



Spanish Bryological Society

Sierra de Cazorla –13th-16th june 2014

**ABSTRACTS OF THE  
SCIENTIFIC COMMUNICATIONS**

Centro de Capacitación y  
Exploración Forestal de Vadillo, Jaén.

ORGANISERS: Ricardo Garilleti  
Belén Albertos

XXIV BRYOLOGICAL MEETING





## The fotoreceptor of Ultraviolet-B radiation (UVR8) in bryophytes.

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After the recent finding of the UVR8 photoreceptor protein in *Arabidopsis thaliana*, knowledge on the responses of photosynthetic organisms to UV-B radiation has considerably increased, in particular the molecular bases of these responses. The UVR8 photoreceptor is a dimeric protein that is converted to a monomeric form following UV-B photoreception. Monomers are functional and trigger a cascade of responses, such as the expression of specific genes implied in flavonoid biosynthesis and morphogenetic processes.

From an evolutionary perspective, the study of UVR8 in bryophytes is of great importance, because bryophytes were the first true plants colonizing terrestrial environments, which were much more exposed to UV-B radiation than the primitive aquatic environments. In bryophytes, UVR8 has only been studied in the model moss *Physcomitrella patens*, which has two UVR8 genes that are expressed, and at least one of the proteins is functional because it complements the *Arabidopsis uvr8* mutant.

Thus, our aim is to study the presence of UVR8 photoreceptor in the two additional evolutionary lineages of bryophytes (liverworts and hornworts), that have not been studied yet. In this way, we firstly established cultures of *Marchantia polymorpha* on Petri dishes, using an accession which is currently been sequenced. Then, its RNA was isolated and corresponding cDNA synthesized. Using primers designed for the conserved DNA regions of the UVR8 gene of other species, a fragment of the UVR8 of *M. polymorpha* was amplified and is currently being sequenced. In addition, samples of *Anthoceros punctatus* were collected and are being cultivated to try to amplify its UVR8 gene. After this, we will test whether proteins encoded by *M. polymorpha* and *A. punctatus* UVR8 genes are active in UV-B photoreception through clonation in tobacco leaves. Also, we will check their functions through *Agrobacterium*-mediated transformation of *Arabidopsis uvr8-1* mutant plants, which lack a functional UVR8 protein.

## **Ultraviolet-absorbing compounds in mosses from Venezuelan Andes: interspecific differences and environmental influence.**

**Castillo M.A. del** (1), C. Rojas (2), Y. León (2), G. Soriano (1), L. Monforte (2), E. Núñez-Olivera (1) & J. Martínez-Abaigar (1).

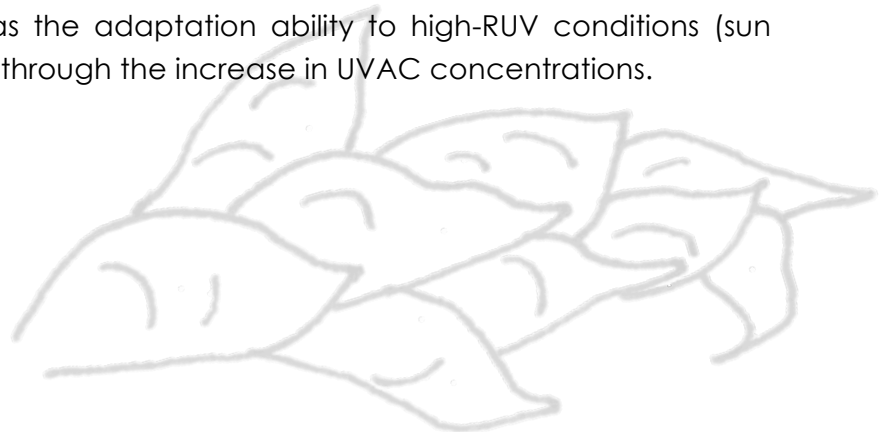
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The ability of plants to tolerate high levels of ultraviolet radiation (UVR) is partly constitutive and partly adaptative, and the accumulation of UV-absorbing compounds (UVAC) is the most consistent response to enhanced UVR. In this sense, bryophytes are not so UVR-sensitive as expected on the basis of their structural limitations, and they respond in a considerably similar manner to tracheophytes. However, studies on bryophytes from extreme environments (such as the high tropical mountains) are still scarce.

Our aim was to analyse the interspecific variations and the environmental influence on the bulk levels of UVAC, in both the soluble (SUVAC) and insoluble (IUVAC) fractions, as well as on the soluble individual SUVAC and the Sclerophylly Index (SI), in 10 Andean mosses collected in Sierra de Culata (Mérida, Venezuela). In four species, sun and shade samples were collected at two different altitudes (2964 and 4394 m). A great interspecific variability was found in the bulk levels of UVAC, although the level of IUVAC was higher than the level of SUVAC in all the species. Sun samples generally showed higher bulk levels of SUVAC and IUVAC, and were more sclerophyllous, than shade samples. Only SUVAC responded to altitude, with higher values at higher altitudes. We identified two flavonoids, derivatives respectively of kaempferol and apigenin, whose concentration was different between sun and shade samples.

In conclusion, we confirmed the great interspecific variability in UVAC and SI in the 10 mosses analysed, as well as the adaptation ability to high-RUV conditions (sun population at higher altitudes) through the increase in UVAC concentrations.



**Environmental factors determining UV-absorbing compounds and physiology in the aquatic liverwort *Jungermannia exsertifolia* subsp. *cordifolia* across a wide latitudinal and altitudinal gradient.**

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With the aim of evaluating the environmental factors determining the physiology of the aquatic liverwort *Jungermannia exsertifolia* subsp. *cordifolia*, we analysed UV-absorbing compounds (UVACs), chlorophyll fluorescence (maximum quantum yield of PSII: Fv/Fm), sclerophylly index and DNA damage in 17 samples of this species, collected in the main mountain chains of Spain: Picos de Europa, Basque Mountains, Pyrenees, Iberian System, Central System, and Sierra Nevada. Sampling was completed in only 18 days near the summer solstice. With respect to UVACs, we differentiated methanol-soluble and insoluble compounds, that are mainly located, respectively, in the vacuoles or bound to the cell walls. The two fractions presumably constitute different protection mechanisms against ultraviolet radiation. In both fractions, the bulk level of UVACs and the concentrations of individual UVACs were measured by, respectively, spectrophotometry and HPLC. In addition, different geographical and environmental variables were obtained for each sampling locality: altitude, latitude, longitude, water temperature, ozone, and radiation data (PAR, unweighted maximum irradiances and daily doses of UV-A and UV-B, and biologically effective UV using two different spectral weighting functions).

We calculated bivariate correlations between all the physiological and environmental variables, analysed the effect of the locality on the physiological variables, and ordinated the samples by Principal Component Analysis taking into account both the environmental and physiological data. In spite of the considerable gradients of latitude (more than 6°), altitude (almost 2500 m) and water temperature (11°C) considered, there were only subtle differences in the physiological variables among the different mountain chains. This was probably due to the high variability occurring within each mountain chain. Thus, the physiology of *Jungermannia exsertifolia* subsp. *cordifolia* was not only influenced by macro-scale factors (chain of mountains), but also, and probably more importantly, by micro-scale factors.

## **A practical approach to assess diversity patterns using systematic sampling.**

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(2) Universidade do Porto. Dep. de Botânica.

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We go to the field to find all the existing species in a region. And all of us have probably thought why there are places more diverse than others. Although seemingly simple, the answer to this question depends largely on the methodology we use to estimate diversity. This is a key issue in less conspicuous organisms such as bryophytes. Here I will explain a straightforward procedure to make these comparisons when data from systematic sampling are available. Moreover, I will show how valuable the information from historic collections is to validate our field designs. As a case study I will present the results of my work in Terceira Island (Azores), where it was performed a stratified sampling based on the main environmental regions and land-uses. In total, 19 sampling localities were selected to record in a standard way the presence and abundance of all bryophyte species growing on soil, rocks and rotting wood. To estimate differences of diversity between environmental regions or land-uses, the number of effective species was compared using rarefaction curves. To do this, the inventory completeness was calculated for all localities and the minimum value was chosen as comparison threshold, regardless of the sampling effort carried out. A total of 148 species were collected, being five of them recorded for the first time in Terceira and three in the archipelago. Differences of diversity between land-uses were statistically significant, which followed an expected disturbance gradient. However, there were also important differences between environmental regions. In forest land-uses, for example, such differences reached almost twice the diversity between distinct environmental regions. When available, historic inventories showed species communities similar to those we found. This research highlights the importance of designing and validating systematic sampling to study the patterns of species diversity.

## **Diversity and geographic affinity of the epiphytic bryophytes in the northwest quadrant of the Iberian Peninsula.**

**Medina, N.G.** (1), J. Hortal (2), I. Draper (1), B. Albertos (3), V. Mazimpaka (1) & F. Lara(1)

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The communities of epiphytic bryophytes of the Iberian Peninsula are remarkably diverse. During the last few decades the study of these communities has notably increased revealing their richness and their importance as indicators of environmental conditions. Nevertheless, it is clear that current knowledge is far from complete, for example some of the most representative woody vegetation types remain unexplored in vast areas of the Iberian Peninsula. Relevant examples of these gaps are *Quercus ilex*, *Q. faginea* and *Q. pyrenaica* dominated forests in the Duero and Tajo basins.

In this context, our main objectives are to contribute to complete the floristic catalogue of Iberian epiphytic bryophytes and to study the variation in structure and composition of bryoepiphytic communities. To do so, we surveyed more than 150,000 km<sup>2</sup> and almost 1/4th of the Iberian Peninsula in the north and center of inland Spain. We have prospected 80 forests and used data from 29 additional forests coming from previous work, which provides a good representation of the oak forests in the study area.

The species catalog includes more than 90 species and reveals that epiphytic communities are very diverse in the area. Besides, there is a large variation in richness and composition that reflects the extensive geographic and environmental gradients in the study area. The highest variability is within *Quercus ilex* dominated forests, which by the wide range of environments in which they develop, present the greatest changes in both richness and composition.

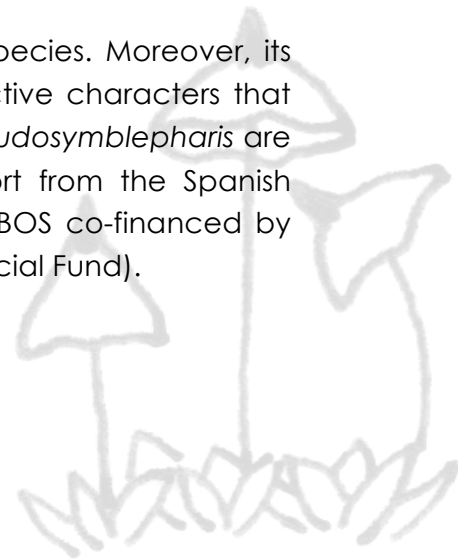
***Pseudosymblepharis perlongifolia* (J. Froehl.) R. H. Zander (Bryophyta, Pottiaceae), a species new to the American flora.**

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During the course of a taxonomic revision of American *Pseudosymblepharis* Broth., we had the opportunity to examine several collections of Puerto Rican mosses deposited at NY. Among these samples, we found some specimens belonging to *Pseudosymblepharis* which did not match any previously known species of this genus in America. A detailed study of these specimens allowed us to identify them as *Pseudosymblepharis perlongifolia* (J. Froehl.) R. H. Zander, which is an Asian species considered a synonym of *Chionoloma bombayense* (Müll.Hal.) Sollman (Sollman 2001. *Trop. Bryol.* 20: 139). Up to now, it was known only from the type locality on Mount Kinabalu, Borneo, in the East Malaysian state of Sabah.

This study presents a complete description of this neglected species. Moreover, its distribution and habitat are provided, and the principal distinctive characters that separate it from *C. bombayense* and the nearest species of *Pseudosymblepharis* are discussed. This research was carried out with financial support from the Spanish "Ministerio de Ciencia e Innovación" (Project CGL2010-15959/BOS co-financed by FEDER) and "Ramón y Cajal" Subprogram (MICINN-European Social Fund).





## The genus *Rhynchostegiella* (Schimp.) Limpr. (Brachytheciaceae) in Iberian Bryophyte Flora.

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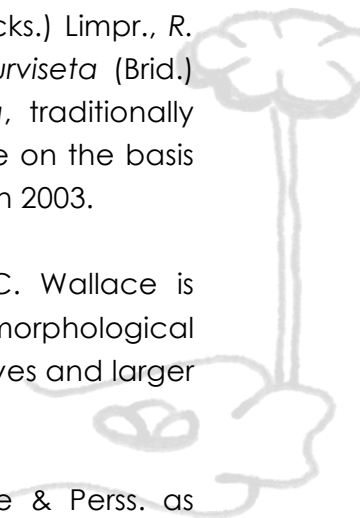
The genus *Rhynchostegiella* (Schimp.) Limpr. (Brachytheciaceae) has been recently redefined and its phylogenetic position recircumscribed.

With the target of update the knowledge about *Rhynchostegiella* in the Iberian Peninsula and Balearic Islands for “Flora Briofítica Ibérica” project, the taxonomical revision of this genus was performed based on morphological informations. More than 300 samples hosted in all available Iberian herbaria were revised, and the type material of the taxa which could be located was studied. The morphological characters of *Rhynchostegiella* were defined, including a key to the species, descriptions, illustrations and distribution data.

We recognize 5 species of this genus in the study area: *R. tenella* (Dicks.) Limpr., *R. litorea* (De Not.) Limpr., *R. teneriffae* (Mont.) Dirske & Bouman, *R. curviseta* (Brid.) Limpr. and *R. bourgeana* (Mitt.) Broth. *Rhynchostegiella bourgeana*, traditionally considered endemic to Canary Islands, is included in mainland Europe on the basis of several Spanish samples from Cádiz (Algeciras) previously published in 2003.

*Rhynchostegiella tenella* var. *litorea* (De Not.) P.W. Richards & E.C. Wallace is considered here at species level, as *R. litorea*, due to its constant morphological differences regarding to the papillose seta, shorter nerve along the leaves and larger spores than *R. tenella*.

We follow the recent circumscription of *R. durieui* (Mont.) P. Allorge & Perss. as accomodated in its own genera *Pseudorhynchostegiella* Ignatov & Vanderpoorten on the basis of molecular and morphological data.



**Re-knowing *Orthotrichum acuminatum* H. Philib.: chorological novelties, morphological and phylogenetic studies.**

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(2) Universidad de Valencia. Facultad de Farmacia, Dep. de Botánica,

*Orthotrichum acuminatum* is a widespread and locally frequent moss in most of the Mediterranean region. In the continental Mediterranean Europe, it is distributed from the Iberian Peninsula to Turkey, while in Northern Africa it is known from Morocco, Tunisia and Algeria. It is also present on the main islands of the Mediterranean and the Canary Islands. However, *O. acuminatum* has been also reported out of the Mediterranean region, in countries like Germany, the Nederland's and Britain, where it can be considered as a transient moss, since it does not keep stable populations in the localities where it has been located.

In this study we present new chorological information for *O. acuminatum* outside the Mediterranean region. We also pursue to assess the morphological and genetic variability of this species throughout its distribution and to provide a preliminary phylogenetic reconstruction of the Mediterranean species of *Orthotrichum* with superficial stomata to evaluate the monophyly of *O. acuminatum*. For this purpose, we performed multivariate morphometric analysis together with molecular analysis including 4 DNA regions: 2 chloroplastic (*rps4* and *trnL-F*) and two nuclear (*ITS2* and *ort-LFY*).

The obtained results indicate that *O. acuminatum* is a monophyletic species with great morphological variability throughout its distribution, although no clear geographic patterns were detected. Contrasting, molecular data showed low genetic variability among the studied samples of *O. acuminatum* with no clear geographical structure.

**Typification of three conflictive names: *Orthotrichum crispum* Hedw., *Ulota crispula* Bruch in Brid. and *Ulota intermedia* Schimp. (Bryopsida: Orthotrichaceae).**

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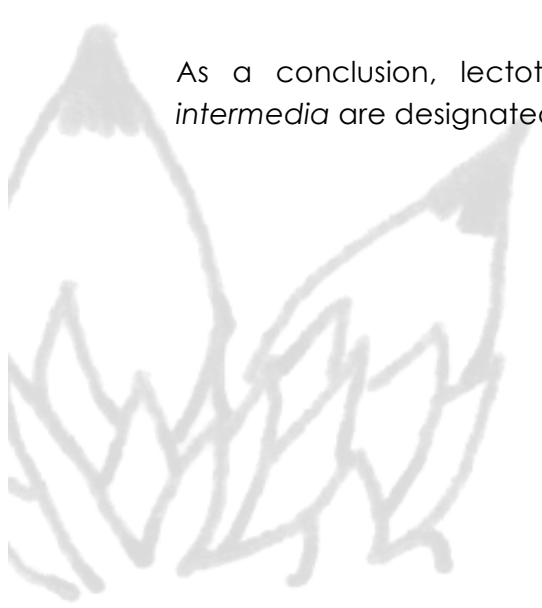
(2) Universidad de Valencia. Facultad de Farmacia, Dep. de Botánica.

(3) Conservatoire et Jardin Botaniques de la Ville de Genève, Switzerland.

Previous taxonomical studies of the controversial group of taxa *Ulota crispa* (Hedw.) Brid., *U. crispula* Bruch in Brid. and *U. intermedia* Schimp., including both morphological and molecular approaches, led us to distinguish them as different taxa worthy of recognition at specific level, instead of a single species with wide variability.

All available original material of those names has been studied, finding that in several cases the herbarium sheets are heterogeneous, containing specimens of two or even three of the studied species. As a consequence, a precise typification of the names related to these taxa is necessary. Accordingly, a detailed analyses of original materials has been made, selecting those specimens that better fit the author's concept of the species or, when this was not possible, preserving the actual and more extended use of names. In this paper we discuss the nomenclatural history of each taxon and the original specimens nowadays extant.

As a conclusion, lectotypes for *Orthotrichum crispum*, *Ulota crispula* and *U. intermedia* are designated.



## Effect of *Campylopus introflexus* on the invertebrate community in Mediterranean calcifuge scrub

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*Campylopus introflexus* was recently detected in the Girona and Barcelona regions. This moss is native to the southern hemisphere. Often form continuous extensions nearly monospecific on Mediterranean calcifuge scrub soils (al. *Cistion*) replacing their own specific lichens (mainly *Cladonia* genus).

To ascertain the possible effect of *C. introflexus* Hedw. (Brid.) on the invertebrate community in these environments, a comparative sampling was done. To achieve this, two vegetation types were selected: areas with high coverage of *C. introflexus*, which forms almost continuous carpets, and areas with high coverage of lichens. For each type of vegetation three replicates on three different locations, with similar climate and soil type, were done. Each sample consisted of 25 x 25 cm carpets. All invertebrates were collected and identified to morphospecies level. In order to present preliminary results about *C. introflexus* effect, species richness and abundance, diversity and MDS analysis were performed.



## **On the influence of atmospheric pollution from the A1 highway in Madrid on the bryophyte communities.**

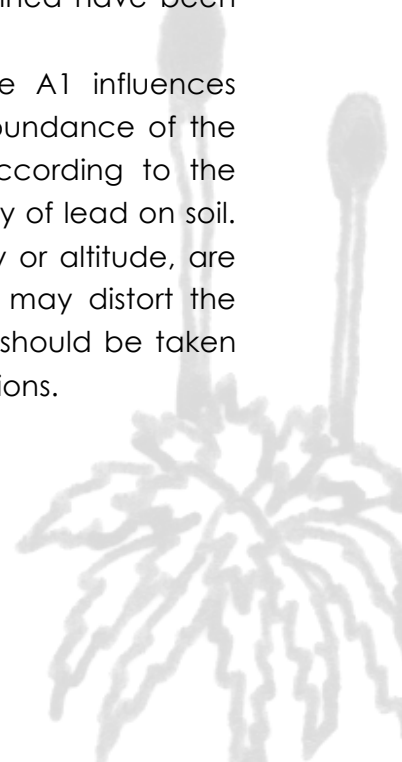
**Draper, I.,** M.M. Romero, M.L. Álvarez, L.R. C. & B. Estébanez.

Universidad Autónoma de Madrid. Facultad de Ciencias, Dep. de Biología (Botánica).

Mosses constitute one of the plant groups most frequently considered for indirect bioindication. They have been used for different purposes, from the detection of variations on the climatic conditions to the analysis of different contaminants. In this context, we have been developing a study since 2011 to analyze how the emission of contaminants from traffic affects bryophyte communities in three selected locations in Madrid along the A-1 highway. This study pursues a double objective: 1) to establish if the emission of contaminants does have an observable effect on the bryophyte communities; and 2) to analyze the applicability of this methodology, traditionally used in Northern Europe, in studies performed across the Mediterranean region.

We have taken samples along 7 lineal transects in three different areas: Guadalix de la Sierra, Lozoyuela and Somosierra. In each transect we have analyzed the composition of the bryophyte communities in eight points, in which we have also taken soil samples to detect the existence of lead. The data obtained have been analyzed with regression and ordination statistical techniques.

Our results indicate that the emission of contaminants from the A1 influences bryophyte communities. This effect involves a reduction on the abundance of the bryophyte communities and the substitution of some species according to the distance to the road. Apparently, this can be related to the quantity of lead on soil. In addition, it is also confirmed that other factors, such as humidity or altitude, are determinant for the composition of bryophyte communities, and may distort the influence of pollution. Finally, we discuss some considerations that should be taken into account when applying this methodology in Mediterranean regions.



## Increase in the known distribution of some liverworts located in Iberian *Prunus lusitanica* L. Populations.

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(2) Universidade de Lisboa, Faculdade de Ciências de Lisboa - Museu Nacional de História Natural e da Ciência, Jardim Botânico.

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We report new records within the Iberian Península of four liverworts species that grow as epiphytes on *Prunus lusitanica*: *Frullania oakesiana*, *Cololejeunea minutissima*, *Lejeunea cavifolia*, and *Microlejeunea ulicina*. The major contribution arises from the first record of *Frullania oakesiana* in the Cantabrian Range. In addition, the first records of *Lejeunea cavifolia* in Extremadura and *Microlejeunea ulicina* in Burgos province are provided. The latter species along with *Cololejeunea minutissima* have been registered for the second time in North-Eastern Iberia. All these new records confirm the results of previous works, revealing the floristic and biogeographic uniqueness of those bryophytes coexisting with *Prunus lusitanica*.

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