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From the president: 2023 Council election



Dear IAB members,

The activities of our Association are governed by a council composed of a President, two Vice-Presidents, the Immediate Past-President, a Secretary-Treasurer, the Editor of The Bryological Times, the Editor-in-Chief of Bryophyte Diversity and Evolution, and ten Councillors. Except for the two editors, which are appointed by the council, all other members are elected by the members. In 2023, you will be invited to vote for a new President, a new Vice President and five Councillors.

At this point, I would like you to consider volunteering for being on the ballot for anyone of these positions or talk to your colleagues, encouraging them to become actively engaged in the Association and accept being nominated. The departing councillors represent Asia, South America and Europe, and will restrict nominations of colleagues from these areas. No restrictions apply to the nominations for President and Vice President. We strongly encourage colleagues from across the diversity spectrum to join the IAB council.

In the coming month we will seek and confirm nominations to compose ballots to be shared with you no later than January 2023. Elections will close in March or April, and officers appointed in July.

If you have any questions about the responsibilities of these positions, please reach out to council members (see <http://bryology.org/officers-council/>) or contact me.

Sincerely,

Bernard Goffinet

IAB President

Issues in Bryaceae taxonomy and potential future projects

John R. Spence

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Introduction

The Bryaceae is a large moss family, with 500–600 accepted species. Ongoing field work in less well explored areas of the world have revealed many new taxa in recent years. I have seen material that represents species new to science in the genera *Bryum*, *Gemmabryum*, *Imbribryum*, *Plagiobryoides*, *Ochiobryum* and *Rosulabryum*. There has been surprisingly little comprehensive work on the classification of the family using molecular methods (Pedersen et al. 2003, Pedersen & Hedenäs 2005, Pedersen et al. 2006, Holyoak & Pedersen 2007). Perhaps because of this, the generic classification remains in some flux. My original approach to the family was to delimit what appeared to be morphologically similar groups (Spence & Ramsay 2006, Spence 2014). Starting in the early 2000s molecular techniques were applied to the family, with varying results. As pointed out by Shaw (2014), the molecular studies were not always consistent with each other, likely due in part to miss-identification of specimens, which remains an ongoing difficulty in the family. Because of these concerns, I reluctantly decided to retain the morphologically-based classification for the *Flora of North America*, with the caveat that it would likely change with ongoing studies. In particular, the molecular results suggested that morphological convergence (homoplasy) is an important feature in the evolutionary history of the Bryaceae, and there are likely many surprises to come. In this brief review, I will contrast my morphological approach with the current understanding of relationships using molecular methods, focusing on the genus and subgenus levels. I do this in the hopes of clarifying relationships within the family and in suggesting future avenues of research.

The molecular results consistently support two major two clades that are also supported by a few morphological features. I will call these Clade B (centered on *Bryum*) and Clade P (centered on *Ptychostomum*). Clade B consists of *Acidodontium*, *Anomobryum*, *Bryum*, *Gemmabryum*, *Haplodontium*, *Imbribryum*, *Leptostomopsis*, *Ochiobryum* and *Osculatia*. Clade P consists of *Brachymenium*, *Plagiobryoides*, *Plagiobryum*, *Ptychostomum*, and *Rosulabryum*. Some genera, such as *Anomobryum*, *Bryum*, *Haplodontium*, and *Imbribryum*, are generally well accepted and stable, but others remain problematic. In most studies to date, *Rhodobryum* remains in a basal position and is often shown as a sister clade to the rest of the family. The two Bryaceae clades are distinguished by differences in specialized asexual reproductive structures in the leaf axils, filiform gemmae in Clade P (also found on stems) and bulbils in Clade B. Laminal areolation is also generally different in the two clades. Rhizoidal tubers are common to both clades. Below each genus is briefly discussed with potential research projects suggested, of which there are many. Those genera with an asterisk are likely to be revised as additional molecular studies are completed. There also remains a large residue of perhaps 30–40 species that have not been studied or assigned to a genus since their original discovery.

The genera

**Acidodontium* (Clade B): a small neotropical genus of 12–15 epiphytic species in the Andes, extending to southern Mexico. One of the surprising results of the molecular work is that the genus appears in a clade with *Anomobryum* and *Haplodontium*, although *Acidodontium* consists of robust plants which exhibit few similarities to those genera and has a peculiar peristome in which the endostome segments are split at the apex. The genus shows significant morphological variability and may represent more than one taxon. Its affinities may lie with *Osculatia* rather than *Anomobryum* and *Haplodontium*, and the evolution of this epiphytic genus from terricolous ancestors would make a fascinating research study.

Anomobryum Schimp. (Clade B): a genus of perhaps 35–40 species distributed worldwide. One of the surprises of the molecular studies is that the genus, although morphologically similar to *Bryum*, is not closely related. Rather, it is in a clade with *Haplodontium* and *Acidodontium*. The genus is known for highly variable peristomes, from complete to sometimes absent.

**Brachymenium* Schwägr. (Clade P): the type section includes about 30–40 tropical and subtropical epiphytes closely similar to *Rosulabryum*. Early molecular results indicated that *Brachymenium* was polyphyletic, and many species have since been transferred to *Gemmabryum* and *Leptostomopsis*. In addition to the type section, the small neotropical *Bryum* section *Orthocarpus* (Müll.Hal.) Broth. is also retained in the genus.

The relationship between *Brachymenium* and *Rosulabryum* has not been examined using molecular methods, and there are two possibilities. One would be that they are sister taxa, while the second possibility is that *Brachymenium* evolved independently several times from *Rosulabryum* ancestors, a common pattern in the evolution of the epiphytic habitat. The subgenus *Orthocarpus* would make an interesting research project, as new species are being discovered and its relationship with the type section has not been examined.



Brachymenium nepalense Hook. (© David Meagher)

Bryum Hedw. (Clade B): the type of the genus is *B. argenteum*, with ca. another 30–35 species known. This genus is closest to *Gemmabryum* section *Gemmabryum*, and both produce leaf axil bulbils. The silver-white *Bryum* species around *B. argenteum* are in urgent need of revision using molecular methods, as their morphology tends to be very uniform. The Chinese endemic *B. gossypinum* seems misplaced and appears to be related to *Leptobryum*.



Bryum argenteum Hedw. (© David Meagher)

**Gemmabryum* J.R.Spence & H.P.Ramsay (Clade B): a large heterogeneous worldwide genus of perhaps 125 species defined by the presence of bulbils and rhizoidal tubers. It has become clear through molecular studies that this is not a natural group, as the characters uniting it are found in other genera and thus likely plesiomorphic. The type section is related to *Bryum*, differing in the near-constant presence of bulbils. This type group also includes several species originally in *Brachymenium*. Molecular results have not yet been done to determine if *Gemmabryum* is sister to or embedded within *Bryum*. The tuber bearing species (sect. *Tuberibryum*) include at least three groups of taxa. The species with large tubers, e.g. *G. subapiculatum*, can be easily accommodated in *Imbribryum*, with which they share many features. The species with small tubers centered around *G. apiculatum* are potentially closer to *Anomobryum* than to the remainder of the tuber-producing species, as the two genera have similar areolation. The placement of sect. *Caespitibryum* (*Bryum caespiticium* and allies) remains confusing, as it has appeared in both clades in previous studies. Finally, there remains a small group of waif species, e.g.

G. violaceum and allies, that appear to be intermediate and have not been easy to assign to a genus. Thus there are numerous interesting research projects in this group.

Haplodontium Hampe (Clade B): another surprise of the molecular results was that several species included in *Mielichhoferia* were misplaced and were in fact members of the Bryaceae. *Haplodontium* remains poorly understood and there are probably additional species within *Mielichhoferia* and the related *Schizymenium* that are likely to be moved to *Haplodontium*. The genus is related to *Acidodontium* and *Anomobryum* and seems to be a well-defined group based on molecular results. Most species occur in cold climates. The poorly known *Mniobryoides degeneriae* Hörmann probably belongs here, but the type has never been located.

Imbribryum N.Pedersen (Clade B): a recently described genus based on molecular data for *I. alpinum* and its relatives, consisting of ca. 35–40 species, often associated with riparian habitats and waterfalls, with many rheophytes. Some species originally placed in *Gemmabryum* have been transferred to the genus. Species limits within the genus remain very confusing.

Leptostomopsis (Müll.Hal. ex Broth.) J.R.Spence (Clade B): a small pantropical genus of perhaps 10 species with a reduced peristome, erect capsules and leaf axil bulbils, originally included in *Brachymenium*. The genus is similar to *Leptostomum*, however, the molecular results appear to be consistent in placing the genus in the Bryaceae, generally basal to Clade B.

**Ochiobryum* J.R.Spence & H.P.Ramsay (Clade B): this genus consists of 4 or 5 species with sometimes complanate habit and elongate laminal cells. Molecular results place it with *Imbribryum*, although whether embedded within that genus or sister to it is not yet known.

**Osculatia* De Not. (Clade B): the molecular results show that this Neotropical genus is either basal to the family after *Rhodobryum* or is sister to the *Acidodontium–Anomobryum–Haplodontium / Bryum–Gemmabryum–Imbribryum* clade, splitting off more recently than *Leptostomopsis*. It is a robust species reminiscent of a *Philonotis*, with an unusual peristome structure, where the endostome segments are split and each half united with the adjacent cilium. The presence of leaf axil bulbils allies it with Clade B. The recent transfer of all *Gemmabryum* and *Imbribryum* species to *Osculatia* based on the shared presence of bulbils (Ochyra et al. 2018) seems premature, as this creates a polyphyletic genus. Also, *Bryum* has priority. Rather, the single species seems to be an early diverging lineage in the Neotropics, where it is widespread.

**Perssonia* Bizot (Clade B?): a poorly known species from the Cape Verde Islands, with a double peristome, but with other features very similar to *Haplodontium*, to which it perhaps should be moved.

**Plagiobryoides* J.R.Spence (Clade P): I described this genus for *P. incrassatolimbata*, with its unusual bi- to multi-stratose limbidium of short wide cells. However, other species share many features in common with it and the genus concept has been expanded to include ca. 20 species. Many species produce rhizoidal tubers of various types, a feature not found in the related *Plagiobryum* or *Ptychostomum*.

**Plagiobryum* Lindb. (Clade P): A small genus of nine species found in cold climates. It appears for the most part to be closest to *Ptychostomum* subg. *Ptychostomum* where it has been placed recently. The type *P. zierii* is somewhat atypical and may represent a distinct taxon.



Ptychostomum capillare (Hedw.) Holyoak & N.Pedersen
[*Rosulabryum capillare* Hedw.] (© David Meagher)



Rhodobryum aubertii (Schwägr.) Thér. (© David Meagher)



Rosulabryum subfasciculatum (Hampe) J.R.Spence
(© David Meagher)

**Ptychostomum* Hornsch. (Clade P): the early molecular studies showed that the traditional concept of *Bryum* was polyphyletic, so I decided to resurrect the genus *Ptychostomum* for the large group of mostly northern hemisphere species in clade P. More recently, some *Plagiobryoides*, *Plagiobryum* and *Rosulabryum* species have been moved to that genus. As such, *Ptychostomum* has become something of a dumping ground for taxa that are often very different from each other. There has been no comprehensive molecular work done on the genus as a whole. More than any other group in the family, *Ptychostomum* (including both subgenera *Cladodium* and *Ptychostomum*), as well as *Plagiobryoides* and *Plagiobryum* are in urgent need of revision. It is likely that such studies would reveal several distinct clades that may or may not reflect traditional genera.

Rhodobryum (Schimp.) Limpr. (Clade P or Rhodobryaceae): A group of ca. 20 species characterized by large size, stolons and often abundantly polysetose perichaetia. In some features this genus is similar to *Roellobryon*, although molecular results tend to place it as basal to the Bryaceae.

**Rosulabryum* J.R.Spence (Clade P): A large worldwide genus of ca. 70 species characterized by rhizoidal tubers and sometimes filiform gemmae in the leaf axils. There are two groups, one corresponding to the small species centered around *R. capillare*, and the second more robust group with a center of diversity in Africa and other parts of the tropics and southern hemisphere. Molecular results to date suggest that the smaller species can be placed within *Ptychostomum*, implying a significant level of homoplasy with the robust species which remain a distinct group related to *Brachymenium*. It is also possible that future work will show the smaller species to comprise a paraphyletic grade basal to the *Ptychostomum*–*Plagiobryoides*–*Plagiobryum* clade.

One, two or three families?

Schimper moved *Rhodobryum* to its own family, a move which has generally not been accepted except by E. Nyholm in her Nordic Flora. However, the species morphology and distinctive large chromosomes that differ from the rest of the Bryaceae (cf. Ramsay and Spence 1996) can be used to support such a placement, which I tend to favor. For the other two clades, one could accept them as subfamilies or as distinct families. There is certainly sufficient evidence to support the recognition of separate families, the traditional Bryaceae (Clade B) and a new family centered around *Ptychostomum* (Clade P). This decision on family recognition is more of a philosophical one depending on whether one is a taxonomic splitter or lumpers.

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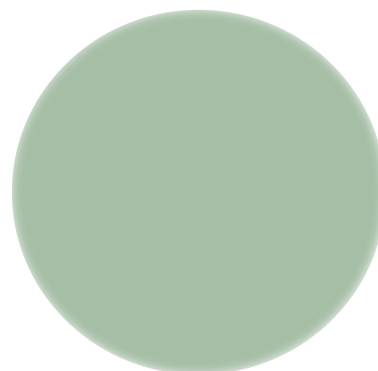
‘Bryophyte’ is now a colour

Recently I was looking around for a suitable paint colour for my bryophyte lab (in the shed out the back at ‘Moss Hollow’). Lo and behold, I discovered that the Dulux company has released a colour in their range of paints in Australia called [Bryophyte](#). (This is in addition to [10 colours](#) with ‘moss’ in their names: Jungle Moss, Fibre Moss, Alga Moss, Club Moss, Slippery Moss, Tropical Moss, Misty Moss, Moss Rose, Moss Vale and Moss Leaf. The colours perhaps indicate the public perception of what ‘moss’ is and looks like!)

The RGB values are R 166, G 190, B 166; the colour shown below is what I now have on the lab’s exterior. Does the colour suit the name? You be the judge!

— David Meagher

Dulux Bryophyte as defined by the RGB values.



Field trip to the Colombian Páramos

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The páramo is a unique ecosystem in the world. Located in the mountains of the north of the Andes, they include extensive areas between the high Andean Forest and the perpetual snow, between 3000 and 4500 m, and characterized by high levels of light radiation and a high endemism (Rangel-Ch. 2000; Hofstede et al. 2003). They are recognized for the high diversity of species and habitats, in addition to the number of ecosystem services they offer, such as the regulation of the water cycle and the regional climate, capture and storage of carbon dioxide, and a habitat for pollinating and seed-dispersing species (Rivera & Rodríguez 2011), and by the presence of bunch or tussock-forming grasses, mostly species of *Calamagrostis* Adans. and *Festuca* L., as well as the giant stem-rosette plant of the genus *Espeletia* Mutis ex Bonpl. (Figure 1), and shrubs and cushion plants. The cushion plant life-form is a very notable feature of this vegetation type, which is not continuous: bare sandy soil is exposed between the individual plants.



Figure 1. Colombian Páramo in the Boyacá department.

The Colombian páramos (Figure 2) are the home to at least 580 species of bryophytes, where they are part of the vegetation, colonizing various types of substrates, in which, due to their small size, microclimatic conditions are very important, given by factors environmental, such as light and water mainly (Montenegro et al. 2005).



Figure 2. Vegetation types of the studied páramos.

Cheilolejeunea (Spruce) Steph. is the third-largest genus of the Lejeuneaceae family; about 160 species have been described worldwide, of which approximately 55 have been recorded for the Neotropics. The species of *Cheilolejeunea* generally grow as epiphytes on tree branches and shrubs and are characterized by the presence of a distal hyaline papilla to the second tooth, trigones and oil bodies generally large, margins of the leaves generally entire, and lobes normally inflated and semicircular. The objective of this field trip was to collect specimens in the Páramo province on the Colombian Andes.

During the first days of December 2021 we were collecting liverworts of the genus *Cheilolejeunea* (Figure 3), with the aim of obtaining fresh material for morphological and molecular analysis, within the framework of the development of the doctoral thesis ‘Phytogeographic review of the species of the genus *Cheilolejeunea* (Lejeuneaceae, Marchantiophyta) in the Pacific dominion and the Páramo province in South America’. The sites chosen were based on criteria such as being historically well preserved (environmental reserves), presenting a high degree of precipitation, and being located on an environmental gradient from lowland humid forests to páramos above 3200 m.



Figure 3. A, B. *Cheilolejeunea xanthocarpa* (Lehm. & Lindenb.) Malombe, C. *Cheilolejeunea lobulata* (Lindenb.) C.J.Bastos & Gradst.

Field trip from 29 November to 8 December 2021

The five locations visited during this period of fieldwork are shown in Figure 4.

29 Nov – 1 Dec: Colombian páramos complexes in the departments of Meta, Guaviare, and Boyacá (Figure 5).

2 Dec: Villavicencio (Meta).

3 Dec: Guayupe Natural Reserve, Fresco Valle (Acacías-Meta).

4 Dec: Archaeological and Natural Reserve Bocas del Raudal (San José del Guaviare-Guaviare).

5 Dec: La Esmeralda trail, Santa María (Boyacá).

6 Dec: Natural Reserve San Rafael (Santa María – Boyacá).

7 Dec: Páramo de Toquilla (Aquitania-Boyacá, Figure 6), from Tunja we travelled to Páramo de Toquilla (Aquitania) and collected between 3000 and 3550 m.

8 Dec: Páramo El Valle (Arcabuco-Boyacá, Figure 6), from Tunja we travelled to Arcabuco, walked about 5 hours, beginning in the Andean Forest (c. 2960 m) until Páramo El Valle (c. 3350 m).

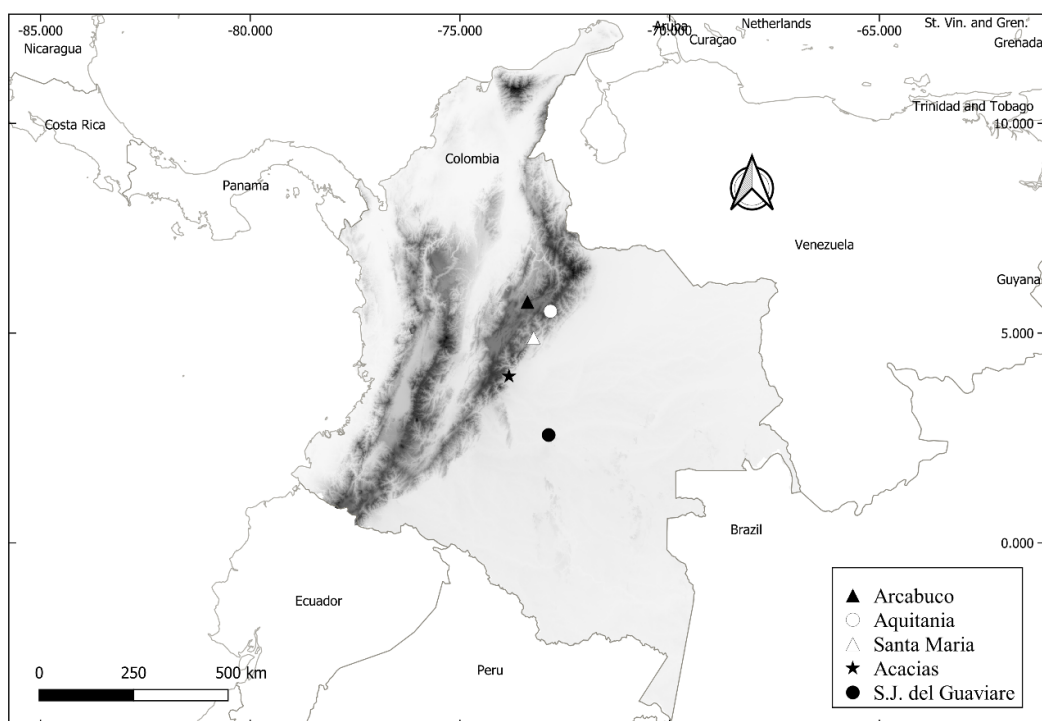


Figure 4. Distribution of the five locations visited during the period of fieldwork in Colombia.



Figure 5. Landscape types of some sampling sites.



Figure 6. A. Páramo Toquilla (Aquitania, Boyacá), B. Páramo El Valle (Arcabuco, Boyacá).

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News from the Hattori Botanical Laboratory

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Hattori Botanical Laboratory (HBL), which bears the international herbarium code NICH, is a specialized research institution for taxonomy of bryophytes and lichens with a long and splendid history. We recently marked our 75th anniversary in 2021. Here we would like to announce a change in staff.

Tian-Xiong Zheng (PhD) has been appointed the research staff (full-time) and he assists in various ways with international exchanges of HBL. The former director, Tomoyuki Katagiri, has moved to Kochi University (KOCH) but he will still be the editor of *Hattoria* and collections director of the herbarium (NICH).

We are also happy to announce that *Hattoria* has been accepted for indexing by Scopus. *Hattoria* (one volume per year) is a peer-reviewed and open access journal published by HBL. International bryologists and lichenologists are invited to publish original research from any field of bryology and lichenology. The current issue (volume 13) was officially released on 10 August.

Our herbarium consists of numerous bryological collections from all over the world; approximately 510,000 specimens (260,000 Japanese and 250,000 exotic specimens) and over 4300 type specimens. The herbarium also houses approximately 20,000 lichen specimens, including 10 type specimens.

We welcome all forms of academic exchange and look forward to cooperating with you. You can find more detailed information on our webpages:

Hattori Botanical Laboratory: <https://hattorilab.org/en/>

Hattoria: <https://www.jstage.jst.go.jp/browse/hattoria>

News from China: books on bryophytes published in China since 2010

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Since 2010, numerous books on bryophytes have been published in China. Even though most of books written in Chinese, the books still are good references for foreign bryologists owing to that there are Latin names for bryophyte families, genera and species and good pictures and figures for Chinese bryophytes. Therefore, a brief introduction to 28 books on bryophytes published in China since 2010 is presented herewith.

Species Catalogue of China, Volume 1 Plants, Bryophytes, by Jia Yu and He Si, Science Press, Beijing, 2013, 525 pp. The book recorded 3021 species, 591 genera and 150 families of bryophytes in China, including 1954 species, 431 genera and 86 families of mosses, 1050 species, 152 genera and 60 families of liverworts, 26 species, 8 genera and 4 families of hornworts. For each species, Chinese and Latin name, synonyms, habitat, distribution are presented. It is good reference for checking species of bryophytes in China.

Genera Hepaticopsida et Anthocerotopsida Sinicorum, by Gao Chien & Wu Yu-huan (editor in Chief), Science Press, Beijing, 2010, 632 pp. Based on structure of perichaetium (female bracts), a new system for liverworts and hornworts was put forward including 932 species, 156 genera, 55 families, 8 orders and 2 classes in China.

Higher Plants of China, Volume 1 Bryophytes, by Wu Peng-cheng, Jia Yu & Zhang Li, Qingdao Press, Qingdao, 2012, 1032 pp. The book reported 1516 species belonging 530 genera and 119 families of bryophytes in China. Among them, 1045 species belonging 383 genera and 69 families are mosses while 471 species belonging 147 genera and 50 families are liverworts and hornworts.

Plants of China in Colour, Volume 1, Bryophytes, by Zhang Li & Zuo Qin, Science Press, Beijing 2016. 226 pp. This is a book written both in Chinese and English. 614 species of bryophytes, including 477 species of mosses, 130 species of liverworts and 7 species of hornworts, are described both in Chinese and English with nice colour pictures.

Chinese Illustrated Bryophytes, by Wu Peng-cheng, Jia Yu, Wang Qin-hua, Yu Ning-ning, He Qiang, Wang Mei-zhi, China Forestry Press, Beijing, 2018. This book recorded and described 1516 species, belonging to 530 genera and 119 families in China.

A Taxonomic Study of the Family Bryaceae (sensu lato, bryopsida) in China, by Zhao Jian-Chen & Liu Yong-Ying (editor in chief), Hebei Science and Technology Press, Shijiazhuang 2021, 433pp. The book divided Bryaceae (sensu lato) into two families, Bryaceae and Mielichhoferiaceae. There are 6 genera, 78 species and 2 varieties in Bryaceae and 5 genera and 35 species in Mielichhoferiaceae reported in China.

Taxonomic revision of Lejeuneaceae subfamily Ptychanthoideae (Marchantiophyta) in China, by Jian Wang, Rui-Liang Zhu, S Robbert Gradstein. *Bryophytorum Bibliotheca* 65. Stuttgart: J Cramer in der Gebr. Borntraeger Verlagsbuchhandlung. 2016, 141 pp. This work is the first treatment of subfamily Ptychanthoideae of China and provides descriptions and illustrations of 38 species, in 11 genera. The genus *Gradsteinianthus* R.L.Zhu & Jian Wang is newly described, and 4 species are newly recorded from China. The occurrence of *Lopholejeunea applanata* in China is reconfirmed.

Flora of the Liverworts and Hornworts of Qinling Mountains, China, by Jia Yu, He Qiang, Wu Peng-Cheng, Wang Mei-zhi. Science Press, Beijing, 2021, 308 pp. 273 species, 11 subspecies and 20 varieties belonging to 86 genera, 47 families are reported from Qinling Mountains, China where G. Giraldi collected many bryophyte specimens in 1889 and 1894, a lot of new species of mosses and liverworts were published by Muller, C. (1896–1898) and Mossalongo C. (1897), respectively.

Field Guide to Wild Plants in China, Bryophytes, by Zhang Li, Jia Yu & Mao Li-hui, Commercial Press, Beijing, 2016, 327 pp. This portable book recorded 286 species of bryophytes, including 204 species of mosses, 77 species of liverworts and 5 species of hornworts, with field pictures.

A Glossary of Terms and Names of Bryophytes (New Edition), by Wu Peng-cheng, Huang Mei-zhi & Jia Yu. China Forestry Press, Beijing, 2016, 356 pp. This is a useful reference book for bryological researches. The book contains terms (English and Chinese) and names (Latin and Chinese) of bryophytes in China.

Biodiversity and Conservation of Bryophytes, by Cao Tong, Guo Shui-liang, Lou Yu-xia, Yu Jing, Zuo Ben-rong, Chen Yi. China Forestry Press, Beijing 2011, 166 pp. As one of series of popular science books on the conservation of biodiversity in China, the book introduced basic knowledge and conservation of bryophytes for public.

A Miniature Angels in the Plant Kingdom, an Introduction to Bryophytes (Chinese-English Edition), by Zhang Li, Zuo Qin & Hong Pou-leng. Guangdong Science & Technology Press, Guangzhou, 2015, 147 pp. This book, written both in Chinese and English, briefly introduces elementary knowledge about bryophytes. The diversity of bryophytes in China and the conservation strategies for bryophytes are presented as well. The interesting stories with beautiful figures and pictures of bryophytes are attractive.

The Magic and Enchantment of Bryophytes (Extended Edition), by Zhang Li, Zuo Qin & Mao Li-Hui. Jinsu Phoenix Science & Technology Press, Nanjing, 2019, 231 pp. This unique book includes 110 bryophytes species, most accompanied by beautiful paintings.

Indication and Response of Bryophytes to the Environments, by Cao Tong, Guo Shui-liang, Lou Yu-xia, Yu Jing, Zhang Yuan-xun & Zuo Ben-rong. Science Press, Beijing. 2014, 251 pp. Based on environment researches in Shanghai city and Yangtze Delta region, the methods and results of Indication and Response of bryophytes to the environments pollution are presented in the book.

Chemistry and Biology of Bryophytes, by Lou Hong-xiang (editor in chief), Science Press, Beijing. 2012, 696 pp. The book reported the results of study on chemistry of more than 200 species of bryophytes.

Bryophyte Flora of Guizhiou, China. Volumes 1 & 2, by Xiong Yuan-xin, Guizhou Science and Technology Publishing House, Guiyang. 2014, 509 pp (vol. 1), 685 pp (vol. 2). *Volume 3* by Xiong Yuan-xin & Cao Wei, 2018, 720 pp. *Bryophytes Flora of Guizhiou, China* is divided into 3 volumes. Volumes 1 and 2 recorded 1033 species, 5 subspecies and 29 varieties belonging to 278 genera, 56 families of mosses distributed in Guizhou Province. Volume 3 recorded 498 species, 8 subspecies, 14 varieties and one form belong to 95 genera, 44 families of liverworts and hornworts in Guizhou. Guizhou Province is in south-west China and has one of the richest bryophyte flora of all provinces, with over 1500 species of bryophytes known from China.

Illustrations of Bryophytes in Guizhou of China: Volume of common species, by Xiong Yuan-xin, Guizhou Science and Technology Press, Guiyang, 2011, 362 pp. This book recorded 539 common species of bryophytes with nice pictures in Guizhou Province.

Bryophyte Flora of Mt. Fanjing, by Xiong Yuan-xin, Shi-lei, Volumes 1 & 2. Guizhou Science and Technology Press, Guiyang, 2014, 290+516 pp. This book records 657 species (including subspecies, varieties and forms) of bryophytes belonging to 222 genera and 55 families in Mt. Fanjing Nature Reserve, Guizhou. Each species is attached with beautiful color photos.

The list of freshwater Phytoplankton & Bryophytes in Guizhou, China, by Xiong Yuan-xin, Yan-lin, Cao-wei, China Forestry Press, Beijing 2021, 314 pp. This book recorded 1658 bryophytes (including subspecies, varieties and forms) in Guizhou Province, China.

Research of Bryophytes Diversity of the Intersection Converge of Guizhou, Chongqing, Hunan, Hubei, by Xiong Yuan-xin (editor in chief), Guizhou Science and Technology Press, Guiyang, 2007, 281 pp. The Intersection converge of Guizhou, Chongqing, Hunan, Hubei lies in the central section of China with the geographical position from 108° to 110°E in longitude and 23° to 30°N in latitude. The book recorded 1026 bryophytes (including subspecies, varieties and forms) belonging to 267 genera and 76 families in the region.

Plant Diversity of Macrofungi, Bryophytes, and Ferns in the Jinping Watershed area, by Ma Wen-zhang (editor in chief), Yunnan People's Publishing House, Kunming, 237 pp. The book recorded 523 species of bryophytes including 308 species and 2 varieties of mosses, 212 species and 2 varieties of liverworts and 3 species of hornworts in the Jinping Watershed area of Yunan Province, Southwest China. A new genus (*Rheoshevoekia* Ignatov, W. Z. Mao & D. G. Long) and two new species (*Pogonatum shevoekii* Hyvonen and *Rheoshevoekia fontana* Ignatov, W. Z. Mao & D. G. Long) were found in the region.

Bryophyte Flora of Shandong, by Ren Zhao-jie, Zhao Zun-tian (editor in Chief), Qingdao Press, Qingdao, 2016, 450 pp. The book reported 514 species, 3 subspecies, 16 varieties belonging to 180 genera, 77 families of bryophytes in Shandong Province which is located at North region of China.

Bryophyte Flora of Mt. Kunyu. by Li Ming, Ren Zhao-jie, Yang Xiao-yan, Shandong Friendship Publishing House, Jinan, 2017, 390 pp. The book reported 381 species, 5 subspecies and 2 varieties belonging to 144 genera and 64 families of bryophytes from Mt. Kunyu of Shandong Province.

Bryophyte Flora of Mt. Meng, by Zhao Zan-tian, Ren Zhao-jie, Science Press, Beijing, 2020, 376 pp. The book reported 332 species, 2 subspecies and 7 varieties belonging to 122 genera and 55 families of bryophytes from Mt. Meng of Shandong Province.

Bryophyte Diversity in Mt. Meihua National Nature Reserve, Fujian, by Jia Yu, Wu Jingping (editor in chief), China Forestry Press, Beijing, 2021. The book recorded 408 species belonging to 197 genera and 78 families of bryophytes from Mt. Meihua National Nature Reserve, Fujian Province, China.

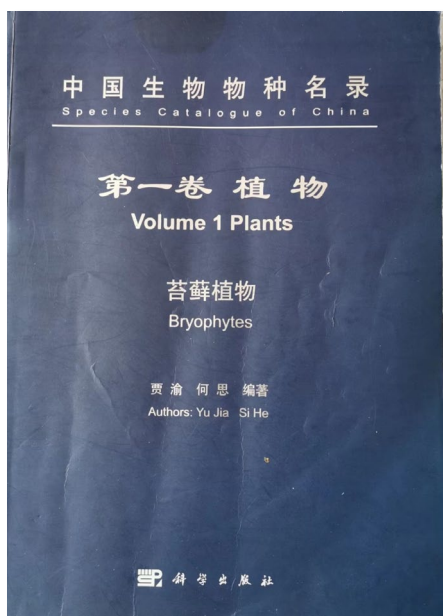
The Colour Illustration of Bryophytes from Volcanic Lava Landform at Wudalianchi, by Bai Xue-liang, Zhao Dong-ping, Inner Mongolia University Press, Huhehaote, 2018, 467 pp. The book recorded 231 species and varieties belonging to 120 genera and 45 families of bryophytes from the volcanic lava landform at Wudalianchi region of Helongjiang Province, Northeast China.

Study of Species Diversity and Flora of Bryophytes in the Main Mountains of Shanxi Province, by Wang Guihua. Ocean Press, Beijing, 2012, 192 pp. The book reported 333 species belonging to 136 genera and 5 families of bryophytes in the main mountains of Shanxi Province, North China.

Flora of Heilongjiang Province, Volume 1 (Liverworts and Hornworts) (revised edition), by Sha Wei, Zhang Mei-juan, Bai Xue-liang, Ma Tianyi, Northeast Forestry University Press, Harbin, 2017. This book recorded 147 species, 4 subspecies and 12 varieties belonging 55 genera, 34 families of liverworts and Hornworts in Heilongjiang Province, Northeast China.

Flora of Heilongjiang Province, Volume 2 (Mosses), by Sha Wei, Zhang Mei-juan, Wang You-fang, Northeast Forestry University Press, Harbin, 2013. This book recorded 325 species, 4 subspecies and 32 varieties belonging 139 genera, 38 families of mosses in Heilongjiang Province, Northeast China.

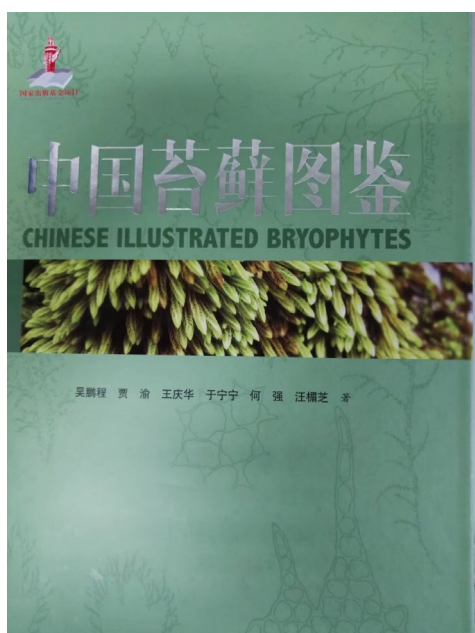
Covers of some books for reference



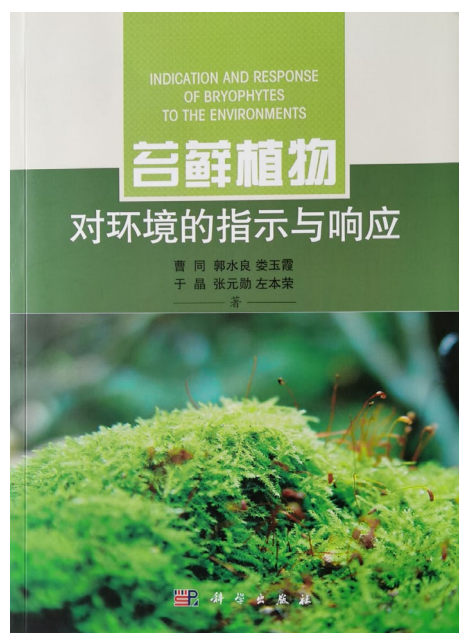
Species Catalogue of China, Volume 1: Plants, Bryophytes



Plants of China in Colour, Volume 1, Bryophytes



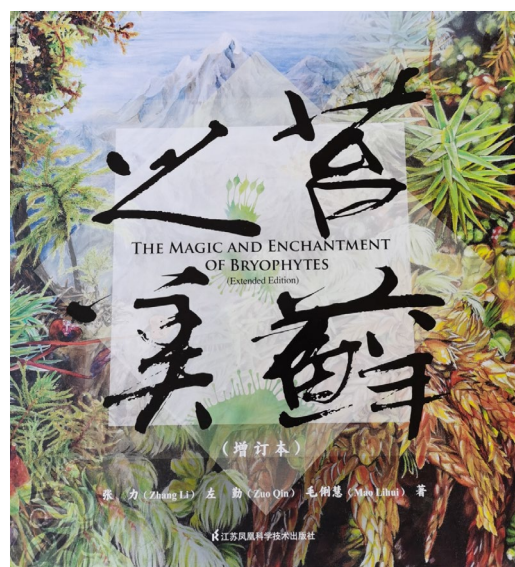
Chinese Illustrated Bryophytes



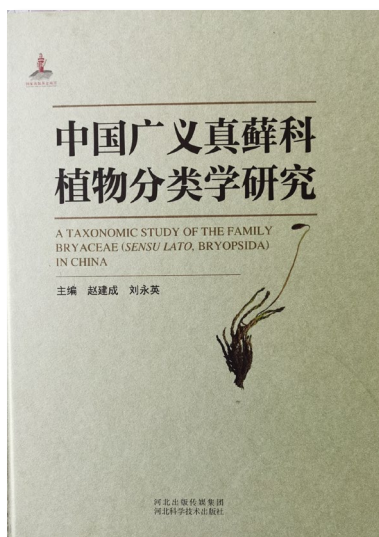
Indication and Response of Bryophytes to the Environments



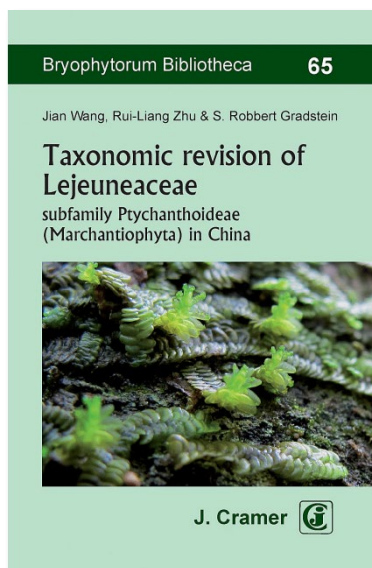
A Miniature Angels in the Plant Kingdom, an introduction to Bryophytes (Chinese-English Edition)



The Magic and Enchantment of Bryophytes (Extended Edition)



A Taxonomic Study of the Family Bryaceae (sensu lato, Bryopsida) in China



Taxonomic revision of Lejeuneaceae subfamily Ptychanthoideae (Marchantiophyta) in China



Illustrations of Bryophytes in Guizhou of China

Nominations for the 2023 Richard Spruce Award, Hattori Prize and Riclef Grolle Award

Dear IAB members,

Every two years IAB honors the accomplishments of various members with specific awards. In 2023, we will adjudicate the Richard Spruce award for important contributions to bryology, within the first 25 years of their career (dated from their first bryological publication), the Hattori Prize, for best book, paper or series of papers published within the previous two years (i.e. 2021–2022) in a journal or book and the Riclef Grolle Award for Excellence in Bryodiversity Research for outstanding contributions in bryodiversity.

For these awards, the respective ad hoc committees propose candidates but will seek nominations from our members. I encourage you to consider developing strong nominations for meritorious colleague for these competitive awards. We will send out a call for nomination later this year for adjudication to begin in the Spring.

Furthermore, IAB will hold two competitions to support bryological research through the Stanley Green Award and the Conservation and Endangered Species Grant.

For more information on the awards and grants please see our webpage at:

http://bryology.org/get_involved/awards-grants/

Sincerely,

Bernard Goffinet

IAB President

Recent activity in Mexican bryology

Claudio Delgadillo-Moya

Instituto de Biología, National University of Mexico

Current pandemia has affected many bryological activities in our area. Students in foreign programs are perhaps those best holding up while those left behind continue their research programs at a slower pulse. In the interval a couple of publications resulted from studies in our lab. Two moss species, *Meteorium flexicaule* and *Aligrimmia peruviana*, have been reported for the Mexican flora; they are disjunct taxa with known ranges in South America and elsewhere. The former taxon is represented by a single specimen collected in a mesophyllous forest of eastern Mexico in 1978 while the second was discovered only 4 years ago in the alpine area of Nevado de Toluca in the central highlands but was described more than 120 years ago.

A group effort resulted in the revision of *Manual de Briofitas*, a text for students and teachers with general information on bryophytes. With numerous drawings, photographs, and bibliographic citations, the text intends to emphasize what is known about bryophytes with examples on tropical (American) taxa. It is a digital production freely available for everyone at:

http://www.ibiologia.unam.mx/barra/publicaciones/3a-edicion_Manual-Briofitas.pdf

More than 50 years have elapsed since a bryological program was established in Mexico. An article on the subject was recently published in *Botanical Sciences* 100. The bryophyte collection at MEXU is perhaps the highlight of this article since it is the largest in the country, but contributions by other Mexican bryologists are beginning to show in the environment of Mexican botany. They may become evident in the forthcoming XXII Mexican Botanical Congress in Puebla in September.

The consequences of COVID: from heathland wildfires to ancient woodlands

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The advent of COVID-19 at the end of 2019 had major consequences for our bryological activities. Access to laboratory facilities at the Natural History Museum and the Royal Botanic Gardens, Kew was greatly restricted and there were major curbs on travel. We therefore diverted some of our bryological endeavours to local low tech fieldwork with some surprising and rewarding results.

Heathland fires

After a short break due to the total lockdown that forbade even short distance travel in 2020 we resumed our monthly documentation of bryophyte recolonization at Thursley and Chobham Commons following major fires on these lowland heaths in late May and August 2020 respectively (Pressel et al. 2021). We now have almost two years detailed data on the phenology of the immediate post-fire colonists *Funaria hygrometrica*, *Ceratodon purpureus* and *Marchantia polymorpha* var. *ruderalis*, together with the later arrival of *Campylopus introflexus* and the gradual spread of *Polytrichum juniperinum*.

Over the course of a year *Funaria* may have several reproductive cycles whereas *Ceratodon* has only one with fertilization limited to a short period in the autumn. As after the 2006 fire at Thursley (Duckett et al. 2008; Duckett and Pressel 2009a; Pressel and Duckett 2019), *Marchantia* has now had two years of rampant sexual reproduction. But to our surprise, prolific gemmae production was limited to the young immediately post fire thalli in parallel with juvenile protonemal gemma formation in *Ceratodon* and *Funaria* (Duckett et al. 2004). A further revelation was that the maturation cycles of male and female *Marchantia* are asynchronous. Antheridiophores develop 2–3 months earlier than the archegoniophores with an interval of up to two months between the onset of antheridium maturation and sporophyte dehiscence. After sporophyte maturation many of the thalli were overgrown by *Ceratodon*. This new information on *Marchantia* in nature now needs to be considered in the uses of this liverwort as a model organism.

What happens next to the *Marchantia* is an open question. We are now in the middle of the driest summer in Britain since 1976 and the driest July since records began in 1836. All the thalli are completely desiccated and appear to be dead although spores are still being released. In 2022–2023 will we see a third season of

Marchantia reproduction, or will the burnt areas, still with extensive bare ground away from lawns of *Funaria* and *Ceratodon*, then become completely covered by *Funaria* and *Ceratodon* before these in turn give way to *Campylopus introflexus* and *Polytrichum juniperinum*?

Urban woodlands

Following a detailed analysis of roadside trees in London (Duckett and Pressel 2019) we identified a second urban bryological target; the ancient woodland remnants and secondary woodlands in the London conurbation (vice county 21, Middlesex). We have now made detailed surveys of over 80% from a total of around 35 sites. From a maximum of 80 mosses and 21 liverworts most woodlands contain 20-40 species. Epiphytes are as diverse as on the free-standing roadside trees (Duckett and Pressel, 2019) but the species are very different. Woodlands are an almost *Syntrichia*-free zones whereas the *Orthotrichaceae* are more diverse with no fewer than 14 species now recorded. *Zygodon viridissimus* and *Z. rupestris* are equally common, which is a pain when you lack access to a microscope to confirm their identity. Whereas *O. diaphanum* is by far the commonest roadside epiphyte it rarely occurs in woodlands. A notable change over the last 4 years is the increasing frequency of *Orthotrichum stramineum* on *Carpinus betulus* (Hornbeam) from its first London record in 2009.

Epiphytic liverworts are much commoner and more diverse in London's woodlands than on street trees. These liverworts include *Frullania dilatata*, *Metzgeria consanguinea*, *M. furcata* and *M. violacea*, *Radula complanata* with the presence of *Cololejeunea minutissima*, which was first recorded in London in 2006 (Duckett and Pressel, 2009b), in almost every wood particularly striking. All these species, except *M. furcata*, were unknown or extinct in London prior to the Clean Air Acts of 1956 and 1968. Epiphyte diversity in London is now probably as good as it's ever going to be and is closely similar to that in the surrounding more rural counties.

Not so the ground flora of the woodlands. This is extremely species-poor with even characteristic woodland species like *Cirriphyllum piliferum*, *Thamnobryum alopecurum* and *Thuidium tamariscinum* decidedly uncommon. We attribute this to high footfall and dog deposits as evidenced by the high frequency of dog walker encounters during our fieldwork. A further negative is a handful of species in decline most notably *Aulacomium androgynum*. *Dicranoweisia cirrata*, *Dicranum flagellare*, *D. scoparium*, *D. tauricum*, *Leucobryum* and *Lepidozia reptans*. Overall these losses are indicative of a reduction in acidic habitats whilst the decline of *Dicranum flagellare* is due to a loss of old *Carpinus* coppice stools.

This account has two important messages:

- 1 If there is a fire near you get out and record bryophyte recolonization as detailed temporal studies like this one are virtually non-existent.
- 2 Document your local roadside and woodland bryophytes. These have changed radically in London this century due to milder winters and increased Nox deposition from car exhausts. In 20 years' time London's bryophytes will almost certainly not be the same as the climate will continue to change and we will (hopefully?) achieve the target of zero emissions.

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Male (left) and female (right) *Ceratodon*, 28 September 2021.



Spear stage *Ceratodon* sporophytes after heavy rain, 2 November 2021.



Highly gemmiferous *Marchantia* and *Funaria*, 7 September 2020.



Marchantia, young and mature antheridiophores, 15 December 2020.



Marchantia, young females, 25 March 2021.



Marchantia, overrun by *Ceratodon*, 30 November 2021.



Marchantia, totally desiccated thalli, 28 July 2022.



Coldfall Wood, oak standards and coppiced hornbeam typical of ancient woodlands in London, 27 February 2021. Note the absence of ground flora.



Orthotrichum stramineum. A new arrival in London and spreading on coppiced hornbeam.

Fieldwork on Mt Kenya and Mt Kilimanjaro after the COVID restrictions

Tamás Pócs

Eszterházy Károly Catholic University, Eger, Hungary (pocs.tamas33@gmail.com)

Tamás Pócs, with his small field group (Ms Judit Havasi, Mária Szegedi and Mr Bence Együd), visited of Mt. Kenya during August 2021, with the help and guidance of Itambo Malombe (Kenya National Museums, East African Herbarium) to survey bryophyte diversity in his seven sampling plots on the eastern slopes along Chogoria Trail, between 1600 and 3000 m elevation. Later they visited Malombe's study plots on Taita Hills, southern Kenya. Their new records are published in Malombe et al. (2022).



The field group in action. Tamás Pócs and Judit Havasi, Mt Kenya, Chogoria trail, 2300 m (photo B. Együd).

During February 2022 Tamás Pócs participated in the project 'The role of nature for human well-being in the Kilimanjaro Social-Ecological System' lead by Andreas Hemp (Bayreuth University and Kidia, Old Moshi) on the southern slopes of the mountains, between 500 and 3800 m elevation. The collecting trips were organized by Andreas Hemp to survey the bryodiversity of his long ago established experimental plots in the natural forest and savanna habitats, partly heavily damaged by the intensifying bush fires and the secondary habitats of grasslands, coffee plantations and traditional Chagga home gardens. The latter habitats yielded many new records for the bryoflora of Mt. Kilimanjaro, being refugia of the former hill and lowland forest habitats (joint paper in preparation).



Regeneration of moss layer of a burnt down subalpine *Erica* bush near Horombo Hut, at 3700 m elevation (photo T.Pócs).



Chagga home garden with banana, coffee and castor plant under shade trees on the south-eastern slope of Mt Kilimanjaro E of Mwika village at 1560 m elevation (photo T. Pócs).

Reference

Malombe, I., Patel, M., Mugambi, G.K. & Pócs, T. (2022): New records to the bryoflora of the E slope of Mt. Kenya. *Acta Biologica Plantarum Agriensis* 10(4): 4—12. <https://doi.org/10.21406/abpa.2022.10.4>

Equity, diversity, and inclusion: bryology unites us

Chris Cargill, Pina Milne and Mereia Tabua

Much has been written about the greats in bryology and deservedly so. Micheli, Dillenius and Hedwig are well-known men in the early days of bryophyte studies. But who were the early women bryologists?

The British Bryological Society (the oldest bryological society in the world) has a section on their [new website](#) (which is fabulous) entitled [Bryohistory](#), which is a social and biographical history of British and Irish field bryologists. Mark Lawley has written short biographies of these men and women, including the earliest account of a woman in British and Irish bryology, Ellen Hutchins. Mark's list includes just five known women prominent in the 19th and early 20th century in Britain and Ireland.

For North America, the American Bryological and Lichenological Society (ABLS) was founded by Elizabeth Gertrude Britton in partnership with Abel Joel Grout, and of the 34 founding members, Annie Morrill Smith was an editor of *The Bryologist* for 10 years. There have been 11 women presidents of the ABLS over its 123-year history. Lewis Anderson has written a fascinating early history of the society which is available through the ABLS website and writes candidly about three women who were important in the history of the society and bryology in the USA — Elizabeth Gertrude Britton, Annie Morrill Smith and Margaret Fulford.

For Australasia, Sara Maroske and Alison Vaughan in their article [Ferdinand Mueller's female collectors: A biographical register](#), list three early collectors of bryophytes: Amalie K. Dietrich (1821–1891), Helena Scott (1832–1910) and Flora M. Campbell (1845–1923). The Australian Bryological Newsletter which commenced in 1979 was produced by three Australian women bryologists, Helen Ramsay, Patricia Selkirk and Alison Downing. The first Australian Bryophyte Workshop was held in 1988 in Tasmania organised by Paddy Dalton, bringing together both amateur, professional and student bryologists every two years. Dr Ilma Stone was probably the first leading Australian woman bryologist in the 20th century. Ilma came back to botany late in life, publishing her first bryophyte paper at the age of 48 (see her [biography](#)). She made over 26,000 collections which are found in every state and territory herbarium in Australia, but the vast majority (just over 25,000) have been lodged at the National Herbarium of Victoria (MEL).



(Left to right): (a) Amelie Dietrich, (b) Helena Scott, (c) Elizabeth Gertrude Knight Britton.

Sources: (a) State Library of Queensland, (b) Australian Museum, (c) LuEsther T. Mertz Library, New York Botanical Garden

Across the ditch, the New Zealanders have held the John Child Bryophyte and Lichen Workshop annually since September 1983, the most recent being the 37th workshop in 2019. Allan Fife and [Bryony Macmillan](#) from Christchurch herbarium (CHR) organised the very first one, though Bryony was unable to attend due to work commitments. But two prominent New Zealand women bryologists in the past have advanced the study of liverworts and hornworts of that country — Amy Hodgson, a New Zealand farmer and self-taught botanist, and Dr Ella Campbell, an academic at Massey University, Palmerston.

As an anglophile I (Chris Cargill) know very little of the history of other women in bryology in other countries, particularly in developing countries. My colleagues, Pina Milne and Mereia Tabua, who have also contributed to this article, will have had different experiences. But we are all in agreement, that we are wanting to raise awareness of all women who have contributed to bryology.

In conjunction with our project to raise the profile of living women in bryology, launched to celebrate the 7th International Day of Women and Girls in Science, we are wanting to honour those who have gone before us.

We would like to invite *all* bryologists to send links or short biographies of women bryologists who have contributed to bryology in your own country or region. A number of women bryologists are featured on the following Wikipedia page: https://en.wikipedia.org/wiki/Category:Women_bryologists.

Lastly, please visit [Women in Bryology](#), which is updated every month, for current biographies featured from around the globe.

Try sharper razor blades for freehand sectioning of bryophytes

Richard H. Zander

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After 50 years of struggling with ‘industrial’ quality single edge razor blades to section moss leaves and stems, it came to me that there may be sharper blades. That is, ones that would not rebound from stiff stems, seldom cut thinner than two or three cells deep, or tear leaves into fragments. A quick search of the Web found that much sharper blades were available from many manufacturers. The sharpest razor blades are made from very hard steel, have one narrow bevel (angle of grind) on each side, and are quite thin—a steel foil. Blades that last the longest have some trade-offs: They have three different bevels, with ultimately a narrow, rather broadly ground edge. The triple-bevel blades approximate a rounded edge and are not as sharp as single or double bevel blades.

A comparison of blade sharpness can be found on the [Refined Shave](#) website with options for purchasing them from Amazon with one click. Price comparisons are then easy. Smith (1980: 1) has pointed out that double-edge razor blades give better results than single-edge for free hand sectioning. Excellent double-edged blades can be had for about US\$0.10 per blade. The sharpest double-edged blades are apparently the Feather brand, which costs US\$0.33 to 0.40 per blade. I bought a pack of 100 Astra Superior Platinum double-edge blades (Amazon about US\$0.09 per blade). I found that I was able to obtain good sections from a tiny moss previously quite refractory to adequate preparation. Even better sections were made with the Feather brand blade, at \$0.33 per blade.

Single-edge razor blades are definitely safer, as one edge is sealed with a fold of metal, and the thicker and stiffer steel will be less likely to shatter with pressure. Some vendors distinguish between ‘industrial quality’

and ‘hardware store’ single-edge razor blades, the former apparently being better. Single-edge industrial quality razor blades available from Carolina Biological Supply (about US\$0.29 each) and from MicroMark (about US\$0.10 each) have two bevels, a wide one then a narrow one along the very edge. The grinding is sometimes a bit irregular and the margins of the bevels (not the actual edge which is straight) can be wavy. Gem brand single-edge razor blades (US\$0.20 each), however, have three bevels, and the margins of the bevels are quite straight. The three bevels ensure that the blades will dull less quickly. In daily use there is not much difference between all three single-edge blades. One should expect to use a new blade every day or hour depending on constancy and intensity of use.

There inevitably comes a time when one must section very small or very fragile or very small and fragile plants. With critical or scanty material the sharpest blade gives the most copious and thinnest sections. Because the thinnest steel is commonly the sharpest and a double-edge blade has the narrowest angle of bevel, it can effectively replace, in critical situations, the work-horse, sturdy single-edge (Gupta et al. 2012: 115). I split the double-edge blade lengthwise by cutting it still in its wrapper with heavy scissors or shears. This halves the cost per blade. Avoid breaking the blade to reduce the possibility of flying shards. A strip of tape folded along the back of the half-blade facilitates handling (Yeung et al., 2015: 12). After use, dispose of the blade in a “sharps” box or the equivalent. Razor blades may not be sharper than microtome, ceramic or glass knives, but care should be taken in handling and in laying them down temporarily in a much used area of the workbench. Students should become adept with the single-edge blade before advancing to the samurai level.

I use the standard ‘roll and chop method’ described by Glime and Wagner (2017: 2-2-32). I remove most leaves of a plant in a drop of 2% KOH solution on the far right of a slide, and put some leaves or a short portion of the stem in the middle of the slide for sectioning. A very small drop of glycerol goes on the material to section to aid in pushing sections away from the blade so they are not over-cut. Turning the slide vertically, I use a probe to hold the leaves or the stem portion, then chop with a slicing motion across one or several leaves at once while rolling the probe towards the material incrementally exposing more of the leaves. The stem is sectioned last.

The blade and probe are scraped into the drop to remove adherent sections, then cleansed with a small paper towel. A mounting solution of 30% glycerol and 70% clear polyvinyl alcohol glue is added with a dropper bottle to both the sections in the slide center and segregated full leaves to the right. Be generous, the mounting solution shrinks when it solidifies. On the left of the slide I add a label made by cutting squares from stiff paper (Bristol board), gluing it on the left with clear polyvinyl alcohol or white polyvinyl acetate glue. Never use pre-glued adhesive labels because they eventually fall off. Using a 0.30 mm point artist’s pen with indelible ink, I add the species name, country of origin, first collector’s last name, collection number, and herbarium acronym. The slides are stored on standard herbarium corrugated cardboard sheets, with rims of narrow corrugated board strips cut with a cutting board. These are stackable and easy to handle.

A final word: If a leaf is big enough, good sections can be made with any razor blade. Patience and multiple tries are needed for any very small leaves. If, after much tedious chopping, no decent sections appear, you are tired and should do something else for a while or go home. ‘Sufficient unto the day...’

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Introduction to Bryophytes Workshop for High School Students conducted in Kadaclan, Mountain Province, the Philippines

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Beginning in 2019, the Benguet State University (La Trinidad, Benguet Province) have organized a series of workshops for high school students as part of the project “Documentation of Traditional Knowledge and Practices on Health and Development of Digital Library on Health: Kankanaey-Palina of Kibungan, Benguet and Ikachakran Ethnolinguistic Group of Barlig, Mountain Province” funded by the Department of Science and Technology of the Philippines. Recognizing the role of the youth in community building, the workshops covered a variety of topics including graphic design, photography, ethnobotany, and plant taxonomy. The project –albeit mainly focused on indigenous knowledge systems and practices on health –also highlighted the role of biodiversity and taxonomy as factors in the interaction between the natural and social domains. In line with this, I was given an opportunity to introduce the bryophytes and bryology to the students of Kadaclan National High School in Mountain Province, the Philippines last 27 June 2019.

Situated along the northeastern slope of the Amuyao Range in Luzon’s Cordillera Central, the Kadaclan Ancestral Domain is covered by large tracts of intact mossy forests particularly along the upper slopes and in mountain peaks frequently veiled in fog and mist. The lower slopes, on other hand, are dotted with *satoyama*-like landscapes which are dependent on the numerous creeks and streams running through the domain. This variety of habitats, coupled with the climate and terrain of the area, resulted to an array of bryophyte species thriving in the domain –making Kadaclan and its environs an ideal field laboratory for the workshop.

A part of a series of workshops organized for a week-long event, the Introduction to Bryophytes Workshop was structured as a one-day activity for 15 participants. The workshop started at 8:30 in the morning with a lecture on the characteristics and importance of the bryophytes together with the similarities and differences between the three bryophyte groups. Locally known as *lumot*, *fokater*, or *forrakhot* depending on the substrate, bryophytes and lichens are particularly familiar to the people of Kadaclan, the *ikachakran*; hence, the participants were able to recognize and distinguish some of the bryophyte species presented in the lecture especially those found in the Cordillera Central. With such a cornerstone already in place, the workshop served more as a supplement and reinforcement rather than an introduction –highlighting the role of local knowledge as a valuable source of information on the natural world. After a 30-minute recess, the workshop resumed with an introduction to the basics of carrying out field research in bryology. The topics covered were bryophyte habitats as well as the collection, preparation, and preservation of bryophyte specimens. The lecture served as preparation for the outdoor activities scheduled for the afternoon.

For the afternoon session, we proceeded with the collection of bryophyte samples in the vicinity of the Kadaclan National High School. Practically present all over the place, the bryophytes collected by the participants represent a variety of habitats including waterways and soil banks in rice terraces, forested roadsides, and built-up areas. With only one sample per participant as the requirement, I was amazed and delighted by the fact that some of them collected two or three each on the grounds that one specimen is clearly different from the others and from those collected by their groupmates. With about 20 specimens collected, we headed back to the school and processed the samples. The major limitation encountered in the event, however, is the limited number of microscopes as well as the unavailability of functional compound microscopes; hence, some had to rely on magnifying lenses in examining the specimens. To compensate, we decided to project some available photomicrographs of representative specimens from the Cordillera Central

to familiarize the students to the microscopic features of bryophytes discussed in the lecture. With hopeful prospect, we planned to organize a follow-up session on microscopy techniques in bryology temporarily scheduled for 2020.

However, with the onset of the global health crisis in early 2020, the succeeding workshops were suspended indefinitely. With the gradual easing of restrictions in the Philippines, we hope to resume our activities by late 2022 or early 2023.



The author introducing basic concepts to high students of Kadaclan National High School, Mountain Province, the Philippines. Photo by Andrew V. Basbas Jr., with permission.

The introduction of basic concepts and terminologies used in bryology to the high school students of Kadaclan may serve as a starting point in engaging and equipping them in the study of a plant group very much familiar to them. Being located in the Amuyao Range, Kadaclan is part of one of the moss diversity hotspots in Malesia designated by B.C. Tan and Z. Iwatsuki (1999, *Bryobrothera* 5: 247-252) and is home to perhaps one of the most intact mossy forests in the Cordillera Administrative Region. With indigenous knowledge preservation and environmental conservation in mind, equipping and empowering the youth as future leaders of the community is of paramount importance.

Workshops on graphic design and photography equipped them with practical knowledge on the documentation of their culture, traditions, and environment. Likewise, workshops on the taxonomy of bryophytes and vascular plants provided them with an introduction to carrying out botanical research in their resource-rich ancestral domain. The skills acquired from these activities are particularly essential for the preservation of the indigenous knowledge systems and practices of the *iKachakran* as well as in updating the Kadaclan Ancestral Domain Sustainable Development and Protection Plan. In supplement to this, a complete set of bryophyte specimens collected by the author from nearby mountains as well as those collected by the participants will be

deposited at the Indigenous Peoples Education (IPed) Center of Kadaclan National High School to serve as a reference collection. In that regard, I hope that the workshop fulfilled its purpose and raised curiosity on the rather minute but abundant bryophytes in Kadaclan.



Participants collecting bryophyte samples in the vicinity of Kadaclan National High School, Mountain Province, the Philippines. Photo by Andrew V. Basbas Jr., with permission.

Special thanks are due to our project leader Dr. Ruth S. Batani, study leader Dr. Jones T. Napaldet, and research associates Rhea S. Loncio and Andrew V. Basbas Jr. of the Benguet State University for organizing the event and for giving me the opportunity to be a part of this endeavor. Also, I would like to thank Anita T. Minong, Hawkins Q. Abellera, Mrs. Brenda P. Fiangrayan and the teachers of Kadaclan National High School for their support and assistance as well as Mr. Dionne Chungalan Jr. and Mr. Patrick Pul-agan for their assistance during our stay in Kadaclan. The project and its related activities are funded by the DOST Philippine Council for Health Research and Development.

Bryological activities of Philip Sollman, The Netherlands, over the last 30 years

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Introduction

About 30 years ago I retired from my work at school. After that I got a lot of leisure time available to work especially on bryological subjects.

Herbarium B.O. van Zanten (The Netherlands)

A large main project was and still is the bryological herbarium of B.O. van Zanten. This is now largely incorporated in herbarium at Leiden (L), The Netherlands.

Over the last years I did a lot of work mainly in the extensive often stored parts of his bryological, tropical collections.

A high priority has especially the work of making completely accessible his tropical material. Due to lack of personal in herbarium Groningen, The Netherlands, many of his tropical expedition material was still mainly stored. So, these collections were, one at a time, made accessible.

That is to say typed English labels were prepared and enclosed in the moss envelopes. The collections were also checked for interesting mixed in material. If these tufts were large enough, they were separated as an A (etc.) number. These were often hepatics. They are rather easy separated in a very wet condition. An administration system, next to the original fieldbook, was built up to keep overview in the (large) collections. At rather regular times, systematic groups were sent to specialists often abroad for identification.

Many material was already early pre-identified mostly to genus by B.O. van Zanten. Much were also pre-identified by the late A. Touw, then laborious in herbarium Leiden. This author (BOvZ) made several bryological expeditions, mainly to tropical countries that are still undercollected.

Several trips to Southeast Asia were organized, especially to Papua New Guinea, the Philippines and the Solomon Islands. Further various voyages were made to Australia and New Zealand. In 1993 I was invited to join the excursion to Australia, New Zealand and the Philippines.

A few African countries were visited: the Kingdom of Lesotho, the Republic of South Africa and Tanzania. In South America expeditions were made to Colombia and two times to Chile.

On several of these, above all fruiting bryophytes were collected. This material was used for his research on long range dispersal of the spores. The results were published by the author (BOvZ) in several publications.

However, still several tropical expedition collections are at the moment not fully accessible. In these - often stored material – still work is going on. These are especially two collections from Chile, one from New Zealand and one smaller gathering from Papua New Guinea.

At the moment these are at my address. A few others are stored in herbarium Wolvega (HFN), the Netherlands.

Identification work

Over the last years many tropical, unnamed material were identified. This work is done alternately with the above-described activity. Identification work was especially done with collections from tropical Asia. Pottiaceous mosses were studied from the following persons/herbaria:

- T. Koponen (Finland; H)
- S. Lisowski (Hungary; EGR)
- D.G. Long et al. (Great Britain; E)
- G. and S. Miehe (Germany; Pottiaceae in L)
- R. Ochrya (Poland; KRAM)
- T. Pócs (Hungary; EGR)
- R.M. del Rosario et al. (Philippines; PNH, partly L)
- J.R. Shevock et al. (USA; CAS)
- H. Streimann (Australia; CANB, L)
- A. Touw (Netherlands; L)
- B.O. van Zanten (Netherlands; L)

This concerns often material collected in the Himalayan region (Bhutan, China, India, Nepal, Pakistan) but also from other regions like Africa and Australia.

Revision work

Revision work on the genus *Hyophila* Brid. was carried out and already privately published by me. The taxa of the African continent were first revised, because of the very poor state of the bryological research.

Revision work on the genus *Anoetangium* Schwaegr. especially for the African mainland, is in preparation. Many studies of materials, including all the described types, have already been done.

An anti-virus mask from mosses

From the Press Office of the Warsaw University of Life Sciences, Poland

In December last year the Japanese Patent Office (JPO) published a patent application for the invention of a moss anti-virus half mask, which was filed by Professor Hazem Kalaji from the Warsaw University of Life Sciences.

The invention relates to reusable anti-viral respirators (primarily against influenza viruses) and ventilation mechanisms (elements) for buildings and vehicles made of moss that absorb viruses. The co-author of the invention is the virologist Dr. Seiya Sato, president of Green's Green Ltd. (<https://greensgreen.com/sunagoke-2/>) and employee of the University of Pharmacy and Applied Life Sciences in Niigata (<https://www.nupals.ac.jp/english/>), Japan.

The mosses are placed in a thin layer of transparent material that allows them to photosynthesize while the user wears the mask. The user's breathing provides the moss with adequate moisture and carbon dioxide. Mosses, in turn, provide the user with oxygen for breathing.

For further information, see the full press release at:

<https://media.sggw.pl/aktualnosci/716065/polmaska-antywirusowa-z-mchow>

Egyptian bryophytes

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The growth of bryophytes in Egypt is not luxurious; it can even be described, in most places, as poor. The best territories for their growth in the country are the mountains and wadis of the Sinai peninsula, particularly in the south where the highest (i.e. over 2500 m a.s.l.) mountains in Egypt exist, with snow forming at their summits.

Hitherto, slightly more than 200 bryophyte species are known from Egypt. The majority are mosses: only 13 hepatics have been reported. About half the number of the reported bryophytes occur in southern Sinai. In fact, and judging from the numerous unidentified moss specimens kept at CAIA, the actual number of mosses that grow in Egypt may be almost double the precisely identified number, so the number of mosses that grow in Egypt may reach 400 taxa (El-Saadawi et al. 1999). New records are therefore continually published (Shabbara & El-Saadawi 2006; El-Saadawi, et al. 2013; El-Sakaty et al. 2018; Lashin et al. 2022 and many others). I judge that many more new records would have been published if not for the COVID 19 pandemic, which hindered many activities.

Nevertheless, bryological activities are continuing. For example, Dr. M. Farag (a young bryologist at Ain-Shams University) recently made two bryophyte excursions: one to unexplored mountains and wadis in southern Sinai, and the other to oases in the south of the Western Desert of Egypt that have not been surveyed for bryophytes before. Many more new moss records are, therefore, expected to continue for years to come.

At the international level (thanks to Dr. Samar Nour-El-Deen, bryologist and palaeobotanist at Ain-Shams University) we keep involved, although moderately and at relatively long intervals (Ros et al. 2007, 2013; Wolski et al. 2021).

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Two extraordinary stick insects that mimic bryophytes

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Stick insects (phasmids) are well known for mimicking sticks or slender branches (and in some cases, leaves), and many add to that mimicry by resembling their habitat as well. The great naturalist Alfred Russel Wallace, who spent eight years in the Malay archipelago, described a phasmid (stick insect) that blended perfectly into its mossy habitat:

‘Sometimes they are exactly the colour of lichen-covered branches, and are covered with little foliaceous excrescences. One that inhabits the swampy forests of Borneo has these of a beautiful olive-green colour, so as exactly to resemble a creeping moss or jungermannia; and the Dyak who brought it me assured me it was very curious, for he had never before seen an insect grown all over with moss while alive! I was quite as much astonished as he was, for I could hardly believe my eyes, and it was only after close and repeated examination that I could convince myself it was not a real plant that covered the animal. This insect loses all its beauty when dried, and it has been very poorly figured by the Dutch naturalists, and very inappropriately named *Ceroxylus laceratus*, from its torn and shaggy appearance in the preserved specimens.’ — Wallace (1867: 178).

This phasmid, originally described as *Phasma laceratum* but now *Neoclides laceratus* (de Haan, 1842) is known from Sumatra, Kalimantan and Sarawak (Figure 1).



Figure 1. *Neoclides laceratus* camouflaged perfectly on bryophyte-rich wood in Gunung Mulu National Park, Malaysia. (© Minden Pictures / Alamy Stock Photo)

Another extraordinary bryophyte-mimicking phasmid is *Trychopeplus laciniatus* (Westwood, 1874), which inhabits the mountainous forests of Costa Rica, Nicaragua, Panama and Colombia (Figure 2). It was first described as *Ceroys laciniatus* by John Westwood, who unfortunately saw only a dried specimen and so described the colour as ‘fusco-luteus’; that is, brownish yellow (Westwood 1874: 174).



Figure 2. *Trychopeplus laciniatus* camouflaged on a bryophyte-covered vine, Cordillera de Talamanca mountain range, Caribbean Slopes, Costa Rica. (© Nature Picture Library / Alamy Stock Photo)

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The International Association of Bryologists was established in 1969 to promote international cooperation and communication among all persons interested in the biology of bryophytes. This is achieved through sponsorship and arrangement of meetings and symposia that relate to the various aspects of bryology, and by IAB-sponsored publications including *The Bryological Times* and *Bryophyte Diversity and Evolution*. The Association also supports the publication of reviews, lists, software, and compendia.

Website: www.bryology.org

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The deadline for the next issue is 28 February 2023.

Cover: Mossy stick insect *Neoclides laceratus* (see page 29).