P. Genetic and morphological diversity of closely related *Sphagnum angustifolium*, *S. fallax* and *S. flexuosum*
- Szűcs, P. The neophytic *Orthodontium lineare* Schwägr. in Hungary
- Vieira, C., Hespanhol, H., Gonçalves, J. Does expert knowledge valuation match the reality of threatened species and diversity hotspots in mountain landscapes?
- Vujcic, M., Papp, B., Sabovljevic, A., Szurdoki E., Sabovljevic, M. In vitro establishment, propagation and conservation of the rare and endangered moss halophyte *Hennediella heimii*

ABSTRACTS

The Spanish Red Book of Bryophytes (ABrA): methodological background

Albertos, B.¹, Garilleti, R.¹

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oral presentation

The ongoing Atlas and Red Book of the endangered bryophytes of Spain (ABrA) has been planned to follow IUCN standards in both categories of threat and applied criteria. But, despite IUCN's aim of universality, sometimes the application of these rules to groups like bryophytes is quite challenging. With this presentation we intend to explain the methodological background of the Spanish Red Book, our definitions and tools, the type of information we are handling and our problems with some IUCN criteria. Another important issue is how to use IUCN standards in fragmented, singular and small areas like the Canary Islands and how to fit information coming from Spanish islands, with that coming from the Continental Spain.

Sphagnum in Croatia – what is new after 84 years?

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oral presentation

The last comprehensive study of the genus *Sphagnum* in Croatia from 1928 was the basis for all newer species lists, but without any newer data. However, some new localities were discovered, but only the presence of unidentified peat mosses was stated. To gain recent data concerning diversity, distribution and habitat preferences of peat mosses in Croatia, new extensive field research has started in 2009. Up to now 23 species on 24 localities have been found. In 1928 the number of known species was 22, of which 20 have been confirmed by recent research. *Sphagnum warnstorffii* can be treated as extinct due to habitat destruction and *Sphagnum rubellum* was most likely mistaken for *Sph. capillifolium*. Three new species were found: *Sph. teres*, *Sph. platyphyllum* and *Sph. tenellum*. 19 of 27 localities from 1928 have disappeared, 13 among them were bogs. All together, in 1928, 18 bogs, 5 forest, and 4 meadow habitats were known. Thereafter 16 new localities have been discovered, resulting in 11 bogs, 11 forest habitats, 1 wet meadow and 1 habitat in karst field. It is quite certain that the majority of these newly discovered localities existed in 1928. Therefore, it can be assumed that around 45% of peat moss sites in Croatia disappeared in the last 84 years. The majority of the "old" localities now have impoverished peat moss communities, compared to the status in 1928. Although the number of *Sphagnum* species itself has been more or less unchanged during the last 84 years, habitat loss and impoverishing is enormous, making peat mosses one of the most threatened plant groups in Croatia.

Vulnerability of Bryophytes in Mecklenburg-Vorpommern, northeastern Germany

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poster

The planar lowland Mecklenburg-Vorpommern was formed during the Pleistocene and is mainly covered by sediments of the last glaciation. Lakes and wetland are frequent. Although the population density is comparable low for Central Europe, anthropogenic influence on ecosystems is high due to an area-wide agriculture on an industrial level. All occurring bryophyte taxa have been classified for the second time into red list categories (Berg et al. 2010). A new assessment standard by Ludwig et al. (2006) was applied which needs a comprehensive historical and recent data basis for the particular species group: Frequency and population size, long and short term trends of the population and risk factors. From this data derived the red list category, added by supplementary information about endemism, distribution, isolation, responsibility and conservation status. From the 557 taxa which have been recorded, 51 belong to the category regionally extinct, 59 are critically endangered, 65 endangered, 79 vulnerable, 10 rare and 59 near threatened. Main threats are eutrophication, changes of the water balance and changes in land use practice. Habitats with high proportion of endangered species are calcareous fens, moist sand, marley and cretaceous cliffs, pond mud and natural founts. Unfortunately, the main changes in the red list status of the species account for the differences in the assessment approach.

References:

BERG, C., LINKE, C. & WIEHLE, W. (2010): Rote Liste der Gefährdeten Moose – In: Rote Listen der in Mecklenburg-Vorpommern gefährdeten Pflanzen und Tiere. – Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern, Schwerin, 64 S.

LUDWIG, G., HAUPT, H., GRUTTKE, H., BINOT-HAFKE, M. (2006): Methodische Anleitung zur Erstellung Roter Listen gefährdeter Tiere, Pflanzen und Pilze. BfN-Skripten 191, 1–97, Bonn-Bad Godesberg.

Bryofloristic changes in the last 150 years: On the use of herbarium data

Bergamini, A.¹, Hofmann, H.², Meier, M.³, Schnyder, N.², Müller, N.², Urmi, E. ²

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poster

Natural history collections in general and herbaria in particular contain unique information on the historic occurrences of organisms. Given the enormous collecting activities in former decades and centuries, these data provide access to time scales far longer than usual in ecological studies. In Switzerland, the collection of bryophytes has a long history, starting in the early 19th century. Swiss herbaria thus contain large amounts of recent and historical bryophyte specimens. In many cases, the labels of the herbarium specimens give quite detailed information on the collection date,

the sampling locality and the altitude. We used here a unique set of thousands of historic and recent bryophyte data to show some applications of these kind of data in ecology and species conservation. When using herbarium data, special attention has to be paid towards different sampling efforts in different time periods. To circumvent this problem, we applied different subsampling schemes to account for different sampling efforts. Moreover, we compared trends to reference distributions based on large numbers of herbarium specimens. In that way it was possible to reveal robust results despite different collecting efforts over time. So far we used these data to compare frequencies of bryophytes in historic and recent time periods and to compare altitudinal range changes of more than 60 species in the last 100 years. At the moment we scrutinize more applications with a special focus on trends of mean indicator values within regions based on herbarium specimens.

Do hornworts in Switzerland benefit from environmentally-friendly arable farming

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oral presentation

Extensively managed arable fields are important components of the traditional agricultural landscape, and, as many habitats and taxa associated with farmland, of high conservation concern in Europe. To counteract adverse effects on wildlife in agroecosystems and to make agricultural production ecologically sustainable, agri-environment schemes (AES) were introduced during the past decades. *Anthoceros agrestis* and *Phaeoceros carolinianus* are examples of the specialised flora of arable fields adapted to regular disturbance, and their gametophytic occurrences depend on farming practices. In many areas of Central and Northern Europe, they are the only representatives of hornworts and have decreased due to agricultural intensification. We examined whether AES in Switzerland, introduced in 1999, promoted hornwort occurrences in the country. We regularly monitored selected hornwort sites from 1989 to 1995 and from 2005 to 2007. We found a decline of hornwort populations between the two periods, which was attributable to a decrease of untilled autumn stubble-fields. Current AES are apparently not beneficial for hornworts as a consequence of conflicting objectives in the schemes. High relative summer air humidity positively affected hornwort occurrence. Gametophytes of both taxa emerged from the persistent diaspore bank after years of unsuitable management. We suggest three alternative small-scale and targeted modifications of existing Swiss AES, to be implemented in cereal fields with known hornwort occurrences. These practices will only marginally decrease yield and are not expected to be costly. They will promote other typically ephemeral arable bryophytes and seed plants and are likely to be advantageous for other organisms, such as farmland birds.

Conservation of selected Red Listed & legally protected species in Ireland

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oral presentation

Ireland has one of the richest bryofloras in Europe, with over 50% of European bryophytes represented, in comparison to only ~10% of European vascular flora. With 834 taxa present, from a wide variety of distributional elements, bryophytes are a very important part of Ireland's biodiversity. However, there is an increasing need to conserve some of Ireland's rarer bryophytes whose habitats are threatened by land use change and other human activities. This research project aims to develop both in situ and ex situ conservation methods for ten Red Listed bryophyte species occurring in four threatened habitats. Firstly, selected populations were monitored in the field to assess baseline ecological and environmental conditions and produce specific monitoring protocols and management recommendations. Secondly, in vitro cultivation techniques were investigated and ex situ collections were established to ensure the species survival into the future. In vitro experiments were carried out to assess the edaphic factors limiting the distributions of three species. Genetic diversity within and between selected populations is being analysed using AFLP fingerprinting techniques in order to assess the variability and distinctiveness of the populations in Ireland. This integrated approach will obtain a better understanding of the target species and how best to conserve them into the future.

A project for an Italian Red List of bryophytes

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poster

In order to draft an updated Red List of Italian flora, the Italian Botanical Society, has recently launched a project to assess the state of threat of the vascular and cryptogamic plants, according to IUCN (2001) criteria. As regards bryophytes, *Buxbaumia viridis* (Lam. et DC.) Moug. et Nestl., *Calymperes erosum* Müll. Hal., *Gigaspermum mouretii* Corb., *Dumortiera hirsuta* (Sw.) Nees, *Paludella squarrosa* (Hedw.) Brid., *Petalophyllum ralfsii* (Wils.) Nees et Gottsche, *Rhynchostegium strongylense* (Bott.) W.R. Buck & Privitera, *Riccia breidleri* Jur ex Steph, *Riella notarisii* (Mont.) Mont and *Zygodon gracilis* Wilson have been assessed until now. They are for the most part threatened taxa in Europe, also included in recent red lists of other countries of this continent. For each of these taxa single forms were compiled which in addition to nomenclatural data and description of morphological features, includes, information on biology, ecology and Italian distribution, the chorological type, global distribution, the causes of threat in the Italian localities, the IUCN criteria used for

assessment, the identified category of risk, the possible interactions between populations, the eventual former status at regional, national and global level, conservation actions and existence of any protection legislation (1, 2). For the future other taxa selected among policy species and rare are to study. 1) Rossi G., Gentili R., Abeli T., Gargano D., Foggi B., Raimondo F.M., Blasi C. (eds.), 2008 – Inform. Bot. Ital., 40 (1). 2) Rossi G., Abeli T., Foggi B., Orsenigo S., Tazzari E.R., Blasi C., Raimondo F.M., 2011 Inform. Bot. Ital., 43 (2).

Some rare and interesting bryophytes from Montenegro

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poster

This paper presents a list of bryophytes, registered in Montenegro from the late nineteenth century to 1931, which presence is confirmed in recent researches. List includes 104 taxa, 73 mosses (64 species, 1 subspecies, 8 varieties) and 31 liverworts (30 species, 1 variety). Mosses *Brachythecium plumosum*, *Bryum pallens*, *Dicranoweisia crispula*, *Diphyscium foliosum*, *Ditrichum pusillum*, *Drepanocladus polygamus*, *Oxyrrhynchium pumillum*, *Hypnum cupressiforme* var. *subjulaceum*, *Kiaeria falcata*, *Orthotrichum diaphanum*, *Paraleucobryum sauteri*, *Phascum cuspidatum*, *Plagiothecium nemorale*, *Pohlia drummondii*, *Rhynchostegium megapolitanum*, *Schistidium confertum*, *Tortula marginata*, *Tortula subulata* var. *angustata* according as hepatics *Cephalozia connivens*, *Cololejeunea minutissima*, *Jungermannia polaris*, *Porella obtusata*, *Riccia ciliifera* and *Tritomaria exsecta* are found only twice, once earlier and secondly during the recent researches. Therefore, that taxa should be considered as very rare.

The hornworts *Notothylas orbicularis* and *Anthoceros neesii* (Anthocerotopsida) in Hessen (Germany)

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oral presentation

In 1980, J. Futschig discovered the two hornworts *Notothylas orbicularis* and *Anthoceros neesii* in the southern part of the Vogelsberg in Hessen (Kellner 1987). In subsequent years, little attention has been paid to these species, although interest grew significantly when *Notothylas orbicularis* was included among the species listed in Appendix II of the EU Habitats Directive. Both species grow exclusively on arable fields in summer and autumn. *Notothylas orbicularis* is currently known from 51 fields in the Vogelsberg and 13 fields in the Westerwald, while *Anthoceros neesii* is known from 33 fields in the Vogelsberg and 12 fields in the Westerwald (Drehwald 2011). The population size of each species varies from year to year, depending on the amount of precipitation and its distribution over the growing season. Up to 10,000 thalli of *Notothylas orbicularis* and 4,000 thalli of *A. neesii* were found on some fields in good years. Neither species can tolerate desiccation, however, and most thalli died during a long dry period in October 2011. The major threat for both

hornwort species comes from modern intensive land use, relying on winter crops and ploughing directly after the harvest. Conservation of both species requires traditional land use, focussing on summer crops and avoiding ploughing until the end of October. To this end, contracts were signed with many land owners, requiring them to grow only summer crops.

References:

Drehwald, U. (2011). Bundes- und Landesmonitoring 2011 des Kugel-Hornmooses (*Notothylas orbicularis*) in Hessen (Art des Anhangs II der FFH-Richtlinie) sowie Nachuntersuchungen zur Verbreitung der Art in Hessen. (unpublished, Hessen-Forst FENA Giessen).

Kellner, K. (1987). Neure wichtige Moos-Funde von J. Futschig †.- Hessische Florist. Briefe 36(4): 50-55.

Project plan: Bryophyte mapping of Hungary

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poster

A plan for mapping the bryophytes of Hungary is presented. The methods proposed are (i) field exploration of 300 grid cells of 3' latitude × 5' longitude evenly spread over the country, with the possible extension to all grid cells (total of 2832) in a later stage, covering the whole country, (ii) development or adaptation of software for a database to accomodate the field data, (iii) herbarium revision of critical and perhaps also of other taxa and (iv) evaluation of published floristical data to complete the picture, (v) production of an atlas showing the distribution of Hungarian bryophytes. The advantages of and the necessity for this or comparable mapping projects are demonstrated and discussed. All bryologists active in Hungary and all persons and institutions interested in exploring the distribution and protection of Hungarian bryophytes are invited to cooperate and support the mapping project.

The bryophytes of coastal areas of Madeira – field guide to some species

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Biodiversity is of vital importance. To adequately protect these resources, conservation and public awareness programs are fundamental and should be strongly encouraged. Bryophytes are a peculiar group of ancestral plants of high significance in the Madeiran flora. Mostly due to their small size and restricted human use, species diversity, their morphological peculiarities and survival strategies are generally neglected by the general public who are less able to understand their importance, richness and vulnerability. In this communication, we present the newly published "The bryophytes of coastal areas of Madeira – guide to some species". This guide, follows "The bryophytes of Laurissilva of Madeira – guide to some species" published in 2006, and

aims highlighting bryophytes in the coastal and dry environments of Madeira. The guide includes an introduction on bryophytes in these apparently harsh environments and presents 60 taxa, including 2 hornworts, 20 liverworts and 38 mosses with photographs and a short description which may help identifying species in the field. With this approach, we hope to increase curiosity on bryophytes, encourage people to take a moment to look at what nature offers, and promote willingness to know more about bryodiversity and participate in its conservation. The presentation of this work is supported by PTDC/AGR-CFL/111214/2009.

Evaluation of the influence of climate change in the distribution patterns of some bryophyte species in Portugal.

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It is estimated that bryophyte diversity in Portugal is high, comprehending more than 40% of the total European taxa and about 65% of all Iberian species. Many taxa are listed in the Red List of the Iberian Peninsula, some are endemic or represent species which are included in Annex II and in the Berne Convention. The use of models with high predictive power based on the determination of the ecological niche of different species is a tool widely used in conservation. These tools constitute a basis for applied research aiming the sustainable management of biodiversity. The use of databases with georeferenced information allows to estimate the probability of occurrence of a given species by calculating the probability distribution of the maximum entropy. Predictive maps are presented for different species, such as, *Marsupella profunda* Lindb., *Bruchia vogesiaca* Nestl. ex Schwägr., *Didymodon bistratosus* Hebr. & R. B. Pierrot, *Schizymenium pontevedrensis* (Luisier) Sérgio, Casas, Cros & Brugués, *Triquetrella arapilensis* Luisier, among others. These maps consider the current and the future distribution pattern of each selected taxon, based on the significant environmental changes according to the scenarios of the IPCC-Intergovernmental Panel on Climate Change. Using this methodology we aim to answer the question (or to evaluate) if the present protected areas in Portugal are the most suitable to keep and protect species with threatened status in a scenario of global climate change.

Bryophyte occurrence patterns on dead wood in montane forests

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The study aimed at searching for ecological patterns in epixylic bryophyte species and communities in relation to dead wood species, elevation, pH and substrate slope, in order to provide a scientific basis for the conservation of threatened species in managed forest. The ANOSIM test shows a significant floristic dissimilarity between epixylic bryophyte assemblages on beech and spruce dead wood. However, there is an overlap of bryophyte assemblages by porophyte-type in the CCA ordination space. The floristic distinctiveness of the two assemblage groups is weak, predominantly along a pH gradient that is overlapped on the CCA axis 1. The

ANCOVA test shows significant and main effects of pH and porophyte type on the scores of bryophyte assemblage on CCA axis 1. Eleven of the 155 bryophyte species inventoried display a significant occurrence response to porophyte type. These species show a clear preference for either beach or spruce dead wood, but none of them occurs exclusively on one of the two substrates. In certain species, the porophyte type displays a main effect, whereas in others it depends on the level of one or two environmental variables. The pairwise association analysis performed on threatened species revealed a group of three species (*Buxbaumia viridis*, *Scapania apiculata* and *Lophozia ascendens*) that co-occur more frequently than expected by chance. Only *Lophozia ascendens* displays significant occurrence response to environmental variables (in particular, elevation and pH), as indicated by the logistic regressions performed on each threatened species inventoried.

How does physiological status impact cryopreservation success of bryophytes from two contrasting habitats?

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oral presentation

Cryopreservation of bryophytes is a promising method for long term storage of plant material and subsequent regeneration. The protocols for cryopreservation of plant material usually involve a pre-treatment step before the plant material is subjected to liquid nitrogen. The unique feature of bryophytes compared to other land plants is their ability to dry out and stay inactive until favourable conditions for growth reappear. In this study we explore how winter harvested frozen plants, physiological active spring harvested and air dried plants react to cryopreservation without pre-treatment. Plants were collected from two contrasting habitats, with high and low natural desiccation stress, dry exposed sea cliffs and moist Norway spruce forest floor. We found that winter collected plants from the forest floor had 33 % regrowth after cryopreservation, while plants from the sea cliffs had 100 % regrowth. Spring collected material did not survive direct cryopreservation from any of the habitats (only *Grimmia pulvinata* from the sea cliffs showed some regrowth). All control had nearly 100 % regrowth. It therefore seems like naturally cold acclimated desiccation tolerant plants from the sea cliffs survives cryopreservation better than forest floor plants. However, the winter collected sea cliff plants had strongly reduced water content compared to the spring collected plants, while plants from the forest floor had high water content both in winter and spring. Air dried plants, also collected winter and spring, had as high regrowth as the controls, both from the forest floor and the sea cliffs. It thus seems like physiological dormant plants with low water content are naturally adapted to survive cryopreservation independent of their natural humidity requirements.

Towards a common methodology for efficient bryophyte and lichen monitoring at species and community level in Portugal

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Monitoring bryophytes and lichens presents considerable problems, since these organisms are usually inconspicuous and their identification might be difficult and time-consuming, even for specialists. There are some studies on bryophyte and lichen species and community monitoring, including: (1) the Hungarian monitoring program, particularly targeted to endangered bryophyte species and communities; and (2) the UK common standards monitoring guidance, centered on bryophyte and lichen interest features monitoring. Other monitoring projects are mainly focused on epiphytic lichens, profiting from the easier recognition of most species in the field and consequent reduction of time and costs. The aims of this study were to collect and summarize information on (i) the methodologies for species and community monitoring adopted in other countries and (ii) the inclusion of bryophytes and lichens in environmental impact assessments occurring in Portugal. A synthesis of the most appropriate methodologies for Portuguese reality is presented and the relevance of including bryophytes and lichens in environmental impact assessments is discussed, as well as the implications of this commitment. It is expected that this synthesis will result in a series of recommendations that could be encompassed by Portuguese law, namely: (1) the selection of habitats for the implementation of bryophyte and lichen species and community monitoring, in the context of environmental impact assessments; (2) the presentation of standardized methodologies for bryophyte and lichen community monitoring; and (3) the definition of protocols for Habitats Directive species monitoring.

The ecology and potential climate change response of a rare and threatened montane oceanic bryophyte community

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oral presentation

The far west of Europe is renowned for its rich and diverse oceanic bryophyte flora, which thrives here due to the prevalent oceanic climate. Of particularly high conservation value is the mixed northern hepatic mat, a community of large leafy liverworts that grows only in sheltered north-facing corries in a handful of mountain ranges in the far west of Ireland and Scotland. All of its constituent species are of highly disjunct distribution, occurring elsewhere only in regions of similar climate, such as the Himalayas, Tropical Africa or Canada. This community grows only where microclimatic conditions are ideal and is highly threatened in Ireland. Overgrazing by livestock has resulted in loss of many stands of hepatic mat in the past 25 years. We examined the ecology of this community in Ireland and the environmental and climatic conditions it requires to survive. A major future threat to this community is likely to be climate change. We modelled the distribution of the constituent species of hepatic mat under future climate change scenarios. Results indicate that many areas in the south of their range in Ireland may become climatically

unsuitable for their occurrence, with climatically suitable space becoming available in the northwest of Ireland. However, these species have poor dispersal capacity, as they do not produce sporophytes in Europe, so may not be able to colonise climatically suitable areas. Therefore, it is essential to maintain this community in optimum condition in order to maximise its resilience to climate change impacts.

Towards a new bryophyte red List for Europe

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oral presentation

Red Lists are essential tools for species conservation. The first attempt at producing a Red List for bryophytes covering all of Europe was in 1995. The last 17 years have seen an enormous improvement in our knowledge of the bryophytes of Europe, and especially of their taxonomy and distribution. There have been some conservation successes but threats to our bryophyte flora continue. For a Red List to be credible, it needs to be updated regularly according to the best scientific information available, and it is now clear that the bryophyte Red List is in urgent need of updating. Over the last year, under the auspices of the ECCB, a small pilot project has been taking place to assess the feasibility of a new bryophyte Red List for Europe. Key products from this project have been a short report outlining the need for a new list and describing ways in which it could be taken forward, a list of current European checklists and Red Lists, an assessment of current relevant bryological work across Europe, an updated list of ECCB country contacts, and a draft spreadsheet showing the distribution of European mosses by country (similar to the one done for liverworts and hornworts by Söderström *et al.* 2007). It is now proposed to examine the results of the pilot project and determine a way forward for a full conservation reassessment of the European bryophyte flora and a new Red List.

The comparison of gemma production among the rare hepatic *Lophozia ascendens* and the common *L. ventricosa* and *L. longiflora*

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The extent and seasonal pattern of asexual reproduction and ability to germinate in the rare liverwort *Lophozia ascendens* and the common liverworts *L. ventricosa* and *L. longiflora* were studied in the Boubínský prales National Nature Reserve in Šumava Mts. (Bohemian Forest) South Bohemia, Czech Republic during two years (2007 and 2008). Asexual reproduction was quantified as the number of gemmae produced per individual shoot. No difference in total gemma production between the rare and common species of epixylic liverworts was demonstrated. Nonetheless, gemma production during the seasons differed substantially between the species. Delayed production of gemmae in rare *L. ascendens* in comparison to the other two species in year

2007 can be attributed to its higher requirement for high air humidity. Likewise massive production of *L. ascendens* gemmae in the summer 2008 can imply an important role of air humidity which increases in late summer. Germinability of gemmae was low in spring, highest in late summer and autumn during both years. This pattern suggests that rather mild winters in the Czech Republic cause the lower mortality of shoots during winter and the environmental pressure towards the production of dormant gemmae is not a prominent factor affecting the population dynamics of the species under study.

The state of bryophyte conservation in Estonia

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oral presentation

Bryophytes are under state protection in Estonia since 1994. Presently 46 bryophyte species are listed in three protection categories. The updated Red list of Estonian bryophytes was compiled in 2008. From the whole bryoflora, 583 species, four percent has been evaluated as regionally extinct, 21 % belong to the three threat categories (CR, EN, and VU), and 17% to the near threatened (NT) category. The species inhabiting our forests are most threatened; the amount of forest species is also highest among protected bryophytes. From the list of EU directive species ten species have been found in Estonia, six of them are under state protection. Monitoring of these species at least at three localities has been started. The preliminary results show that two species have quite stable populations, but four species are slowly declining. The reason for the decline is degradation of habitat quality or total damage of habitats. The bryophyte species are often threatened even if their localities are in the nature protection areas.

Characteristics of the red-listed bryophytes of Lithuania

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The Red List of Lithuania (2007) contains 93 species of bryophytes (23 hepatics and 70 mosses). The species represent the main habitat types of Lithuania: open habitats (18% of red-listed species), spruce forests (17%), calcareous rocky slopes (14%), broad-leaved forests (12%), transition mires and quacky bogs (9%), raised bogs (8%), etc. The largest part of red-listed bryophytes make terricolous species (about 53%), epiliths (17%), epiphytes (12%) and epixyles (11%). Distribution of about 82% of all species is based on quite recent data (not more than 10 years old), meanwhile that of 11% of the species is based on the data up to 40 years old or even older (7%). Most of very rare (1–3 records) species, which make 60% of all red-listed bryophytes, are under-investigated species (distribution based on old data, short-lived species, those of neglected habitats, etc) or species of habitats that are rare in the country (e.g. calcareous rocky slopes). The list also includes species that are more widely distributed throughout the territory, but represent the main types of natural habitats, e.g., *Hamatocaulis vernicosus* (spring fens), *Antitrichia curtispindula* (broad-leaved forests),

Trichocolea tomentella (swamp forests), *Sphagnum platyphyllum* (transitional mires), *Pseudocalliergon trifarium* (calcareous fens).

Nature conservation relevance of Bryophytes in Troodos National Forest Park, Cyprus

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oral presentation

Cyprus is the third largest island in the Mediterranean region and is known as a Mediterranean biodiversity hotspot. The outstanding geology and geomorphology, the variation in temperature and rainfall and the location surrounded by three continents are responsible for the great richness of flora and fauna. The Troodos National Forest Park (TNFP) comprises the area around the highest mountain of Cyprus (Mount Olympos 1.952 m) with a variety of habitats such as *Cedrus brevifolia*- and *Pinus brutia*-forests, *Quercus alnifolia*-maquis, garigues, mountain streams, siliceous and calcareous rocks, talus areas and stone walls. The Crete-Cyprus endemic moss *Onchophorus dendrophilus* occurs only in western Cyprus. In contrast to vascular plants, little is known about the Bryophytes of Cyprus, nor they are implemented in nature conservation strategies. Within six weeks we studied the Bryophytes of the TNFP to find out a better understanding of their occurrence, ecology and nature conservation relevance. Therefor we arranged 180 plots of 10 m² across the TNFP by intentional selection. Until now 130 species are detected for the TNFP, 56 % of the known Bryophytes of Cyprus. Eight mosses are determined as new for Cyprus. This high proportion of the whole diversity of Cyprus needs to involve Bryophytes in the management plan of the TNFP. Increasing air pollution, forestry, tourism and not least climate change could represent serious threats. Especially the comparable old forests of TNFP (and the Pentadaktylos) are sensitive to a further increase of temperature and frequency of forest fires. For this, bryophytes are not only targets of nature conservation measures, but can diminish negative effects of climate change for the whole ecosystem.

Bryophyte diversity of sycamore pastures in the Northern Alps with a special emphasis on *Tayloria rudolphiana*

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Key words: Biodiversity, land use changes, patch size, cultural history, connectivity, rare species, *Tayloria rudolphiana*

Sycamore pastures are a traditional land management system in the montane region of the Northern Alps. The trees provide shelter for grazing animals and, mainly in former times, were important for woodland products such as timber and leaves obtained by pollarding and harvesting and used as forage and litter. Like many other cultural landscapes e.g. orchards, sycamore pastures are threatened by the ongoing land use changes: intensification of management, abandonment, reduced patch size and fragmentation. The old *Acer pseudoplatanus* -trees on these pastures are the habitat of the threatened epiphyte *Tayloria rudolphiana* (Garov.) Bruch & Schimp.

(*Splachnaceae*). *Tayloria rudolphiana* is listed in the Flora-Fauna-Habitat (FFH) -directive of the EU and in the Bern Convention. The species is only reported from a few localities in the Alps (Austria, Germany and Switzerland) and from a disjunct area in China. So far there is not much known on the population structure, habitat limitations and dispersal- and establishment strategies of *T. rudolphiana*.

Our project aims to describe species richness of bryophytes, vascular plants, and epiphytic macrolichens, to investigate the cultural history of sycamore pastures as well as to study the autecology of *Tayloria rudolphiana*. The project objective is to elaborate specific and effective conservation measures for sycamore pastures as areas of high conservation value and as the habitat of *Tayloria rudolphiana*. We will introduce the target species *Tayloria rudolphiana* and the study design of our project.

Turkish *Sphagna*

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Early records on the bryophyte flora of Turkey were started in the 18th century. Since the mid-1990s, numbers of studies on Turkish bryophytes have been carried out. Floristic studies and country reports contributed to Turkish bryoflora which is represented 934 taxa (171 liverworts, 760 mosses, three hornworts (Kürschner & Frey, 2011). In spite of these investigations, important parts of Turkey are still bryologically poorly known such as the Middle, East and Southeast Anatolia. The family *Sphagnaceae* is represented 17 taxa in the Turkish bryoflora. Among them 9 taxa which are *Sphagnum capillifolium*, *S. compactum* var. *brachycladum* (Roell) Roell, *S. fuscum* (Schimp.) Klinggr., *S. girgensohnii* Russow, *S. inundatum* Russow, *Sphagnum teres* (Schimp.) Angstr., *S. squarrosum*, *S. subsecundum* var. *obesum* (Wilson) Schimp., *S. warnstorffii* Russow are known from only one locality. All species except *S. fuscum* collected before 1969 (Henderson, 1969; Byfield & Özhatay 1997). 3 species which are *S. angustifolium* (C.E.O.Jensen ex Russow) C.E.O.Jensen, *S. angstroemii* C. Hartm. and *S. lescurii* Sull. & Lesq. were also given by Çetin without locality details (Çetin 1988). Also the scientific name of the taxon *S. turiere* which was recorded from Kaz Mountains by Gemici et al.(1998) is wrong. This name does not exist in world *Sphagnum* list.

Hepatics in regional Red Data Books of European part of Russia

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oral presentation

The civil division of European part of Russia includes 54 administrative units (republics, provinces, territories). Red Data Books (RDB) were compiled and published for majority of them but hepatics are inserted in 14 regional RDB only. Several regional RDB that included hepatics are in preparation now. The main reason preventing from compiling of regional lists of threatened hepatics is the poor knowledge on hepatic diversity in many regions of European part of Russia. In total 123 hepatics are red listed in different civil divisions of European part of Russia. Most of these

hepatics are widespread species that are rare in several particular regions because these regions are situated at the edge of species distribution ranges. Hepatic flora of European part of Russia counts 42 species red listed in Europe. Most of them are included in one or several regional RDB. Some of European red listed species are not rare and endangered regionally. For another side 15 red listed in Europe hepatics that occur in European part of Russia are not presented in any regional RDB. Among them 4 are endangered (*Biantheridion undulifolium* (Nees) Konstant. & Vilnet, *Frullania oakesiana* Austin, *F. parvistipula* Steph., *Scapania carinthiaca* J.B.Jack ex Lindb.) and 4 are vulnerable (*Asterella saccata* (Wahlenb.) A.Evans, *Frullania inflata* Gottsche, *Pallavicinia lyellii* (Hook.) Carruth., *Scapania zemliae* S.W.Arnell) in Europe hepatics. Red lists of species included in regional RDB as well as distribution of European red listed species in European part of Russia will be briefly discussed.

Should endemic hepatics of Caucasus be included in the new Red Data Book of Europe?

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At present three taxa of hepatics are known as endemic for the Caucasus. *Solenostoma caucasicum* (Váňa) Konstant. is a rare species recorded from several localities in the South-West Caucasus. *Lophozia wenzelii* (Nees) Steph. var. *massularioides* Bakalin was recently described from Karachaevo-Cherkessia and then collected in Adygeya and Krasnodar Territory (West Caucasus). The third endemic hepatic of Caucasus is *Jubula hutchinsiae* (Hook.) Dumort. subsp. *caucasica* Konstant. & Vilnet. Previously all known Caucasian reports of *Jubula* were referred to *J. hutchinsiae* (Hook.) Dumort. subsp. *javanica* (Steph.) Verd. or *J. pennsylvanica* (Steph.) A. Evans. We resolved these putative references as a new taxon that is well segregated from other *Jubula* taxa from molecular and morphological features. Thus, *J. hutchinsiae* subsp. *javanica* should be excluded from the list of European hepatics as well as from Red Data Book of Europe. At the same time *Jubula hutchinsiae* subsp. *caucasica* need to be included in the new Red List of European Bryophytes with status vulnerable. The subspecies is restricted mainly to the western Caucasus to areas with relict flora of Kolkhida. In appropriate sites it seems is not rare. Of all endemic hepatics of Caucasus it is the most widespread but its populations usually are relatively small. Moreover the subspecies is restricted to areas that are now under high anthropogenic press. Distribution, ecology, biology as well as supposed threatened status of all mentioned above taxa will be discussed.

Rare and threatened bryophytes of Ireland

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Ireland's temperate and humid climate provides suitable conditions for a particularly rich bryophyte flora, with 835 taxa, representing nearly 48% of the entire European flora. Rare and

threatened bryophytes of Ireland is a new book that reports results from a collaborative programme of research by the National Parks and Wildlife Service, in the Republic of Ireland, and the Northern Ireland Environment Agency. These studies have involved fieldwork annually from 1999-2010, during which almost all previously known sites for rare bryophytes in Ireland have been revisited, in all the counties. The book gives a detailed review of the distribution, ecology, threats and conservation status of those liverworts and mosses that are rare or declining in Ireland and provides the first Red List for the bryophytes of the whole island. For each species, the status of populations in Ireland is also compared to that in Europe as a whole. Hence this study establishes an agenda for the conservation of the most threatened species by ranking them in order of priority, identifying Important Bryophyte Areas, listing protected sites and outlining practical concerns in managing their populations and habitats.

Experiments on realized dispersal of *Discelium nudum*

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oral presentation

To study the dispersal of small diaspores over intermediate and long distances, we transplanted a reproducing mother colony of the moss *Discelium nudum* (spore diameter > 20 µm) into a non-habitat matrix in two open areas where the species did not occur in the immediate vicinity and in a region where it is generally rare. Approximately 2000 pots with suitable substrate (acidic clay) were placed at distances up to 600 m and 1 km. In the pots close to the mother colonies (up to 10 m) the mean colonization rate was above 50 %. From 40–50 m the maximum colonization rate was stable with mean colonizations of between 1 % up to 600 m and 20 % up to 1 km, in the two areas. Dispersal experiments on bryophytes have not detected diaspore dispersal at longer distances than 15 m, so with this study we extend this range by two orders of magnitude. A fat tail of the dispersal curve for many species with small diaspores is in agreement with the inference from other studies on shorter distances and from modelling. However, the surprisingly high colonization rate at the longest distances in this study (600, and 1000 m) suggests a mixing of large number of spores in the air before the colonization took place. This study raises interesting questions about the role of a single dispersal source to build up a high background deposition at landscape scale.

Desiccation tolerance of fen bryophytes

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poster

Eight fen moss species (*Aulacomnium palustre*, *Bryum pseudotriquetrum*, *Calliergonella cuspidata*, *Campylium stellatum*, *Climacium dendroides*, *Hamatocaulis vernicosus*, *Plagiomnium elatum* and

Tomentypnum nitens) were studied in order to assess their ability to tolerate long-term desiccation. The mosses were dried naturally in room temperature. After 0-20 weeks, a set of mosses was rewetted and grown for five more weeks in water-rich conditions. Afterwards, the number of green living stems was recorded. The mosses differed significantly in their desiccation tolerance. The highest tolerance was shown in the hummock moss species *Climacium dendroides*, *Aulacomnium palustre* and *Tomentypnum nitens*, with more than 10% of stems surviving after 20 weeks of desiccation. On the other hand, in *Campylium stellatum* and *Plagiomnium elatum*, almost no stem survived after 6 weeks without water supply. The other mosses (*Hamatocaulis vernicosus*, *Calliergonella cuspidata* and *Bryum pseudotriquetrum*) showed medium desiccation tolerance, which differed only a little among those species. After 12 weeks of desiccation, less than 10% of stems were able to restore their growth. In general, most of the species displayed remarkable desiccation tolerance which was not expected in species from water-rich fen habitat.

Towards a Red List of the Albanian bryophytes – the need for extensive exploration, conservation strategies and actions.

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Albania is among the SE European countries with the least known bryoflora, a situation that may be attributed to the long-time isolation of the country and the lack of both funding for bryology and trained local bryologists. This is reflected by the limited number of local collections and publications and by the simple fact that up to 2008 only 219 moss taxa and 91 liverworts have been reported, based only on ca. 400 and 500 records respectively. Yet the situation is changing - nowadays both local and foreign bryologists are paying much more attention to the bryoflora of the country, shown by a greater level of collecting and publishing. Still, no red list of bryophytes exists for Albania. The aim of the present contribution, therefore, is to put together a list of the bryophyte taxa of Albania with a conservational value according to the European Bryophyte Red Data Book, or other regional red lists (e.g. Serbia & Montenegro and Bulgaria), among those we currently know. Hence, about twenty liverwort species (ca. 20% of the total liverworts) and fifty moss species (ca. 15%) are taken into account, and for conservation purpose their status is discussed. However, for a red list of the bryophytes of Albania there is a great need for further extensive exploration and collecting in the country. The present list is to be considered as a tentative and as a first contribution; it is hoped that with its help and that of the updated versions that will follow, it will be possible to develop effective conservation strategies and actions, all urgently needed.

Diversity and Lipidome of Mosses of Eastern Himalaya

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oral presentation

The spatial distribution of some Moss species over some areas of Eastern Himalayan biodiversity zone has been recorded with the aid of GPS (Garmin, USA) and collected for detail lipid profiling almost through out the year. The floristic criteria and chemical characteristics have been utilised to generate data base to assess the intrinsic capability of these poikilohydric species for well adaptation to the environmental thrust and climatic changes. The neutral lipid classes like diacylglycerol (DAG), free sterol (FS), sterol esters (SE), long chain alcohols (LCA), non-esterified fatty acids (NEFA) and triacylglycerols (TAG) and membrane phospholipids like lysophosphatidyl choline (LPC), phosphatidyl choline (PC), phosphatidyl inositol (PI) and phosphatidyl ethanolamine (PE) were estimated with the help of high performance thin layer chromatography (HPTLC, Camag USA). Higher proportion of endogenous TAG in most of the species might be significant for storage purpose due to higher altitude acclimatization. The fatty acid (FA) compositions of total lipid were analysed after transesterification and quantitated by gas chromatography (GC) using flame ionization detector (FID) (Varian, UK). Lipidomes of higher altitude species at the sporophytic stage reveal some interesting features on even and odd carbon number of saturated, monoenoic and polyunsaturated fatty acids. The presence of higher quantity of membrane PE and carbon 16 and carbon 18 FA in all the recorded species might be indicative for enzymatic generation of oxylipin signalling molecules in Himalayan moss community.

Buxbaumia viridis – an endangered species in the Czech Republic?

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poster

The epixyloous moss *Buxbaumia viridis* is considered an endangered species in the Czech Republic. Likewise, it is red-listed in many European countries and included in Annex II. of the EC Directive 92/43/EEC on conservation of natural habitats and of wild fauna and flora. *B. viridis* is systematically mapped in the Czech Republic since 2000. As a result 87 localities are known, however more than a half of them was discovered in the last three years. Most of the localities were found in the Moravian mountain range (mainly the Western Carpathians and the Jeseníky Mts.). 56% of the localities are situated in the Sites of Community Importance. One of the most important ecological factors is probably humidity level as majority of the sites are located up to 100 m from watercourse. The log diameter, exposition and slope of the sporophytes occurrence do not significantly influence the presence of *B. viridis*. However, it is mainly found on wood of advanced level of decay. Most frequently co-occurring species are *Herzogiella seligeri*, *Chiloscyphus profundus* and *Rhizomnium punctatum*. Surprisingly only 38% of the localities occupy natural forest habitats especially beech forests. The rest of the localities are situated in commercially managed production forests. Sufficient amount of decaying wood in both types of forests is crucial for occurrence of *B. viridis*.

Effect of stand structure on the diversity of epiphytic and ground-floor bryophytes assemblages in Hungarian mixed forests

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oral presentation

Determinant factors of forest stands on bryophyte diversity and composition were studied in managed deciduous-coniferous mixed forest in Western Hungary. Ground-floor and epiphytic assemblages were investigated separately in 35 stands (900 m²) and on ca. 1000 trees. The potential explanatory variables on stand level were tree species composition, tree size distribution, dead wood amount, substrate proportions, microclimate, light, historical and landscape factors.

The range of stand level species richness was 8-35 in ground-floor and 5-27 in epiphytic assemblages, tree level species richness varied between 0 and 13. For epiphytes, shrub cover and tree species richness were the most important factors in species richness; specialist epiphytes were related to large trees. On tree level, the species of the host tree was the most determinant factor, oak had high, other deciduous trees intermediate, while pine low diversity.

For ground-floor bryophytes, the species richness was dependent on the proportion of substrates as open soil patches and logs, and negatively related to litter cover. Presence of shrub layer increased the diversity of terricolous species and facultative epiphytes, as it maintains a more cool and humid microclimate that positively influenced bryophytes.

The management maintaining high bryophyte diversity in forests should focus on tree species diversity, presence of shrub layer, logs, open soil patches and large trees. Beside the exploration of the relationships between bryophytes and forest structure, this study tried to contribute to the strategy of close to nature forest management and forest biodiversity conservation for the studied region.

Red list of Hungarian bryophytes

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oral presentation

The check- and Red list of Hungary published in 2010 includes 659 bryophyte taxa (2 hornworts, 146 liverworts, and 511 mosses). According to the Red List 26% of the Hungarian bryoflora are threatened, marked by categories CR, EN, VU, and 17% are near threatened (NT). In all of these categories the percentage of liverworts (including hornworts) is higher than that of the mosses. The ratio of data-deficient taxa is also high (21%) and a higher percentage of liverwort taxa falls in these categories, than of the mosses. In addition, only 35% of the bryoflora can be regarded as non-threatened. From conservation aspect it is worrisome that only 15,5% of the liverworts are non-threatened; this percentage is much higher in mosses (40,5%). The most threatened are the boreal, subboreal species and the alpine, montane elements; 36-37% of these plants are redlisted and many of them included in the data deficient category (22-23%). A part of these species occur in wetlands, which are in very poor condition in Hungary (eutrophicated or dried out). The remaining taxa live in the mountains mostly in the northern part of Hungary approaching the foothills of Carpathians or in the western part of the country near the Alps. The majority of these species were detected in the 60's of last century when the climatic conditions were more humid and cold. These species extended their range from the surrounding higher mountains towards the lower parts of the Carpathian basin. Nowadays however, they are retreating and slowly becoming rare or disappearing from our mountainous areas. Among the Mediterranean and subatlantic species the data deficient species are represented by 26% and 50%, respectively. Due to their ephemeral character, short lifetime and the short period suitable for their appearance and observation usually in the spring, chances for detecting these species are limited. This reflects an unsatisfactory situation, and explains our shortcomings in field bryology. Less threatened are the species of the temperate zones of Europe; 61% of these fall into the non-threatened category.

Besides the red list categorisation, we selected 144 indicator species, which by their mere presence denote a greater level of conservation value of the habitat where they occur. The indicator species list provides a useful tool in selecting and assigning Important Bryophyte Areas, which can promote the conservation of characteristic, well-developed bryophyte assemblages and rarities, even if their occurrence in the territory cannot be proved in a given time during one field excursion.

Towards the Red List of Balkan

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oral presentation

The bryophyte collection of the Hungarian Natural History Museum contains 15396 specimens from the Balkan. Large part of it (9271 specimens) has been collected recently (last 10 years) during our field trips, while 6125 specimens derive from historic collections. The most part of the old Balkan collections (more than 4000 specimens) belong to the Árpád Degen's herbarium. Degen organised several collecting trips especially to the territory of Croatia in the beginning of last century. Large part of this material was determined by Julius Baumgartner, Austrian bryologist, who also carried out collecting trips at that time to Croatia, especially Velebit Mts.

Our collecting trips have targeted mainly the areas of the former Yugoslavia. Large material has been collected in Serbia (2831 specimens) and Montenegro (1668 specimens), while two years ago we have started the exploration of the Former Yugoslav Republic of Macedonia, which resulted until now 544 specimens. Besides of these materials we have large collections from Bulgaria (2053 specimens), Greece (1325 specimens), and a smaller amount of specimens from Albania (686 specimens). In total we have reported 390 species as national new records; among them the largest number from Serbia (125 species), but also numerous species from Albania (76), Montenegro (72), Republic of Macedonia (56), Greece (25), Bulgaria (21).

In addition during these field trips several populations of European redlisted and other rare species have been discovered.

Taking into account the above mentioned data we consider that the Balkan collection of the Hungarian Natural History Museum holds basic information for national Red Lists of Balkan countries and also for a comprehensive Balkan Red List.

The Hungarian Biodiversity Research Society and some bryological results of the Biodiversity Days in 2011

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The Hungarian Biodiversity Research Society is the official sponsor of the 8th ECCB Conference. The Society was established in January 2011. The most important task of the Society is the organisation of the Biodiversity Days in Hungary, gathering the results of the surveys, and makes them available and understandable for the public.

In Hungary, the Biodiversity Days began in 2006 and until now 7 localities were visited. During a 2-days survey several plant and animal groups (bryophytes, lichens, higher plants, fungi, soil inhabiting and aquatic invertebrate animals, almost all groups of insects, and vertebrates) were investigated by 40-50 voluntary experts. As the duration of fieldwork and data collecting is short, the results can only provide an overview of the living organisms at the given site. However, the 1500-2200 species detected on a certain place can serve as an important documentation in the evaluation processes and for the legislation involved in matters of nature conservation. Such data are invaluable in identifying the conservation status of the site. And not to mention the benefits of

the personal scientific contacts that can be established during such type of professional work. Furthermore, such surveys have contributed several new regional and national records that were unknown previously in the area. Two volumes were already published containing detailed species lists of sites earlier investigated. Activities of the Society have been usually sponsored by the MKB-Euroleasing Zrt. and the appropriate national parks that oversee the targeted site.

Bryological results of the two Biodiversity Days in 2011 can be summarised as follows. These were the first events, when we used the new Hungarian Bryophyte Red List in the evaluation of the nature conservation importance of the bryophyte flora.

The locality investigated in 28-29 May, 2011 was a swamp forest in the eastern part of Hungary, Fényi forest at Bátorliget village. Here 58 bryophyte taxa (8 liverworts and 50 mosses) were collected from soil, tree bark and decaying wood. Among them there were one vulnerable (VU), 6 near threatened (NT) and 6 least concern-need attention (LC-att) according to the new Hungarian Bryophyte Red List. 9 species were marked as indicator, which by their presence denote the greater level of conservation value of the habitat where they occur.

On the other locality investigated in 11-12 June, 2011 was a low hill (300 m a.s.l.), Strazsa hill at Esztergom town on the northern-central part of Hungary. The vegetation types here were xerotherm oak forests, dry open and closed calcareous grasslands. Here 99 bryophyte taxa (7 liverworts and 92 mosses) were collected from soil, shaded and exposed limestone rocks, tree bark and decaying wood. Among them there were one vulnerable (VU), 11 near threatened (NT) and 20 least concern-need attention (LC-att) according to the new Hungarian Bryophyte Red List. Besides of these 24 indicator species were detected.

Case study of vegetative regeneration: a perspective way for ex situ conservation of bryophytes

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The vegetative regeneration capacity of bryophytes can be used for ex situ bryophyte propagation. The sterile circumstances are not ideal for all the bryophyte species for propagation. In vitro experiments were carried out on moss species collected from different habitats. Leaves, shoots and fragments were put on different soil surfaces among laboratory conditions. The exact time of the vegetative production of shoots from leaves and fragments was measured and the phases of development were documented on photographs. The results showed that the gametophyte of both species have vegetative reproductive capacity from fragments, leaves or shoots after a desiccation period. In some cases bryophyte fragments on soil surface grow faster than spore in vitro cultures. The role of desiccated fragments can be important in natural habitats in the regeneration processes. In situ experiments with some bryophyte species were carried out in the Botanical Garden of Eszterházy Károly College and in the Bükk Mountains.

Bryophyte ex situ conservation at the Royal Botanic Gardens, Kew: past, present and future.

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The British Isles are of international significance for their bryophytes with approximately 1000 species and the Atlantic bryophyte communities are of global importance yet at least 10% of UK bryophytes are threatened.

The Royal Botanic Gardens, Kew (RBG Kew) has been involved in the ex situ conservation of threatened UK bryophytes since 2000, when the UK Country Conservation agencies in partnership with RBG Kew initiated a project that focused on developing methods for in vitro propagation and cryopreservation. At the close of the second phase of the project in 2006, 21 priority species (29 accessions) chosen from World, European and UK Red Lists had been propagated axenically and placed as a cryopreserved collection in liquid nitrogen. Recently the partnership between Natural England and RBG Kew has been re-established to secure additional priority taxa in the existing ex situ collection and develop methods for spore cryopreservation and problematic species.

Working with the British Bryological Society (BBS), the Natural History Museum (NHM), Royal Botanic Gardens, Edinburgh (RBGE) and other partners, the Royal Botanic Gardens, Kew has begun feasibility planning for a comprehensive ex situ programme for UK bryophytes. The main aims of the project are:

1. To systematically collect and store at least half of the UK bryophyte flora
2. To carry out research to improve storage protocols and to enable the use of bryophyte collections in restoration and reintroduction programmes

Maintenance of favourable conservation status of bryophytes in forests of Latvia Within lands managed by the Latvia's State Fore

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Functional management of forests covers various aspects, the basis of longterm sustainable development is to balance interests of nature conservation and economics. Nature conservation e.g. maintenance of biological diversity, takes important place within strategic and tactical planning of lands managed by the Latvia's State Forests. Since 2010, great attention has been dedicated to implement these aims:

- registration of rare and endangered species, and monitoring of habitats of these species, has been initiated;

- new, on Latvia's State Forests scale, protected areas with importance for biological diversity, so called Eco-forests, has been established where, besides nature protection measures binding on the State level, additional measures to maintain rare species and habitats has been adapted. Existing data on the State Forests managed lands (1.62 million ha of forests, 220 000 ha other lands), shows quite high diversity of bryophytes. Till now, there are registered 355 or 65 % of bryophyte species registered in Latvia, e.g. 268 species of mosses and 87 species of liverworts, including 61 species under the State protection (48 % of protected species in Latvia) e.g. 14 (87%) species of micro-reserve level; 2 species included in the II appendix of the European Union Habitats Directive (92/43/EEC, 1992); 92 species included in the List of the Red Data Book of Latvia; 207 of registered species are directly connected to forest habitats. Since 2012, special monitoring programme of species will be carried out to ensure control and surveillance of species e.g. bryophytes.

Ex situ conservation of European bryophytes: state, problems and progress

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Bryophytes (liverworts, mosses and hornworts) are often overlooked in conservation initiatives despite their presence in most terrestrial habitats and being major contributors to the functioning and biodiversity of many of the world's ecosystems. The ex situ conservation of bryophytes faces many challenges including: insufficient amounts of plant material for implementing action plans; unresolved taxonomic problems; poor knowledge of the biology and ecology of target species; habitat degradation and/or loss and hence a lack of potential habitats for introduction; underdeveloped biotechnological processes for the establishment and propagation of both xenic and axenic cultures; genetic variability (problems with maintaining genetic variability in ex-situ stocks). The recently established European Bryophytes Ex situ Conservation Network (www.ebesconet.org) brings together for the first time all the information available on bryophyte ex situ conservation programs across Europe including species currently being conserved, protocols available, people involved, and thus aims to facilitate cooperation with the overall goal of saving threatened European bryophyte species. Progress in this area has been achieved by individual and group activities. So far, 16 liverwort and 53 moss species of national and wider conservation interest are to some extent conserved as in vitro cultures, with 51 additional bryophyte species maintained in living tissue collections for purposes other than conservation.. Financial support is now urgently needed to boost current and develop further initiatives and collaborations in ex situ bryophyte conservation and thus to ensure the survival of rare and threatened species in a rapidly changing European environment.

In vitro establishment, propagation and conservation of the rare and endangered European endemic moss *Goniomitrium seroi*

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Goniomitrium seroi Casas (Funariaceae) is the only European and Holarctic species of the genus. Its recent distribution includes a few populations in eastern part of Spain (Valencia, Almeria) and some islands of the Canary archipelago. The species is threatened due to its small number of populations and fragmented area and the habitat alternation. In order to achieve efficient ex situ conservation of this species, its requirements in in vitro cultures were established. Axenic culture of this species was achieved by sterilizing 4 years old capsules from one eastern Spain population voucher in VAL-bryof 7190. The spores germinated and developed protonemata, which under certain condition induced buds and gave fully developed gametophyte plants. *Goniomitrium seroi* produces numerous rhizoidal gemmae in nature, an efficient asexual multiplication mechanism which was not observed in the cultures, so far. This was because of the poor development of rhizoids in vitro cultures. The propagation of this species is easy from the other vegetative parts of the plantlets, which develop small secondary protonema and again pulvinules of green plants. Further optimization of cultivation and massive production is needed prior to experiments of reintroduction and reestablishment to potential nature habitats as a plan for its conservation strategy.

In vitro propagation and conservation of the European endangered liverwort *Riella helicophylla*

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The liverwort monotypic genus *Riella* Mont. (*Riellaceae*, *Sphaerocarpaceae*), includes ca. 23 taxa growing commonly submerged in clean, shallow, fresh or brackish waters of seasonal ponds, streams and more rarely in permanent waters of arid and semiarid regions. The *Riella* species inhabit all continents except Antarctica and have disjunct distributions and scattered populations. The *Riella* species are rare and/or underrecorded due to its specific habitat types, ecology and biology. Most of the time, they survive in the spore bank. When grown in the laboratory from pond sediments, the cultures are often contaminated with algae and other organisms which prevent their use in experiments depending on the purity of the starting materials. In this study, establishment and propagation, as well as conservation issues of the *Riella* model species (namely

R. helicophylla (Mont.) Hook. Spanish genotype) are given. The two phase system (solid and liquid) axenic cultures are developed for the purpose of achieving fully developed gametophytes. The disposal of xenic organism and the germinability of spores are some of the problems that were solved out. Spores were able to germinate on solid medium, and developed some kind of callous tissue that after being transferred to the two phase culture developed into green plants - gametophores. This method allows for obtaining large amounts of gametophytes free from algal contamination which will be used in subsequent high through output sequencing for the study of genetics and genomics of *Riella*.

Monitoring of endangered bryophyte species in Switzerland

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poster

Bryum versicolor, *Riccia breidleri* and *Tayloria rudolphiana* are mainly endemic in Central Europe. Switzerland has a high responsibility for their conservation because the main part of all known populations is found within its borders. In a monitoring program financed by the Swiss Federal Office for the Environment, a representative selection of populations of these three species has been observed. The aim of the project was to get better knowledge of the ecological requirements, population size and population dynamics of the investigated species and to assess possible threats. This is a prerequisite for conservation measurements. During the last four years five populations of each species were visited annually. The populations of all three species proved to be very stable and only minor changes in population size occurred. Main threats are loss of habitat and lack of knowledge and lack of communication between involved parties (conservationists, owners, persons in charge). As a direct measure transplantation experiments were carried out, which proved to be partially successful for all three species.

Distribution of *Buxbaumia viridis* (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl. in Croatia

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Buxbaumia viridis (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl. is a boreal montane species, which lives on large, well-decaying wood in constantly humid forests. Being an indicator species of old-growth (primeval) forests – a rare forest habitat in European context - it is a Red listed species, included in the Bern Convention and Habitat Directives. The populations of *Buxbaumia*

viridis in the regions of Balkan Peninsula and Pannonian Plane (e.g. Serbia, Montenegro and Hungary) have already been studied and monitored. However, the data on distribution of *B. viridis* in Croatia are very old, the “newest” dating from 1938. The field research started in 2011 resulted in preliminary distribution map of the species in Croatia. In total 12 localities along Croatian Dinarides (Gorski Kotar, Mt Velika Kapela and Mt Velebit) inside fir, spruce and beech dominated forests (ass. *Omphalodo-Fagetum*, *Blechno-Abietetum*, *Laserpitio krapfii-Piceetum* and *Aremonio-Piceetum*) were recorded. The discovered populations were numerous (somewhere with hundreds of specimen), developing exclusively on fir and spruce decaying logs or stumps. The largest populations were noticed on fallen decaying trees in non-managed forest stands where natural processes of forest regeneration are ensured. However, the development of *B. viridis* on rotten tree stumps in managed forests stands has also been observed. Since mixed beech, fir and spruce forests are not rare along the Dinaric mountain range, the specific ecological, climatic and anthropogenic factors are to be studied in order to explain the species’ distribution patterns in Croatia.

Threatened status of Portuguese bryophytes and assessment of important areas for bryophyte conservation

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Endangered species threatened status assessment is an important basis for determining protection priorities and establishing conservation strategies, and it has become a key step in the conservation of biodiversity. Over the last 20 years bryophyte knowledge has undergone substantial changes in Portugal and markedly improved mainly due to new studies. A new preliminary Red Data Book of ca. 700 species in Portugal is presented. The current IUCN criteria were applied for the first time to the Iberian Peninsula (Sérgio et al. 2007) and now we attempt to provide an updated assessment for all reported species to the country. Few species (2%) are assigned as Regionally Extinct (RE) but ca. 6% are classified as Critically Endangered (CR), 12% as Endangered (EN) and 11% as Vulnerable (VU). A further 2% and 4% were classified as Near Threatened (NT) and Attention (Att), respectively. Of the remaining species, 48% are classified as Least Concern (LC) and 15% as Data Deficient (DD). This preliminary list has been used to create a potential distribution model of 250 species with a threatened status using a georeferenced recordset in Maxent (v.3.3.3e). These results were used to identify areas of concern by selecting the most important ecogeographical factors after a multivariate ordination factor analysis. These results confirm bryophytes as a highly threatened group of plants in Portugal and we present the most important areas in Portugal for endangered bryophytes with particular emphasis on endemic species which will be integrated into the European Red List.

Towards an Atlas of the threatened bryophytes of Madeira Archipelago

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oral presentation

Madeira (including Madeira and Selvagens archipelagos), has a total of 530 bryophyte taxa (349 mosses, 175 liverworts and 6 hornworts), among which 29 are endemic to Macaronesia, including 12 taxa exclusive to Madeira. As a result of extensive investigation over the past years in Madeira, the bryophyte flora of distinct habitats has been widely explored. Additionally, new data on habitat, ecological preferences, and distribution of rare or insufficiently known species in Madeira has been produced. With this work, we aim to evaluate the threat status, following IUCN criteria, of a selection of 130-150 bryophyte species, including Madeiran and Macaronesian endemics as well as other rare or insufficiently known. For each species, bibliographic and herbarium data is being collected and species occurrence in recently localities in Madeira is considered. In addition, the present extension of species populations, their ecology, demography and risk factors is also under evaluation. Improved knowledge concerning these aspects is essential for effective conservation of the natural resources of Madeira.

The role of botanic gardens in ex situ conservation of rare bryophytes, experiences from Ireland.

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oral presentation

The global strategy for plant conservation (Target 8) highlights the theme of ex situ conservation and Botanic Gardens Conservation International, emphasises this role for botanic gardens. Bryophyte ex situ conservation has been overlooked for many years because bryophytes are generally not specifically grown in botanic gardens across Europe. Ten threatened red data book species were selected for ex situ conservation trials at the National Botanic Gardens (NBG). Two of the species (*Hamatocaulis vernicosus* and *Petalophyllum ralfsii*) are listed on Annex II of the EU Habitats and Species Directive, six of the species (*Catoscopium nigratum*, *Leiocolea gillmanii*, *Leiocolea rutheana* var. *rutheana*, *Paludella squarrosa*, *H. vernicosus* and *P. ralfsii*) are legally protected by Irish national legislation and all of the species including *Bryum uliginosum*, *Cephaloziella massalongi*, *C. nicholsonii* and *Ditrichum cornubicum* appear on the Red Data List of bryophytes in Ireland. These ten threatened species were trialed on fern compost media and autoclaved natural substrate from in situ sites in the Killarney fern house at the NBG and on several sterile culture media in vitro at Teagasc Kinsealy. Nine of the ten species are viable in vitro and *Bryum uliginosum* has successfully completed its lifecycle in culture (modified Parker/*Hoaglands media*) and weaned on natural substrate. However, the annexed liverwort species *Petalophyllum ralfsii* did not establish well in vitro due to complications with sterilisation and contamination. This species however, grows extremely well on its autoclaved natural substrate ex situ. Seven of the ten species have survived

growing on their natural substrate ex situ since 2008. For optimising an ex situ rare bryophyte conservation collection, a combination of in vitro culture and traditional methods are required.

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Early Land Plants Today - a resource for liverworts and hornworts

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oral presentation

Early Land Plants Today (ELPT) is a project that aims to unite nomenclature, taxonomy and distribution for liverworts and hornworts globally. The aim is to collaborate with bryologists around the world and collect information from various sources so that we can provide information to whoever needs it. The core of the project is a database including nomenclature, taxonomy and distribution data. At present it includes about 35,000 names of about 8,500 accepted species and about 500,000 distribution records. A first world checklist of all horn- and liverworts are under production in collaboration with many bryologists around the world. This list will update nomenclature to recent knowledge and hopefully unify the use among countries and continents. Several checklists (Jamaica, Java, New Caledonia, Fiji, Tonga) have been produced out of the data in the database and some more are under production.

The most threatened liverworts in Romania

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poster

In this paper, the most endangered liverwort species of Romania are presented. The assessment of conservation status and degree of liverwort threatened in Romania was based on chorological data, the threats evaluation of their habitat, ecology and biology of these species. Between all the liverwort species of Romania, *Pallavicinia lyellii* (Hook.) Carruth., proved to be the most endangered species. This species was first reported from Romania since 2001 (Ștefănuț 2003), but has not been found until 2011 (Ștefănuț 2012), although it was searched in 2002, 2003, 2004 and 2006.

The main threats to this species in Romania are:

- until now, the peatbogs from south of Arpasu de Sus, Sibiu County, is the only locality where this species has been found in Romania;
- the area of forested bogs habitat, favorable for *P. lyellii*, is reduced in Romania;
- *P. lyellii* grows on the edge of a brook, on 2 m² and its habitat has 2,000 m² only; - these peatbogs is drained;

- the alder trees from brook edge are regularly cutted;
- the habitat is annual burned;
- the sexual reproduction missing, only male specimens were found.

Based on same type of analysis, it was possible to identify the most important conservation areas for liverworts in Romania and the main actions to be taken to protect the endangered species.

Genetic and morphological diversity of closely related *Sphagnum angustifolium*, *S. fallax* and *S. flexuosum*

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We investigated morphological and genetic variability within a well-delimited but taxonomically contentious species complex of the moss genus *Sphagnum* (peatmosses).

We aim at addressing the following questions: (1) Are the three European taxa of *Sphagnum recurvum* group morphologically and genetically distinct entities in Europe or not. (2) Are morphological and genetic groups concordant? Answers to this question will be sought by conducting morphometric and population genetic analyses.

In total, 244 specimens were included in this project from 22 European countries. We are utilizing ten microsatellite loci to evaluate the genetic diversity. Morphological measurements are held on spreading and hanging branches, stem leaves, pendent and spreading branch leaves, altogether 12 variables were measured. All specimens were identified on the base of morphological features, however there were many ambiguous samples (taxonomical groups).

There were 209 alleles on 11 loci, and the average number of alleles per loci was 19 (min-max: 4-44). On the basis of microsatellite variation three species are separated from each other (STRUCTURE analysis, PCoA). These genetic based groups are not perfectly fitted to taxonomical groups. In the case of *S. fallax* the taxonomical and genetic groups are totally overlap, but the other two species are much more problematic, 28% of samples were misidentified, on the basis of most frequently used morphological features. The Linear Discriminant Function Analysis also misallocated about 8% of samples on the base of leaf morphology.

The neophytic *Orthodontium lineare* Schwägr. in Hungary

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The *Orthodontium lineare* is a non-native species in Europe (Hill et al., 2006) from the southern hemisphere, which was first recorded in 1910 in Britain (Burrell 1940). Since then, it has been spreading continuously, and from Central Europe was detected about 50 years ago (Hassel &

Söderström 2005). This neophytic species is not included in the recent red- and checklist of the moss flora of Hungary (Papp et al. 2010), and the present report is the first in the country. A the author collected in 14 Jan 2011 a few sample of species in planted *Pinus nigra* forest from northern foothills of Gerecse Hills (47°42'59.5"N, 18°19'22.6"E, ca 180 m a.s.l.) in Komárom–Esztergom Region, Dunaalmás village. The *Orthodontium lineare* situated on log of *Pinus* in advanced state of decay, associated with *Bryum capillare*, *Bryum moravicum*, *Campylopus introflexus*, *Dicranum montanum*, *Dicranum scoparium*, *Herzogiella seligeri*, *Hypnum cupressiforme* and *Leucobryum glaucum*. The first hungarian report of *Campylopus introflexus* was described from same forest (Szűcs & Erzberger 2007), exactly from same log. The *Orthodontium lineare* is usually produces sporogons with a great number of spores, and it supersedes other species from their habitats (Herben 1994). In Hungary, where peat and sandstone rock are rare, decaying wood (pines, oaks) appears as a suitable substrate.

These investigations have been carried out with the sponsorship of TÁMOP-4.2.2.B-10/1-2010-0018.

An annotated and updated checklist of the mosses of Turkey with data on their distribution

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oral presentation

The present checklist provided based on literature reports and recent herbarium records. A total of 792 mosses (Bryophyta) within 187 genera and 54 families are listed, of which five are new records for Turkey. The main species list includes tabular distributional data by grid-square system of Turkey and the taxa are alphabetically arranged. In addition, 3 lists concerning the new reported taxa, the excluded taxa, and the known synonyms are presented.

Key Words: Distribution, Mosses, Turkey, New Records.

Does expert knowledge valuation match the reality of threatened species and diversity hotspots in mountain landscapes?

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The valuation of biodiversity can be one of the first critical steps necessary for the adequate protection of the environment and the implementation of the Convention on Biological Diversity from the global, regional and local points of view. At a regional scale, valuation of landscapes can be faced as strategic for landscape planning and conservation of "habitat functions", i.e., of the spatial conditions needed to preserve biotic (inc. genetic) diversity, refuge and reproduction habitat. In Portuguese mountain landscapes the effects of agricultural abandonment accompanied by the intensification of urbanization, results in highly heterogeneous mosaics with dissimilar conditions for bryophytes. The study area (Baixo Tâmega Region) presents a rich Atlantic and

Mediterranean bryoflora catalogue with threatened status species in different niches. The main aims of this study were to: i) present a methodology of land uses' valuation in mountainous areas based on expert knowledge, which resulted in estimated bryological hotspots mapping; and ii) compare this valuation with data on total and threatened species richness (field bryological hotspots) compiled with other purposes (PhD thesis and opportunistic samplings). We explored the positive spatial correlations found between bryological hotspots found through fieldwork or through the valuation procedures. Furthermore we discuss the importance of certain land uses for the preservation of endangered taxa and the relevance of valuation exercises based on expert knowledge as an important management tool, especially when poor biological data is available.

In vitro establishment, propagation and conservation of the rare and endangered moss halophyte *Henediella heimii*

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The rare moss *Henediella heimii* (Hedw.) R.H. Zander (Pottiaceae) is a small plant of bipolar distribution. It inhabits salt soils, which are temporarily under water. It grows among other vascular halophytic plants and is one of the seldom moss species growing in salty environment. The plant material was collected at: Hungary, Bács-Kiskun County, Szappanszék at Fülöpháza village, saline-alkali area, 46°53'11,1"N, 19°25'35,3"E, 115 m a.s.l., 11.05.2010. With aim to established stable axenical culture and large-scale micro-propagation and plants productions for the purposes of introduction, reintroduction and further research on biology of this species, we have optimized growth conditions by studying environmental condition variations and the effect of exogenous plant growth regulators. The axenic culture was established after surface sterilization of sporophytes and the spreading of spores over the nutritive media. Spores germinate in small percentage (up to 17%). After germination the protonema remained small, but dense. The fully developed gametophytes has been achieved in BCD medium, a year after germinations at low light short day regimes.

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