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No. 41

A Computerized Workbench for the Taxonomist. 1 : Applications*

By A. Empain

Abstract

SOME ASPECTS of the problem of taxonomic data handling are presented and discussed. The widely available access to computer facilities has led to a reassessment of what is now possible in this area, and some taxonomic applications are introduced, based on a taxonomy oriented macrolanguage.

The background

As taxonomists, we are dealing with huge quantities of information dispersed in many libraries and herbaria; descriptions, keys and drawings to be found in the literature (in very different styles and languages); exsiccatae; paper files; and now even some magnetic media files.

Such an amount of data is useful statistically, due to the biological variability of plants and the numerous characters being taken into account. This is not a new idea: see Sneath & Sokal (1973) for a review.

The problems

Most of us repeat again and again such basic tasks as matching a specimen to a published description, or to a type specimen located anywhere in the world (the taxonomist needs also to be an archivist and linguist!). The lack of adequate information archiving has given rise to a flood of new taxa, out of which, for instance, it is estimated (Touw, 1974) that more than 70% of tropical mosses must be deleted.

"However, in most groups of mosses, serious and more or less critical work on a large scale has not been done, and one is left with the uncomfortable feeling that some names are little more than pigeon-holes. Do the results justify this time-consuming work?" (Touw, 1974).

"The information presented exclusively in the form of prose-with-illustrations is exasperating in the extreme for the data-seeker"; "a numerical approach at least has the merits of forcing the taxonomist to define his terms in public....so a taxonomic system derived by numerical means is open in all its aspects to independent scrutiny....future researchers will not necessarily have to repeat all the work from scratch." (Watson, 1971).

The lack of an all-purpose, "near the microscope" data logger and data manager makes explicit another thought about the taxonomy of bryophytes: "there are surprisingly few quantitative studies..." (Wyatt & Stoneburner, 1984).

Greene (1976), in his introduction to the symposium on bryology (Leningrad, 1975) developed further these basic complaints, and called for more coordination of data acquisition.

Where are we, ten years later?

The technological change

For the first time in the history of science, an individual can buy a powerful microcomputer, and can develop his own software and files
[continued on page 2.]

GLOBULAR MOSSES

By Karl Mägdefrau

ON THE OCCASION of the transit of Venus in 1874 the U.S.A. sent an observation expedition to Îles Kerguelen in the South Indian Ocean. The Surgeon, J.H. Kidder, was an eager collector of plants. Among 28 species of mosses, which were identified by Th.P. James, was a new species, *Grimmia kidderi*, which he described as "compacte globosa". He added: "The small balls formed by this curious moss seem not to be rooted to another plant, but to be blown about by the wind indiscriminately".

When, in 1898, the German Deep Sea Research Expedition "Valdivia" visited Îles Kerguelen, the botanist A.F.W. Schimper also discovered such globular mosses, and without knowledge of the earlier publication of James, he described them as follows (translated): "The diameter of these globular mosses ("Kugelmoose") varies between that of a cherry and a middle-sized potato. The smaller balls are formed by *Blindia aschistodontoides*, the larger ones, however, by *Andreaea parallela*, the stems of which regularly radiate from a central core of soil or a pebble. Strong winds roll these bodies over large distances. Thus successively the different faces are exposed and are able to develop." Later globular mosses were found in the sub-antarctic regions of Prince Edward Island and Marion Island and also in the subarctic on Jan Mayen, The Aleutian Islands, Alaska and Iceland, Norway and on Mount Ontaka in Japan.

A very surprising observation of globular mosses was made by Olov Hedberg in the tropics, in the alpine region of Mount Kenya (4,000-4,800 m), Mt. Elgon and Mt. Kilimanjaro in East Africa. The globular mosses on Mt. Kenya were investigated in detail by Erwin Beck. They were represented by only one species, *Grimmia ovalis*. They exist on scilfuction soils in which frost-
[continued on page 3.]

* A contribution to the Computer Column, edited by J.-P. Frahm and B. O'Shea. For addresses, see *Bryol. Times*, 31:9.

GREETINGS

A VERY HAPPY NEW YEAR TO ALL
READERS

Computerized workbench ...

[continued from page 1.]

(see earlier papers for bryophytes: Magill, 1982 and Frahm, 1983).

The impact of the rapidly spreading microcomputer is not yet fully appreciated, but the main result for the taxonomist lies in the fact that each one can have a slave near his microscope. A slave able to deal with specific tasks such as making semi-automated cell measurements (Empain, 1985); behaving like a taxonomy oriented calculator (Empain, in press); and also providing the normal microcomputer facilities such as word processing, data handling, database management etc, or even being linked to a more powerful computer.

Problem oriented languages

Conventional programming languages are not well adapted to these challenges: a conventional program executes only what it is written for, and may not be general purpose. When a non-computer-expert wishes to perform another task, he must ask the specialist to alter the program for him.

The computer environment can be a burden to a scientist when the machine is restricted to rigid tasks. On the contrary, such a system should be a useful aid to experimenting with new combinations or new ideas with the data at hand.

Computer science is evolving, giving the non-specialist a simpler means to tell the computer what he wishes to do in a particular domain. Such languages are called "problem oriented languages", in that they allow you to state what the problem is, rather than telling the computer how to solve it.

My aim is to develop a taxonomy-oriented language that is easy to use by the taxonomist, and a future paper will cover this in more detail. I have called this a 'macrolanguage', as it is built from other language elements. This paper concentrates on the possible applications of this language within taxonomy.

Some taxonomic applications

On a small scale I have experimented with one application dealing with microscopical measurements. After a short training period, all the users

(all without a computer background) were convinced of the system's advantages. Eye strain decreased, the rate of data input tripled, and in addition, diversified statistical results were gained using only the data captured during the measurement process. The larger number of measurements possible gave more significant results, and enabled users to concentrate more of their time on higher level tasks. The applications tackled were as follows:

- semi-automated measurements at the microscope and statistical treatment of the results;

- high resolution drawings of the leaves (see Figure 1). The structured description needed for the drawing is also useful for statistical work, and the simple analytical characters needed to encode leaf shapes are less subjective than the intractable morphological terms;

- interactive input of structured descriptions of specimens, with a very efficient use of disk memory;

- synthesis of a higher level taxon, described by a set of specimens (for each synthetic character, a statistically allowable range is given in place of a value);

- comparison between two taxa, selecting the most useful discriminant characters (the system takes into account not a simple match, but the two allowable ranges, so integrating a dynamic evaluation of the usefulness of a character);

- determination of a specimen with respect to a set

of references (using the same grounds for comparison as above). The order of the records is automatically maintained, so the order of the descriptions does not need to match from file to file.

Some other tools are available or in progress, eg production of large text characters for poster sessions, Fast Fourier Transform Analysis, and cluster analysis. Many more applications have been considered, and will be added later.

Conclusion

For a real application, the taxonomist needs only to know a limited subset of the commands, usually in an interactive form; the full list of commands is always available to the more expert user.

The main purpose of this paper is to catalyse discussions and collaborations (at a formal or technical level) and to open the debate towards a collective consensus about a basic tool set, leaving as much freedom as possible to the user.

A workshop on this subject is scheduled at the I.A.B. Methods Workshop at Mainz, in July 1987.

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[continued on page 3.]

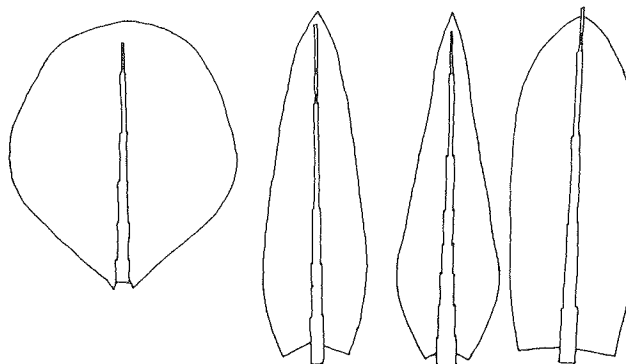


Figure 1. Samples of leaf outlines generated using the taxonomy-oriented macrolanguage.

VACANT TICKETS

for the Bryological
Field Excursions, Berlin
Botanical Congress, 1987.

IN JUNE 1986, I booked a place for myself on both of the bryological excursions planned for the International Botanical Congress to be held in Berlin during July/August, 1987. These trips are No. 33 (before the Congress with Jette Lewinsky to the Faeroe Islands - DM2450) and No. 14 (after the Congress with Patricia Geissler to the Swiss Alps - DM1400).

In the interim I have been given the opportunity of spending a sabbatical at Michigan Technological University in 1987-88, investigating the effects of acid rain on *Sphagnum* growth. As I would also like to participate in the pre-Congress bryological methods workshop at Mainz this has left me no time to attend the excursions, and my tickets have therefore become vacant.

If anyone would like to take over my place(s) on these excursions, please write urgently to the organizer: Dr. Brigitte Zimmer, Konigin Luise Str. 6-8, D-1000 Berlin (West) 33. That way I might just save my deposit!

Shaun Russell, Dept. of Plant Sciences, Fort Hare University, Ciskei, South Africa.

A computerized workbench..
[continued from page 2.]

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Jardin Botanique National de Belgique, Domaine de Bouchout, B-1860, Meise, Belgium.

Globular Moss Balls [continued from page 1.]



Figure 1. Globular mosses (*Grimmia ovalis*) on gently-sloping soil at Teleki Valley (Mount Kenya) at an altitude of 4,300 m. (Photograph, E. Beck, 1983).

formed ice needles grow at night. In the alpine region of Mt. Kenya the disruption of *Grimmia* cushions by frost and their splitting off from the rocks was observed. The fragments, which were found below the rocks covered with mosses, are moved by the wind, so that they grow in various directions. On horizontal soils the fragments of moss are steadily moved by the constant solifluction and the wind and always grow into taller balls.

In the Teleki Valley (4,200 m) marked moss balls were sketched in a diagram and their turning and moving after 4 and 10 days was researched. In a second experiment the efficiency of the wind was gathered from a stone wall. In times of dryness there was no solifluction, and the moss balls remained in their situation. With daily watering and frost in the nights the balls were turned, but they held their position within the plain. From these results it appears that the dislocation of the moss balls is caused by the wind and their turning by solifluction processes.

The diameter of the moss balls is 0.5 - 5.5 cm (in rare cases up to 8 cm). The balls never develop sporophytes, while the cushions of this species attached to the rocks are plentifully fertile. Evidently the growth of sporophytes is prevented by the rolling movement.

Only on disk-like moss balls which lie a longer time on one or the other side do sporophytes develop on the edge of the disk.

The structure of globular mosses is the same as that of attached cushions, just as is the form of branching of the stems. The density of the rhizoids increases towards the centre of the balls. Only the outer region of the balls is green. Towards the centre a brown, dead region occurs. The central core of the balls consists of fragments of stems, rhizoids and leaves, and also soil-like material, sometimes even a little stone.

So-called "moss balls" of various bryophyte species which have been observed in lakes in Japan and Patagonia do not represent globular mosses in the true sense: they are comparable to the "sea balls" which, as is well known, originate from algae or even dead material by the rolling action of the waves.

Reference

Beck, E, Mägdefrau, K. & M. Senger, 1986. Globular mosses. *Flora* 178: 73-83.

Waldstrasse 11, D-8024. Deisenhofen bei München, Federal Republic of Germany.

K.A. WAGNER'S

OCULAR PROTRACTOR. FOR MEASUREMENT OF ANGLES WITH A COMPOUND MICROSCOPE *

By John A. Christy

WHILE INVESTIGATING MORPHOLOGY of the moss *Limbella* (Christy, 1985) I used an "ocular protractor" first described by K.A. Wagner (1951). Wagner designed the protractor to answer "the need for more exact measurements to describe the shape of the leaf apex. Some method of measuring the angle of the leaf apex was required to give definite limits to such words as acute and obtuse."

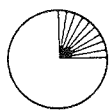
The protractor is inexpensive and takes only a few minutes to construct, requiring only an ocular micrometer and simple drafting instruments. I found it to be a valuable tool with which to measure rapidly the angles of leaf apices and leaf dentition that were needed for phenetic analysis. To my knowledge, the portion of Wagner's dissertation describing the protractor has never been published (pages 8-9). It is reproduced here in a modified form to make it more accessible to other researchers. A xerographic copy of the entire dissertation (catalog number 0002665) may be obtained from University Microfilms International, 300 N. Zeeb Road, Ann Arbor, MI 48106, USA, or 60, High Street, Godstone, England.

Construction of Ocular Protractor

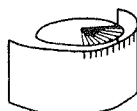
Note: One microscope eyepiece (ocular) must be fitted with an ocular micrometer.

- Using a drafting compass, draw a circle equal in diameter to the top of your eyepiece. Use heavy paper or index card stock.
- Using a protractor and ruler, draw 10 radii in 10 degree increments, marking a 90 degree segment of the circle (Fig. 1).
- Cut out (a) the circle and (b) a rectangle about 3 x 10 cm.
- At the points where the 10 degree radii meet the edge of the circle, draw corresponding marks along one of the long edges of the rectangle (Fig. 2). Do this all along the entire edge of the rectangle, to form a scale calibrated in 10 degree intervals. Discard the circle.
- On the rectangle, draw a

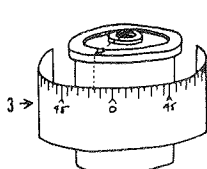
* A contribution to the *Techniques Notebook* column edited by Janice M. Glime. For her address see *Bryol. Times* 31:9.



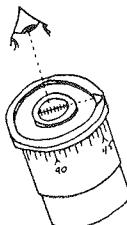
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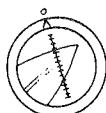
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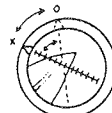
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4



5



6

Figures 1 - 7. Stages in the construction and use of a Wagner ocular protractor. For explanation, see text.

smaller mark midway between each 10 degree mark. Midway in the scale, label one of the 10 degree marks "0", then count in each direction from zero and mark off 45, 90, 135 and 180 degrees, respectively. You now have a scale calibrated in 5 degree intervals (Fig. 3).

6. Wrap the scale, calibrations on upper edge, around the side of the eyepiece tube, and using adhesive tape, secure the overlapping end to form a ring of paper around the eyepiece tube (Fig. 4). This is Wagner's "collar", the fit of which should be "loose enough so that the collar can be rotated on the tube, but tight enough so that friction can hold it at any setting".

7. Put a V-shaped scratch, or pencil mark, on the rim of the eyepiece, on a radius parallel to the scale line of the ocular micrometer, to serve as an index mark (Fig. 5).

Use of Ocular Protractor

1. Rotate the eyepiece or move microscope slide until one of the scale increment lines on the ocular micrometer is parallel with one side of the angle to be measured. While holding the eyepiece stationary with one hand, rotate the collar with the other hand and set the zero point of the collar at the index mark on the rim of the eyepiece (Fig. 6).

2. While holding the collar stationary with one hand, rotate the rim of the eyepiece with the other hand, until the other side of the angle is parallel to one of the scale increment lines on the ocular micrometer (Fig. 7). The degrees of the angle can then be read on the collar at the point directly below the index mark on the rim of the eyepiece.

References

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Wagner, K.A. 1951. The Neck-eraceae of North America. Ph.D. dissertation, Univ. of Michigan, Ann Arbor. 195pp.

Botany Section, Milwaukee Public Museum, 800, West Wells St., Milwaukee, WI 53233, U.S.A.

UNIVERSITY OF HELSINKI

350th Anniversary

Celebrations, 1990

A BRYOLOGICAL CONGRESS, the preliminary name of which is "The phytogeography, taxonomy and morphology of SE Asian bryophytes", will be arranged in Helsinki, 12-18 August, 1990, as one of the activities commemorating the 350th anniversary of the founding of the University of Helsinki. The Congress will include a three-day paper reading session, including poster presentations, and two days of field trips.

The plans for the Congress are reported this much in advance since summer hotel accommodation in Helsinki gets booked up well in advance. People hoping to participate are asked to send a letter to Prof. Timo Koponen, Department of Botany, University of Helsinki, Unioninkatu 44, SF-00170 Helsinki 17, Finland. The first circular will be mailed early in 1987 to those people who answer this request. T. Koponen, Helsinki.

A CORRECTION

S. ROB GRADSTEIN'S address in Michigan (where he will be until 1st June, 1987), was given incorrectly in the last issue (40:10). It should have been:

Department of Biology,
The University of Michigan,
Ann Arbor,
Michigan 48109-1048, U.S.A.
Tel. (313-) 936-3243.

Tropical Bryology Column

ABOUT ENDANGERED TROPICAL AREAS*

By Claudio Delgadillo

THERE IS NO DOUBT that tropical floras are undergoing dramatic changes due to pressures of ever-expanding human populations. Such activities as clearing for agriculture, wood or housing may be justified in as much as they satisfy primary needs of man. However, when these practices are carried out on a large scale, or when their effect is augmented by other forms of alteration, it is desirable to re-evaluate our attitudes to land use and vegetation.

In terms of bryophytes, in order to take positive action, one must first identify key areas and various types of vegetation in which they grow. For the bryologist, to protect the forest or other plant community is a way to preserve unique bryophyte habitats, for when forests are lost so are most bryophytes.

In response to an enquiry submitted by the Committee for Tropical Bryology, several individuals provided the names of endangered areas. The Committee calls this to the attention of tropical bryologists so that they may retrieve specimens for future studies, identify and support (or co-ordinate) efforts to protect these areas.

Tropical rainforests throughout the world are endangered; in the Neotropics several locations have been widely advertised by conservationists. The Amazonian forests of Brazil and those in the Uxpanapa basin of southern Mexico have received attention and press coverage, but there are areas which are undergoing irreversible changes and are of similar biological importance. Among them is Selva Lacandona of Chiapas in southern Mexico.

Certain types of vegetation in the Neotropics should be of particular concern to tropical bryologists. The Atlantic Coast forest, the Cerrado and Caatinga vegetation of Brazil, the Cloud forests of Costa Rica and the Andean forests have been cited in response to our questionnaire. Several areas have been mentioned without connection to plant formations: Misiones Province in Argentina,

* Contribution to a Tropical Bryology Column, edited by Dana Griffin III; Florida State Museum, University of Florida, Gainesville, U.S.A.

western Paraná and Mato Grosso in Brazil, the Barú Volcano, the Tuira-Chucunaque (Darién) and Teribe-Changuinol (Bocas del Toro) basins in Panama.

The valley of Mexico houses one of the largest cities in the world; city encroachment, pollution and hydrologic management, have greatly disturbed all available bryophyte habitats. There are, however, many sites in the Valley which are of great floristic importance, and are worth preserving. Some areas in Cuba are suffering from air pollution due to nickel works; besides conservation these examples may also serve to illustrate the value of bryophytes in pollution studies.

In the Old World Tropics, respondents cited as endangered the forests of southeast Asia and Australia, with particular reference to those in Peninsular Malaya, north Queensland and the Pacific islands, including New Guinea and the Society Islands. In these areas besides the usual human activities, natural vegetation has been, or is being altered by the use of herbicides, mining or even introduction of exotic species.

Tropical Africa has been hardly mentioned in our survey, but the mountain forests of Ethiopia, Tanzania and Kenya were cited as endangered. We urge bryologists to take a harder look there.

Departamento Botánico, Instituto de Biología, Universidad Nacional Autónoma de México, Apartado Postal 70-233, 04510 México D.F., México.

Personalia

DR. VIRENDRA NATH, a bryologist from the National Botanical Research Institute, Lucknow (India) was in Poland from 8 October to 31 December 1986, under a CSIR-PAS Scientific Co-operation programme. He visited several bryological laboratories, including the Institute of Botany PAS Krakow; The Biological Institute of the Maria Curie-Skłodowska University, Lublin; the Institute of Botany, University of Warsaw; the Genetics Department of the Biological Institute and Department of Geobotany, Adam Mickiewicz University, Poznań; and the Institute of Botany, University of Wrocław.

During his stay he had the opportunity of discussions with many eminent bryologists, viz.: Profs. K. Karczmarsz, S. Lisowski, J. Szwejkowski, Drs. M. Krzakowa, R. Ochrya, and A. Rusińska, W. Koža, W. Berdowski, W. Wilczyńska, J. Mickiewicz, about many problems of Indo-European bryophytes. He also investigated several bryophyte taxa available in various herbaria of Poland.

K. Karczmarsz, Lublin.

DRA. NORIS SALAZAR ALLEN, who used to be at the University of Alberta, is now at the University of Panama. Her address is: Cryptogamic Herbarium, Department of Botany, Facultad de Ciencias Naturales y Exactas, University of Panama, Republic of Panama, Central America.

Report on the Proceedings of

IAB BRYOECOLOGICAL CONFERENCE, BUDAPEST-VÁCRÁTÓT, 1985, and
CEBWG BRYOLOGICAL CONFERENCE, EGER, 1985.

By T. Simon* and S. Orbán†

1. The proceedings of the first IAB bryoecological conference is expected to appear in the first quarter of 1987 as volume 35 of *Symposia Biologica Hungarica, Akadémiai Kiadó, Budapest*. The explanation for the delay is that some manuscripts were not sent in time to the conveners. The editors in Budapest, T. Pócs, T. Simon, Z. Tuba and J. Podani, received the whole of the material by the end of May 1986. The careful reviewing and editing work by the conveners is gratefully acknowledged. Further editing of the volume, typing, and solving problems with tables, figures and diagrams required a few more months in the summer of 1986. The final manuscripts, in camera-ready form (a total of about 850 pages) were sent to the publisher in September 1986.

We would like to thank all

the writers of letters expressing personal feelings about the success of the Conference, the friendly atmosphere and the hospitality of the organizers.

2. The proceedings of the 4th CEBWG Bryological Conference, held in Eger, will appear as Supplement 2 of *Abstracta Botanica*, Vol. 9, 1985, to be published by L. Eötvös University and edited by S. Orbán and J. Podani. Because of technical problems associated with the preparation of about 230 pages as camera-ready manuscript, this issue was due to go to the printing office on the 3rd of October 1986 and to appear early in 1987.

We thank all bryologist and ecologist colleagues for participating in these symposia and for contributing to the proceedings.

* Eötvös University, Budapest. † Ho Si Minh Teachers' College, Eger.

FARLOW REFERENCE LIBRARY OF CRYPTOGRAMIC BOTANY
HARVARD UNIVERSITY.

Friends of the Farlow
Graduate Fellowship

THE FRIENDS OF THE FARLOW announce a graduate fellowship for the study of cryptogamic botany at the Farlow during the year 1987. The fellowship is intended to cover expenses up to \$1,000 for students enrolled in graduate degree programs who wish to engage in short-term study in the Farlow.

Graduate students interested in this fellowship should describe their proposed work at the Farlow and its relation to their current work and/or professional goals and itemize projected expenses, duration and timing of their visit. At various times during the year (especially during the summer) the Farlow can provide free housing for visitors; consequently, the fellowship will include that provision when possible.

The closing date for applications is April 1, 1987. Further information from, and applications to: Dr. Robert K. Edgar/ FoF Fellowship, Farlow Reference Library & Herbarium, Harvard University, 20 Divinity Avenue, Cambridge, Massachusetts 02138, U.S.A.

LÁSZLÓ VAJDA (1890-1986)

LÁSZLÓ VAJDA, the grand old man of Hungarian and Central European bryofloristic research, died in Budapest on 3rd November, 1986 at the age of 96 years.

László Vajda was a specialist of Hungarian, Carpathian, Eastern and Central European bryophytes and flowering plants. He was known to many bryological colleagues in Europe and North America as the author of numerous papers on the floristics and taxonomy of Hungarian and Central European hepatics and mosses. His most important publication, *The Handbook of the Hungarian Bryoflora* was published (jointly with the author) in 1983. The species *Marsupella hungarica* and more than 200 new floristic records, were discovered by L. Vajda. His rich bryophyte collection of more than 20,000 specimens has been deposited in the Herbarium of the Ho Si Minh Teachers' Training College, Eger, (EGR) and at the Botanical Department of the Hungarian Natural History Museum, Budapest (BP).

S. Orbán.
Ho Si Minh Teachers' Training
College, Eger,
Pf. 43, Szabadság tér 2.,
H-3300, Hungary.

Sayre Scholar

THE SAYRE SCHOLARSHIP is an endowed Farlow Herbarium Fellowship which has received substantial support from FoF members. It is awarded periodically to help bring a scientist working in cryptogamic botany to the Farlow for research and consultation. The visit last spring of the first Sayre Scholar, Dr. Hélène Bischler, was beneficial to us as well as to her, since she annotated many of our collections of *Marchantia*.

Nominations and applications for future awards should be referred to the Curator, Dr. Donald H. Pfister, Farlow Reference Library & Herbarium, Harvard University, 20 Divinity Avenue, Cambridge, Massachusetts 02138, U.S.A.

REPORT ON THE
5TH MEETING OF OPTIMA
Istanbul 8-14 September,
1986.

By ILANA HERRNSTADT

THE 5TH MEETING OF OPTIMA (Organization for the phyto-taxonomic investigation of the Mediterranean Area) was held in Istanbul, 8-14 September, 1986. It included 5 symposia, none of which dealt with bryophytes. But on the 7th, the day prior to this meeting, the second meeting of the Commission for Bryophyta took place.

Following the list of goals agreed upon at the first meeting in Palermo (see *Bryol. Times* 23: 7, 1983) we have been concentrating on the preparation of a computerized register of literature for the bryophytes of the Mediterranean area. A great number of relevant entries have been accumulated. Dr. F. Raimondo (Istituto di Botanica, Palermo) has already prepared a draft of a Data Collection Card which was discussed in detail and some alterations were requested by the Commission members. He will input the literature data using equipment available in Palermo. Most of the data will be entered even if some descriptors and/or keywords are missing. The idea is to circulate a first incomplete printout as a working draft to all Commission members who will check the references against original sources.

The compilation of a checklist of Mediterranean bryophytes was also discussed, as one of the further tasks of the Commission. It was, however, agreed that it would not be undertaken immediately, since it needs further discussion and a clear working plan.

Department of Botany, Institute of Life Sciences, The Hebrew University of Jerusalem, Givat Ram, Jerusalem 91904, Israel.

Advances in Bryology

By N.G. MILLER

VOLUME 3 of the *Advances in Bryology*, which is scheduled for publication in the autumn of 1987, has the theme "Bryophyte Ultrastructure", and will feature six papers by leading specialists. The subjects and authors include: sporogenesis (R.C. Brown and B.E. Lemmon); plastid ultrastructure (J.G. Duckett and K. Renzaglia); the cytoskeleton (J. Doonan and J.G. Duckett); comparative blepharoplast morphology (Z.B. Carothers and A.E. Rushing); peristomes (D.M.J. Mueller and A.J. Neumann); and the sporophyte-gametophyte junction (R. Ligrone and R. Gambardella).

A new, 9-member Editorial Board with a broad international representation has been assembled to work with the Editor, Dr. Norton G. Miller, New York State Museum, Albany, NY 12230, U.S.A. The new publisher (replacing the late J. Cramer) is E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Federal Republic of Germany. The format of Volume 3 and succeeding volumes will change in response to improved typesetting and production capabilities provided by the new publisher.

The *Advances in Bryology* was established to evaluate the status of bryological knowledge with respect to contemporary advances in the biological sciences, and to satisfy the need for up-to-date summaries of research involving bryophytes. Papers are published in English with German and English abstracts.

The theme of Volume 4 (to be published in 1989) is bryophyte ecology.

Biological Survey, New York State Museum, Albany, NY 12230, U.S.A.

EXCHANGE & MART

NORTON MILLER (Biological Survey, New York State Museum, Albany, NY 12230, U.S.A.) seeks a copy of *Hedwigia*, Volume 81 (1942-44) for purchase or trade. Anyone with an available copy should write to Dr. Miller

THE CRYPTOGRAMIC HERBARIUM at the University of Panama would appreciate receiving as donations or on an exchange basis, duplicates of articles and books on tropical bryology and lichenology.

All enquiries to Dra. Noris Salazar Allen, Cryptogamic Herbarium, Department of Botany, Facultad de Ciencias Naturales y Exactas, University of Panama, Central America.

BACKGROUND

to Dr. Horton's Article WHEN THE DECISION was taken by the IAB Council to revive the Bulletin of Bryology (Bryol. Times 22:1), some people asked "Why does IAB need two Newsletters?" The answer was, of course, that IAB was not planning to have two Newsletters. When the Bulletin was merged with the Bryological Times in 1982 the latter became the Association's only Newsletter (Bryol. Times, 13:5). Thus, a new style Bulletin was envisaged that was to be something other than a Newsletter.

To try and ensure that everyone is clear about the aims of the two publications, I suggested to Dr. Horton that we each published articles setting out our views of the role and relationship of the publication for which we were each responsible. My article appeared in Bryol. Times, 37:7-8: here is Dr. Horton's.

S.W. Greene

THE ROLE OF THE BULLETIN OF BRYOLOGY

By Diana G. Horton

THE ADVENT of the Bryological Times in January 1980 led to some concern regarding the role, if any, of the Bulletin of Bryology. The Bryological Times was initiated by Stanley Greene, who astutely recognized that the IAB had grown to such an extent that a more frequent and less formal means of communication among bryologists would do a great deal to facilitate the aims of the International Association; that is, to promote friendship and co-operation among bryologists of different nations. The growing number of bryologists who receive the Bryological Times and submit notes for publication is a clear indication of the success of this Newsletter. However, with the advent of the Bryological Times, the question arose whether the Bulletin should be continued, or if its need had been superseded by the Bryological Times. In March of 1982, Rob Gradstein reported (Bryol. Times 13:5) that the Bulletin had been discontinued and that all news items concerning bryologists would be incorporated into the Bryological Times. However, at the World Conference of Bryology in 1983, the Publication Policy Committee of the IAB, chaired by Lewis Anderson, strongly advocated reinstatement of the Bulletin.

After a lapse of almost 5 years, the next issue of the Bulletin (XXI) was published in Taxon 35 in 1986. In the editorial, I briefly addressed the relationship between the Bryological Times and the Bulletin. I stated that I considered the Bryological

Times to be "an informal publication where items of local and/or specialized interest, as well as more general information on field trips and meetings, can be publicized rapidly", while the Bulletin is "the formal communication of international bryological activities, not only to bryologists, but also to other botanists." I would like to enlarge on that comment as follows.

By "formal communication" I meant that I considered the Bulletin to be the public presentation of the IAB to its members and, most importantly, the rest of the botanical world. Therefore, I consider this our opportunity to "advertise" bryology as a scientific endeavour. My aim is to present major bryological events, for example, Janice Glime's report "Presentation of the First Hedwig Medals" (Bulletin XXI) and Rob Gradstein's report on "The Bryoecology Conference in Hungary, 1985" (Bulletin XXII) and articles that give insight into bryological activities in countries throughout the world, so that bryologists and non-bryologists can be better informed with respect to professional activities of bryologists.

I would like articles that profile bryologists in particular countries or regions, for example, the report by Cao Tong "Chinese Bryologists Abroad" (Bulletin XXI) and that by Noris Salazar and Claudio Delgadillo "Bryologists in Mexico and Central America" (Bulletin XXII). I regard book reviews as an integral part of the Bulletin; they are a good way to promote bryological literature.

I also want to draw attention to educational opportunities, particularly with a view to attracting non-bryologists; therefore, I have included reports on bryological courses offered at biological stations, for example, Cynthia Kack and Susan Murphy's report "Iowa Lakeside Laboratory" (Bulletin XXI) and Howard Crum's on "Bryology at the University of Michigan Biological Station" (Bulletin XXII).

An underlying, but extremely important function of the Bulletin is to highlight activities that will draw attention to the incorporation of "modern" techniques in bryological research.

In short, I view the Bulletin as having a very significant role that is complementary to, and co-operative with, that of the Bryological Times. I hope that I can look forward to your support of the Bulletin and I would encourage more members of the IAB to take the in-

itiative and submit reports for publication in the Bulletin.

Department of Botany, University of Iowa, Iowa City, Iowa 52242, U.S.A.

BRYOLOGICAL BOOK OF RECORDS

BRYOPHYTES IN OPERA

By Janice M. Glime & Zen Iwatsuki

ALTHOUGH MOST RECORDS portray the "most" of some quantitative attribute, surely an opera based on an incident involving a moss is a record worthy of note? The opera "Luminous Moss" by Ikuma Dan is set near the end of World War II in Hokkaido, Japan. It is based on the book of the same name by Taijun Takeda.

Four men have been shipwrecked in a blizzard and are stranded in a cave at the northern-most extremity of the Shiretoko Peninsula. They are sure they are going to starve to death, and some are afraid to die because they do not want their flesh to be eaten by the others after they die.

Dan has made the work into a morality opera by reflecting on the cannibal in each of us as we struggle among millions to survive. Finally, only the Captain survives, after eating his comrades as each dies, and he is brought to trial for his unthinkable acts. But the Captain asks each member of the courtroom to reflect upon his or her own cannibalistic acts. He says there is a halo of green about the head of each who has been a cannibal, but the halo is visible only to those who have not been cannibals. The halo he refers to is the same one he saw in the cave after eating his friends - the dim glow of the luminous moss.

To-day, Japan has a national monument to the luminous moss, *Schistostega pennata*, at a cave near the town of Rausu on the Shiretoko Peninsula.

Dr. J. Glime, Dept. Biological Sciences, Michigan Technological Univ., Houghton MI 49931, USA. Dr. Z. Iwatsuki, Botanical Inst., Fac. of Sciences, Hiroshima Univ., Higashisenda-machi, Hiroshima 730, Japan.

Personalia

GEERT RAEYMAEKERS successfully defended his Ph.D. thesis entitled "Ecophysiological effects of simulated acidic rain and lead on *Pleurozium schreberi* (Hedw.) Brid." He received his Ph.D. on 22 November 1986, from Michigan Technological University, Houghton, MI, U.S.A. Dr. Raeymaekers worked under the direction of Dr. Janice Glime.

Recent Publications

- Briolatina*, 10: 1-8, 1986.
Bryologist, 89(2): 91-187, 1986.
Buxbaumia, 19: 2-44, 1986.
Evansia, 3(3): 33-48, 1986.
J. Bryol., 14(2): 203-414, 1986.
Lindbergia, 12(1): 1-72, 1986.
Novit. Syst. Plant. non. Vasc.,
 23: 1-248, 1986.
Proc. Bryol. Soc. Jap., 4(6): 89
 - 108, 1986.
Taxon, 35(4): 647-994, 1986.

Scott, G.A.M. 1985. *Southern Australian liverworts*. Canberra, Australian Government Publishing Service. [Australian flora and fauna series, No. 2.]. ix + 216pp, 134 figs. Available from Mail Order Sales, Australian Government Publishing Service, GPO Box 84, Canberra, A.C.T. 2601, Australia. Price \$A. 19.20.

This delightful book, with the text by George Scott, the photographs by Bruce Fuhrer, and the line drawings by Rod Seppelt, is well laid out, informative and a pleasure to handle. According to its author it "..... attempts to provide assistance to the beginner in hepaticology and does not purport to be either exhaustive or intensive descriptions have been restricted in most cases to the relevant minimum and must be taken in conjunction with the keys ... It is a first, and not a final, flora". It deals primarily with the liverworts and hornworts of the State of Victoria, all species of which are included, but it should be of use throughout all of Southern Australia, and to a lesser extent in Tasmania.

There is an introductory section dealing with the morphology and biology of liverworts, followed by clearly laid out keys to species. The descriptions are brief, written in clear, non-technical English, and supported by distribution and habitat data and comparative notes. Photographs and/or drawings are provided for the common species. The book ends with a bibliography, glossary and an index.

It is the excellent line drawings and superb photographs that give this book so much appeal. The photographs are black and white habit studies of species which reveal a wealth of detail. They are also extremely artistic, due to good lighting and skilful composition, and are guaranteed to whet anyone's appetite to learn more about these plants. At \$A. 19.20, it is a give-away price and should not be missed. Unfortunately there are well-founded rumours that it is in short supply.

Daniels, R.E. & A. Eddy, 1985. *Handbook of European Sphagna*. Abbots Ripton, England, Institute of Terrestrial Ecology 1-262, with 85 figs. and 41 coloured plates. Available from Institute of Terrestrial Ecology, Administrative Headquarters, Monks Wood Experimental Station, Abbots Ripton, Huntingdon PE17 2LS, England. Price £10.50, postage extra.

The intention of this elegantly-produced Handbook, which is a handy size for field use (210 x 145 mm) is to provide a practical guide to the morphological and habitat characteristics of the more typical forms of each taxon throughout Europe. Both morphological and habitat characteristics are included in the key. Each taxon is fully described and illustrated with a whole or half-page figure and a colour habit photograph is provided of almost all of them. Notes are given on the habitat ranges of each and individual distribution maps outline the areas each occupies in Europe.

Additionally there is a good introductory account of the morphology and life history of *Sphagnum* and a discussion of distribution types and habitat preferences. A section on collecting, preserving and examination of material, a glossary and an index of section, species and varietal names and a good bibliography, complete the work.

This helpful guide is well laid out, clearly written and refreshingly free from jargon. It represents excellent value for money and should be of great help to a wide range of botanists.

Döll, R. 1985. *Exkursionstaschenbuch der wichtigsten Moose Deutschlands. Eine Einführung in die Mooskunde, mit besonderer Berücksichtigung der Biologie und Ökologie der Moose. Für die Lupenbestimmung der leicht erkennbaren Arten im Gelände*. Rheurdt, IDH-Verlag für Bryologie und Ökologie. 1-273, with 66 plates. Price DM30. Available from Dr. I. Döll-Hermanns, D-4137 Rheurdt, Hochend 62a, B.R.D.

This nicely-presented little book is written by one of Europe's foremost field bryologists. It is, as its title and sub-title suggest, a field guide to the common mosses and liverworts of Germany and is written mainly for use by amateurs and students.

Introductory chapters deal with such topics as the characteristics, life cycle, biology, habitats and bryogeography of bryophytes. These are followed by an extensive annotated key (44 pages) and the descriptions. The latter are brief, but are supported by the line drawings, notes on ecology, comparative comments

on species that might be confused and, for some, additional notes on points of interest. An index to genera, a brief literature list and the plates complete the book. For the price it is an excellent buy.

L'Herbier G. Thuret (PC) : Précisions

GUSTAVE THURET, "amateur éclairé" du XIXème siècle, était aussi grand collectionneur. Son herbier est composite, et contient, à part les récoltes principalement françaises de Thuret et de ses amis, des exsiccata que l'on rencontre habituellement dans une telle collection, et surtout l'herbier BORY DE SAINT-VINCENT (1778-1846) dont Thuret a acquis une bonne partie des cryptogames en 1847. Bory avait réuni de nombreux bryophytes du monde entier, récoltés et décrits par lui-même, ou récoltés par ses amis ou correspondants, p. ex. Gay, L'Hermier, Bertero, Webb, Despreaux, Dumont d'Urville, Lesson, A. Richard, et bien d'autres. Beaucoup de ces échantillons sont des isotypes.

H. Bischler & D. Lamy. Musée National d'Histoire Naturelle, Laboratoire de Cryptogamie, 12 rue de Buffon, 75005 Paris, France.

Council on Botanical & Horticultural Libraries: Organizational Meeting

THE COUNCIL ON BOTANICAL AND HORTICULTURAL LIBRARIES is planning a special business meeting during the International Botanical Congress in Berlin in July 1987. A major objective of the meeting is to organize a European chapter. CBHL invites all interested in botanical documentation to attend. It is anticipated that the meeting will follow the scheduled symposium on Electronic Data Processing in Botany, and be followed by a dinner.

The Council on Botanical and Horticultural Libraries was established in 1970 to encourage communication among individuals and institutions concerned with the botanical and horticultural literature. The present 250 members represent the United States and 10 other countries around the world.

For more information, contact the President, Mrs. G. C. Kaye, Farlow Library, Harvard University, Cambridge MA 02138, U.S.A.

XIV International Botanical Congress,

Berlin (West), Germany, 24th July to 1st August, 1987.

AN ACCOUNT of the bryological activities planned for the Congress were published in the last issue (*Bryol. Times* 40:5) since when details of 2 additional lectures and the 3rd and final circular have been received. The following information updates what was given in the last issue.

Congress SymposiumDivision 5 : Systematic and Evolutionary Botany5-14 Taxonomy of higher categories and generic concepts in bryophytes

Grolle, R. Hepatics in amber - what do they tell on evolution?

5-16 Cytotaxonomy, ultrastructure and systematic relationships in bryophytes

Duckett, J.G. & K.S. Renzaglia. Spermatogenesis and systematics of bryophytes.

Special Interest Group Meetings

These are basically closed meetings with a limited number of invited participants. Anyone wishing to attend should write as soon as possible to the appropriate contact address with the expectation that any unfilled places will be allotted on a "first come, first served" basis.

14. Bryological bibliographic databases: directory project

Contact Address: Dr. S. W. Greene, Department of Botany, The University of Reading, London Road, Reading, Berkshire RG1 5AQ, United Kingdom. Tel. +44-734-875234, Ext. 241. Telex (RULIB) 847813. For further details, see elsewhere on this page.

27. Tropical bryophyte taxonomy & floristics of the Pacific

Contact Address: Prof. H.A. Miller, Department of Biological Sciences, University of Central Florida, Orlando, FL 32816, U.S.A. Tel. +1 - 305-275-2148.

Excursion Programme

Excursions No. 14 (Bryophytes of Switzerland) and No. 33 (Bryology of the Faeroe Islands) are fully booked, but some places may become available through cancellation (see p. 3). Anyone wanting a place on one of these excursions should write immediately to the Congress Organizers, XIV International Botanical Congress, Königin-Luise-Strasse 6-8, D-1000 Berlin (West) 33, Germany.

Further Announcements

Additional information on all aspects of the Congress will be published in these columns as it becomes available.

S.W. Greene

SPECIAL INTEREST GROUP MEETING, BERLIN, 1987.

Bryological bibliographic databases: directory project

By S. W. Greene

IT IS ANTICIPATED that this meeting will last about three hours, and focus on the role of bibliographic databases in bryology. Following a review of those available, and the present position of those in progress, the meeting will go on to discuss the best means of producing the proposed International directory of bryological taxonomists, their collections and their publications. The Directory will be based on data in the Biofiles and the Litfiles assembled during the preparation of the *Conspectus of bryological taxonomic literature*, due for completion this year. An outline of the Directory proposal will be found in *Hikobia*, 2(4): 401-404, 1986.

Anyone requiring further information should get in touch with the author of this note at the Department of Botany, University of Reading, London Road, Berkshire RG1 5AQ, United Kingdom.

BLAM**Field Excursion**

THIS YEAR'S FIELD EXCURSION for members of the Bryolodisch-Lichenologische Arbeitsgemeinschaft für Mitteleuropa, will be to the Allgäu in Southern Bavaria. The headquarters will be at Sonthofen, Between Kempten and Oberstdorf, and can be reached by train from Munich (c.130 km) or Stuttgart (via Ulm and Kempten, ca. 170 km).

Frau Dr. R. Lübenau-Nestle (Kempten) has agreed to act as leader and local organizer.

Application should be made by 1 April 1987 to Dr. G. Philippl, Erbprinzenstr. 13, 7500 Karlsruhe, Federal Republic of Germany, who will send further particulars in due course to all registered participants. Those attending the International Botanical Congress in Berlin will be especially welcome.

DIARY

For explanation of acronyms, see *Bryol. Times*, 31: 7-8, 1985.

1987

Feb. 14. VWGB. Annual Meeting, Meise, Nationale Plantentuin.

March 7. VWGB. Field trip to Bruggenhout (Prov. of Oost Vlaanderen). Meet at Bugenhout Church, 09.30 hrs.

April 1-8. BBS. Spring field meeting, Penzance, Cornwall. Local Sec.: Mrs. J.A. Paton, Fair Rising, Wagg Lane, Probus, Truro, Cornwall TR2 4JU. For details see Bull.BBS. 48:13.

April 4. VWGB. Field trip to Zwinbosjes-Het Zoute (Prov. of WestVlaanderen). Meet in front of parking area, Het Zwin, 09.30 hrs.

May 1-3. VWGB. Bryological weekend near Buzenol (Ardennes). Details to be announced.

May 7. Joint BBS-Linnean Society Meeting, London. For preliminary information see *Bryol. Times*, 40:9. Enquiries and booking: The Executive Secretary, The Linnean Society of London, Burlington House, Piccadilly, London W1V 0LQ.

June 13-14. SBLS. Annual Assembly. Bernese Oberland. Further information from: Dr. K.A. Ammann, Syst.-Geobot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.

Diary [Continued]

- Mid July. NBS. Annual business meeting and excursion. Isle of Fyn. Further information from G.S. Mogensen, Botanical Museum, Gothersgade 130, DK-1123, Copenhagen K, Denmark.
- July 17-23. IAB. Mainz. Bryological Methods Workshop. For further information see Bryol. Times 34:7.
- July 24-1 Aug. XIVth IBC Berlin (West). Preceded by IAPT Nomenclature Session, July 20-24. For latest announcement see this issue p.9. Congress address: XIV IBC. Bot. Garden and Museum, Königin-Luise-Str. 6-8, D-1000, Berlin (West) 33, Germany.
- Aug. 3-7. BLAM. Field excursion to the Allgäu, Southern Bavaria. For further information, see this issue, p.9.
- Aug. 5-19. BBS. Summer field meeting, Achill Island, Co. Mayo (1st week) and Westport (2nd week). Local Sec.: Dr. D.M. Synnott, National Botanic Gardens, Glasnevin, Dublin 9, Ireland. For preliminary information see Bull. BBS. 47:14.
- Aug. 7-8. ABLIS. Foray in Ohio. Leader J.A. Snider, Dept. of Biological Sciences, University of Cincinnati, Ohio 45221, U.S.A.
- Aug. 9-13. ABLIS. Annual Meeting in conjunction with AIBS Meeting, Ohio State University, Columbus, Ohio, U.S.A.
- Aug. (2nd half) SBLIS. Inventory of cryptogams in the Alluvial deposits of the Gauli Glacier. Further information from Dr. K.A. Ammann, Syst.-Geobot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.
- Aug. 26-30. SBLIS. Annual Field Trip in Samnaur, Grison. Further information from Dr. K.A. Ammann, Syst.-Geobot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.
- September. The 12th Annual Andrews Foray will be held in Maine, U.S.A. Write to: Dr. Nancy Slack, Biology Dept. Russell Sage College, Troy, NY 12180; or Dr. Robert Thomas, Dept. of Biology, Bates College, Lewiston, ME 04240, for further information and to be added to the mailing list.
- Sept. 6. VWGB. Field trip to Braakman/Terneuzen (Netherlands). Meet at recreation area 10.00 hrs.
- Sept. 26-27. BBS. A.G.M. and paper-reading meeting, Wye College, Kent. Local Sec.: Dr. M.A.S. Burton, MARC, The Otago Building, 459A Fulham Road, London SW10 0QX. For preliminary notice, see Bull. BBS. 47:14.
- Oct. 4. VWGB. Field trip to De Maten/Genk (Prov. of Limburg). Meet at entry reserve, 09.30 hrs.
- Nov. 4. VWGB. Field trip to Herselt/Westerlo (Prov. of Antwerpen). Meet at Herselt Church, 09.30 hrs.
- Nov. BBS. Taxonomic Workshop. University of Manchester. Local Sec.: Dr. S.R. Edwards, The Herbarium, Manchester Museum, The University, Manchester M13 9PL. For preliminary details see Bull. BBS. 47:14.
- July 24-20. BBS. Summer field meeting, Aigas Field Centre, Beaulieu, Invernesshire. Local Sec.: Dr. P.J. Lightowlers. Participants at the BBS ecological symposium (see July 19-23) will be most welcome.
- Aug. 7-11. ABLIS Annual Meeting in conjunction with AIBS meeting, University of California, Davis, U.S.A.
- Aug. 31-2 Sept. Phytochemical Society of Europe. Saarbrücken. International symposium on the chemistry and chemical taxonomy of bryophytes. Further information from Prof. H.D. Zinsmeister or Dr. R. Mues, Fachrichtung Botanik der Universität der Saarlandes, D-6600 Saarbrücken 11, B.R.D.
- Sept. 12. 6th CEBWG Meeting, Liblice (Village near Mělník), Czechoslovakia. For preliminary announcement of this 4-5 day meeting, see Bryol. Times 40: 10.
- Sept. 17-18. BBS. A.G.M. and paper-reading meeting, Liverpool. Local Sec.: Dr. J. Edmondson, County Museums Dept., William Brown St. Liverpool. L3 8EN, U.K.

1989

- Aug. 6-10. ABLIS Annual Meeting in conjunction with AIBS meeting, University of Toronto, Canada.

1990

- Aug. 12-18. Helsinki, Symposium on SE Asian bryophytes. See preliminary announcement in this issue, p.4.

STOP PRESS

MEMBERS of the 1986-87 Academia Sinica-National Geographic Society/Southwest Missouri State University/Missouri Botanical Garden Joint Bryological Expedition, extend their greetings to the Editor and readers of the Bryological Times.
M. Crosby, J.S. Lou, B. Magill, P. Redfearn, P.C. Wu.

THE INTERNATIONAL ASSOCIATION OF BRYOLOGISTS publishes The Bryological Times every two months, the Bulletin of Bryology twice a year and the Advances in Bryology irregularly. Material for the Bryological Times can be sent at any time, but submission dates for the Bulletin and the Advances should be discussed with the Editors, Dr. Diana G. Horton (University of Iowa) U.S.A. and Dr. Norton G. Miller (Albany) U.S.A. respectively. The Editors do not accept responsibility for the views of authors.

For details regarding membership of the International Association of Bryologists (currently U.S. \$ 8.00 p.a.), write to the Honorary Secretary, Dr. S.R. Gradstein, Institute of Systematic Botany, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands.

THE BRYOLOGICAL TIMES is published in Utrecht and distributed from Beijing (China), Eger (Hungary), Reading (U.K.), St. Louis (U.S.A.), Tokyo (Japan) and Utrecht. All correspondence concerning mailing to: Rob Kruijt, Institute of Systematic Botany, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands.

ITEMS FOR THE NEXT ISSUE to be with the Editor, Dr. S.W. Greene, Department of Botany, The University of Reading, London Road, Reading RG1 5AQ, Berkshire, England (Telex 847813 RULIB) by the 1st of March, at the latest. Items for the regular columns should be sent direct to the column editors, whose names and addresses will be found in Bryol. Times, 31:9, 1985.