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Field Work in New Britain, Papua New Guinea

by Heinar Streimann

The major purpose of the field work was to collect cryptogams on the island of New Britain, Papua New Guinea as part of the extensive cryptogam collecting program of the Australian National Botanic Gardens. A secondary, but still important aspect was the training of Papua New Guineans in collecting methods, field note requirements, field drying of the collections and subsequent handling of the collections. Collecting was conducted between 16-27 March 1989. Other members of the field party were P. Katik and T. Umba, National Herbarium, Lae, Papua New Guinea and Dr F. Essig and two graduate students, University of Southern Florida, Tampa,

U.S.A. Unfortunately the field work had to be undertaken during the wet season which meant the trip had to be cut short, with the result that many worthwhile areas on New Britain could not be visited.

The island of New Britain is thickly forested except on the Gazelle Peninsula which is densely populated. Along the coast and on the

continued on p. 3

IAB Proceedings on Tropical Bryology Published

The proceedings of the I.A.B. conference on Tropical Bryology, which took place at the Missouri Botanical Garden, St. Louis, 1989, have appeared as Volume 2 of the journal *Tropical Bryology*. The volume contains 21 articles (284 pages) on a wide range of subjects, e.g. altitudinal zonation of bryophytes in New Guinea (Enroth), origins of neotropical Hepaticae (Schuster), revision of *Crossomitrium* (Allen), species richness of rain forest bryoflora (Gradstein *et al.*), bryophytes of New Caledonia (Iwatsuki), evolution of Leucobryaceae (Robinson), moss flora of China (Redfearn, Hu), floristics of the páramo moss flora (Griffin), Lejeuneaceae of Australia (Thiers), etc.

The volume is available, in a limited number, to non-subscribers on the journal at the price of DM 75.- /US\$ 40.- including postage. Orders can be sent to Dr. J.-P. Frahm, University of Duisburg, Fachbereich 6 (Botany), P.O. Box 101503, 4100 Duisburg, Germany.

Crisis in the British Museum

The current administration of the British Natural History Museum, London is considering a closing down of the Bryophyte Section and its research, and laying off some of its staff members effective September 1990, for budgetary reasons. The Herbarium of the Natural History Museum probably houses the largest collection of bryophytes in the world and is particularly rich in types and other authentic materials. The collections are absolutely indispensable for systematic research on bryophytes and a closing down would simply be disastrous to the international bryological community. Moreover, it is surprising that research would be terminated in a field which nowadays is unique in the United Kingdom, whereas areas duplicated elsewhere in the U.K., such as systematics of phanerogams, are scarcely affected.

Bryologists all over the world are called upon to write letters of protest to one of the following persons:

The Rt Hon Richard Luce MP, Office of Arts and Libraries, Horse Guards Road, London SW1P 3AL, U.K.

Sir Walter Bodmer FRS, Chairman, The Trustees, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

Sir High Leggatt, Museums and Galleries Commission, 17 Duke Street, London SW1Y 6BD, U.K.

Prof. Sir George Porter, President, The Royal Society, 6 Carlton House Terrace, London SW1, U.K.

Please send a copy of your letter to:

Dr. Neil Chalmers, The Director, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

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Endangered Bryophytes in Europe - Causes and Conservation

Uppsala 24-28 September 1990

PROGRAMME

Monday 24 September

- 8.00 - 9.00 Registration.
 9.00 - 10.00 Opening of the symposium.
- Status and distribution of endangered bryophytes.**
- 10.00 - 10.45 René Schumacker (Belgium). *Threatened bryophytes in Europe: a critical approach.*
 11.00 - 11.20 Edwin Urmi (Switzerland). *How to obtain data about endangered bryophytes?*
 11.20 - 11.40 Krister Karttunen (Finland). *Endangered bryophytes in Finland.*
 11.40 - 12.00 Lars Hedenäs (Sweden). *And what about the "traditional" taxonomist?*
 13.00 - 13.20 Jirí Vána (Czechoslovakia). *Endangered bryophytes in Czechoslovakia - causes and present state.*
 13.20 - 13.40 Ludwig Meinunger (DDR). *Endangered bryophytes in GDR.*
 13.40 - 14.00 Irene Bisang (Switzerland). *Hornworts in Switzerland - endangered?*
 14.00 - 14.20 Richard E. Andrus, Eric Karlin & Stephen Talbot (USA). *Rare and endangered Sphagnum in North America.*
- Population biology of rare and decreasing bryophytes.**
- 15.00 - 15.45 Royce E. Longton (Great Britain). *The role of reproduction in rare and common species.*
 15.45 - 16.05 Tomáš Herben (Czechoslovakia) & Lars Söderström (Sweden). *What parameters of habitat and life history are most important for the species persistence?*
 16.05 - 16.25 Sandor Orbán (Hungary). *Life strategies of endangered bryophytes in Hungary.*
 16.25 - 16.45 Terry A. Hedderson (Great Britain). *Habitat relationships of rare extraneous moss species in a boreal Canadian National Park.*
 19.00 - 21.00 Reception at Linnés Hammarby.

Tuesday 25 September

- Population genetics of rare and decreasing bryophytes.**
- 9.00 - 9.45 Robert Wyatt & Ann Stoneburner (USA). *Population genetics of rare and endangered bryophytes.*
 9.45 - 10.05 Nils Cronberg (Sweden). *Genetic diversity of populations of Sphagnum capillifolium and S. rubellum.*
 10.10 - 12.00 POSTER SESSION
- Bryophytes in a changing environment - Invasion and extinction.**
- 13.00 - 13.45 Gerard M. Dirkse (Netherlands). *Bryophytes in a changing environment, introduction to the theme and some results of Swedish fertilization experiments.*
 13.45 - 14.05 Krzysztof Goz (Poland). *Changes in the moss flora of Slowinski National Park on the Polish baltic coast.*
 14.05 - 14.25 H.C. Greven (Netherlands). *Changes in the bryophyte flora of the Netherlands.*
 14.25 - 14.45 S. Blacerkiewicz & Anna Rusinska (Poland). *Extinction and expansion of mosses in a changing environment on the basis of bryoflora of Poland.*
 14.45 - 15.05 Kjell I. Flatberg (Norway). *Bryophyte mortality and damage in southern Norway - assumed effects of acid precipitation.*
 15.20 - 15.40 Tomas Hallingbäck (Sweden). *Air pollution and bryophytes in southern Sweden.*
 15.40 - 16.00 Elena N. Andrejeva (USSR). *Bryocenomorphs and industrial pollution.*
 16.00 - 16.20 Jan Sarosiek (Poland). *Radioecological implications in bryophyte synusias from natural radiational anomaly area.*
 16.20 - 16.40 Piotr Kosiba, Lucyna Mróz & Jan Sarosiek (Poland). *Ecological organization of populations of some species of bryophytes and their disturbances.*
 19.00 - 21.00 Round table discussion on establishing an European Committee on Conservation of Bryophytes.

continued from p. 2: *Endangered Bryophytes in Europe (Programme)*

Wednesday 26 September

9.00 -18.00 Excursion to the mixed deciduoud forests of Nedre Dalälven.

Thursday 27 September

9.00 -12.00 POSTER SESSION

Conservation and measure for the future.

13.00 -13.45 Lars Söderström, Tomas Hallingbäck, Lena Gustafsson, Nils Cronberg & Lars Hedenäs (Sweden). *Conservation and measures for the future.*

13.45 -14.05 Nick G. Hodgetts (Great Britain). *Measures to protect bryophytes in Britain.*

14.05 -14.25 Nadya Konstantinova (USSR). *Protection of bryophytes in Murmansk region (USSR).*

14.25 -14.45 Rudolf Soltés (Czechoslovakia). *On the protection of bryophytes of Vysoké Tatry and Belianske Tatry Mountains.*

14.45 -15.05 Nancy G. Slack (USA). *Endangered bryophyte species in fens with the emphases on endangered habitats and our natural heritage research program.*

15.20 -15.40 Lena Gustafsson, Anneli Fiskesjö, Tomas Hallingbäck, Torleif Ingelög & Börje Pettersson (Sweden). *Semi-natural deciduous woods in southern Sweden - habitat factors of importance to sensitive bryophyte species.*

15.40 -16.00 Timo Koponen (Finland). *Endangered bryophytes in a wider scope.*

16.00 -17.00 Summary and the establishment of an IAB Standing Committee of Endangered Bryophytes.

19.00 Symposium dinner.

Friday 28 September

8.30 Excursion to the raised bog Ryggmossen.

Urgent request from the Tropical Bryology Committee

The IAB Committee on Tropical Bryology recently circulated through the last issue of *the Bryological Times* a questionnaire designed to find out the problems confronting research on tropical bryophytes. It is important that all IAB members should support the survey by returning the answered questionnaire as soon as possible to Dr. B.C. Tan, Farlow Herbarium, Harvard University, 22 Divinity Avenue, Cambridge, MA 02138, USA. The Committee needs your opinions and good suggestions on the issue.

Because of budget restriction, the Committee was not able to reproduce extra copies of questionnaires to be mailed to workers and graduate students residing in tropical countries who are not members of the IAB.

The Committee therefore would like also to urge members to reproduce the questionnaire and distribute it to people who do not receive the survey forms. The more replies the committee receives, the clearer the problems in tropical bryology become, and the better the solutions that might be offered.

contd p.1: Field Work in New Britain

coastal flood plains of the larger northern flowing rivers there are pockets of mangrove, swampy areas and undergrowth. Along the fertile coastal strip between Willaumez Peninsula and Open Bay there are numerous coconut plantations and the logged forest has been subdivided into oil palm blocks. Dense forest covers the remaining plains and the rugged mountain ranges that comprise most of the island. Unfortunately

ly large scale reckless logging is changing this very rapidly. The understorey comprises a great variety of shrub and treelet species. In the mountains a rich and diverse fern flora was noted.

The island is affected by two wind systems The Northwest Monsoons bring heavy rains to the north coast in the months of November to April and the Southeast Trades bring heavy rains to the southern coast from May to November making this

one of the wettest areas of Papua New Guinea. Basically the island is divided between limestone and volcanic rocks. The volcanic rocks are situated in the central part of the island, a small area east of Wide Bay, on the Gazelle peninsula, the coastal strip between Willaumez Peninsula to Open Bay and the western part of the island. Two large blocks of limestone form the Nakanai Mountains and the Whiteman Range. New Britain is still volcanically active

(e.g. Mt Ulawun) with frequent earthquakes. On the plains between Willaumez Peninsula and Rabaul the volcanic soils are very fertile and coconut plantations are established. Now also the oilpalm industry is being developed. The soils developed on the pumice deposits are not very fertile, while the soils developed on the darker lavaflores are richer. This is reflected by the different forests on the soils.

The vascular flora of New Britain has not been very well studied and our knowledge of the cryptogam flora is practically non-existent. No significant work has appeared on the cryptogam flora since the pioneering survey of Schumann & Lauterbach (Brotherus, 1900). The following table shows our present knowledge of the island's cryptogam flora.

	Genera	Species
Mosses	8	8
Hepatics	11	15
Lichens	17	27

There are no endemic species known. All the above data are based on collections made by vascular plant collectors during the German administration and are from the coastal areas of the Gazell Peninsula and the Duke of York Islands. More recently Mr S. Kolema, an employee of the Stettin Bay Lumber Company near Hoskins, has been collecting bryophytes which he sent to me at the Australian National Botanic Gardens. Amongst the hepatics collected were several new records for the island (Streimann, in press).

The island has a variety of vegetation types together with an altitudinal variation which would indicate that a wide range of cryptogams could be present. This is, in fact, what I found. The cryptogam flora of New Britain appears to be quite rich, especially the lichen flora. The bryophyte flora appears to be similar to that of the lowland areas of the Morobe Province. Despite the richness of the cryptogam flora, ende-



Figure 1. Collecting sites on New Britain.

mism may be low due to the recent origin of the island.

About 1500 collections of cryptogams were obtained. However, further collecting is essential. If we are to form an accurate view of the island's cryptogam flora, more areas must be sampled; areas such as those at higher altitudes and in non-volcanic areas, especially the limestones. Then we can begin to form a picture of New Britain's cryptogam flora.

Field work.

Because of the limitations imposed by the weather, collecting was generally restricted to the lowland forest (Fig. 1). Only in one area in the Nakanai Mountains were we able to ascend to the lower limits of the lower montane forest (520 m). Mangrove or strand forests were not sampled. We collected in the following localities:

Hoskins (1). Collecting was in disturbed vegetation with planted coconut trees, where crustose lichens predominated and of which there was a good variety. Smaller colonies of mosses from the family Calymperaceae and several species of leafy hepatics were also present. Further collections were obtained from exotic shrubs and trees from the gardens of the Hoskins Hotel where a good vari-

ety of hepatics was collected, but where the moss and lichen flora was poor.

Nakanai Mountains (2). Camp was set up on the main ridge of the central range at an altitude of 320 m. This gave us access to forests on various topographical features and was also close to the Geleo-Lasilai logging area. The forest was sampled along a secondary ridge leading to Mt Nambon, also in two river valleys and the divide between the rivers which flowed to the south coast.

Cryptogams were abundant and conspicuous in this area, but the species composition was not so rich. Leafy hepatics predominated, *Radula* being common, and other hepatics often forming trailing clusters. For mosses Calymperaceae, Sematophyllaceae and Hypnaceae were common. However, crustose lichens predominated on the tree and treelet trunks with a good diversity of species, especially of the families Graphidaceae and Thelotremaaceae.

Stream sides also provided a rich suite of bryophytes as often as there was slightly more light than in the forest. Follicolous cryptogams predominated and often the whole leaf surface would be covered by 4-6 species including the moss *Floribundaria*. Trailing bryophytes were

much more abundant here. Along the streams bryophytes were also collected off the stream banks and boulders in the stream. Here the most common mosses recognized were *Fissidens* spp. and *Racopilum spectabile*. At a low altitude just above the coastal plain a large colony of *Marchantia* was found. This was the only time this genus was noted on the island. *Anthoceros* was common in most moist shaded sites.

Several fallen tree branches were found and the cryptogams differed greatly from those on the trunks, stems and shrub branches, with the lichen genus *Leptogium* predominating as well as the mosses *Macromitrium* spp. and *Garovaglia* sp. together with several different hepatic species. The early colonizing mosses of *Campylopus* spp. and *Philonotis* sp. occurred on roads and road cuttings in great abundance.

There did not appear to be a great difference in species between the low ridges and the river valleys. The only perceptible difference appeared to be where the *Castanopsis* (oak) forest commenced. On the high ridge a species of *Hypnodendron* was common on rotting logs, while another species, *H. dendroides*, was found on a rock and on treelet stems beside a river.

The Geleo-Lasilai logging area provided the greater variety in cryptogams including some apparently new species of lichen. This forest grows on pumice and was not tall, with medium height trees predominating. Most of the collecting was from the tree crowns and upper trunks with the dominant tree species, *Homalium foetidum*, having a large number of taxa: *Leucophanes* sp. (quite common), *Macromitrium* spp., a large species of Calymperaceae, *Garovaglia* spp., *Frullania* spp. and *Plagiochila* spp. None of these mosses mentioned had been previously reported from New Britain. The common timber tree *Pometia* had a poor cryptogam flora however,

which was dominated by a species of Lejeuneaceae.

Ibana Logging area, Mt Ulawun (3).

The richer soils developed on the lava in a much better type of forest than that found on the Nakanai Mountains. The stands of trees were taller, denser and with a sparser understorey. On the shrubs and treelets a good variety of bryophytes was found as well as the foliose lichens *Collema* and *Sticta*, the latter being more common and forming larger colonies than in the Nakanai mountains. Again the crowns and upper trunks of felled trees were rich in cryptogams, especially the crown of *Homalium foetidum*. Many of the cryptogam genera found in the previous locality also occurred here, but some species, especially lichens, appeared different.

Soi logging area (4). A lowland forest on flats beside the Soi River was sampled and here the treelet stems and tree buttresses exhibited a rather sparse and poor cryptogam flora with little variety. Even the *Homalium foetidum* crowns had a poor representation. The only moss in large colonies was *Leucophanes* sp. in a tree crown. Leafy liverworts dominated the bryoflora at this site.

Evili River (5). This was a regrowth area beside a river dominated by *Ficus* spp., but the variety in cryptogams was poor with leafy hepatics being the more common. Several moss species were collected off the boulders in the stream, but surprisingly enough the moss *Racopilum* was rare which was not the case in other similar sites. One spreading, shrubby *Ficus* species in a more open area had a good suite of cryptogams, especially trailing bryophytes. The moss genus *Floribundaria* was common on treelet stems and branches.

Talasea (6) and *Numunda* (7). The trip to Talasea was marred by bad weather with heavy rain and strong winds starting at 10 a.m. Collections were made from coconut trunks in a coconut plantation as quickly as possible while keeping a sharp eye open for falling coconuts! Most collections were leafy hepatics, but there were a few lichens; however some crustose species may have been overlooked. The diversity was poor. At Numunda plantation (7) collections were also obtained from a coconut plantation. The only moss found was *Macromitrium* which was very common and forming large colonies on coconut trunks in most of the plantation. Only two leafy hepatic species were noted, but numerous crustose lichens were collected.

Dami Forestry Station (8). Collections were gathered from tree trunks in a mixed plantation of *Tectona grandis*, *Casuarina papuana* and *Terminalia* sp. The variety was poor and the collections comprised mostly leafy hepatic species. Further collecting was undertaken from exotic ornamental shrubs at the station. These had a good variety with hepatics; small colonies of mosses in the family Calymperaceae were also noted. I have found in the past these types of habitat to be good cryptogam sources and they have yielded several new hepatic records for the country.

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A Bryogeographic Map of the Americas

by

Marko Lewis

Since the publication of the floristic map by Van de Wijk *et al.* (1959-1969) in *Index Muscorum*, this has been widely used for recording distribution records of bryophytes. Although it has the possible advantage of being simple, in my opinion it is next to worthless in showing bryogeographic relationships. Griffin (1984) discusses some of the problems in using the *Index Muscorum* system in showing bryogeographic relationships within South America.

The mapping system presented in this paper (Fig. 1) is largely the result of personal experience and extensive field work. During the past 16 years I have had the opportunity to travel to all of the 14 provinces of the Americas here outlined, with the exceptions of S. Am. 1 (Southern Chilean Temperate Cloud Forests), and S. Am. 4 (Southeast Brazilian Araucaria Forests). As a general basis for expressing my experience in a bryogeographically sensible, yet simple form, I have referred to maps in the *Fifteenth Edition of Goode's World Atlas* (Espenshade & Morrison, eds., 1980) for general information on climate, vegetation, topography and political or natural boundaries. For more specific information I have referred to numerous other publications, checklists, and floristic treatments. The floristic treatments for North America, Eastern North America, Guatemala, Jamaica, Puerto Rico, Utah, Surinam and the Brunswick Peninsula as well as the checklists available for most American countries are well known and I don't feel it necessary to include them in a bibliography. For areas in which I have no personal experience I have referred to papers by Steere (1984),

Delgadillo & Zander (1984), Hässel de Menendez *et al.* (1984), Bowers (1970), Herzog (1916, 1920) and Gradstein & Weber (1982). Consultation of revisions and monographs such as those by Reese (1977, 1978) for the Calymperaceae, Zander (1972) for *Leptodontium* and Manuel (1981) for the Cryphaeaceae have also helped me gain impressions of

important distribution patterns.

I have no pretensions that the mapping system as presented is not beset with problems, both geographically (what to do with the western slope of the Sierra Madre in Mexico, the llanos in Southern Colombia and Venezuela, and the Pacific coastal forests of Ecuador, Colombia and southern Panama as three examples),



Figure 1. Bryogeographic map of the Americas. Provinces are abbreviated.

or in ease of use (it will now be necessary to know something about where a specimen came from, such as a province, altitude or longitude, before a distribution record can be recorded according to the system). I therefore offer it as a preliminary system for discussion.

It appears to me that a bryogeographically based distribution recording system such as presented here will prove more valuable than a system, based on macropolitical boundaries such as provided by the *Index Muscorum*. Since I have no experience in the Eastern Hemisphere, it is hoped that Asian, African, European and Australasian colleagues might attempt to provide a similar system for the areas in which they are knowledgeable.

Description of the 14 Bryogeographic Provinces (Figure 1):

Tropical America 1 (*Tropical and Subtropical Montane Forests, Paramos and Humid Punas*):

Argentina: Provinces of Jujuy between 64° and 66°; and Tucuman. **Bolivia:** Departments of Tarija except Prov. Gran Chaco; Chuquisaca except Oropeza, Yamparaez and the eastern half of Luis Calvo; Santa Cruz Provinces of Caballero, Florida and Vallegrande; Cochabamba from the high ridge of the Andes to the foot; La Paz from the high ridge of the Cordillera Real to the foot of the Andes. **Colombia:** from the eastern foot of the Andes to the Pacific Ocean. **Costa Rica:** entire. **Ecuador:** from the eastern foot of the Andes to the Pacific Ocean. **Guatemala:** all Departments except Peten. **Honduras:** all except the Caribbean Coastal Plain. **Mexico:** Chiapas; Pacific Coastal Range of Colima, Guerrero, Jalisco, Michoacan, and Oaxaca; eastern slope of the Sierra Madre Oriental to its foot and as far north as the Tropic of Cancer. **Nicaragua:** All except the Caribbean Coastal Plain. **Panama:** entire. **Peru:**

east of the Continental Divide to the foot of the Andes. **Venezuela:** Andean sector north to the Caribbean Sea.

Tropical America 2 (*Caribbean basin, Southern Gulf Coast and Florida Everglades*):

Belize: entire. **Caribbean Islands:** all, including the Bahamas. **Florida:** Everglades and the Florida Keys. **Guatemala:** Peten Dept. **Honduras:** Caribbean Coastal Plain. **Mexico:** States of Campeche, Quintana Roo, Tabasco, Tamaulipas, Veracruz, and Yucatan except the eastern slope of the Sierra Madre Occidental and the pan handle of Tamaulipas. **Texas:** Southern Coastal Plain south of the Rio Nueces. **Nicaragua:** Caribbean Coastal Plain.

Tropical America 3 (*Tropical Amazonian Forests, Llanos of Colombia and Venezuela, the Guiana*):

Bolivia: Deptos. Beni and Pando; Provs. Caupolican and Ituralde of Depto. La Paz. **Brasil:** States of Amapa, Amazonas, Espiritu Santo, Maranhao, Piaui, Para, Rio do Janeiro, Rondonia and Roraima; Bahia Coastal Plain, Goias N of 12° 30', and Sao Paulo north of the Tropic of Capricorn. **Colombia:** east of the eastern foot of the Andes. **Ecuador:** east of the eastern foot of the Andes. **French Guiana:** entire. **Guyana:** entire. **Peru:** east of the eastern foot of the Andes. **Surinam:** entire. **Venezuela:** south of the foot of the Andes.

South America 1 (*Southern Chilean Temperate Rain Forests*):

Chile: from Valdivia to the south.

South America 2 (*Patagonian, Atacaman and Altiplanic Arid Areas, Coastal Peruvian Desert and Chilean Mediterranean Climatic Zone*):

Argentina: Deptos. of Catamarca east of 66°; Chubut, Jujuy east of 66°; La Rioja, Mendoza, Neuquen; Rio Negro south of the Rio Negro; Salta

east of 66°; Santa Cruz and San Juan. **Bolivia:** Provincias Oropeza and Yamparaez of Depto. Chuquisaca; Provincias Aroma, Camacho, Loayza, Los Andes, Manco Kapac, Ingavi, Omasuyos and Pacajes of Dept. La Paz, Deptos. of Oruro and Potosi entire. **Chile:** from Valdivia north. **Peru:** from the Continental Divide to the Pacific Ocean.

South America 3 (*Savannah and Xerophytic Woodlands of the Pampas, Chaco, Mato Grosso, and Caatinga*):

Argentina: Departments of Buenos Aires; Catamarca east of 66°; Chaco, Cordoba, Entre Rios, Formosa; Jujuy east of 66°; La Pampa; Rio Negro north of the Rio Negro; Salta east of 66°; Santa Fe, Santiago de Estero. **Bolivia:** Deptos. Chuquisaca the southern half of Prov. Luis Calvo; Santa Cruz except Provincias Caballero, Florida and Vallegrande; Depto. Tarija in the Prov. Gran Chaco. **Brasil:** Alagoas; Bahia except for the coastal plain; Ceara; Goias south of 12° 30'; Mato Grosso do Norte, Mato Grosso do Sul, Paraiba, Pernambuco, Rio Grande do Sul, Rio Grande do Norte, Sergipe. **Paraguay:** entire. **Uruguay:** entire.

South America 4 (*Southeast Brazilian Araucaria Forests*):

Argentina: Dept. Misiones. **Brasil:** Parana, Santa Catarina; Sao Paulo south of the Tropic of Capricorn.

North America 1 (*North American Temperate Rain Forests*).

North America 2 (*Great Basin and Mexican Plateau Xerophytic climates, and Californian Mediterranean Climatic Zone*).

North America 3 (*Great Plains*).

North America 4 (*Southeast United States Mixed Coniferous Forests*).

North America 5 (*Northeast United*

States and Maritime Provinces of Canada Mixed Deciduous Forests).

North America 6 (*Boreal Taigan Forests*).

North America 7 (*Polar Deserts*).

North America 1-7: The provinces described in the map are well known and a long list of place names is not thought to be necessary. Some notes though may be useful.

North America 1 coincides with the Pacific Coastal Range from Kenai Peninsula, Alaska south to Humboldt County California. North America 2 includes the traditional Great Basin Areas from Southern British Columbia and the Cascade Mountains south into the Mexican Plateau where it includes all of the Mexican states except for those belonging to Tropical America 1&2, and the northeastern half of Nueva Leon and the panhandle of Tamaulipas, which are included in North America 3. It may be advisable to separate the Pacific coastal forests of Mexico into a province of its own. I reserve judgement on this until publication of the Moss Flora of Mexico, which can provide more exact information on the bryogeography of Mexico. North America 3 through 7 consist of, respectively, the traditional concepts of the Great Plains, Deep South, Eastern North America east of the Mississippi River including the Maritime Provinces of Canada, The boreal forest region and the polar tundra.

Final note.

I would appreciate any comments or criticisms by specialists in the various areas to help fine tune the boundaries as presented in this paper, for a final publication of a world mapping system based on bryogeographical data. The areas are outlined in a preliminary manner, and for the present the placement of specimens may be necessarily subjective and

based on habitat information if localities are not known.

The map is presented in a purposely vague and informal manner as a vehicle to expressing the idea. It is hoped that other bryologists in the Americas, especially those of the Mexican Flora Project, will add their input for publication of a bryogeographically based mapping system in a formal manner.

Acknowledgements

The National Geographic Society has provided funds for field work in Bolivia through a grant to John J. Engel. The Field Museum of Natural History has provided funds for field work as well as for lab work in Chicago and Bolivia. These contributions are gratefully acknowledged.

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New Publications

P.S. Hsu (ed.), 1989. Cryptogamic Flora of the Yangtze Delta and Adjacent Regions. Shanghai Scientific & Technical Publishers. 573 pp. (hard cover). \$400 including postage. In Chinese.

This book is the first of its kind. It treats 1100 species of algae, fungi, lichens, bryophytes and ferns. For each species information is furnished on form, distribution, and economic uses. 544 figures and 234 pictures are included in the book.

Those interested should contact Shanghai Museum of Natural History, 1102 Longwu Road, Shanghai 200232, P.R. of China.

Progress with curation of the John Bartlett Collection at Auckland Institute & Museum Herbarium (AK)

Shortly after the death of John K. Bartlett on 1 May 1986, his entire private herbarium of bryophytes and lichens, botanical library, reprint collection and herbarium-related correspondence was bequeathed to the Auckland Institute and Museum Herbarium (AK). Since then all the material has been sorted, and curation of the specimens and their amalgamation with the main AK collection is progressing well.

All of the separated, smaller, better-labeled specimens have been placed in AK packets with new AK labels. These number approximately 4000 bryophytes and 10000 lichens, effectively adding half as many specimens again to AK's existing bryophyte collection, and trebling the size of the lichen collection. All of the Bartlett bryophytes and 1000 of the lichens have now been entered onto AKILLES, the computer accessions system in use at AK. Accessioning of the remainder of the lichen specimens is continuing, and when complete, the entire collection will be able to be cross-referenced according to any item of label information. Much of this work has been completed by Marcel Smits, and funded by grants from the New Zealand Lottery Board.

A complete locality list for John Bartlett's collections ordered from north to south within New Zealand has been compiled from the labelled specimens, and is being updated as specimens are entered onto AKILLES.

Specimens required for a loan or research purposes have been given priority to enable their immediate use by those requesting them.

A few hundred large newspaper packages of bulk, unsorted collections from particular localities remain uncured. These have been ordered from north to south according

to locality, ready for sorting and identification by a bryologist/lichenologist.

I recently wrote to all individuals represented in our files of John's correspondence seeking further parts of his herbarium which may be out on loan, and any information or copies of his correspondence which might help with the labelling of specimens. We are currently holding many specimens labelled only with John's herbarium number; presumably these are duplicates of collections sent elsewhere with fuller details of locality etc. Unless further label details can be found, these collections are of no value to us.

If you know of any specimens that John Bartlett may have sent out, either on loan or as a gift, I would be grateful for information. It would assist us greatly if material held on loan from John could be returned to AK for curation and registration as soon as possible. Any such material needed for further study could be returned on formal loan from AK very speedily.

Anthony Wright
Curator of Botany
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Recent Bryological Research sponsored by the Finnish-Chinese Botanical Foundation (1988-1990)

The Finnish-Chinese Botanical Foundation was established in the summer of 1988 in Helsinki.

The following research activities are in progress:

1. Compilation of a *Bibliography of Plant Taxonomy in China* (in English, with Chinese titles and authors' names) covering lichens, bryophytes, ferns and seed plants. - Institute of Botany, Academia Sinica, Beijing.
2. Compilation of an *Iconography of Common Bryophytes and Lichens of China* (in Chinese, with 900 species illustrated and described). - Institute of Applied Ecology, Academia Sinica, Shenyang.
3. Bryofloristic comparison of East China and Taiwan. - Shanghai Museum of Natural History.
4. Limestone bryoflora of Guangxi Province. - South China Institute of Botany, Academia Sinica, Guangzhou.
5. Joint work on several families of the *Bryoflora of China*, vols. I-VI. Rhizogoniaceae, Racopilaceae, Hypnodendraceae, Spiridentaceae are in preparation.
6. Establishment of an "Asian Bryological and Lichenological Club" as well as of a new journal *Acta Bryolichenologica Asiatica*.

Ming-jou Lai.
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Diary

For explanation of acronyms, see *The Bryological Times* 31: 7-8 [1985]
Contributions to the Diary are to be sent to the Diary editor, Dr. D.H. Vitt

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Aug 31- September 2. The Swiss Bryological and Lichenological Society. Mapping weekend with fieldwork in Canton Schwyz and determination work at University of Zürich. Further information from K. Ammann or P. Clerc, Altenbergrain 21, CH-3013 Bern, Switzerland.

September 21-23. Autumn Annual General Meeting of the BBS. A special meeting to be held in Cambridge in honour of Professor Paul Richards and Dr. Eustace Jones. Further information from Philip Stanley, 48 Glisson Road, Cambridge CB1 2HF, U.K. Tel. 0223 460888.

September 24-28. Symposium on Endangered Bryophytes in Europe. Uppsala, Sweden. Further information from Tomas Hallingbäck, Swedish University of Agricultural Sciences, Department of Ecology and Environmental Research, P.O. Box 7072, S-750 07, Uppsala, Sweden.

November 9-11. BBS Weekend Workshop on Bryophyte Photography in Manchester, U.K. Further information from Sean R. Edwards, Manchester Museum, Manchester University, Oxford Road, Manchester M13 9PL, U.K. Tel. 061 442 9346.

December 27-30. American Bryological and Lichenological Society (ABLS) Annual Meeting and Field Days. Walkulla Springs, Florida. Further information from Bill Buck, New York Botanical Garden, Bronx, New York 10458, U.S.A.

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July 5-12. Nordic Bryological Society Annual Meeting. Kongsvald, Norway. Twenty-fifth anniversary meeting. Further information from Gert Mogensen, University Botany Museum, Gothersgade 130, DK-1123, Copenhagen K, Denmark.

July 17-18. IAB Symposium: The Biology of *Sphagnum*. Exeter, United Kingdom. Symposium preceded by field meeting on July 12-16. Contributed papers are invited. Offers of papers and inquiries should go to R. E. Daniels, Institute of Terrestrial Ecology, Furzebrook Research Station, Wareham, Dorset BH20 5AS, U.K. Tel. 09295 51087.

July 19-23. IAB/BBS joint meeting on experimental bryology, Exeter, United Kingdom. Symposia, contributed paper sessions and field days. Offers of papers and inquiries should go to M.C.F. Proctor, Hatherly Laboratories, The University, Prince of Wales Road, Exeter EX4 4PS, U.K.

WINONA HAZEL WELCH 1896 - 1990

Winona Welch, a well known figure in North American bryology, died on 16 January 1990. Dr. Welch was best known internationally for her world monograph of the Fontinalaceae, but in the United States was probably better known for her moss flora of Indiana. This book was one of the very first state moss floras, and is still in use today.

Winona Welch was born on her family's farm in Jasper County, Indiana, on 5 May 1896. She was always interested in an academic education and, despite some familial protest, she saved her money from public school teaching and attended DePauw University. She received her A.B. from DePauw in 1923 and continued on to graduate school with the encouragement of her professor, T. G. Yuncker. She earned her A.M. from the University of Illinois in 1925 and her Ph.D. from Indiana University in 1928. After graduation she began a career-long tenure at her beloved DePauw University, where she garnered praise for her teaching abilities. Her research initially concentrated on vascular plants but, again with encouragement from Truman Yuncker, she changed to the study of mosses since there was no one else locally working on the group. A series of publications finally led, in 1954, to her *Mosses of Indiana*. It was also during this period that she began her long-term interest in *Fontinalis* and its allies, this time at the suggestion of A. J. Grout. Her meticulous nature led her to examine virtually every herbarium specimen she could lay her hands on. Not only did she borrow from almost all North American herbaria (the area where the family is most diverse), but in the days just before World War II she traveled to Europe to consult herbaria there. Upon completion of her *A Monograph of the Fontinalaceae* (1960), she began work on the Hook-

eriaceae for North and Central America and the West Indies. Her numerous papers in *The Bryologist* culminated in her treatment of the family in *North American Flora* in 1976. About this time her failing eyesight prevented her from continuing research. Nevertheless, despite this handicap, she continued to curate the DePauw University herbarium until 1981, at which time she had been declared legally blind. Her claim to blindness was always somewhat amusing because right up until her death she continued to write letters and be an avid stamp-collector. In her final years she even continued to give talks to amateur groups, such as garden clubs. She knew her material so well all that the organizers had to do was point her in the right direction and she would give her talk.

In the 1970's DePauw University subsumed its Department of Botany and Microbiology into a Department of Biology. Many years earlier, foreseeing this possibility, Winona Welch had written her will such that in the eventuality that the Botany Department lost its autonomy, her herbarium (39,471 bryophyte and lichen specimens) would go to the New York Botanical Garden. In early 1987 negotiations began for the possible transfer of not only the Welch collections, but the entire DePauw University herbarium (including some 100,000 vascular plants) to the New York Botanical Garden. In the end, NY purchased the DePauw herbarium, with Winona Welch being the final arbitrator of its disposition, and it was moved to New York in the fall of 1987. At the time of the transfer, the New York Botanical Garden offered to publish tributes to both Winona Welch and her mentor Truman Yuncker. The *Minona H. Welch Festschrift* was published in *Brittonia* 40(2) on 5 May 1988, Winona's 92nd birthday. (The Yuncker tribute appeared in *Brittonia* 41(3) in 1989).

Until her final days Winona Welch remained alert and vigorous. She welcomed her numerous botanical visitors which pilgrimaged to her retirement home. To all those who were privileged enough to have known Winona Welch, her memory will always evoke a smile. To those who never had the opportunity to meet this incredible woman, additional information can be found in the much more detailed biography, as well as bibliography, in the aforementioned *Brittonia* issue.

William R. Buck
New York Botanical Garden
Bronx, NY 10458-5126, U.S.A.

Request for *Funaria hygrometrica*

I am presently working on a genetic study of *Funaria hygrometrica* that involves electrophoretic analyses of enzym variability in populations from as broad a geographic area as possible. Our approach is to grow cultures, either from single spores or from samples derived from individual sporophytes, and estimate levels of genetic variability based on samples from at least 25 families (sporophytes) per population.

I am writing to ask your help in obtaining natural populations of *F. hygrometrica* from your area (or anywhere else you might be in the near future). Plants with mature sporophytes (even those up to a few years old, for the spores retain their viability) can be sent dry. If you have populations with immature sporophytes down to barely visible "spears" only, you could send them fresh and I can let the sporophytes mature here.

Thank you in advance for any help you can provide.

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Colophon

The Bryological Times, founded in 1980 by Stanley Wilson Greene (1928–1989), is the bimonthly newsletter of the INTERNATIONAL ASSOCIATION OF BRYOLOGISTS. It is published in Edmonton (Canada) and distributed from Edmonton, St. Louis (USA), Beijing (China), Tokyo (Japan) and Eger (Hungary).

All items for publication in *The Bryological Times* are to be sent, **preferably on diskette**, to the editor, S. Rob Gradstein, Institute of Systematic Botany, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands, **except** those for the regular columns, which should go **direct** to the column editors.

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For details regarding membership of the INTERNATIONAL ASSOCIATION OF BRYOLOGISTS (currently US \$10.00 p.a.) write to the Honorary Secretary, Dale H. Vitt, Department of Botany, University of Alberta, Edmonton, Alberta, Canada T6G 2E9. All correspondence concerning mailing to Sandi Vitt at the same address.