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New Age Databases — Part I

Contribution from
René Belland
Regional Editor

Digital databases have never before taken on the importance that they have in the present "information age". Databases are used extensively in businesses of all types to store and retrieve information on customers and their interactions with vendors, by governments to maintain data of all types regarding countries, by institutions, and by individuals.

Similarly, biological databases have never been seen to be as important as they are currently, largely because of the global concerns over the decline in world biodiversity and the needs to register and gain speedy access to specimen records. In North America and Europe, databases are used to track information on rare and endangered species. On the former continent, The Nature Conservancy has developed a detailed database standard that is used at more than 50 conservation data centers throughout Canada and the U.S. to track and maintain information about rare species.

In the botanical world, including bryology, the traditional uses for databases have been to store herbarium information and to create herbarium labels. Most of the databases were devel-

oped in-house, or they used off-the-shelf retail products customized for herbarium use. The widespread use of databases for botanical information storage is relatively recent and coincides with the availability of personal computers starting in the early 1980's. At this time database products were for the first time easily and affordably obtained, and they allowed herbaria to develop databases for their holdings. Popular databases include what are often referred to as "desktop" databases. They include the dBase line of products, Paradox, Foxpro, Filemaker Pro, and Advanced Revelation. Some of these, most notably dBase, have been with us since the introduction of the IBM PC (1981) and are still very popular. Most of the others are also still widely used, and have been joined by other products such as Access.

Database technology has changed dramatically in the last five years. For PC users, the most important change has been the affordability and access to client/server systems. These database systems were once the domain of the large enterprise. In the 'olden' days of the PC, installation of a client/server database would have cost tens of thou-

sands of dollars (in \$US!). While a large part of the cost would be the purchase of the hardware needed to support the system, a considerable fortune would have also been spent in licensing costs, maintenance, and client software. Therefore, the price to set up a client/server database 10 years ago would have been prohibitive for most herbaria. Today, client/server systems are truly affordable, and they offer important advantages for herbarium databases. The purpose of this article is to provide an introduction to client/server systems.

Before presenting details, it is important to understand something about "desktop" databases so that one can compare them with client/server databases. Desktop databases, including the aforementioned products, are most often used as stand-alone programs. They were designed for personal computers

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and to be used by a single user. In the early days of the PC, data files were not shareable between users. So for example, if Joe down the hall wanted to use a copy of your database, you would have to create a copy of the database files on a diskette and then physically carry that diskette to Joe. As the PC became more widespread however, desktop databases were improved so they could be used on networks. In a networked configuration the data files are installed on a 'file server' (a computer dedicated to holding the data files), where they are available to other users on the network. The advantage of this setup is that only one copy of the data exists (on the file server); consequently, if Joe changes a herbarium record, all users on the network will see that change.

From the perspective of the database application (e.g., dBase), the data files on the file server appear as if the data resides on the local (user) machine's hard disk. The database application on the user machine does all the work of fetching the data from the file server and its subsequent manipulation. The manner in which the data is fetched is of particular interest. In many cases, the application must drag the entire database over the network to the user machine in order to retrieve and present the requested records. This creates a lot of network traffic, and, in situations where many users are on the network, waiting for the data to appear can be a glacial experience.

In a client/server system, a database server can reside on a computer either on the same network, or on one thousands of kilometers away. When a user logs onto such a system, the application being used to connect to the database (called a 'client') is unaware of the data files on the database server (*db-server* for short). All the client sees is the db-server. To receive information, the client makes a request to the db-server, which the db-server processes and then sends the desired data to the client. The difference between client/server and desktop databases is analogous to the difference between a full

service liquor store and a self-serve one. In the self-serve (=desktop), you walk around the store and choose the bottles you want. The entire stock of liquor is available to you. In the full service store (=client/server), you decide beforehand which items you want, then submit your request to a clerk who goes to the store-room to fetch your spirits - you never see the entire stock of goods.

In a client/server system, the db-server manipulates the indexes and database files. The workload is now distributed between a client (on your machine) and the db-server, which usually resides on a much faster machine. More importantly, if Joe makes a request that returns just a single record, then the db-server will send just the single record to Joe - whether the table was indexed or not (unlike the desktop databases, as we discussed earlier). Client/server systems are thus very efficient when it comes to reducing network traffic. But wait, there's more...

Here are some other advantages to consider in moving herbarium databases to a client/server system.

Performance/Scalability: Most client/server systems are designed to handle very large tables. Maximum table sizes may often exceed millions of records, or are gigabytes in size. Compare this to a Paradox table where the maximum size is 256Mbytes (Paradox is also very wasteful of disk space- likewise for dBase and Foxpro).

Queries arriving at the db-server are optimized for speed, and may execute as much as 10x faster than the same query being processed by a file-based server. Also, most client/server packages can be run on a variety of platforms, including SUN, many flavors of Unix, VAX, Novell, and Windows NT, and they are also available for a variety of different processors. That means that one can choose an operating system/processor combination that will invariably outperform any personal computer system. As your needs grow, you can scale your database to a faster/bigger machine to accommodate more users and larger databases.

Flexibility: A client/server system can

be thought of comprising two somewhat independent pieces of software: the db-server application and the client application. Neither piece of software has to come from the same vendor. For instance, the db-server might be purchased from Microsoft. However, the client does not necessarily have to be a Microsoft product. In fact, the client is often custom software designed specially for the job at hand. The tools used to construct the client can come from any of a multitude of vendors. What this means for the user is that they get software that does exactly what they want it to do — no more and no less. Also, using special software 'drivers', many off-the-shelf software packages such as Excel, Paradox, and dBase, can be made to access a client/server database.

Accessibility: Client/server systems work on a variety of networks, including local area networks, wide-area networks, and the Internet. Internet access is particularly important, and presents a wide range of possibilities for bryologists who are interested in data sharing.

Capacity: Client/server systems can handle many hundreds and often thousands of clients at one time (compare this number with your desktop database). Consider, for instance, airline reservation systems or banking systems; both use high-end client/server technology.

Multi-user capability: Because client/server systems are designed to service many users there is always the possibility that two users may try to update the same record at the same time. Client/server systems have built in facilities to deal with such record conflicts. For example, record locking is not usually done at the table level, enabling many users to be working on the same table at the same time.

Programmability: Client/server database systems are programmable. All of the major products allow a programmer to write specialized chunks of code that perform specific functions. These chunks are called stored procedures or

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stored functions. They are pre-compiled on the db-server, and executed by the db-server as required. For instance, a stored procedure might be to query a herbarium table that returns all records having a particular range of accession numbers. Because they are pre-compiled, using stored procedures and functions results in considerable performance gains. In addition, they can be used to enforce 'business rules'. These are the protocols that define how the data should be accessed. Well-defined business rules ensure that the data is always accessed in the same way by a client application and thus guarantees database integrity. Stored procedures and functions are therefore standard 'interfaces' or windows to the data.

Stored procedure and functions are written in Structured Query Language (SQL) which is the standard language for client/server systems. SQL is very flexible, allowing for you to ask for data in a myriad of ways. And, since it is a standard, you need only learn it once and then you will know how to extract data from any client/server database.

Transaction Control: The ability to update or insert data into several tables at one time, and be guaranteed that either all the updates/inserts succeed or that they all fail, is important for complex databases. In our database for instance, when a user enters a herbarium record into a 'voucher' table, there are several other tables into which data is inserted. For instance, if the species is rare in Alberta, then a record is also inserted into a 'rare species' table. Because of the structure of the database, both data insertions need to occur to ensure database integrity. The sequence of data entry events is, 1) the data is saved into the voucher table, then, 2) the record is saved into the rare species

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There are a number of choices when it comes to choosing db-server software. The one you choose will, of course, depend on your needs, and your budget. The following is a short list of available products.

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This concludes our brief overview of client/server databases. In the next issue, we will present the database system that has been developed for the bryophyte herbarium at the University of Alberta. In that installment we will get into some of the nitty details.

René J. Belland, Devonian Botanic Garden, University of Alberta, Edmonton, Canada, e-mail: rbelland@ualberta.ca

Travel-Dissecting Microscope

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Obituary: Karl Mägdefrau

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Karl Mägdefrau, professor at the university of Tuebingen, was known for his life forms of bryophytes, and his palaeobotanical, biohistorical, anatomical and physiological work. After his retirement he lived near Munich. Last autumn he had a heart attack and since then lived in a home for elderly people. His botanical library was sold to Koeltz, who included the bryological books in his most recent catalogue.

Vendor	Web Site
DB2	www.software.ibm.com/data/db2/
Informix	www.informix.com/informix/
Interbase	www.interbase.com
Microsoft SQL Server	www.microsoft.com/sql/
Oracle	www.oracle.com
Sybase	www.sybase.com

NEW PUBLICATIONS

Enroth, J., Hyvönen, J. & Piippo, S. (editors): *From Finland to Japan to New Guinea to China – that is Timo Koponen, Bryologist.* – *Bryobrothera* 5. 314 pp. Finnish Bryological Society, Helsinki 1999. Price FIM 150 (30 USD) + postage.

This brand new book was compiled in honour of Prof. Timo Koponen on the occasion of his 60th birthday (13 January, 1999). In addition to the article "Timo Koponen: 60 years" by Sinikka Piippo, it contains a total of 33 scientific articles by hepaticologists and muscologists.

The following titles may be given as examples of the contents:

Allen, B.: A revision of the moss genus *Lepyrodon* (Leucodontales, Lepyrodontaceae).

Buck, W. R.: *Timotimius*, a new genus of Sematophyllaceae (Bryopsida) from Ecuador.

Grolle, R.: *Metacalypogeia* (Calypogeiaceae, Hepaticae) new to Europe as Baltic amber fossil.

Hedenäs, L.: Altitudinal distribution in relation to latitude; with examples among wetland mosses in the Amblystegiaceae.

Matsuda, S., Estébanez, B. & Deguchi, H.: Sporogenesis in *Oncophorus crispifolius* (Dicranaceae, Bryopsida).

Norris, D. H.: On the auricles of *Sphagnum* leaves.

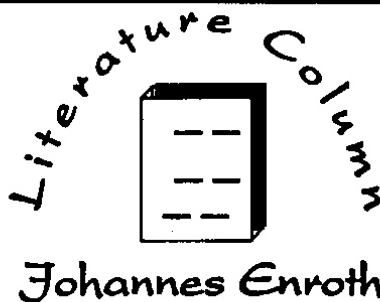
Pócs, T.: Bryophyte speciation and diversity in the East African mountains.

Stech, M. & Frahm, J.-P.: Systematics of species of *Eurhynchium*, *Rhynchostegiella* and *Rhynchostegium* (Brachytheciaceae, Bryopsida) based on molecular data.

Váňa, J.: Phytogeography of the Jungermannineae (Hepaticae).

The book, which is a bargain, can be ordered (and review copies can be requested) from the editors:

Prof. Sinikka Piippo and Dr. Johannes Enroth, Botanical Museum, Dept of Ecology and Systematics, P.O. Box 47, FIN-00014 Univ of Helsinki, Finland, Fax +358 9 708 4830, sinikka.piippo@helsinki.fi, johannes.enroth@helsinki.fi



Blockeel, T. L. & Long, D. G.: *A Check-list and Census Catalogue of British and Irish Bryophytes.* – 208 pp. British Bryological Society, Cardiff 1998. Paperback, laminated covers. Advertised price: £ 7.50. Postage and handling: UK £ 1.00, Europe £ 1.75, outside Europe £ 3.50. Available from: A. R. Perry, British Bryological Society, National Museum and Gallery of Wales, Cathays Park, Cardiff CF1 3NP, UK.

M. F. V. Corley & M. O. Hill published their "Distribution of Bryophytes in the British Isles" in 1981. The present book is an updated successor of that. In the 18 years intervening between the publication of the two books, knowledge of the British bryophyte flora has increased greatly; new taxa have been added, others excluded, and the geographic distributions of many species are far better known. This, combined with the taxonomic and nomenclatural changes accumulated over the years, more than justifies publication of this new edition. It is my impression and feeling that the members of the British Bryological Society are "enviously" active in collecting data on which this book is based!

The geographic distributions within the British Isles are recorded by the 112 vice-counties (including the Channel Islands). The vice-counties are presented on maps. The British Bryological Society has adopted the same policy that is used for bryophyte mapping in the Nordic countries (Söderström et al. 1998): additions to the recorded distribution must be supported by a voucher identified by a specialist. The vouchers are available for re-checking if necessary. This is the only sensible way: a record that cannot be checked or re-checked is practically worthless.

In the Check-list and Census Cata-

logue, all changes relative to the Corley & Hill book are accompanied by explanatory annotations. "Excluded taxa" and the reasons for exclusion are given before the list. The proposed three new combinations, all in the genus *Sphagnum*, are given and discussed in separate paragraphs.

The genera and their constituent species are numbered and arranged taxonomically rather than alphabetically. In my opinion, taxonomic relationships are not relevant in check-lists, and I would thus have preferred an alphabetical listing within the major groups, thus making it much easier to find an entry. There is, of course, an index to the names at the end of the book, but still.

The annotations are most useful and important, but some taxonomic opinions of various authors are disregarded without explanation. For example, Hedenäs (1992) established the genus *Straminergon* for the species traditionally known as *Calliergon stramineum*, but there is no annotation accompanying the latter name. Similarly, Hedenäs (1993) transferred *Hypnum lindbergii* to *Calliergonella*, but again there is no annotation.

The above mild criticism should be taken as such: mild. This book, affordable to anyone, is definitely most useful and necessary for anyone dealing with European bryophytes. I take this opportunity to wish the British Bryological Society a prosperous 1999 – keep up the good work!

References

Corley, M. F. V. & Hill, M. O. 1981. Distribution of Bryophytes in the British Isles. A Census Catalogue of their Occurrence in Vice-Counties. – British Bryol. Soc., Cardiff.

Hedenäs, L. 1992 ("1990"): Taxonomic and nomenclatural notes on the genera *Calliergonella* and *Breidleria*. – *Lindbergia* 16: 161-168.

Hedenäs, L. 1993: A generic revision of the *Warnstorfia-Calliergon* group. – *J. Bryol.* 17: 447-479.

Söderström, L. et al. (eds.) 1998: Preliminary distribution maps of bryophytes in northwestern Europe. Vol. 3, Musci (J-Z). – Mossornas Vänner, Trondheim.

Johannes Enroth

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Vendor

Web Site

DB2	www.software.ibm.com/data/db2/
Informix	www.informix.com/informix/
Interbase	www.interbase.com
Microsoft SQL Server	www.microsoft.com/sql/
Oracle	www.oracle.com
Sybase	www.sybase.com

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Bates, J. W., Ashton, N. W. & Duckett, J. G. (eds.): **Bryology for the Twenty-First Century**. – 382 pp. Maney Publishing and the British Bryological Society 1998. ISBN 0-901286-90-7. Pb. Advertised price: EU £38, OS £48, US\$ 76. Available from: Maney Publishing, Hudson Road, Leeds LS9 7DL, UK.

The brochure says that this book is "A compilation of state of the art papers on key topics in bryology from invited speakers at the Centenary Symposium" of the British Bryological Society, held in Glasgow 5–7 Aug, 1996. It also promises "New information". Interesting!

The first part of the book is a well-deserved tribute to Prof. Paul Richards, whose influence has been important not only for bryology in Britain but also worldwide. The scientific content is divided into three sections entitled "Origins, evolution and systematics", "Morphogenesis and cell biology", and "Physiology, ecology, pollution and global change". Altogether there are 23 scientific papers plus a summary of a paper by Royce Longton that was previously published elsewhere.

The first scientific section of the book ("Origins, evolution and systematics") includes several highly interesting articles. There is no "traditional" taxonomy but the methods and approaches are very modern, often employing cladistic methodology and combining molecular and ultrastructural characters in surveying phylogenies. There are many top-class articles by leading experts, such as David Garbary & Karen Renzaglia, Terry Hedderson et al., Dale Vitt et al., Lars Hedenäs, etc. The papers deal for example, with the fossil record of early land plants (with some *really* new findings), molecular evidence on the origins and diversification of land plants, molecular taxonomy of liverworts and that of bryophytes, and ordinal classification of the mosses (again, with some refreshingly new points of view).

The "Morphogenesis and cell biology" section is not quite as large as the preceding one, but the five articles are no less interesting, even to a taxonomist such as myself. Moss protonemae

are dealt with in two articles: Jeffrey Duckett et al. write about their morphogenesis and Fred Sack et al. about their gravitropism. Microtubules of a species of *Marchantia*, bicentrioles in anthocerotid spermatogenous cells, and auxin structure–activity relationships in *Physcomitrella patens* are the topics of the other papers in this section.

The third part "Physiology, ecology, pollution and global change" consists of eight articles dealing with such diverse topics as ecophysiology and photosynthetic pigments in aquatic bryophytes (J. Martinez-Abaigar & E. Núñez-Olivera), quantification of bryophyte–environment relationships (H. J. B. Birks et al.), dynamics of bryophyte populations (L. Söderström), and peatland carbon economy and climate change (R. S. Clymo), and others.

"New information"? Oh yes! I am really impressed by the scientific quality of this book, its forward-looking attitude, and also by the *excellent* editorial work! I can whole-heartedly recommend the book to all bryologists regardless of their area of expertise. Just read it – it will be most rewarding. Modern ideas and methods, when used critically, are just as important in bryology as in any other field of botany, but this does not mean that traditional taxonomy and bryofloristics are obsolete – there is enough challenge and need for "modern" as well as "traditional" bryologists. A fruitful symbiosis between them is of fundamental importance to a successful bryology in the 21st century.

Ryszard Ochrya: The Moss Flora of King George Island, Antarctica. XXIV + 278 pp. Paperback. ISBN 83-85444-60-2. Polish Academy of Sciences, W. Szafer Institute of Botany, Cracow. 1998. Available from: Publishing Office, W. Szafer Institute of Botany, Polish Academy of Sciences, Ul. Lubicz 46, PL-31-512 Kraków, Poland. Price: US\$ 30 (including handling + postage).

"A species of *Polytrichum* resembling the *alpinum* of Lin. one or two lichens and a fucus found in the sea, along the shores – when you add to these occasional plant of a small species of *avena*, you complete the botanical catalogue of

the islands." (A quotation from a biological report on South Shetland Islands, published in 1833).

King George Island, ca. 65 km long and up to 40 km wide, is the largest island in the South Shetland archipelago. It is mostly ice-covered, the ice-free areas being restricted to the coasts, especially in the SW tip, and to some inland nunataks. How rich a moss flora can such an island sustain? Ochrya's flora gives the answer: 61 species (in 33 genera and 15 families). Thus, the above quotation represents more than a mild underestimation of the floristic diversity.

The flora on Antarctica has been seriously studied only in the 20th century. Although poor in vascular plants – there are only two indigenous species – the number of bryophyte and lichen species is much higher. Jules Cardot's report from 1908 was the first major work on the mosses, and there are few subsequent, more or less comprehensive local accounts. Thus, it is justified to consider Ochrya's flora as a pioneer work.

The flora is subdivided into 6 chapters: 1) Introduction; 2) King George Island; 3) Bryological exploration; 4) The island's vegetation; 5) Bryogeography; 6) Systematic treatment. In addition, there is e.g., a list of taxonomic and nomenclatural changes and an excessive literature list.

Chapter 2 is a detailed presentation of King George Island and its natural history (location, topography, geology, climate, human presence). It is interesting reading but perhaps partly (e.g., geology) even a bit too detailed for a flora. Chapter 3 is a thorough and useful account of the bryological exploration, and it contains an enumeration of the collecting localities, with precise longitudes and latitudes. Perhaps the next list "Personal collection localities and numbers" could have been joined with the other, more comprehensive list simply by adding the collection numbers. A minor point is that it would have been more logical if Chapters 3 and 4 ("Bryological exploration" and "The island's vegetation") were transposed. Chapter 4, dealing with the vegetation, is in itself plain

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excellent, thorough yet concise enough.

In Chapter 5, Ochyra presents the phytogeographical elements of King George Island and recognizes five: Antarctic, Subantarctic, South Temperate, Bipolar, and Pan-Continental. These are illustrated in distribution maps. About half of the species belong in the bipolar element, including several interesting ones such as *Sanionia georgico-uncinata*, which in Scandinavia has been called *S. nivalis*. It is not surprising that the bulk of the species belong in wide-spread taxa of families such as Grimmiaceae, Pottiaceae, Polytrichaceae, and Bryaceae.

The mosses are systematically treated in Chapter 6, naturally the most important part of the book. The families are presented in the "traditional" Brotherus sequence with minor deviations. The genera and species are arranged alphabetically rather than according to supposed taxonomic relationships. The families and genera are not described formally but more "freely". There are some aspects that I would have done otherwise (but not necessarily better), such as the author abbreviations: some are according to Brummitt & Powell's recommendations while others follow the "traditional bryological usage". The identification keys to genera and species sometimes give too many features, when just a single differentiating character could have been used.

OK, let's drop the more or less critical attitude and move on to the strengths of the flora. It is clear that the merits by far outweigh the minor flaws (if they can be called flaws in the first place). The specific treatments are excellent. The descriptions are detailed enough and the accompanying illustrations are of the very high quality that consistently comes from the pen of Halina Bednarek-Ochyra. Informative notes on ecology and phytogeography are given for each species, and the distribution in King George Island is presented as maps for most of them. One important thing this book contains is the lists of specimens examined from the flora area. In my opinion, every serious, scientific flora should contain such lists of at least some repre-

Cryptogamie

One hundred and twenty-five years ago, on May 1st 1874, Pierre Tranquille HUSNOT created the *Revue Bryologique*. The journal quickly found unanimous support among contemporary bryologists, and soon became a journal of international distribution. Pierre Allorge took over the editorial task in 1926, and the editorial office moved to the Museum d'Histoire Naturelle in Paris where it remains to this day. In 1932, Pierre Allorge decided to broaden the scope of the journal and included lichenological studies. The *Revue Bryologique et Lichénologique* was born. Between the years 1942 and 1944, the journal was published under "Mélanges Bryologiques et Lichénologiques". Following P. Allorge's death in 1944, his wife, V. Allorge became the owner and thereby the editor of the journal. She was assisted later by two colleagues at the Museum, namely S. Jovet-Ast and H. Bischler. Publication resumed in 1945 under the former title "*Revue Bryologique et Lichénologique*". In 1980, under the direction of Hélène Bischler and Denis Lamy, the non-profit organization "Associations des Amis des Cryptogames" was created to assume ownership of *Cryptogamie*, and publication of the three journals, including *Cryptogamie*, *Bryologie-Lichénologie*. For its 125 years of existence, the journal has been published almost continuously, and provided its readers with articles on all aspects of bryology and lichenology, from floristic records to taxonomic monographs, from cytological reports to the analysis of population genetics, from physiological properties to ecological patterns.

Starting January 1st, 1999, the journal sentative specimens. Previous literature records are also cited for each species. There are "floras" and floras. The present book certainly belongs in the latter category; all of its really crucial aspects are no less than exemplary. Its thoroughness and comprehensiveness are the results of more than 20 years of meticulous research by Ryszard Ochyra, one of the world's leading and, should I

will be devoted again entirely to bryological research, and volume 20 (1999) will be published under the new name: *Cryptogamie, Bryologie*. The publication, promotion and distribution will be now be assured by the Scientific and Medical Editions of Elsevier. The editorial board, chosen by the owners, retains responsibility for the quality of the scientific content of the journal. The editors, Denis Lamy and Bernard Goffinet, remain committed to maintaining high standards of publications, and thereby to meeting the expectations of the readers. The editors will consider for publication in *Cryptogamie, Bryologie* all manuscripts pertaining to the Biology of Bryophytes. The main editorial office remains in Paris, and is housed in the Museum d'Histoire Naturelle, under the direction of Denis Lamy. Manuscripts should be submitted to Denis Lamy (*Cryptogamie, Bryologie*, 12 rue Buffon, 75005 Paris, France). Contributors from the Americas should send their manuscripts to Bernard Goffinet (Department of Botany, Box 90339, Duke University, Durham NC, 27708-0339 USA). The format of *Cryptogamie, Bryologie-Lichénologie*, and past guidelines for contributors remain in effect.

We hope that authors will follow us in our choices and consider *Cryptogamie, Bryologie* as a desirable arena for publication, so that we can continue to provide a respected international journal focused on all aspects of Bryology.

Denis Lamy and Bernard Goffinet (eds.)

Bernard Goffinet, Department of Botany, Box 90339, Duke University, Durham, NC 27708-0338 USA, e-mail: goffinet@duke.edu, phone: 919 660 7370, fax: 919 660 7293

say, most uncompromising bryotaxonomists. Preparing this book has certainly not been a piece of cake, given the extreme conditions of the flora area and the resulting morphological modifications in the mosses. As for the contents of the flora, it is easy to recommend it to the colleague bryologist, and the price makes it even easier!

Johannes Enroth

Regional Editor



RAY TANGNEY

My interest in bryophytes began as an undergraduate here at Otago University. My interest was initially ecological, and I have undertaken studies of bryophyte communities and bryophyte island biogeography in southern New Zealand. More recently my research has been in the taxonomy of mosses. I have completed a taxonomic revision of the Lembophyllaceae (*Camptochaete* and its relatives), and I have been working on a revision of the Polytrichaceae for the Flora of New Zealand project. I am also interested in developmental aspects of moss morphology, particularly heteroblasty and architecture, and their relation to variation in taxonomic characters.

In addition to morphology, I am also utilising DNA sequence data in phylogenetic analyses. Last year I briefly visited Brent Mishler's Lab at UC Berkeley to learn molecular techniques, and I have been applying the data to problems of the generic limits and monophyly of the Lembophyllaceae. I am currently a lecturer at the University of Otago, which is a great place to be a bryologist as all the major groups of bryophytes occur in natural populations in podocarp-broadleaf forest less than ten minutes from my office. That also makes it a great place to visit!

Bryological Activities in China in 1998

Contribution from
Cao Tong
Regional Editor

(1) "98 Shenyang Bryological workshop", sponsored by the IAB and the BSC (Botanical Society of China) was held at the Institute of Applied Ecology, Academia Sinica, Shenyang and the Forestry Ecosystem Research Station at Changbai Mountain during 21-28 August. Twenty people, including three from Taiwan, attended the workshop. After four-days of lectures and discussion in Shenyang, all participants joined the field trip on Changbai Mountain for five days.

(2) The Editorial Committee for the Chinese Cryptogamic Flora meeting Beijing in August. Four senior bryologists attended the meeting. It was decided that publication of the five volumes of Bryoflora of China would be supported by the National Nature Science Foundation of China during 1998-2002.

(3) Profs. Gao Chien and Cao Tong, Institute of Applied Ecology, were invited by Dr. Lai Mingzhou, Tunghai University, to visit Taiwan for two weeks in October. They investigated and collected bryophytes on several mountains in northern Taiwan.

(4) Chinese bryologists were active in international and regional collaborations in 1998. Two young bryologists, Mr. Jai Yu, Botanical Institute, Academia Sinica, Beijing and Mr. Zhang Z. H., Guizhou Normal University, visited and studied at Harvard University, U.S.A and University, UK respectively. Prof. Wu Penchen, Botanical Institute, Beijing collaborating with Prof. But, P.-H. has been working on the Bryoflora of Hong Kong. Prof. Li Xingjiang, along with her husband, Mycologist Prof. Zang Mu, is visiting the Natural History Museum, Taizhong, Taiwan for three months (11, 1998 - 2, 1999). A bryological team led by Dr. T. Koponen of Helsinki Univer-

sity visited and collected bryophytes in Hunan Province through the exchange program between the Chinese and Finnish Academies.

(5) Two bryological books (in Chinese), namely "Biology of Bryophytes" edited by Wu Penchen and "Bryoflora of Shandong Province" edited by Zhao Zhuntang and Cao Tong, were published in 1998.

(6) The 65th Anniversary Conference of the Botanical Society of China was held in Shenzhen in December. Four bryologists attended the conference and submitted nine abstracts dealing with bryology.

(7) Five people are studying bryology for the Ph.D. degree in China. They are Mr. Zhu Ruiliang at Hong Kong University (Hepatics, Lejeuniaceae), Mr. Zang Li at Hong Kong Chinese University (Ecology of Bryophytes), Ms. Wu Yuhua (Mosses, Amblystegiacaceae), Ms. Yi Jing (Morphology and Ecology of Bryophyte Spores) and Mr. Liu Yingdi (Physioecology of Bryophytes) at the Institute of Applied Ecology, Shenyang. Dr. Guo Shuiliang is working as a postdoctoral fellow in Prof. Cao Tong's Lab. at the Institute of Applied Ecology.

(8) Besides the editing of Bryoflora of China, several bryological projects are supported by the National Nature Science Foundation of China. These include: Relationships between the bryofloras of China and North America and their origins (Wu Penchen), Studies on the bryophyte resources and flora in Jining-Mufu mtns (Ji Meng-Cheng), and Systematics, evolution and biogeography of the genus *Ptychomitrium* (Cao Tong).

At Present, there are 40 Chinese members of IAB in mainland China. 70% of these are young so we expect considerable progresses in Chinese bryological research in 1999, the last year of this century.

Cao Tong, Regional editor of the IAB, Institute of Applied Ecology, Academia Sinica, Shenyang, 110015, China., E-mail: ifp@iae.syb.ac.cn, Fax: 86-24-2343313.

Evolutionary Biology of the Bryophyta: A synthesis

Goffinet B. and Hedderson T.A.

Session 4: 4.00-6.30 PM, Monday August 2 at the International Botanical Congress, St Louis

Although mosses comprise the second most speciose group of land plants, and play major roles in many of the world's ecosystems, their evolutionary relationships have remained obscure. Over the past decade, however, a considerable body of data has accumulated including information on morphological, developmental, anatomical and ultrastructural characteristics as well as nucleotide sequences for a number of nuclear and plastid genes. This symposium aims to achieve a synthesis of these data sets for each of the six major groups of mosses and present a state of the art summary of advances in our understanding of the evolutionary biology of the Bryopsida. The seven internationally

collaborative presentations cover all six major groups of the Bryopsida as well as an overview of relationships among these main groups.

Talk 1: Evolution of the major moss lineages. Hedderson T.A., Cox C., Duckett J., Goffinet B., Mishler B., and Vitt D.

Talk 2: Phylogenetic relationships of the Sphagnopsida. Boles S. and Shaw J.

Talk 3: Phylogeny of Polytrichopsida. Hyyönien, Jaakko. Koskinen, Satu, Hedderson, Terry A. and Smith Merrill, Gary L.

Talk 4: Phylogenetic relationships among basal arthroodontous mosses (Bryopsida) with special emphasis on the evolution of peristome types.

Goffinet B. and Cox C.

Talk 5: Phylogenetic relationships within the Haplolepidous Mosses. La Farge C., Mishler B., Wheeler J., Wall D., Johannes K., Schaffer S., and Shaw J.

Talk 6: Phylogenetic relationships among the Diplolepidous-alternate Mosses (Bryidae) inferred from nuclear and chloroplast DNA sequences. Cox C., Goffinet B., Newton, A., Shaw J., and Hedderson T.A.

Talk 7: Phylogeny of Pleurocarpous Diplolepidae based on morphological and molecular data. De Luna E., Buck W., Newton A., Maeda S., Hedenäs L., Akiyama H., Arikawa T., Tsubota H., Cox C., Tangney R., Goffinet B., Kosuge K., González D., Shaw J., Higuchi M.

The Bryological Section of the Polish Botanical Society is 20 years old.



The Bryological Section of the Polish Botanical Society was established in 1978. We meet regularly every three years, together with other Sections centred in the Botanical Society.

In October 1997 we had our second conference, entitled "Genetic Aspects in Taxonomy of Bryophytes". The Conference was chaired by Prof. Maria Krzakowa (President of the Bryological Section, elected for the years 1995 - 1998

and 1998 - 2001). The presented papers concerning phytogeography, chemotaxonomy, cytology and molecular genetics, were published as abstracts in Biological Bulletin (Biol. Bull. Poznan 34: 99-108, 1997).

In Sept 1998, we met once again during the 51st Meeting of the Polish Botanical Society held in Gdansk, celebrating the 20th anniversary of the Section. The last International Bryological Meet-

ing was organised in Poznań by Prof. S. Lisowski and Prof. J. Szwejkowski in 1980 so, after 20 years, the year 2000 should be a good time to have you in Poznań once again. Are you ready for it?

M. Drapikowska M. Sc., Department of Genetics, Adam Mickiewicz University, ul. Międzychodzka 5, PL-60-371 Poznań, Poland

BRYOFORAY '99 - 13-16 MAY 1999 - VANCOUVER ISLAND

The third annual Pacific Northwest bryological foray will be held 13-16 May 1999, at the Cowichan Lake Research Station on south Vancouver Island, B.C. This year's bryoforay features an action-packed agenda including an introductory lecture on the basics of bryology for beginners, hands-on laboratory time and field trips to several sites (including Garry oak-madrone woodlands, coastal rainforests and a coastal true bog) on the southern end of Vancouver Island in the company of Dr. Wilf Schofield. In addition, we will get the opportunity to share information and recent research through a series of informal lectures and slide shows. If you have anything you wish to present, please contact us to be placed on the agenda.

Cowichan Lake Research Station is located approximately one and a half hours north of Victoria, about five kilometres northwest of the town of Lake Cowichan in south-central Vancouver Island. From the Island Highway between Duncan and Nanaimo, go west on Highway 18 about 29 km to the town of Lake Cowichan, go straight through town, and look for the sign for the Research Station. Turn right on the Forestry Road and follow it out to the end.

The price of the foray includes stay-

ing three nights at Cowichan Lake, as well as dinner on the first day, all three meals Friday and Saturday and breakfast and a sack lunch on Sunday. Transportation to and from the field will not be provided; plan on carpooling or bringing your own transportation. Participants coming from the mainland should be advised of ferry costs from Tsawassen to Swartz Bay and Horseshoe Bay to Nanaimo, these typically run \$35-\$40 (Canadian) one way with 1 passenger.

Draft agenda (more specific details will be provided upon registration):

Thursday, 13 May: 1100-1200 registration, PM Introduction to bryology: lectures and lab session

Friday, 14 May: AM Lecture session. PM Field trip. After dinner in laboratory with samples.

Saturday, 15 May: All day field trip. After dinner in laboratory with samples

Sunday, 16 May: AM Field trip. 1200 Break up and head home

Price schedules: Can\$120.00 per person for all four days including three nights lodging, three dinners, three breakfasts and three lunches. Registration fees will be collected at the door when the participants arrive. Payments in US Dollars will be assessed based on the exchange rate of that day.

What to bring: The normal field gear—boots, raingear, hand lens, etc. Light microscope, slides, cover slips, if you have one. Copy of Lawton, Moss Flora of the PNW, if you have one.

Important: If you would like to present any recent work involving bryophytes as an informal lecture, please let us know the title of your presentation, approximate length, and whether or not you will have slides, overhead projections, etc. We encourage participation in this information sharing event!

Registration: Registration will be limited to 30 participants; a waiting list will be maintained to fill any subsequent vacancies on a first-come, first-served basis. To register, please send name, address, phone, fax and e-mail addresses, specify if you have special food needs (e.g., vegetarian), and whether or not you will be bringing a light microscope, to: Judy Harpel, harpel@csci.clark.edu, or phone (360) 891-5121. **REGISTRATION DEADLINE IS 16 APRIL.** We look forward to seeing you at Cowichan Lake!

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Bryological Mystery: Was Peter Dreesen ever in Britain?

In the Swedish Museum of Natural History I recently found a specimen of *Anacamptodon splachnoides* (Brid.) Brid., that according to the label was collected in Westmoorland, England in 1873. The species is not known to occur in Britain or Ireland (e.g., Blockeel & Long 1998), and the specimen is thus potentially of great interest - if it can be proved to be likely that it really comes from England. With help from David Long, the collectors name was deciphered as Peter Dreesen, a seemingly local botanist who lived in Bonn, Germany. Jan-Peter Frahm and Anja Lindlar were able to provide some more information about *Anacamptodon* and Dreesen, especially from those parts of his herbarium that

are preserved in Bonn. It is of interest that there are other specimens in Dreesen's herbarium that were collected in Britain, but possibly only by other persons than Dreesen himself, and there are no more specimens of *A. splachnoides*, from any locality. The *A. splachnoides* specimen in S comes from J. Ångström's herbarium, according to an additional label in the envelope.

Since it would be of considerable interest if the specimen really comes from England, I would appreciate any help with clarifying this mystery. If someone has information about Peter Dreesen that is helpful in deciding whether it is likely, or unlikely, that the specimen really comes from England, or if someone has another

likely explanation for the label associated with the specimen, please contact me. A simple mislabelling of the specimen could be the cause of the mystery, but so far there is nothing except the fact that no-one has seen the species in Britain before pointing in that direction.

Reference

Blockeel, T. L. & Long, D. G. 1998. A check-list and census catalogue of British and Irish bryophytes. British Bryological Society, Cardiff.

Lars Hedenäs, Swedish Museum of Natural History, Dept of Cryptogamic History, Box 50007, S-104 05 Stockholm, Sweden; e-mail: lars.hedenas@nrm.se

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DIARY

1999

May 13-16. Third Pacific Northwest bryological foray at the Cowichan Lake Research Station on south Vancouver Island, B.C. See text on p. 9. Registration to Judy Harpel, harpel@csci.clark.edu, phone (360) 891-5121.

May 29-30. Hedwig Symposium, Göttingen, Germany. For information contact: S. Rob Gradstein, Institute of Plant Sciences, Untere Karspüle 2, 37073 Göttingen, Germany. Email: sysbot@gwdg.de

June 4-6. SVBL: Annual assembly with excursions and paper reading. Feldis, Grison (central Alps with xeric vegetation). Organizer: Hanspeter Senn, Haldenweg 29, FL-9495 Triesen, phone/Fax +41 75 3843181.

July 22-28. NBS summer excursion and annual meeting, Telemark, South Norway. Local Secretary: Arne Pedersen, Snippen 19F, N-0566 Oslo. Tel. +47 22370040. Fax. +47 22220910 (Arne.Pedersen@statvoks.no)

July 30-August 1. IAB/ABLS meeting in Carbondale, Illinois. Information from Barbara Crandall-Stotler, Department of Plant Biology- Mail Code 6509, Southern Illinois University, Carbondale, IL 62901.

August 1-7. XVI International Botanical Congress and IAB Biennial Meeting in St. Louis, Missouri, USA. Information from IBC's web site <http://www.ibc99.com>.

August 15 - 20. BLAM: High Tatra (Stara Lesna, Slovakia). Information: R. Türk, Institut für Pflanzenphysiologie, Hellbrunnerstr. 34, A-5020 Salzburg (roman.tuerk@sbg.ac.at).

September 23-26. Field work for the Swiss bryophyte mapping project. Tessin, region of Gambarogno (southern Alps). Information: P. Geissler, Conservatoire botanique, CP 60, CH-1292 Chambésy (geissler@cjb.unige.ch).

October 1-3. Blomquist Foray at DeSoto State Park in northern Alabama. Information from Molly McMullen (mmcm@duke.edu)

December 19-22. XIII Symposium of Cryptogamic Botany. Universidad Complutense, Madrid. Information and pre-registration: XIII Simposio de Botánica Cryptogámica, Dept de Biología Vegetal II, Facultad de Farmacia, Univ Complutense, E-28040 Madrid, Spain. Web site <http://www.ucm.es/info/farmacia/XIIIscripto>

The Bryological Times, founded in 1980 by Stanley Wilson Greene (1928-1989), is distributed from Canberra (Australia), Edmonton (Canada), Eger (Hungary), Geneva (Switzerland), Hiroshima (Japan), Moscow (Russia), Praha (Czech Republic), Reading (U.K.), Shenyang (China), St. Louis (USA) and Trondheim (Norway).

Production

Lars Söderström, Trondheim

For details regarding membership of to *International Association of Bryologists* (currently US \$ 11.- per year) write to Dale H. Vitt, Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada T6G 2E9. Email: svitt@gpu.ualberta.ca