



The Bryological Times



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President's Message

Bernard Goffinet | University of Connecticut | Storrs, U.S.A. |
bernard.goffinet@uconn.edu

With 2018 coming to an end and time to renew your membership and encourage your colleagues and students to join our Association, the year ends also with a new beginning, and I want to take this opportunity to thank Patrick Dalton for taking on the editorship of our newsletter. His service is most sincerely appreciated by me, the council and all members. The best way to express your support for his editorship is to submit contributions to upcoming issues of the Times. The newsletter can only be as informative and anticipated for the news it shares, as members of IAB contribute to its content. Hence, I encourage you all to send Patrick news of grants, exciting projects, meetings and students completing their graduate projects in bryology. All items that refer to upcoming events will also be distributed via our FaceBook page and Twitter. Let's feed these outlets news to share with our members. The Bryological Times is only one benefit of joining the Association and maintaining one's membership. The association offers other benefits, such as free publication in and free access to our journal Bryophyte Diversity and Evolution, eligibility for travel grants for early career scientists and students to our biennial meeting, for research funds through the Stanley

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Green award and the Conservation and Endangered Species grant, and to satisfaction of

supporting these opportunities through our membership fee. Membership is a mere \$16USD and only \$8USD for bryologists from select countries (see bryology.org for more information). Bryology is a vibrant field contributing critical knowledge to plant biology in general, and our association was founded 50 years ago, to represent all bryologists, at the International Botanical Congress. I encourage you to renew your membership as soon as possible, to convince your colleagues of the value of joining, and to support your or other students in becoming a member. Over the next five years we would aim at incrementally doubling our membership, and for 2019 our target is 350, including 70 new members. Achieving such goal would start the 50th anniversary year of our association in a most positive way and provide an encouraging foundation to a successful meeting in Madrid in July. I am looking forward to meeting many of you in Madrid again, and also to meet many new members, at a special event bringing together members of IAB and iMOSS to celebrate discoveries and progress in our understanding of all aspects of the biology of bryophytes. We plan to celebrate our 50th anniversary in a variety of forums beyond the IAB meeting, including a special issue of the Bryological Times and a special issue of Bryophyte Diversity and Evolution. If you have other ideas how we can celebrate please contact us and share them!

2019 Award Competitions

In 2019 IAB will honor bryologists for their contributions and leadership to bryology and to bryodiversity research as well as grant funds for bryological research. Awards and prizes will be presented at the upcoming meeting in Madrid, in July 2019. All submissions and nominations are accepted via on-line forms, which are password protected. Starting January 1, 2019, adjudications committees will be accepting nominations for:

- the **Richard Spruce Award**, for important contributions to bryology, within the first 25 years of their career

(dated from their first bryological publication). The award committee is chaired by Lars Söderström, and is further composed of Hironori Deguchi and Alison Downing. Submit nominations at <http://bryology.org/iab-spruce-award-nominations-2019/> using the password Spruce2019.

- the **Hattori Prize** for the best paper or series of papers in the previous two years. The award committee is chaired by Yelitza Leon (with Norris Salazar), committee members: Nils Cronberg, Javier Martinez and Masaki Shimamura. Submit nominations at <http://bryology.org/iab-hattori-prize-nominations-2019/> using the password Hattori2019.
- the **Ricléf Grolle Award** for excellence in bryodiversity research in developing countries. The award committee is chaired by Dr. William Buck (NY), and includes Dr. Hiroyuki Akiyama and Rosa Maria Ros. Submit nominations at <http://bryology.org/iab-grolle-award-nominations-2019/> using the password Grolle2019.

Furthermore, IAB will support a bryological research project through the **Stanley Greene Research award**. The award committee is chaired by Matt von Konrat; committee members: Claudine Ah-Peng, Denise da Costa, Annick Lang and Masanobu Higuchi. Submit nominations at <http://bryology.org/iab-stanley-green-award-2018/> using the password Stanley2019.

Information concerning the awards can be found at http://bryology.org/get_involved/awards-grants. Submission will be accepted starting January 1st and the deadline for submission will be Friday May 3, 2019.



XXVIth Bryological Meeting Spanish Bryological Society (SEB)



The twenty-sixth meeting of the SEB was held in Cantabria, based in Reinosa, between October 17th and 19th, 2018, with the final attendance of 10 participants. Coming from different centres (universities of Santiago de Compostela, A Coruña, Central de Barcelona and Pablo de Olavide in Seville, Museo de Ciencias Naturales de Álava, Real Jardín Botánico de Madrid, as well as some independent professional botanists), among these there were many new faces, most coming from the north of the peninsula.

Although Cantabria had already been the scenery of two previous bryological meetings (in 1994 and 96), in addition to other works and more accidental prospecting, this territory continues to provide surprises. The surveyed locations stretched from sea level to more than 2.000 m of altitude on Pico Tres Mares, which has favoured the visit of a great variety of habitats: slopes and rocky crests, hydroturbose habitats and fens, silicicolous pastures, ash wood on limestones, *Quercus robur* forests, *Fagus sylvatica* forests, streams at all altitudes, sea cliffs, agricultural tracks between cornfields and mixed Cantabrian forest with laurel and chestnut.

Despite the initially bad weather forecasts, the weather finally accompanied in good measure, with a first beautiful sunny day in the highlands, and the rest with some rain and some fogs that did not prevent our activity.

The organizers of these days (Patxi Heras and Marta Infante) thank the support of Jesús Varas

(Government of Cantabria) in obtaining permits for collection, as well as the attention given by the Hotel Vejo de Reinosa as the base for our meeting.



On the afternoon of the 18th, the General Assembly of the Spanish Society of Bryology was held and a total of 4 scientific papers were presented, covering the following thematics: bryoflora of the Sierra de Gredos; the bryophyte Atlas of the Pyrenees; experimentation for *Sphagnum* dominated habitat restoration in the central Pyrenees and fossil bryophytes in ombrotrophic peatlands in the north of the Iberian Peninsula.

Thanks to all the participants for their cordiality and enthusiasm!

Patxi Heras & Marta Infante

The 14th Australian Bryophyte Workshop



Participants in the 2018 Australian Bryophyte Workshop (Photo Andrew Franks)

Twenty-four participants gathered at the Dorrroughby Environmental Education Centre in the Northern Rivers region of New South Wales. The inclusion of a representative from USA (Jim Shevock), Japan (Yuya Inoue) and New Zealand (Kelly Frogley) added an international flavour to the 14th Australian Bryophyte Workshop.

We were based in a region known as the “Big Scrub” once the largest area of subtropical lowland rainforest in eastern Australia. It was widely explored by early botanists including the bryologist William Walter Watts, however it has extensively been cleared and in the footsteps of WW Watts we surveyed the remnants of this fertile subtropical forest.

Field trips included several sites in the Nightcap National Park as well as a full day trip to the Border Ranges National Park. Not even thunderstorms curtailed our collecting and all

sites yielded a diversity of mosses and liverworts which allowed vibrant discussion around the microscopes. An inventory list will appear later when all identifications are completed.

Several presentations provided an interlude from the evening microscopes, they included: Phylogeny and Sporophyte diversity of *Weissia* (Pottiaceae) in Japan (Yuya Inoue); Treasures of the Tarkine (Paddy Dalton); Stress in the city: Experiments with moss, microhabitat and multiple stress (Alison Haynes); The realities of *Riella*: working with an elusive aquatic liverwort (Chris Cargill & Pina Milna); Fungal diversity within the moss microbiome: Bryophilous symbiosis (Lana Mistic); Monitoring rehabilitation and recovery of damaged *Sphagnum* peatlands with a UAS aka drone (Pep

Turner); and an excellent biography on the Reverend William Walter Watts by Katherine Downs & Helen Ramsay.

The Workshop concluded with the inaugural meeting of the Australian Bryological Network (ABN) on the last evening. Office bearers were elected as follows: President, Andrew Franks; Vice-President, Lyn Cave; Secretary/Treasurer,

David Meagher; Committee person, Nimal Karunajeewa.

Another workshop ended and our gratitude to convener Andrew Franks who was ably assisted by Alison Downing for their organisation of a successful workshop. We look forward to meeting in two years' time at the Bogong High Plains, Victoria for the 15th Workshop.

Paddy Dalton, University of Tasmania



Lumot sa Bundok: Exploring Mt. Labo in Bicol Region, Philippines

Eugene L.R. Logatoc
University of the Philippines Los Baños
Laguna, Philippines
elrlogatoc@gmail.com

From mid-March to late April 2018, a series of fieldworks were organized to explore the bryoflora of Mt. Labo, the northernmost component of a volcanic chain that dots the Bicol Region in the Philippines. This was made possible through the support of the Department of Science and Technology of the Philippines under its Accelerated Science and Technology Human Resource Development Program (DOST-ASTHRDP) and through the assistance of the Department of Environment and Natural Resources-Daet and the local communities of Patag and Matacong in San Lorenzo Ruiz, Camarines Norte.

Mount Labo, at 1544 m, is a potentially active Plio-Pleistocene stratovolcano composed of dacitic and andesitic domes, lava flows, and a prominent central cone. The area has been subject to geothermal explorations for the last 25 years. In terms of biodiversity and conservation, Mt. Labo and its environs are recognized as: 1) Priority Important Plant Area, in view of its biological importance and the degree of socio-economic pressure exerted in the area (DENR-CI-UPCIDS, 2002); 2) Priority Important Bird Area, supporting a number of threatened and restricted-range birds of the Luzon Endemic Bird Area (PH029; BirdLife International, 2016); 3) Biodiversity Conservation Priority Area, based on

a combined assessment of plants, arthropods, amphibians and reptiles, birds, and mammals and socio-economic pressures (CPA50; DENR-CI-UPCIDS, 2002); and 4) Key Biodiversity Area, based on the occurrence of one or more globally threatened species and presence of restricted range species or endemic species (CI-DENR PAWB-Haribon, 2006). However, it is apparent that published works on biodiversity and vegetation of the mountain remains few (e.g. Balete *et al.*, 2013; Gruezo and Badayos, 1996; Malabrigo and Abanto, 2013).

The main objective of the exploration is to document the diversity of bryophytes across different vegetation and land-use types in the central cone of Mt. Labo (1544 m asl) and the neighboring Mt. Guinatungan (916 m asl). Lowland evergreen rainforests, pasture and agricultural lands, and residential areas occupy the lower slopes of these mountains (ca. 300 m elevation and below). On the other hand, the central cone of Mt. Labo is characterized by tropical lowland evergreen rainforest (300 to 800 m asl), tropical lower montane rainforest (800 to 1200 m asl), and mossy forest (1200 to 1544 m asl) while Mt. Guinatungan is characterized as a mosaic of tropical lowland evergreen forest (300 to 700 m asl), *Thysanolaena latifolia* thickets (600 to 800 m asl), bamboo thickets (600 to 750 m asl), and mossy forest (700 to 916 m asl). A number of streams and rivers cutting through the landscape originate from the upper slopes of these mountains. Overall, around 600 specimens were collected from these habitats. The specimens were packeted, air dried, and transported to the University of the Philippines Los Baños where examination and identification are in progress.



The upper slopes of the Mt. Labo, showing the gradual transition from a lower montane forest to a dwarf mossy forest at the summit. Photo by Eugene Logatoc.



The dwarf mossy forest dominated by *Clethra canescens* (Clethraceae) and *Eurya japonica* (Pentaphylaceae) in the summit of Mt. Labo. Photo by Eugene Logatoc.



A view of Mt. Guinatungan from Patag, San Lorenzo Ruiz. Photo by Eugene Logatoc.



A tree trunk covered by *Spiridens reinwardtii* (Hypnodendraceae) in the summit of Mt. Guinatungan. Photo by Eugene Logatoc.

In general, access to the sampling localities is difficult. In Mt. Guinatungan, the lowland rainforest (ca. 500 m asl) is easily accessible from the village of Patag through a established trail leading to one of several populations of *Rafflesia* through the *Thysanolaena* thickets and the bamboo thickets near the caldera. This trail is generally steep with loose rocks. In such cases, one had to rely at the ‘mercy’ of dangling *usiu* (*Dinochloa* species, Poaceae) and the spiny ratan (*Calamus* species, Arecaceae). Periodic rains also made the trail muddy and slippery.

lagascae (Rafflesiaceae); the site is designated as an ecotourism area by the local government. However, the trek from this point to the summit provides a different story. We had to re-establish the only access trail that passes

Climbing up the central cone of Mt. Labo involves four (4) hours of hiking from Patag to the campsite at 882 m, covering a distance of 13 km. This trail is a remnant of an old road established by the Philippine National Oil Corporation (PNOC) which conducted geothermal explorations in the area during the 1990s. This passes through the tropical lowland rainforest and

involves four (4) river crossings. Due to periodic rains and heavy downpours, the survey in the area had to be delayed for about two (2) weeks due to the swelling of the To-o River. Due to the isolation of the area, we set up camp at the former PNOC Site A drilling area, this is now known to the locals and mountaineers as the campsite. From here, another three (3) hours of hiking is needed to reach the summit, covering a distance of about four (4) kilometers and passing through a rather steep trail from 900 m asl up to the summit. Overall, climbing up and getting down from the central cone of Mt. Labo covers a total of 34 km; not to mention several close encounters with noxious plants such as the lipa (*Dendrocnide meyeniana*, Urticaceae) and a number of venomous snakes.

Despite of the strains in conducting fieldwork, this experience is considered highly rewarding; the opportunity to see intact primary dipterocarp forests, thriving mature and young almaciga (*Agathis philippinensis*, Araucariaceae), natural stands of agohong bundok (*Gymnostoma rumphianum*, Casuarinaceae), and thriving populations of *Huperzia squarrosa* (Lycopodiaceae), *Cyathea callosa*, *C. contaminans*, and *C. philippinensis* (Cyatheaceae), *Rafflesia lagascae* (Rafflesiaceae), and *Nepenthes ventricosa* (Nepenthaceae) to cite a few reasons. As with the main objective of the exploration, this experience is rewarding because it provides an opportunity to study the oftentimes overlooked bryophytes in the Philippines and an opportunity to relate to the local populace the importance of biodiversity, including the lowly lumot (bryophyte).

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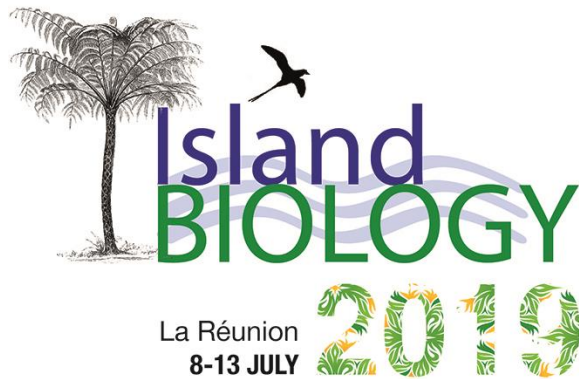
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News from Africa and neighbouring islands

Contributions: Claudine Ah-Peng, University of La Réunion,
claudine.ahpeng@univ-reunion.fr

The next international Conference Island Biology 2019 will be hosted in La Réunion, in Saint-Denis, from **July 8-13th 2019** (Chairs: D. Strasberg & C. Ah-Peng). The conference will gather scientists from all over the world and practitioners working together on islands with particular emphasis on ecology, evolution, conservation and biogeography of terrestrial and marine biotas in the vicinity of islands.

A symposium on insular bryophytes will be proposed during the conference, and a taxonomical and field workshop will follow the event (July 15-19 2019). Please free to contact me (claudine.ahpeng@univ-reunion.fr) for any information concerning these two events if you would like to contribute or to attend. Bryologists are very welcome in La Réunion!



Louise Guérot (Master a student in tropical botany and ecology, 2017/2018, University of Montpellier) did an internship at the University of La Réunion entitled, “Variation in the resilience of bryophytes to desiccation at the microhabitat level within the tropical montane cloud forest of La Réunion”.

Abstract. Tropical mountain cloud forests (TMCF) are ecosystems characterized by the frequent presence of fog which regulates their ecohydrology. Among the most abundant groups of plants in TMCF, in terms of biomass and diversity, are bryophytes which are widely represented and contribute to the water balance of these systems. The research program, which this study is embedded in, aims to better understand the evolution of these moisture abundant ecosystems in response to future climate change. Laboratory results of this study on dehydration-rehydration experiments examining chlorophyll fluorescence for sixteen bryophyte species (8 mosses, 7 leafy liverworts and 1 hornwort) from the TMCF of La Réunion, highlighted the presence of various strategies for managing desiccation. This study shows that at the microhabitat level, at mid elevation, there is a multiplicity of responses depending on the species, partly relating to their physiology, and their life form. Bryophytes have either a strong strategy in tolerance or drought

avoidance or a combination of strategies in the TMCF. Further research on morphological traits, and the release of volatile organic compounds after rehydration, would clarify the resilient characteristics of bryophytes at the cellular level.

Contribution: Itambo Malombe
malombeitambo@gmail.com

Bryophytes of Kenya's coastal forests, a guide to common species

The coastal forests of Kenya are characterised by high endemism and threatened plant species. Whilst the vascular flora is relatively well known, the bryophyte diversity has remained under-collected for many years largely due to lack of experts. A team of local (Itambo Malombe) and regional (Nicholas Wilding, Terry Hedderson and Claudine Ah-Pheng) experts have been collaborating to study the bryophytes of the area since 2016. A joint expedition organised at the coastal forests of Kenya (Arabuko Sokoke, Gede, Buda, Gogoni and Kinondo forests) in September 2016 established the diversity and distribution of the bryophytes and developed a 'guide to the common species'. The guide presents the 20-common species of bryophytes (12 mosses and 8 liverworts) in Kenya's coastal forest region. A short description and image is provided for each species. It is useful for plant enthusiasts and importantly for students and conservation managers to help in 'spotting' the species and protection of the unique ecosystems.

Wilding, N., T. Hedderson, C. Ah-Peng & I. Magombo. 2016. Bryophytes of Kenya's Coastal Forests. A Guide to the Common Species. Published by authors in electronic format. 66 p.
https://www.researchgate.net/publication/314650250_Bryophytes_of_Kenya's_coastal_forests_a_guide_to_the_common_species

The MadBryo Project
<https://www.madbryo.org>

We would like to announce a new project on the bryophytes of Madagascar that we call MADBRYO, and solicit your participation. Our vision for this project is to improve our knowledge of the Malagasy bryoflora so that we may address important scientific questions

regarding the evolutionary relationships, ecology, and conservation of these special plants. Given that the foundation of our current knowledge of Malagasy bryophytes resides in natural history collections, one of the first aims of this project will be to enhance those collections via digitization, taxonomic study, and targeted collecting expeditions. We expect that these efforts will in turn both stimulate and support further scientific investigations into the Malagasy-bryoflora.

Currently, both the collections and scientific data pertinent to the project are scattered across many different locations and institutions. At the same time, the members of our community with experience and interest in the Malagasy bryoflora are also spread out over the globe. Therefore, one of the main goals of this project will be to build and sustain a network of collaborators with both the expertise and enthusiasm to succeed in this endeavor.

The Missouri Botanical Garden (MBG) in St. Louis and the Muséum National d'Histoire Naturelle (MNHN) in Paris can help provide some of the basic tools necessary for an effective collaboration. For example, data capture and sharing can be done via our online institutional databases (Tropicos & SONNERAT). As a start, the 'Catalogue of the Plants of Madagascar' (MadCat) on Tropicos recently added basic information on bryophytes compiled from the most recent checklist for the island <<http://www.tropicos.org/>>. The MBG and MNHN also have long-standing operations in Madagascar that make it possible for us to facilitate in-country research, capacity building, and outreach. An initiative funded by the GBIF BID is already underway at the Antananarivo herbarium (TAN), providing support for our Malagasy partners to curate, database, and image their collections <<https://www.bryotan.com/>>.

A project steering committee comprised of eight members has met twice and agreed that it is now time to advertise to a larger audience. We believe that a strong collaborative effort will be fundamental to the success of this project and so we are reaching out to you to join us in this effort. Please visit the project website <<https://www.madbryo.org/>>.

Project coordinators:
John Brinda, MBG, <john.brinda@mobot.org>
Catherine Reeb, MNHN,
<catherine.reeb@mnhn.fr>

Advances in the effects of ultraviolet (UV) radiation on bryophytes, as derived from two Doctoral Theses developed at University of La Rioja (Spain)

PhD dissertation by Laura Monforte (28-July-2014)

Supervisors: Prof. Encarnación Núñez-Olivera and Prof. Javier Martínez-Abaigar

Title: Ultraviolet-absorbing compounds in bryophytes: phylogeny, ecology and biomonitoring

Abstract. We aimed to study the significance of ultraviolet-absorbing compounds (UVACs) in bryophytes, in relation with phylogenetic, ecological and biomonitoring aspects. Specifically, our objectives were:

To carry out a phylogenetic study to know if the different evolutionary lineages of bryophytes (mainly liverworts and mosses), had the same compartmentation of UVACs between the soluble (SUVACs, mainly present in the vacuoles) and insoluble (IUVACs, bound to the cell walls) fractions. This may have evolutionary importance since bryophytes were the first “true” plants colonizing land, where they had to cope with substantially higher levels of UV radiation than those experienced in the primitive waters.

To study the influence of environmental factors on UVACs accumulation and compartmentation. In this way, we quantified different environmental variables: sun exposure, orientation, the Ellenberg indicator values for light, humidity, temperature, continentality, pH and nitrogen, and several other bryological attributes.

To analyse UVACs in herbarium samples of the aquatic liverwort *Jungermannia exsertifolia* subsp. *cordifolia* from all over Spain, evaluating

their usefulness in the reconstruction of past UV levels.

To evaluate the influence of environmental factors on the physiology of the aquatic liverwort *Jungermannia exsertifolia* subsp. *cordifolia* across a wide latitudinal and altitudinal gradient in streams of the main mountain chains of Spain. Our main results and conclusions were as follows: Liverworts and mosses differ in the levels and compartmentation of UVACs. In general, liverworts had higher levels of SUVACs and lower levels of IUVACs than mosses. This difference represents an additional evidence of the phylogenetic distance between both groups. In addition, assuming that IUVACs are more efficient UV screens than SUVACs, this compartmentation would have allowed mosses to be more competitive than liverworts in sunny UV-rich environments, segregating ecologically both groups. Thus, UVACs compartmentation represents a new ecophysiological trait that could be evolutionarily important.

Exceptions to the general rule described above may appear in species with a peculiar UVAC composition or compartmentation, such as *Atrichum undulatum*, *Bartramia pomiformis*, and species of *Bryum*, *Porella* and *Frullania*. Also, UVAC compartmentation may help differentiate the main evolutionary lineages in mosses (acrocarpous and pleurocarpous), and also peculiar mosses as *Sphagna*, but still not the main evolutionary lineages in liverworts or the different Orders of mosses and liverworts.

The lack of clear and solid relationships between UVACs accumulation and compartmentation, and the environmental variables considered (those determining the UV amount received by the samples), suggested that UVACs are, at least to a certain extent, constitutive and not usually induced by natural UV.

In the 90 herbarium samples of *J. cordifolia* that were analysed, *p*-coumaroylmalic acid was the only UVAC of this species showing significantly higher concentrations in the years after the onset of stratospheric ozone degradation with respect to the previous years. This indicated its usefulness in the biomonitoring of the UV-B increase associated to ozone degradation.

The bulk level of SUVACs, together with the concentrations of two coumarins, were the most

UV-responsive variables in spatial gradients of *J. cordifolia* in the field, and thus they could be used for biomonitoring of ambient UV levels.

Papers derived from this PhD are as follows:

L. Monforte, E. Núñez-Olivera & J. Martínez-Abaigar. 2015. UV radiation biomonitoring using cell compartmentation of UV-absorbing compounds in herbarium samples of a liverwort. *Ecological Indicators* 52: 48–56, doi: 10.1016/j.ecolind.2014.11.027.

L. Monforte, R. Tomás-Las-Heras, M.A. Del-Castillo-Alonso, J. Martínez-Abaigar & E. Núñez-Olivera. 2015. Spatial variability of ultraviolet-absorbing compounds in an aquatic liverwort and their usefulness as biomarkers of current and past UV radiation: a case study in the Atlantic-Mediterranean transition. *Science of the Total Environment* 518–519: 248–257, doi: 10.1016/j.scitotenv.2015.03.006.

L. Monforte, G. Soriano, E. Núñez-Olivera & Javier Martínez-Abaigar. 2018. Cell compartmentation of ultraviolet-absorbing compounds: an underexplored tool related to bryophyte ecology, phylogeny and evolution. *Functional Ecology* 32: 882–893, doi: 10.1111/1365-2435.13048.

After her PhD, Dr. Laura Monforte got a three-year contract for teaching and research at University La Rioja.



The research team sampling bryophytes in a stream in Sierra Nevada (southern Spain).

[PhD dissertation by Gonzalo Soriano \(30-September-2017\)](#)

Supervisors: Prof. Encarnación Núñez-Olivera and Prof. Javier Martínez-Abaigar

Title: Effects of ultraviolet radiation on bryophytes: from the genes to the field

Abstract. Bryophytes were the first “true” plants colonizing land, where they had to adapt to higher levels of ultraviolet (UV) radiation, together with other stressing factors in comparison to the aquatic environment inhabited by their evolutionary ancestors. Bryophytes, despite their structural simplicity in comparison with tracheophytes and their consequent lack of typically UV-protective structures (such as epidermis and thick cuticles), have shown a notable tolerance against UV radiation. The responses of extant bryophytes to this stimulus may help explain how the first plants could cope with the new UV regime in the water-to-land transition. In this Thesis, these responses were studied at different scales, from a molecular level in the laboratory to an ecophysiological point of view under natural conditions. In addition, a great variety of methods were used to evaluate these responses among different species within this phylogenetic group, with particular attention to the corresponding model species of each of the three evolutionary lineages: *Physcomitrella patens* for mosses, *Marchantia polymorpha* for liverworts and *Anthoceros agrestis* for hornworts. This main aim was divided in several more specific ones:

To study the UV-B photoreceptor protein (UVR8) and its importance for land colonization, in the main two groups of bryophytes, mosses and liverworts.

To evaluate the responses of UV-absorbing compounds (UVAC) to UV in six bryophytes differing in their taxonomical and structural characteristics.

To characterize the responses of *Marchantia polymorpha* to photosynthetic, UV-A and UV-B wavelengths, using both molecular and physiological variables.

To study the influence of the developmental stage of the liverwort *Marchantia polymorpha* in UVAC accumulation.

To study, under field conditions, the acclimation modalities of three taxonomically and structurally

diverse bryophytes to UV and photosynthetic wavelengths.

To evaluate, for the first time, the responses of a hornwort (*Anthoceros agrestis*) to UV radiation. From the results obtained in this study, it can be concluded:

Both the moss *Physcomitrella patens* and the liverwort *Marchantia polymorpha* express functional UVR8 proteins, which are UV-B photoreceptors. Despite some differences in structure and localisation, the function of this protein is strongly conserved over evolution from green algae to angiosperms.

UVAC accumulation in bryophytes depends on the type of bryophyte, the species, the specific compound and the localisation within the cell.

Marchantia polymorpha responded especially to UV-B wavelengths, showing an increase in sclerophylly, overexpression of chalcone synthase, and UVAC accumulation.

The youngest samples of *Marchantia polymorpha* were the most UV-responsive ones in relation with the accumulation of UVAC. The responsiveness decreased as thallus age progressed.

Marchantia polymorpha was the most plastic and radiation-responsive species among the three studied. Sun plants showed higher contents of UVAC, higher sclerophylly and changes in photosynthetic variables in comparison with shade plants.

Although no significant differences were found in the UVAC of *Anthoceros agrestis* in response to UV radiation, an increasing trend was found in every compound.

Papers derived from this PhD until present day are as follows:

G. Soriano, C. Cloix, M. Heilmann, E. Nuñez-Olivera, J. Martinez-Abaigar & G.I. Jenkins. 2018. Evolutionary conservation of structure and function of the UVR8 photoreceptor from the liverwort *Marchantia polymorpha* and the moss *Physcomitrella patens*. *New Phytologist* 217: 151–162, doi: 10.1111/nph.14767

G. Soriano, M.Á. Del-Castillo-Alonso, L. Monforte, E. Núñez-Olivera & J. Martínez-Abaigar. (in press). Phenolic compounds from different bryophyte species and cell compartments respond specifically to ultraviolet

radiation, but not particularly quickly. *Plant Physiology and Biochemistry*, doi: 10.1016/j.plaphy.2018.07.020

G. Soriano, M.Á. Del-Castillo-Alonso, L. Monforte, R. Tomás-Las-Heras, J. Martínez-Abaigar & E. Núñez-Olivera. (in press) Responses of the model liverwort *Marchantia polymorpha* subsp. *ruderalis* to photosynthetic, UV-A and UV-B radiation. *Photochemical and Photobiological Sciences*.

G. Soriano, M.A. Del-Castillo-Alonso, L. Monforte, E. Núñez-Olivera & J. Martínez-Abaigar. (in press). First data on the effects of ultraviolet radiation on phenolic compounds in the model hornwort *Anthoceros agrestis*. *Cryptogamie-Bryologie* 39: 201–211, doi: [10.7872/cryb/v39.iss2.2018.201](https://doi.org/10.7872/cryb/v39.iss2.2018.201)



Anthoceros agrestis grown without (above) and with (below) UV-B radiation

After his PhD, Dr. Gonzalo Soriano received a one-year postdoctoral contract in the Biotechnology National Centre of Spain (CNB), belonging to the Spanish Higher Council for Scientific Research (CSIC), under the supervision of Prof. Roberto Solano. During this stay, he will try to disentangle different hormonal pathways and their regulation in model bryophytes.

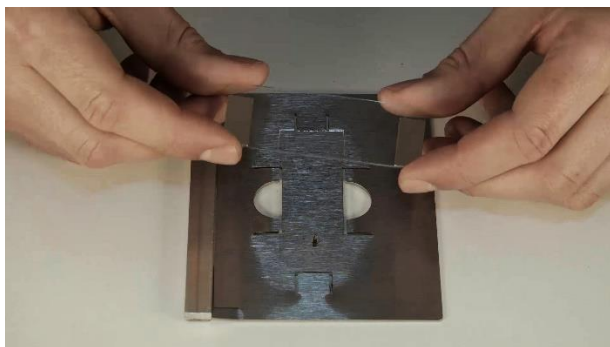
Cross sectioning made easy(er)

Daniel Hepenstrick | ZHAW Zurich University of Applied Sciences | Wädenswil, Switzerland | hepe@zhaw.ch

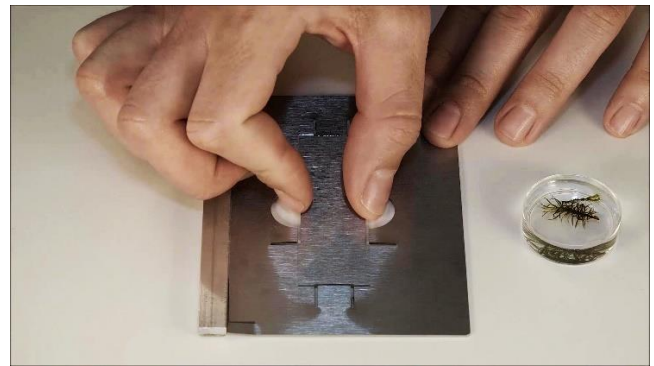
Cutting cross sections of bryophytes is a fiddly task that especially challenges newcomers to bryology. Here I would like to promote a low-tech, easy-to-handle sectioning aid, which might be helpful for everyone who struggles with cross sectioning bryophytes. The tool fixes the specimen into position without the involvement of the hands and therefore allows the cutting of sections with a razor blade that is guided by both hands, which substantially facilitates sectioning. Hepenstrick (2018) describes the production and the application of the tool in detail and provides technical plans as well as an instructional video. On the homepage of the Swiss Association of Bryology and Lichenology the tool is offered for sale (www.bryolich.ch/shop/shop_en.html).

Literature Cited

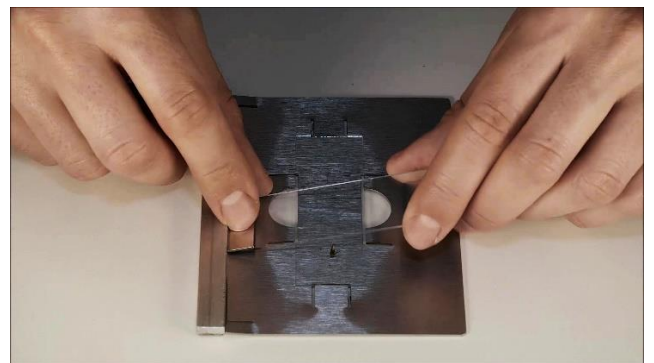
Hepenstrick, D. 2018. A simple, magnet-assisted bryophyte cross sectioning tool for beginners and for teaching in bryology. *Lindbergia* 41: 01099



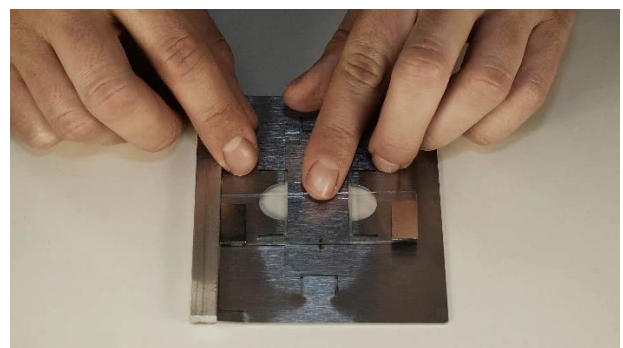
The tool consists of a magnetic support plate and a standard microscopic slide with two strong magnets attached to its narrow slide.



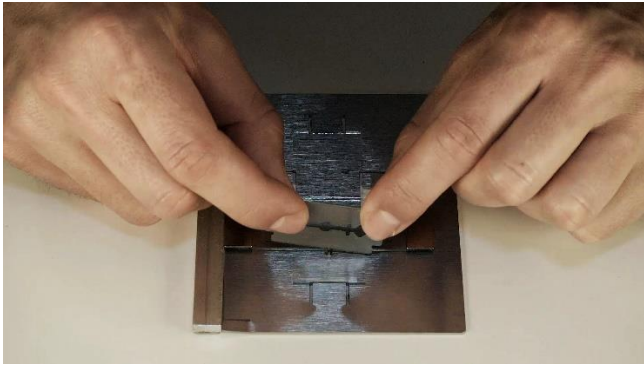
Sectioning starts with the positioning of a microscope slide on the support plate.



A specimen is placed on the lower slide and then fixed with the magnetic slide. Fixation starts by directly aligning one narrow side of the magnetic slide against the inner edge of the lateral non-magnetic strip. Then, the magnetic slide is gently laid down on the specimen so that it is partly covered.



Slight pressure on the middle of the magnetic slide will tilt it to a horizontal position. Then, the magnetic slide fixes the specimen by means of the lateral magnets, which symmetrically applies pressure on the lower slide.



Now, the specimen can be cut into sections, with a razor blade that is controlled with both hands. For extra stability or in case of thick specimens, the magnetic slide can be placed with downwards orientated magnets, which will prevent it from tilting. For fine specimens, that need to be pressed down more powerfully for proper fixation, additional magnets can be placed on the magnets attached to the magnetic slide.

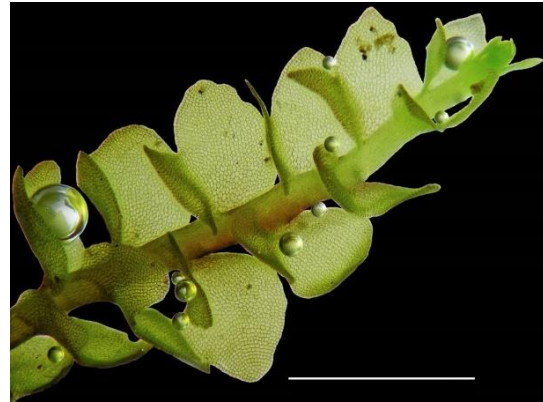


A leaf cross section of *Polytrichum commune* made with the magnetic sectioning tool by someone who had never sectioned a bryophyte before.

Photographic Tip

David H Wagner
Northwest Botanical Institute, Eugene, OR, USA
davidwagner@mac.com

The following two stacked images of *Scapania irrigua* show how the background made black makes a more dramatic image even though the details are identical.



The stacked image below is of a dry specimen of *Scapania americana* taken in air, demonstrating a decurrent wing on the dorsal lobe



All images were taken with a digital camera mounted on a compound microscope. The dry specimen is strictly reflected light while the

Scapania irrigua shoot was in water and uses a combination of transmitted and reflected light.



News Items

Flora Briofítica Ibérica

The scientific and editorial project **Flora Briofítica Ibérica**, which began in 1988, ended with the publication of Volume VI (Hypnales) in 2018. The editorial process has led to another 5 volumes:

Vol. I: Sphagnales, Andreaeales, Polytrichales, Tetraphidales, Buxbaumiales, Diphysciales.

Vol. II: Archidiales, Dicranales, Fissidentales, Seligeriales, Grimmiales.

Vol. III: Pottiales, Encalyptales

Vol. IV: Funariales, Splachnales, Schistostegales, Bryales, Timmiales.

Vol. V: Orthotrichales, Hedwigiales, Leucodontales, Hookeriales.

Vol. VI: Hypnales.

To purchase a volume, consult the web: florabriofiticaiberica.com

Or send your order to:

Fax: (+34) 868883917, or (+34) 868883963

E-mail: jguerra@um.es

Cryptogamie, Bryologie

We are pleased to inform that *Cryptogamie* (*Algologie*, *Bryologie*, *Mycologie*) will change its administration & production process. The journal will join in January 2019 the Scientific Publication of the Muséum National d'Histoire Naturelle) and will be a diamond open access journal, free of charges both the author and the reader and assessable as soon as published. *Cryptogamie* is distributed by BioOne (as currently), which provides its archiving in Portico and LOCKSS.

This new organization will insure a long-term management of the journal as well as an institutional added value. The great news is that we will beneficiate from a back office and a professional secretary. We will keep you posted

as soon as the new process will be operational. But now, we can inform you that the new format will be A4 on two columns.

For Bryology, the authors will continue to send their manuscripts to Denis Lamy, denislamy@cryptogamie.com

For renewal questions, pricing information, or to request a free trial please contact library.services@BioOne.org or the account manager for your region. New subscribers will need to complete a Subscriber License Agreement (SLA).

Announcing Eagle Hill Institute's seminars on bryology in 2019

Eagle Hill is right on the coast of Eastern Maine, between Acadia National Park and Petit Manan National Wildlife Refuge.

May 26 – Jun 1: Introduction to Bryophytes and Lichens by Fred Olday

Jun 9 – 15: Mosses: Structure, Ecology, and Identification by Jerry Jenkins and Susan

Aug 25 – 31: The Moss Family Grimmiaceae, with a Focus on the Genus *Schistidium* by Terry McIntosh

Oct 11 – 13: Bryophytes: Mosses and Liverworts (weekend workshop by Fred Olday

For more info: <https://www.eaglehill.us>

Call for proposals to host the 2021 IAB meeting

The IAB council seeks proposals to host the biennial IAB meeting in 2021. IAB promotes holding the conference on a rotating basis on different continents. The preceding three meetings were held in South America (Chile), Asia (China) and Europe (Spain). Ideally, we seek proposals from Africa, Central and North America or Australasia but the council will consider all proposals.

A proposal should include tentative dates, description of venue, estimates of costs, lodging possibilities as well as potential field trips.

Proposals should be submitted by May 1st. The council will assess proposals and vote at the council meeting in Madrid in July 2019.

Please submit proposals as a single pdf via the on-line form on <http://bryology.org/proposal-for-iab-meeting-in-2021/> using the password IAB2021.

Bernard Goffinet
President of IAB

On behalf of the International Association of Bryologists and after broad consultation, it is with great pleasure to announce that the entire series of The Bryological Times is now online, **openly** available to the **public** - except the latest issue that is locked for I.A.B. members only.

Please enjoy this new and treasured resource at: <http://bryology.org/publications/bryological-times/>

There is some fantastic reading and decades worth of invaluable information.

In celebrating the 50th anniversary of I.A.B., it is appropriate we also celebrate the extraordinary efforts of all the previous editors of The Bryological Times: S.W. Greene (numbers 1–50; 1980–1989), S.R. Gradstein (51–70; 1989–1992), L. Hedenäs & L. Söderström (71–85; 1993–1995), L. Söderström, H. Weibull & T. Hedderson (86–105; 1996–2002), G. Raeymaekers (106–127;

2002–2009), D. Poli (128–141; 2009–2016) and J. Atwood (142–146; 2016–2018). Please contact the current editor Patrick Dalton for contributions.

Matt von Konrat,
Secretary-Treasurer



A joint conference between iMoss,
the International Association of Bryologists
and the Sociedad Española de Briología

Venue: Real Jardín Botánico, Madrid, Spain

This conference will celebrate the 50th anniversary
of IAB and the 30th anniversary of the Sociedad
Española de Briología. More information to come
on registration, accommodation and program soon!

Contact: Jesús Muñoz jmunoz@rjb.csic.es



REAL JARDÍN
BOTÁNICO

Administrative Information

IAB Officers & Council

President

Bernard Goffinet
Dept. of Ecology and Evolutionary
Biology, 75 North Eagleville Road,
University of Connecticut,
Storrs, CT, 06269-3043
United States of America

Editor of Bryophyte Diversity and Evolution

Dietmar Quandt
Nees-Institut für Biodiversität der
Pflanzen, Meckenheimer Allee 170
D-53115, Bonn
Germany

Council Member

Juan Larrain
Instituto de Biología
Pontificia Universidad Católica
de Valparaíso
Campus Curauma
Chile

Council Member

Juliana Rosa Oliveira
University of Brasília
Dep. Botany, Caixa Postal 04457
Brasília, DF.
Brazil

1st Vice-President

Lars Söderström
Dept. of Biology, Norwegian
University of Science and Technology,
N-7491 Trondheim,
Norway

Editor of The Bryological Times

Patrick Dalton
School of Natural Sciences
University of Tasmania
Australia 7001

Council Member

Javier Martínez-Abaigar
Universidad de La Rioja
Madre de Dios 51, 26006
Logroño, La Rioja,
Spain

Council Member

Michael Stech
Naturalis Biodiversity Center
PO Box 9517, NL-2300 RA
Leiden
Netherlands

2nd Vice-President

Yelitza León
Centro Jardín Botánico
Universidad de Los Andes
Apartado 52 La Hechicera
Mérida 5101
Venezuela

Council Member

Claudine Ah-Peng
University of La Réunion
UMR PVBMT, BP 7151
15 Avenue René Cassin
97715 Saint-Denis
France

Council Member

Denise Pinheiro da Costa
Instituto de Pesquisas Jardim
Botânico do Rio de Janeiro
Rua Pacheco Leão 915
22460-030, Rio de Janeiro, RJ
Brazil

Council Member

Kien Thai Yong
Institute of Biological Sciences
University of Malaya
50603 Kuala Lumpur
Malaysia

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UMR 7205, Muséum National
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Québec
Canada

Secretary-Treasurer

Matt von Konrat
Dept. of Science and Education,
Field Museum, 1400 South Lake Shore
Drive, Chicago, IL 60605-2496,
United States of America

Website Coordinator

Vacant

Newsletter Column Editors

Conservation Column Editor: Tomas Hallingbäck,
Tomas.Hallingback@Artdata.slu.se

Literature: Johannes Enroth,

Theses: William R. Buck, wbuck@nybg.org

Tropical Biology: Tamás Pócs, colura@chello.hu

Association Objectives

The objectives of the International Association of Bryologists (IAB) is to promote international co-operation and communication among persons interested in bryophytes.

Next Meeting

The next meeting is 9-12 July 2019 in Madrid, Spain.
Please visit bryology2019.com for more information.

Call for Submissions

The Bryological Times was founded in 1980 by S. W. Greene (1928--1989) as a newsletter published for the IAB. *The Bryological Times* welcomes announcements and summaries of bryological conferences, workshops, and fieldtrips; book reviews and notices of publications; and original articles, artwork and photography. Please send submissions to the editor: P.J.Dalton@utas.edu.au. All submissions will be acknowledged by email. Contributors will be asked to review their submissions before publication.

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