

The Bryological Times  
March 1980, Number 2  
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## Cultivation of Mosses

WHENEVER bryophyte taxonomists gather to discuss taxonomic problems individuals invariably discover that others have trod the same path, at least in part, in attempting to conquer their difficulty. Frequently the outcome of the discussion is agreement that the only answer is to cultivate material in controlled environments. On returning to his/her work-place, however, further consideration results in doubts which give rise to inactivity or a course of action usually falling short of embarking on cultivation work which involves maintaining populations under conditions as close as possible to those in nature. The few workers who have actually gone on to pursue actively this approach and have produced relevant conclusions are spoken of in revered terms. Many never start and for those who do much work falls by the wayside for a variety of reasons and the crumbs of success (for rarely all is lost) are seldom made available to others. Is there a magic formula for success?

There is little doubt that cultivation of bryophytes is not easy but I am certain that many aspects are not as difficult as they are made out to be, as long as certain basic ground rules are adhered to. The following few notes are based on various attempts at cultivation of mosses over the last ten years.

Depending on the nature of the investigation and the material available the starting point may be spores, fragments or complete colonies.

i. Spores. Mature capsules may be stored dry with little loss of spore viability. Spores readily germinate on agar and simple microbiological techniques ensure an acceptable level of media sterility. In my experience protonematal development and bud formation will proceed easily, given adequate light and temperature regimes, and culminate in leafy shoot production. Where necessary the transfer of a thin layer of agar supporting the young leafy shoots can be made from a petri-

dish to an appropriate secondary substrate. The main problems arise with subsequent development.

ii. Fragments. The use of fragments as propagules, e.g. detached leaves, excised shoot tips or portions of stems with one or more leaves intact, is the quickest way of establishing the large quantities of material necessary in much growth work. But here the problem is to maintain sterile cultures over long periods. Complete sterilisation of a fragment is, in my experience, extremely difficult (and often fatal!). If a nutrient solution is used in the watering regime and agar as the substrate, in a closed petri-dish, the problem of contamination is exacerbated. One of the more successful methods of producing leafy shoots from propagules is not to use agar but to place the material, following a thorough washing in sterile water, on sterile sand or a substrate such as perlite in open dishes/pots in a well-ventilated cabinet. When a species is to be cloned it is not essential to retain the material in its natural growth form prior to replication. Thus it can be maintained in polythene bags, plastic boxes, plant propagators, environmental cabinets or on a mist bench depending on the length of time prior to fragment culture.

iii. Colonies. It is in the maintenance in cultivation of young shoots, arising from spores or fragments, as well as mature colonies gathered from the field, where the main problems lie. The establishment of basic watering and nutrient regimes to ensure growth (often in a range of environmental conditions) is obviously essential. Equally these regimes will vary according to the particular requirements of species.

The growth bench I use incorporates an air-conditioning unit at one end and misting equipment, the whole being enclosed by a polythene skirt. Temperature is maintained throughout the year at around 15°C. A restricted amount of daylight is supplemented by a battery of sodium lamps. Air above the material is constantly in motion due to the air-conditioner's action.

The mist units are separately controlled by automatic balances incorporating magnetic Reed switches.

The environment created on the bench is such that water-logging (easily the worst enemy of bryophyte cultivation) and fungal infection are avoided and a range of watering regimes is available. In these conditions I have had a measure of success with a range of mosses representing different growth forms. It would still be fair to say, however, that I can never be certain of success with a particular species.

I would welcome comments from other workers who perhaps have solved a cultivation problem during the course of work but which has not been published. I believe that much useful information regarding cultivation "do's and don'ts" is known but not generally available. Often the information in published accounts is not as accurate as it should be. For example how often has one seen statements such as "the material was watered regularly with nutrient medium X". Whatever does "regularly" mean and as the nutrient medium frequently is one of several named after an individual, which one has been used? Has the use of a particular nutrient solution been the end result of trying several? Information on disasters is as interesting as successes and this Newsletter offers an excellent medium for exchanging such snippets.

B.G. Bell, Institute of Terrestrial Ecology, Bush Estate, Penicuik, Midlothian, EH26 0QB, Scotland.

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#### SPECIAL FEATURE. PAGE

ALL EDITORS like to have at least one page which can be planned well in advance so that the production of an individual issue does not become too much of an eleventh hour operation. The present Editor is no exception! It is suggested that pages 1-2 might be regarded in this way and carry an article 2-3 columns in length. To be successful, the material should be topical, thus appealing to a large section of the readership. If the articles are written so as to stimulate comment, correspondence etc. so much the better. What do readers think?

All suggestions, offers of articles etc. will be gratefully received.

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## New IAB Project

AS A RESULT of discussions at the International Bryology Workshop at Geneva, 1979, it was recommended to the Council of IAB that the Association should sponsor the publication of a multilingual glossary of phytographic bryological terms and that a working group be set up for this purpose. Certainly there are glossaries of botanical terms in existence and even bryological ones which are used by many workers but they are not all widely available or known to everyone. At the Workshop it was stimulating to learn of the resurgence of interest in bryophytes in countries such as Mexico, Columbia and Israel and also to find that chemists, electron microscopists and other scientists are increasingly turning to bryophytes for research material. A standard set of terms should prove useful to such workers.

Even though the need for a glossary is more evident in the case of liverworts than in mosses, delegates to the Workshop felt that the glossary should cover the whole field of bryophytes.

The working group was asked to give special consideration to the practicality of the glossary being issued in a number of different languages. Another suggestion was that, once a draft in English was available, this should be circulated widely for comment to get as much acceptance as possible before it is sent to the printer. It was thought that it might be possible to have the English text finalised by the time of the International Botanical Congress in Sydney, in 1981.

For the present, the working group would welcome any suggestions as to the type of glossary which would be the most useful and the languages into which it ought to be translated. It would be a place in which new terms such as bryangium (see *The Bryological Times*, No. 1, p.6) could receive recognition if these were generally acceptable. The success of the project will depend on the ideas and cooperation of many people.

It is hoped to be able to announce the names of the members of the working group in the next Newsletter. In the meantime any suggestions can be sent to the Editor or to the leader of the working group, Dr. E.O. Campbell, Department of Botany & Zoology, Massey University, Palmerston North, N.Z.

## TYPE REGISTERS

SEVERAL aids are available for ascertaining the presence of types and possible types in the FARLOW HERBARIUM. Names of species for which these specimens exist are underlined on the indexes to the separate herbaria. The following are completed and can be purchased at the prices indicated, plus fifty cents postage for each item: Bartram Moss Herbarium, \$4; Fleischer Moss Herbarium, \$7.50; Schiffner Hepatic Herbarium, \$3.50; Sullivant Hepatic Herbarium \$2 (indexing of the moss herbarium is in process); Taylor Moss Herbarium, \$2 (indexing of the hepatic herbarium is planned).

Although no list has yet been made of types in the general collection, type specimens of mosses were segregated by genera during the recently completed revision of the nomenclature to current status, and can now be located quickly. It may also be mentioned that the Farlow maintains as a card file a species index to exsiccata sets, and it is usually possible to identify numbered but untitled labels of sets distributed in herbaria. A six-volume catalogue of the Farlow Library was published in 1979 by G.K. Hall Co. of Boston which may be useful for locating original literature.

Geneva Sayre, Farlow Herbarium, 20 Divinity Avenue, Cambridge, Mass. 02138, U.S.A.

AUSTRALIAN Herbaria contain many "TYPE" specimens of mosses and hepatics mainly, but not only, Australian species. During repackaging of the moss collection at NSW National Herbarium, a number of packets with nov. sp. or type written on them have been located.

A list of more than 250 is being prepared for circulation or publication as a preliminary list later this year. Checking the status of each is not possible unless one is involved in the taxonomy of each genus. However, anyone carrying out a revision of a family or genus who might be interested in a list of the specimens in this category held in Australian herbaria, should send a list of genera and species or synonyms so that the names and herbaria containing specimens can be sent to you. The information sent will contain the name and collection details on the packet for

each specimen, and how many packets or duplicates there are.

It is likely that many are isotypes, some nomina nuda, while others are not new species or types at all. Any help in making a decision for some of the specimens will be gratefully received.

Helen P. Ramsay, School of Botany, University of New South Wales, Box 1, P.O., Kensington, 2033, N.S.W. Australia.

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### Cryptogam Cryptograms

HAVE A jolly time "breaking the code" in these puzzles! Each letter of the alphabet (or each of many of them, anyhow) has another letter consistently substituted for it in each cryptogram. One might begin by intuitively substituting such commonly occurring words as "the" and "and" for words with the same number of letters, then applying the apposite code letters "learned" to other words. Or, substitute the most common letters of the alphabet for the most common letters in the phrases. Note: No. 1 & 2 have different codes.

#### Cryptogram No. 1:

Two important bryological works -

Ysc Zyimcpyz Sapmlggo gr Lheyzez  
Fgzcz, S. Mevpg;

Mec Lhkgqskycp fcepch wjceycp Hczc  
mihbs Lgnexea, Y. Schwgd.

#### Cryptogram No. 2:

Ten of the strangest-appearing mosses-

Vycovauvaide kinneae, Brmberhoe  
ekcsjje, Gewvunoe dpengov, Kcsjjudunorh  
qovyuvrh, Vkopoginv pionwepgao, Vkcjeycnrh  
jrairh, Engpieie wojvunoo, Ikcihipukvov  
apinaikucjouogiv, Pcotufebpunoe vkceipuyepke,  
Imugoyasun bjrhou.

Replies c/o Editor. The correct answers and the names of those who have submitted them will be published in a future issue. Dr. H.E. Robinson is thanked for suggesting the names of the species in Puzzle No.2.

R. Rednaz.

NOTE. Rednaz is real enough but there is no prize for guessing who he/she is! A copy of the solutions have been lodged with the Editor.

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What about a laugh?

IT has been suggested that a jokes corner and/or one or more cartoons might be included as regular features to brighten up a corner of the page. Maybe you have a "howler" tucked away somewhere just waiting for the right occasion which never seems to pop up - why not try The Bryological Times? Should we have a Limerick competition - would anyone like to try ..... "There was a young lady muscologist.. ...."?

On a more serious note a bryologically based crossword could be of interest.

Anyone with ideas should write to the Editor outlining what they have in mind giving an estimate of the space required (e.g. half-column, a paragraph 10-15 lines long etc.) as well as the date by which the material can be expected.

## Personalia

DR. PIOTR SZMAJDA, a Polish bryologist and assistant to Prof. Dr. S. Lisowski of the Adam Mickiewicz University at Poznan, is working at the Jardin botanique national de Belgique, Meise, Belgium, since 18 November 1979 and he will stay there until May 1980. He is studying problems of "atlantic" distribution of European mosses but he also hopes to get to know tropical African mosses. His research is being carried out under the direction of Dr. E. Petit and Dr. J.L. De Sloover.

NANCY G. SLACK is on sabbatical until 1 September 1980 and will be working at the Department of Systematic Botany University of Göteborg, Carl Skottsbergs Gata 22, S-413 19 Göteborg, Sweden. Tel. 031-418700.

DR. JETTE LEWINSKY'S address will be Botany Division, D.S.I.R., Private Bag, Christchurch, New Zealand until 31 July 1980. For this period, she will be a temporary member of staff of the Botany Division and her work will be mainly concentrated on a revision of the genus *Orthotrichum* in New Zealand and Australia. It will include cytological work to be carried out in co-operation with Dr. Helen Ramsay of Sydney. Dr. Lewinsky expects to be back in the Botanical Museum, University of Copenhagen, from 1 August.

MISS GABRIELA KIS joined Dr. T. Pócs last September at the Research Institute for Botany of the Hungarian Academy of Sciences at Vácrátót as his Assistant. She is currently working on the South East Tropical African moss checklist.

DR. R.E. LONGTON, formerly of Department of Botany, University of Manitoba Winnipeg has now returned to England and taken up the position of Lecturer in the Department of Botany, The University of Reading, Whiteknights Park, Reading RG6 2AS.

## BULLETIN of BRYOLOGY

THE DEADLINE for the next Bulletin of Bryology is 1 May 1980. Any contributions on bryological work in specific countries or institutes, or comprehensive information on current bryological research projects will be very welcome. Please send all replies direct to the Secretary of IAB, Dr. S.R. Gradstein, Heidelberglaan 2, Utrecht, The Netherlands.

## Desiderata

IN continuation of our work on the chemistry of liverworts we are investigating the terpenoids of the following species: *Scapania undulata*, *Marsupella aquatica*, *Anastrepta orcadensis*, *Barbilophozia barbata*, *Lophozia ventricosa*, *Lepidozia reptans* and *Mannia fragrans*. *Scapania undulata* seems to exist in at least two different chemical races in Central Europe: one race with the diterpenoid scapanin and the other without scapanin.

To learn more about the geographical distribution I would be very thankful to bryologists for sending me air dried samples (20 - 100 g) of *Scapania undulata* for a chemical analysis.

Specimens should be marked: Einfuhr in die DDR auf Grund der allgemeinen Genehmigung Nr. 50. and addressed as follows - Institut für Biochemie der Pflanzen der Akademie der Wissenschaften der DDR, DDR-401 Halle/Saale, Weinberg, German Democratic Republic.

S. Huneck, Halle.

PROFESSOR HU REN-LIANG, Department of Biology, Shanghai Normal University, Shanghai, China, is anxious to obtain specimens of bryophytes especially of Entodontaceae and Brachytheciaceae from foreign bryologists. He will be happy to send specimens in return and he would also like to exchange reprints.

DOES anyone know of any species of pleurocarpous mosses, besides the Ptychomniaceae, that exhibit the character state wherein the columella is persistent in the capsule even beyond the time of spore dissemination?

Excluding those members of the Orthotrichaceae with a rather pleurocarpous habit (e.g. *Drummondia prorepens*), are there any known species of pleurocarpous mosses besides those in the Ptychomniaceae that exhibit precocious maturation of spores while within the capsule? *Glyphothecium*, *Hampeella*, and *Cladomnion* exemplify this tendency; the first two genera to the extent that gametophytes have been observed growing out of the mouths of capsules.

Robert A. Hattaway, The Pennsylvania State University, 202 Buckhout Laboratory, University Park, Pennsylvania 16802, U.S.A.

DALE H. VITT, Department of Botany, University of Alberta, Edmonton, Alberta, Canada T6G 2E9, is currently finishing a world-wide monograph of the genus *Macrocoma* (Orthotrichaceae) and he would like to receive any specimens of this genus on loan in order to complete distributions and morphological descriptions. Material from India, Africa and Australia would be particularly useful. All material will be returned promptly.

## Deaths

LAZARENKO, Andrei Sazontovich on the 13 October 1979 after a prolonged illness, aged 78 years.

SMIRNOVA, Zoja Nikolayevna on the 4 December 1979, aged 80 years.

## REQUESTS FOR LITERATURE

I HAVE been working for many years with the mosses of the Mascarenes. I have checked all references to older literature and I am now left with only three problems which I suspect are exsiccates. They are:-

Schimper in Musc. Boryanis  
Schimper in Musc. Darntyanis  
C. Müller in Musc. Robill

I would very much like to receive copies of any text that was published or sent out with these exsiccates.

Gillis Een, Solbacksvägen 25, S-14700 Tumba, Sweden.

INSTITUTO Nacional de Investigaciones sobre Recursos Bióticos (INIREB) would like to develop a strong research program on bryophytes with emphasis on taxonomy and floristics of Mexican mosses. For this purpose, we would like to request support from the international community to build up our bryological library. Reprints, catalogues and other bibliographical material would be greatly appreciated. Correspondence related to this matter may be addressed to Herbario Briológico INIREB, Heroico Colegio Militar No. 7, Apartado Postal 63, Jalapa, Veracruz, Mexico.

C. Delgadillo, Instituto de Biología, National University of Mexico.

## A Problem Solved

DR. ILMA G. STONE of the School of Botany, University of Melbourne, writes: With regard to the item "A Geographical Puzzle" in the No. 1 issue of The Bryological Times, I think I can help. The place is Eumundi not Eumondi, and is situated approximately 100 Km north of Brisbane, 26°29' S, 152°57' E (Reader's Digest Atlas of Australia).

DR. R. H. ZANDER of the Clinton Herbarium, Buffalo, offered the following helpful suggestion for solving some of these puzzles: Often, placenames are encountered on herbarium packets that cannot be found in the usual gazetteers and geographic dictionaries. Many of these localities are actually resort and tourist areas that are easily located in travel guide books, such as those published by E. Fodor.

## RECENT PUBLICATIONS

Nowak, Heidemarie, 1980. Revision der Laubmoosgattung *Mitthyridium* (Mitten) Robinson für Ozeanien (Calymperaceae). 236 pp. 16 Abb. 15 Kart. 28 Taf. - *Bryophytorum Bibliotheca*, No. 20. - Subscription DM.40, After publication DM.60. In German with English summary.

Vanden Berghen, C. 1979. *Flore des hépatiques et des anthocérotes de Belgique*. Meise, Jardin botanique national de Belgique. Price BFr. 300. An illustrated pocket flora with annotated keys replacing Vol. 1 of *Flore general de Belgique*, Bryophytes (1955-57).

Farr, E.R., Leussink, J.A. and F.A. Stafleu eds. 1979. *Index nominum genericorum (plantarum)*. Vol. 1 *Aa - EPOCHNIUM* (Regnum Vegetabile Vol. 100: 1-630); Vol. 2 *EPROLITHUS - PEERSIA* (Regnum Vegetabile Vol. 101: 631-1276); Vol. 3 *PEGAEOPHYTON - ZYZYGIIUM* (Regnum Vegetabile Vol. 102: 1277-1896). Utrecht, Bohn, Scheltema & Holkema; The Hague, dr. W. Junk b.v. Price Gld. 575 but 20% discount to members of IAPT in good standing.

An essential reference work for every taxonomist, which sets out to provide as complete an index as possible of the validly published scientific names of all plant genera (excluding bacteria), both recent and fossil, with correct citation of the authors, reference to the place and time of the first valid publication, a record of existing homonymy, and indication of taxonomic placement (i.e. major group and family) and some additional information concerning the names e.g. conservation, typification and nomenclatural status. There are nearly 63,500 previously published names arranged alphabetically but no new combinations or lectotypes are included. Supplements to update the text are planned.

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## Letters to the Editor

### MORE ABOUT THE BRYANGIUM

Dear Sir, I would be grateful if you could add the letter n to the word bryo so that it becomes bryon.

G. Dihoru, Institute de Stiinte biol. Splaine Independentei 296, Bucuresti, Romania.

Dear Sir, I appreciate the spirit of provocation which introduced the term "bryangium" in the first issue of the Newsletter, but there is a real danger that the word might come to be accepted by default. I am, therefore, writing in protest although there are many others better qualified to discuss the matter than I am.

"Bryangium" is presumably derived from the classical Greek βρύον a moss and ἄγγειον a vessel. By analogy with such words as sporangium, a spore container and gametangium, a gamete container, bryangium would have to mean a moss container. It could, therefore, never mean a moss inflorescence. If it means anything it might mean a herbarium packet.

This raises the question of overspecialisation of nomenclature. The whole point of jargon is that it should be unambiguous in context. There is no need to insist that "inflorescence" should be confined to flowering plants any more than that moss leaves and stems should be called "phyllids" and "caulids". Homology is not the only criterion to be applied in deciding the meaning of a technical term. "Inflorescence" is, I think a word defined more by function and location than by homology, in the same way as: leaf, stem, paraphyses, sporangia, capsule, calyptra and a whole range - perhaps the majority - of the most useful botanical terms, including "plant" itself.

The term "inflorescence" is never, as far as I can see, ambiguous in a bryological context. There is little to be said for having words which are unnecessarily narrowly defined. To impose an unnatural rigour on the applicability of English words is to deprive the language of one of its greatest strengths - flexibility.

Yours sincerely, George A.M. Scott,  
Department of Botany, Monash University, Clayton, Victoria 3168, Australia.

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Another letter about the bryangium has been received from Dr. R. Grolle and will appear in the next issue. Editor.

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ITEMS FOR THE NEXT ISSUE to be with the Editor, Dr. S.W. Greene, Institute of Terrestrial Ecology, Bush Estate, Penicuik, Midlothian EH26 0QB, Scotland by 15 April at the latest.  
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