

The BRYOLOGICAL TIMES

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Ecosystematics and Geotaxonomy of the Campylopodioideae *

By Jan-Peter Frahm

THE SUBFAMILY Campylopodioideae was established by Brotherus (1924). The genera included were formerly placed in the Dicranelloideae (Fleischer 1901; Brotherus 1901). Although the delimitation of the Campylopodioideae given by Brotherus was weak and ill-defined (including *Dicranella* but excluding *Anisothecium*) the Campylopodioideae as understood here probably comprise a natural group of 8 genera: *Campylopus*, *Campylopodium*, *Microcampylopus*, *Pilopogon*, *Dicranodontium*, *Atractylocarpus*, *Bryohumbertia* and *Sphaerothercium*. The placement of other genera in this subfamily is doubtful: for example, *Bryotestua* Thér. is known only from sterile plants, *Maireola* Thér., with one species from Morocco, probably consists of a *Ditrichum* species, and *Mitrobryum* Robins. from India, again with one species, differs seriously from all the other genera mentioned above.

Characteristics of the Subfamily

All these genera are characterized by the gametophyte having leaves with a wide costa, occupying usually more than half of the leaf width. The costa usually has a dorsal and ventral stered band, with a row of median deuter cells enclosed by them. Only *Campylopus* shows various other costal structures, which seem to be one of the reasons for the enormous diversification of this genus. Alar cells are usually present, perhaps functioning in water uptake from the stem. The alar cells are reduced in all genera with small plants (as *Microcampylopus* and *Campylopodium*) and in species of wet habitats. The leaves are all lanceolate, mostly

erect-patent with a broad range of length from 2.5 to 15 mm and an areolation of short-rectangular to oval or elongate lamina cells. Also, the habit of the plants varies between small *Dicranella*-like plants to large, *Dicranum*-like plants.

The sporophyte has a mostly short, twisted seta with a highly advanced twist mechanism (Frey & Frahm, 1986). The setae of most genera of the Campylopodioideae are curved by growing first upwards and then downwards into the perichaetial leaves. In this stage, capsule development is protected by the perichaetial leaves. Finally, the setae grow upwards again, forming a sigmoid curve at their middle. Frequently, the calyptrae are left in the perichaetial leaves. As a result the capsule makes wide curves when moistened by uncoiling of the sigmoid seta. When moistened, the peristome teeth open in contrast to many species, in which the opposite occurs, i.e. opening by desiccation. All these mechanisms together function in spore dispersal.

Only *Atractylocarpus* and *Pilopogon* have straight, spirally-twisted setae; they have either lost the curved feature, or never developed it. In *Pilopogon*, a curved seta has been made impossible by the long, sheathing perichaetial leaves, which, however, also function for protection of the young capsule. In *Sphaerothercium*, the twist effect of the setae is reduced by capsules on very short setae, which occur in the perichaetial leaves. The peristome consists of the normal "dicranoid" type, which is present in most Dicranaceae. Only species of *Campylopus* subg. *Thysanomitrium* and *Pilopogon* have long, narrow, filiform teeth. The capsules are short-ovoid (*Campylopodium*, *Microcampylopus*, *Sphaerothercium*) to long-cylindrical (*Pilopogon*, *Atractylocarpus*)

[contd. on page 2.]

TECHNIQUES NOTEBOOK *

Software Review

By B.J. O'Shea

GIOS (Graphical Input and Output of Structures) v.3.5. Available from Thieme Software, Georg Thomas Verlag, Stuttgart and New York. Price DM 32.00 (Apple II c or e).

The enormous cost of developing sophisticated high quality commercial computer software means that very little is developed for an under-financed academia, unless it also has industrial or business applications. One area where the spin-off has been to the bryologist's benefit is the now extensive range of software packages for data administration and word processing. Such software has been discussed already in this column, and applications using such 'off the shelf' products will be described in future columns. Another area of overlap of the bryological world with that of commerce is biochemistry, and the column editors recently received information about a product in this area that it seems useful to describe.

GIOS (Graphical Input and Output of Structures) is a system of five interacting programs that allows the input, processing and drawing of chemical structure formulae. The system requires an Apple IIe or IIc microcomputer, (IBM PC and Wang versions are in preparation) together with some way of inputting graphical data, and a graph plotter for printing the chemical structure diagrams - and although the cost of this equipment may be several thousand UK£, it may be equipment that University Botany Departments already have available. The system works by providing a

[continued on page 6.]

* A contribution to the Taxonomic Column, edited by D.H. Vitt (mosses) and J.J. Engle (hepatites). For addresses, see *Bryol. Times*, 31:9.

Footnote* Column editors J. -P. Frahm & B.J. O'Shea. For addresses, see *Bryol. Times*, 31:9.

The Campylopodioideae (continued from p. 1)

and usually symmetrical. Only in *Campylopus* subg. *Campylopus* sect. *Campylopus* do curved and strumose capsules occur. The spores are mostly uniform in size, about 13 µm in diameter. Only *Sphaerothercium*, *Campylopodium* and *Microcampylopus* have larger spores, about 20 µm in diameter. Spore ornamentation varies from nearly smooth to warty, and is distinct at the generic or subgeneric level.

Characteristics of the genera

Amongst the genera of Campylopodioideae, *Campylopus* shows the greatest plasticity. Morphologically and anatomically there is much differentiation of structures of the costa. Ecologically, the genus occurs in a broad spectrum of habitats, from rocks to swamps, from sea level to 4,800 m, and geographically throughout the world from 65° N to 65° S. With more than 350 revised species, the genus is probably one of the largest in the mosses (high numbers of species in such other genera as *Fissidens* are misleading because these genera have not been critically revised and are merely accumulations of names). For these reasons, Schuster (1984) called *Campylopus* a "successful" genus but what are the reasons for this success?

In the gametophyte, the broad costa has certain advantages. It functions for water uptake, water storage, mechanical fixation, and assimilation. In anatomical adaptations, special structures of the costa have developed in response to different ecological conditions (Frahm, 1986). For example, lamellae are used for storing water and assimilation in dry habitats, but in tropical humid habitats, for better gas exchange. Also, ventral hyalocysts are used for water uptake and water storage in wet habitats, ventral stereids for mechanical fixation and protection against desiccation in dry habitats, and dorsal stereids for conducting water from tomentose leaf bases to the leaf tips.

Characters of the sporophyte have been used for infrageneric classification (Frahm, 1983a). For example, filiform peristome teeth in the subg. *Thysanomitrium*; dicranoid peristome teeth in the subg. *Campylopus*; erect capsules in the sect. *Homalocarpus*; and curved capsules in the sect. *Campylopus*. *Bryohumbertia* differs from *Campylopus* by longer setae about 15 mm long, smooth inner surfaces of the peristome teeth and no differentiation between basal and upper lamina cells

(Frahm 1982a). *Pilopogon* resembles *Campylopus*: the gametophyte is similar, but it has long sheathing perichaetial leaves. The sporophyte has erect (but mostly longer) capsules with filiform peristome teeth as in *Campylopus* subg. *Thysanomitrium* (Frahm, 1983b).

Campylopodium and *Microcampylopus* have identical gametophytes, with small, *Dicranella*-like plants, sheathing leaf bases suddenly contracted, hyaline basal and oval upper lamina cells without alar cells. The sporophyte has symmetrical ovoid to short cylindrical capsules. It has stomata in *Campylopodium*, but lacks them in *Microcampylopus*. The spores are about 20 µm in diameter and warty in *Microcampylopus*, but papillose in *Campylopodium* (Giese & Frahm, 1986a,b).

Atractylotocarpus and *Dicranodontium* differ from each other as does *Pilopogon* from *Campylopus* subg. *Thysanomitrium*. Again, the gametophytes are quite similar, but *Atractylotocarpus* has straight setae, while *Dicranodontium* has curved ones. *Sphaerothercium* resembles a small *Campylopus* in vegetative characters, but has very short setae with capsules inserted in the upper leaves and larger spores about 20 µm in diameter.

Relations between the genera

All genera of Campylopodioideae differ largely in sporophytic characters. With the exception of the highly-differentiated costae in species of *Campylopus*, the stem and leaf anatomy is very similar throughout the genera, making it difficult to identify sterile specimens. Thus a differentiation of sterile *Microcampylopus* from *Campylopodium* is impossible — a reason to join both genera and to consider them distinct at the subgeneric level? The differentiation between *Atractylotocarpus* and *Dicranodontium*, *Pilopogon* and *Bryohumbertia* from certain species of *Campylopus* needs experience. Therefore, this subfamily forms a very homogeneous group with only a few distinguishing sporophytic characters.

The presence of stomata in *Campylopodium* is a matter for deeper consideration. Stomata occur elsewhere in the Dicranaceae, in the Dicranelloideae. Indeed, *Campylopodium* resembles *Anisothecium* except for the curved and twisted seta. Also, the spore size of *Campylopodium* (as in *Microcampylopus*), is exceptionally large compared with other genera of the Campylopodioideae and fits better with that of the Dicranelloideae. However, *Microcampylopus*, which is nearly identical with *Campylopodium*, differing only in spore surface

features, has no stomata. Some authors place both genera in two subfamilies based on the presence or absence of stomata: *Campylopodium* in the Dicranelloideae, *Microcampylopus* in the Campylopodioideae. So, is *Campylopodium* a dicranelloid genus with curved setae, or a campylopod genus with stomata? And does *Microcampylopus* (because of its strong affinities to *Campylopodium*) also belong in the Dicranelloideae with reduced stomata? Apparently, both subfamilies do overlap and it is difficult to evaluate the character of stomata versus curvature. A similar problem exists with *Campylopodella*, a genus placed in the Campylopodioideae by Brotherus (1924). It has the gametophytic characters of *Brothera*, which belongs to the Paraleucobryoideae, but a curved and twisted seta similar to most genera of Campylopodioideae.

Distribution

All genera of Campylopodioideae are distributed nearly worldwide. This probably indicates that they are old genera, but they also show recent speciation (e.g. *Pilopogon*, *Atractylotocarpus* or explosively as in *Campylopus*).

Atractylotocarpus is represented in nearly all mountain systems of the world by a single species (Padberg and Frahm, 1986.). It is lacking in North America north of Mexico except for an adventive occurrence and is represented in the Andes as two species. As with many other genera (e.g. *Pilopogon*), the Andes seem to be a centre of secondary evolution, as these mountains are mostly of tertiary age and all species are closely related. The species of *Atractylotocarpus* seem to have evolved in the Tertiary from the same ancestor.

Also, *Campylopus* is distributed nearly worldwide, however, in different intensity. Species are numerous in the subantarctic and in the tropical mountains, but less numerous in the northern temperate belt. For example, as shown by an atlantic distribution, all species in Europe can be interpreted as relicts from warmer periods (Frahm 1984), recent invasions (cf. *Campylopus introflexus*) or probable old invasions aided by man (cf. *C. pyriformis*, Corley & Frahm 1982). The concentration of species in the subantarctic leads to the suggestion that the genus originally was restricted to the southern part of Gondwanaland. Conspicuously, all subgenera and sections are represented there and it might be supposed that species have spread from there to the tropics, where adaptive

The Campylopodioidae (contd.)

radiation occurred. With the extension of the tropical climate at the beginning of the Tertiary, a secondary expansion to the northern hemisphere took place. Another argument is that the subgenus *Thysanomitrion* is represented in the subantarctic by *C. clavatus*, which is the only representative of the section *Thysanomitriopsis* and the most primitive representative of this subgenus. Additionally, some subantarctic species are replaced in the tropics by closely related species (e.g. *C. introflexus* by *C. pilifer* (Central and South America to Africa) and *C. aureus* (SE Asia)).

The progressive distribution of species of *Campylopus* is furthermore documented by the existence of "micro-endemics", species closely related to widespread ones, but morphologically different and confined to a small range. Examples are *Campylopus galapagensis* derived from *C. pilifer* and *C. andersonii*, also on the Galapagos Islands, derived from the andine *C. luteus*. Similarly, the common *C. fragilis* is replaced in SE Brazil in the Itatiaia Mountains by *C. fragiliformis* and in the Serra dos Orgaos by *C. luetzelburgii*, both probably the result of long isolation. The so-called endemic species of the old authors, especially those of the Atlantic Islands (St. Helena, Tristan d'Acunha, Ascension, the Canaries, Madeira and the Azores) have all proved to be synonymous with other, widespread species. Except for micro-endemics, geographically vicariant species occur in the genus, especially in SE Asia. There *Campylopus flexuosus*, common in tropical America and Africa, is replaced by the closely related *C. comosus*, *C. pilifer*, with the same range is replaced by *C. aureus* and *C. fragilis*, and *C. nivalis* by *C. crispifolius* and *C. austrosulcatus* respectively. Both endemic and vicariant species demonstrate clearly the potential genetic variability of this genus.

By way of contrast, *Dicranodontium* has a typical northern hemisphere distribution, with most species occurring in the subarctic to temperate regions. *Dicranodontium* can be regarded as the vicariant genus of *Campylopus* in the northern hemisphere. Its species resemble those of *Campylopus* and both genera may have the same pangaean root. However, *Dicranodontium* was less successful than *Campylopus*, perhaps due to fewer morphological adaptations, compared with the plasticity in the costal structures of *Campylopus*.

According to recent revisions (Giese & Frahm, 1986a),

Microcampylopus occurs in all tropical parts of the world, whereas *Campylopus* is confined to Australasia and Chile. *Sphaerothercium* is known only from two species in Colombia and Sri Lanka, which may reflect an incomplete floristic knowledge, but indicates also a widespread range for this genus. Therefore all these genera are not "modern" as indicated by Schuster for *Campylopus*, but show, in my opinion, an ancient distribution. However, the recent speciation in some genera, e.g. *Campylopus* or *Pilopogon*, should be considered much more recent.

Ecology

For an unknown reason, all species of the Campylopodioidae (as well as most Dicranaceae, with the exception of some Dicranelloideae and Rhabdoweisioidae), are confined to acidic substrates. The habitats cover a broad range, from all kinds of soil (sand, gravel, peat) to soil-covered rocks, and rotten wood, but rarely bark of trees or twigs. Such epiphytic species have only small geographical ranges (cf. *Campylopus weberi* in N. Peru and S. Ecuador on twigs, *C. flagelliferus* in Sri Lanka and S. India on bark and therefore seem to be the result of recent adaptation.

Most species have preferences for open habitats and therefore a remarkably wide altitudinal range from alpine regions down to, sometimes, sea level, (e.g. *Pilopogon peruvianus* or *Campylopus pilifer* with an altitudinal range of 4,500 m). *Campylopodium*, *Microcampylopus*, *Pilopogon* and many species of *Campylopus* are pioneer species on open ground and colonize successfully open soil, perhaps favoured because of their anatomical specializations (e.g. as protection of the capsules by sheathing perichaetial leaves, specialized spore dispersal by the uncoiling seta, and different costal structures).

Evolution

The broad morphological variation in *Campylopus* raises the question, which characters are the "modern" ones? This is difficult to answer, because all the infrageneric groups found in the subantarctic have these different morphological expressions and they may have been already present in the Mesozoic. All other genera of Campylopodioidae have in common the same costal structure. This type, with ventral and dorsal stereids and median deuters, may be the basic one. All other types may have been derived from it by reduction of the stereidal cells and their replacement by substereids

or hyalocysts, a process that involves the suppression of cell divisions (Frahm 1982b), from which the stereids are derived. However, there are recent trends that can be seen in morphological development. *Campylopus* subg. *Thysanomitrion* is represented in the subantarctic by one species, one in South and Central America, 5 in Africa, and 7 species in SE. Asia. Thus SE. Asia seems to be the centre of speciation in this subgenus. When comparing the morphology of the species in these different regions of the world, it becomes evident that the species in SE. Asia show the highest differentiation of the gametangia. In these species, antheridia and archegonia are "flower-like" on appressed foliate upper parts of the stems. Furthermore, the peristome teeth are narrower and more filiform.

Such filiform, peristome teeth also occur in *Pilopogon*. *Pilopogon* is represented in Africa by one species, but in the Neotropics by 6, with an accumulation of species in the northern Andes (Frahm 1983b). Again, in this centre of speciation, the species have narrower and more slender peristome teeth than in the single African species, which approaches the common dicranoid type. Particularly interesting in the fact that the only epiphytic species in this genus, *P. longirostratus*, probably the youngest branch of evolution, has the longest teeth. The trend to filiform peristome teeth is also correlated in *Pilopogon*, as well as in *Campylopus* subg. *Thysanomitrion*, with thick-walled, pitted, lamina cells.

In contrast to these two genera, all other genera of this subfamily show a remarkable uniformity in the gametophyte at the species level and also wide geographical ranges at the species and genus level. Therefore, they may be regarded as the most conservative representatives of this subfamily. The similar structure of the gametophyte seems to indicate the same "prototype", from which sporophytic adaptations have resulted in the evolution of different genera. Amongst these genera, *Sphaerothercium*, *Microcampylopus* and *Campylopodium* may be the more ancient ones considering their large spore size, which hardly allows for an extension of their geographical ranges.

The representatives with straight setae may be derived from those with curved setae, e.g. *Pilopogon* from *Campylopus*, and *Atractyllocarpus* from *Dicranodontium*, as shown by the recent speciation of both genera in relatively young mountain systems.

The Campylopodioideae (contd.)

Affinities to related subfamilies

There are close relationships between the Campylopodioideae, the Paraleucobryoideae, and the Dicranelloideae. The Dicranelloideae are linked to the Campylopodioideae by *Microcampylopus* and *Sphaerothecium* (in spore size), and *Campylopodium* (by the presence of stomata). The Paraleucobryoideae are related to the Campylopodioideae by *Campylopodidiella*, which resembles *Paraleucobryum* or *Brothera* vegetatively, but also has curved, twisted setae. Thus it seems to be impossible to find sharp delimitations between the subfamilies.

Conclusions

The most surprising phenomenon in the Campylopodioideae is the contrast between derived characters (as small spores*, special twisting mechanism in the setae, dioicous plants*, elongation of laminal cells) and the wide distribution, which seems to indicate an old, at least, mesozoic age. In spite of recent taxonomic revisions, several questions remain unanswered: how shall the curved setae be evaluated? Has this character evolved separately two or three times (in the Paraleucobryoideae, in *Campylopodidiella*, as suggested here, and also in the Dicranelloideae, in *Campylopodium* and *Microcampylopus*) or only once? How must the genera with straight setae (*Pilopogon*, *Atractyllocarpus*) be valued and placed? Or is our systematic approach the wrong tool to clarify multifactorial continuous changes in nature?

References

- Brotherus, V.F. (1901). Musci. In Engler, A. & K. Prantl. *Die natürlichen Pflanzenfamilien*. Ed. 1, 3. Leipzig.
- Brotherus, V.F. (1924). Musci. In Engler, A. & K. Prantl. *Die natürlichen Pflanzenfamilien*. Ed. 2, 10. Leipzig.
- Corley, M.F.V. & J.-P. Frahm. (1982). Taxonomy and world distribution of *Campylopus pyriformis* (Schultz) Brid. *J. Bryol.*, 12: 187-190.
- Fleischer, M. (1901). *Die Musci der Flora von Buitenzorg* Bd. 1. Leiden.
- Frahm, J.-P. (1982a). A reinterpretation of *Bryohumbertia* P. de la Varde et Ther. Crypt. *Bryol. Lichen.*, 3: 365-369.
- Frahm, J.-P. (1982b). Problems of infrageneric classification in *Campylopus*. [cont.p.5.]

* Column Editor's note: I believe most authors would consider small spores and dioicous sexual condition as plesiomorphous (less derived).

Constitution of the International Association of Bryologists

Section 1. Name and Affiliation

Article 1. The Association shall be called the International Association of Bryologists (I.A.B.)

Article 2. The Association shall be affiliated to the International Association for Plant Taxonomy (I.A.P.T.) on the basis of Article 3, section 4, of the Constitution of that Association.

Section 2. Objectives and Means

Article 3. The objectives of the Association shall be to promote international co-operation and communication among bryologists, whether amateur or professional.

Article 4. The objectives of the Association shall be pursued by the same methods and procedures as those provided in the I.A.P.T., either jointly or independently, but normally under the aegis of that Association. The methods of the Association shall include:

- (i) The facilitation and encouragement of fuller co-operation between individual workers;
- (ii) The establishment of committees for special purposes;
- (iii) The organization of meetings and symposia relating to bryology, in which bryologists should be involved and to which they can contribute;
- (iv) The publication of a regular newsletter, the publication of a regular list of all new taxa, at every level, from the world's literature; the periodic publication of an up-to-date address list of the world's bryologists; and issues that are of general interest to bryologists other than original research papers.

Section 3. Membership

Article 5. All persons actively interested in any phase of bryology are eligible for membership of the Association.

Article 6. Membership is acquired by application in writing to the Secretary of the I.A.B. or I.A.P.T. and payment of the appropriate fee.

Article 7. Membership of the Association shall be open without payment of an additional fee to any personal member of the I.A.P.T. in good standing, who may desire to become a member of the I.A.B.

Section 4. Council

Article 8. The affairs of the Association shall be controlled by a Council which shall consist of a President, a First and Second Vice-President, the Immediate Past-President, a Secretary, and ten Councillors. Normally not more than two members of the Council shall be residents of the same country when elected.

Article 9. The President, Vice-Presidents, Past-President and Secretary shall constitute the Executive Committee whose role will be to maintain a general control over the affairs of the Association and carry out the duties that may be delegated to them by the Council.

Article 10. The President and Vice Presidents shall hold office between two Business Meetings of the Association and shall not be eligible for re-election to the same office. The Councillors shall hold office between three Business Meetings; five of them shall retire by rotation at each Business Meeting and shall not be eligible for immediate re-election to the same office. The Secretary shall hold office between three Business Meetings and shall be eligible for re-election.

Article 11. Any vacancy occurring during the term of office of a Council member, other than that of President, shall be filled by the Council. In the case of a vacancy in the presidency, the Past-President shall fill the remaining term of office. If the Past-President is unable to serve, the First Vice-President shall act as President until the next Business Meeting of the Association.

Article 12. The Council may at any time co-opt additional members for special purposes; for example, the Association will eventually need the services of an Editor and a Bibliographer.

Article 13. The Council shall have power to appoint committees to further the objectives of the Association and shall define the composition, duties and powers of such committees.

Section 6. Meetings and Elections

Article 14. The Association shall meet at each International Botanical Congress. Other meetings may be arranged by the Council when deemed appropriate. A Business Meeting shall be held at each International Botanical Congress or at an appropriate International Congress. The time interval between two Business Meetings shall normally be at least four years and not more than six years. Notice of the Business Meetings shall be sent to members at least four months before the date of the meetings.

Article 15. The Council shall be elected by a majority of the votes cast by members in a mail ballot conducted at least four months prior to the Business Meeting of the Association. The votes cast for nominated candidates for one of the offices of the Executive Committee shall count for their election as Council Members if they are not elected for an office.

Article 16. At least seven months prior to a Business Meeting of the Association, the President shall appoint an ad hoc Election Committee to conduct the election of Council. The Election Committee shall consist of at least three and not more than five members.

Article 17. The Election Committee shall call for nominations of candidates for the ensuing period from the membership of the Association. Nominations shall be sent to the Chairman of the Election Committee, they shall form the basis of the ballot. If nominating additional candidates, the Election Committee shall strive, as far as possible, to take account for the diverse interests of bryologists as well as the varied geographical areas of candidate residency.

Section 7. By-Laws and Amendments

Article 18. The Council shall have the power to make by-laws for carrying into operation the terms of the Constitution.

Article 19. Amendments to the Constitution may be proposed in writing by any member of the Association. Such amendments receiving the approval of a majority of the Council shall be submitted to the members for a mail ballot. Adoption shall require a favourable vote of two-thirds of the votes cast.

However, amendments rejected by the Council may be re-submitted by the mover for discussion at the next Business Meeting of the Association, and if a favourable decision is then obtained, they shall be voted upon by mail vote.

By-Laws for IAB Committees

1. Such Committees as may be required to fulfil IAB's purposes shall be created on a temporary or unlimited basis, upon the decision of the Council.
2. The Chairman and Members of each Committee shall be appointed (and can be dismissed) by the Executive Committee. Unless otherwise specified, their commission ends with that of the Council, during which they were appointed: it can be renewed. The President and the Secretary of the IAB are ex-officio members of each Committee.
3. Within the limits of their tasks and competencies, as defined by the Council, the Committees are autonomous in their action.
4. Every January, the Committees shall submit annual reports of their activities to Council through the Secretary of IAB who shall circulate them and report back to the Committees any comments received from Council members.
5. Funds that may be put at the disposal of a Committee shall be administered under the personal liability of the Chairman of that Committee, their use being fully accounted for in the Committee's reports.

The Campylopodioideae (contd.)

- In: Bryophyte Taxonomy. Beih. Nova Hedwigia, 71: 219-224.
- Frahm, J.-P. (1983a). A new infrageneric classification of the genus *Campylopus*. J. Hatt. Bot. Lab., 54: 207-228.
- Frahm, J.-P. (1983b). A monograph of *Pilopogon*. *Lindbergia*, 9: 99-116.
- Frahm, J.-P. (1984). Phytoecography of European *Campylopus* species. *Proceedings of the third meeting of bryologists from Central and East Europe, Praha, 14th-18th June, 1982. Praha, 191-212.*
- Frahm, J.-P. (1986). The ecological significance of the coastal anatomy in the genus *Campylopus*. *Proceedings of the fourth meeting of bryologists from Central and East Europe, Eger, August, 1985. (In press).*
- Frey, W. & J.-P. Frahm (1986). The twist mechanism in the cygneous setae of the genus *Campylopus*: morphology, structure and function. *J. Hatt. Bot. Lab. (In press).*
- Giese, M. & J.-P. Frahm. (1986a) A revision of *Microcampylopus* (C. Muell.) Fleisch. *Lindbergia*. (In press).
- Giese, M. & J.-P. Frahm. (1986b). A revision of *Campylopodium* (C. Muell.) Besch. *Lindbergia*. (In press).
- Padberg, M. & J.-P. Frahm (1986). Monographie der Gattung *Atractylocarpus* Mitt. *Crypt. Bryol. Lichen*. (In press).
- Schuster, R.M. (1983). Phytoecography of the Bryophyta. In: *New Manual of Bryology, Vol. 1. Nichinan, 463-626.*
- Gesamthochschule Duisburg, Postfach 10 16 29. 4100 Duisburg 1.

MOSSES OF LORD HOWE I.

D.H. Vitt and H. RAMSAY are preparing a book of mosses of Lord Howe Island and would like to learn of any substantial collections from the Island in private or public Herbaria to which they might refer. Please send specimens to D.H. Vitt, Dept. of Botany, University of Alberta, Edmonton, Alberta, Canada T6G 2E9.

Has anyone specimens from the Island of the following for which there are literature records, but no specimens in Australian herbaria?

Rhodobryum commersonii (Schwaegr.) Par.; *Camptochaete gracilis* (Hook. f. & Wils.) Par.; *Entodon pallidus* Mitt.; *Neckera trichophoroides* Muell.; *Racomitrium leptostomoides* Forster.

Replies to H. Ramsay, School of Botany, University of New South Wales, Kensington 2033, NSW, Australia.

March, 1986.

Computer Techniques [contd. from page 1.]

list of options (the 'menu') on the bottom part of the screen, and allows diagrams to be drawn on a variable grid on the screen using either a graphics tablet or mouse - both of which are devices that allow a physical movement on a flat surface to generate movements on the screen, which in this case allows two points to be indicated on the screen which the computer then connects with a straight line. The input device (or the normal keyboard) is used to indicate whether the bond is single, double, triple, alpha or beta configured, stereochemically undefined or aromatic. Using this and other functions, a full structure can be created, and when the drawer is happy with it, it can be stored on magnetic disc together with all the necessary alphabetic and numeric information. It is also possible to create libraries of diagrams that can be used to create new structures.

Another program translates the structural formula into the corresponding molecular formula, thus allowing the molecular weight, the isotope mass of the molecular ion peak and the elemental analysis of the component to be calculated. A further program allows the design of formula schemes, synthetic sequences, tables, etc., by combining previously-designed structures and adding the necessary lines, arrows, annotation, etc. A final program draws a camera-ready copy using the plotter, having been told which drawing pen to use for bond skeletons, heteroatoms, lines and text, and to what scale it should be drawn. The finished drawing shown in the program documentation is of high quality, and taken from a published paper; a demonstration of the software has not been seen.

The level of software sophistication that can now be made available on micros is very high. Increasingly, standard and comparatively straightforward ways of interfacing to the more complex facilities of computers, such as graphics, are now being made available to programmers, and it is thus to be hoped that in future much more friendly, easier to use and yet more powerful programs will ensue.

Bryophyte Herbarium of T.J. Bines

THE COLLECTION OF BRYOPHYTES made by T.J. Bines in the Canary Islands in 1964 has recently been donated to the Royal Botanic Garden, Edinburgh (E) by the Nature Conservancy Council, Peterborough, and is available for study.

D.G. Long, Curator of bryophytes, Royal Botanic Garden, Edinburgh EH3 5LR, Scotland.

Book Review

By J.-P. Frahm

BIEDERMANN, Heiner (ed.). 'Microcomputer und Publikation: Ihr Einsatz als Hilfsmittel bei der Arbeit an medizinisch-naturwissenschaftlichen Veröffentlichungen'. Stuttgart (Fischer) 1984. 300 pp. UTB no. 1265. ISBN 3-437-40139-4. Price DM 21.80. (ca. \$7.00).

Word processing and data banking are the most widespread uses of computers in laboratories and offices today, but nevertheless, only a small number of bryologists make use of these facilities. This book is intended to stimulate the beginner to take better advantage of microcomputers, particularly for text editing. It provides basic computer knowledge in an easily understandable way, neither too simple nor too specialized, and it shows a broad range of applications in text editing. It also gives useful information and advice on the acquisition of a microcomputer.

Computer - supported text editing is becoming increasingly important; already some publishers accept manuscripts on computer-produced magnetic storage disks, and in the future this is likely to become much more common: authors will key their manuscripts directly into the computer, ready for printing, and the editors of journals will review it on the screen. The amount of work necessary in preparing a paper is well known: handwritten draft, typewritten draft, additions, corrections, second version of the paper, further additions, and then perhaps reorganisation by cutting and pasting, before the final version is ready - when the editor and reviewer may again ask for changes. In this way a manuscript may be rewritten three or four times. Word processing makes it all much easier: all corrections, additions and changes are made directly on the screen, and at any time a new (perfectly typed) version of the manuscript can be printed. For those of us without a secretary, this is an important consideration!

Dr. Biedermann's book gives most of the necessary informa-

tion a bryologist would need. It gives a critical account of different microcomputers, keyboards, printers and other 'peripherals', gives experienced advice on the acquisition of a microcomputer, and warning of the traps of dealers. The major part of the book concerns text editing and data banking, the compatibility of computers and data files, and the passing of data between data files and word processing programs. Special reference is given to computerized literature research. Many computer books can only be read by those familiar with the jargon and concepts, but not this book, which is written in a narrative style (although the style differs in the chapters written by different authors). The authors have extensive personal experience of the subject, and thus even advanced users of microcomputers may learn some new tricks - for instance, how to name and save text without getting it lost, or how to exchange disks between different makes of computers. Some of the contents have less to do with computers than with publication in general, with discussion of titles, references, abbreviations, typography, glossaries, etc., which may be of less interest to a bryologist. However, there is a useful glossary giving an overview of computer terminology - sometimes of necessity, as not all terms are explained in the text.

This book will be useful to everyone from the student, who can start to prepare everything from short papers to a thesis, to colleagues who want to change from time-consuming, traditional methods to new, more reliable methods. This book will be out of date in a few years, of course, so read it now! It has been published in a paperback series of university text books, so the price is quite low.

Membership of IAB

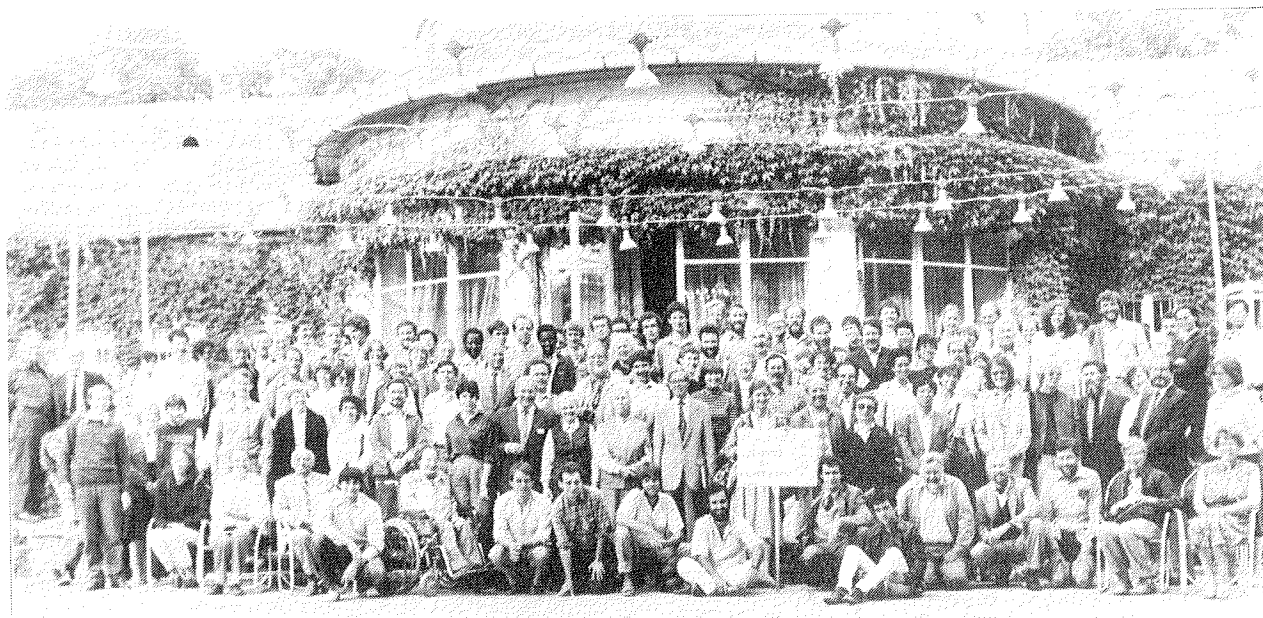
THE FOLLOWING LISTS, for the period 1 February 1985 - 31 January 1986, up-date those already published. The last list appeared in *Bryol. Times*, 31:5.

New Members

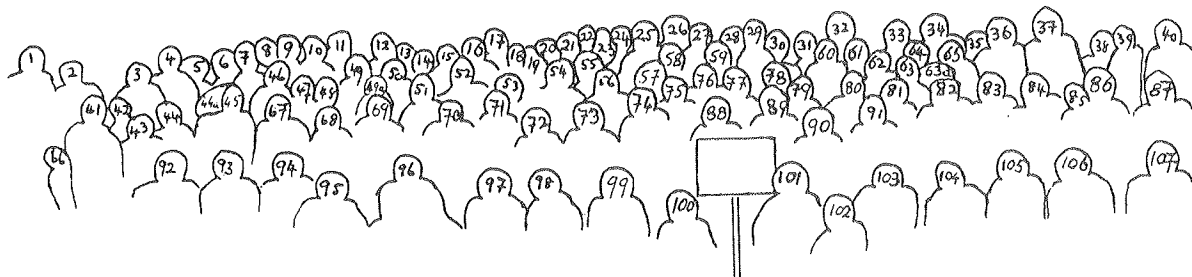
Beyer, Jürgen*; Büscher, Philippe*; Gonçalves - Carralves, Mathilde F.; Hoffman, Maurice*; Mazimpaka, Vincent*; Oostendorp-Bourgonjon, C. L.*; Schriebl, Adolf*; Sêneca Cardoso, Ana Maria*; Smith, A.C.*; Strank, Karl-Josef*; Vasander, Harri*; Wanstall, Peter*; Watzet, J. Roger*.

[contd. on page 8]

IAB Mohaökológiai Konferencia



Delegates at the IAB Conference on Bryoecology, Budapest 5 - 10 August, 1985.



1. G.A. Slack; 2 ? ; 3. ? ; 4. M. Rajczy; 5. S. Pócs; 6. K. Baló; 7. A. Touw; 8. M.C.F. Proctor; 9. R. Zielinski; 10. J.-P. Frahm; 11. T. Herben; 12. Z. Soldán; 13. H. Kanda; 14. H.L.K. Whitehouse; 15. E.A. Odu; 16. A. Mäkinen; 17. J. Váňa; 18. V. Mazimpaka; 19. D.H. Norris; 20. H. Rydin; 21. J. Hyvärinen; 22. L. Söderström; 23. H.J. During; 24. L. Berris; 25. A. Whittle; 26. B.F. van Tooren; 27. R.I. Lewis Smith; 28. ? ; 29. N.G. Miller; 30. M. Hoffmann; 31. Mrs. N.G. Miller; 32. H. Deising; 33. D. Wächter; 34. H. Rudolph; 35. P. Babulka; 36. D.M. Bergstrom; 37. I.J. Odrzykoski; 38. A. Causse; 39. Mrs. T. Simon; 40. T. Nakamura; 41. G. Raeymaekers; 42. Z. Debreczy; 43. E. Parkas; 44. L. Lőkös; 44a. S. Piippo; 45. I. Novotný; 46. J. Shaw; 47. A. Stoneburner; 48. A. Franklová; 49. M. van Baaren; 49a. G. Nordhorn-Richter; 50. H. Wozakowska-Natkaniec; 51. R. Wyatt; 52. J. Kwapuliński; 53. H. Vasander; 54. B.O. van Zanten; 55. Mrs. van Zanten; 56. G.B.A. van Reenan; 57. J. Whittle; 58. R.E. Longton; 59. W.C. Steere; 60. F. Dániels; 61. K. Nehira; 62. ? ; 63. J.L.D. Meenks; 63a. C. Norris; 64. E. Simon; 65. E.O. Campbell; 66. B. Odé; 67. G. Hässel de Menéndez; 68. E. Ron; 69. A.J. Harrington; 70. A. Davidson; 71. J. Sarosiek; 72. H. P. Ramsay; 73. A. Richards; 74. P.W. Richards; 75. B.M. Murray; 76. D. Steere; 77. R.E. Magill; 78. Mrs. Hoffmann; 79. H. Ando; 80. C. Sergio; 81. R.M. Cros(?); 82. ? ; 83. H. Bischler; 84. T. Pócs; 85. M. Váňa; 86. A. Borhidi; 87. G. Kis; 88. A. Sée; 89. Mr. Pedrotti; 90. C. Cortina-Pedrotti; 91. Z. Iwatsuki; 92. D. During; 93. J.M. Glime; 94. T. Simon; 95. Z. Tóth; 96. R. Grolle; 97. C.T. Miles; 98. T. Noakes; 99. H. van Rijnberk; 100. I. Granzow de la Cerda; 101. T. Olasz; 102. J. Vicente; 103. S.W. Greene; 104. S.R. Gradstein; 105. G.A.M. Scott; 106. Mrs. Whitehouse; 107. J. Ide.

Also in the picture, but virtually invisible, are: H.A. Schriebl, between Nos. 4 & 5; A. Berczik, between Nos. 35 & 36, and G. Fekete, between Nos. 36 & 37.

RESOLUTIONS ADOPTED

1. That IAB should actively seek ways to promote the conservation of endangered bryophytes and bryophyte habitats.
2. That a future IAB conference should be devoted to the subject of micro- and macroevolution in bryophytes.
3. That IAB should attempt to organize, at an international ecological conference or at an IAB conference, sessions that would stress: A. the contribution of bryophyte ecology to the solution of general ecological problems: B. the role of bryophytes in ecosystem processes: C. studies which combine observations and experiments in the field and in the laboratory.

Membership of IAB (contd. from page 6.)

Addresses

- Beyer, Jürgen. Leuschnerstrasse 5, 6700 Ludwigschafen, Germany, B.R.D.
- Büscher, Philippe. Vrije Universiteit Brussel, Dienst Plantenfysiologie, Paardenstraat 65-67, B-1640 St. Genesius Rode, Belgium.
- Gonçalves-Carralves, Mathilde F. Museo Arg. Cs. Nat., Bernardino Rivadavia, Avda. Angel Gallardo 470, 1405, Buenos Aires, Argentina.
- Hoffman, Maurice. K.L. Ledengankstraat 35, B-9000 Gent, Belgium.
- Mazimpaka, Vincent. Dept. de Botánica y Fisiología Vegetal, Facultad de Ciencias, Universidad Autónoma de Madrid, Canto Blanco, 28049, Madrid, Spain.
- Oostendorp-Bourgonjon, C.L. Broekeindweg 20, 5971 NZ Grubenvorst, The Netherlands.
- Schriebl, Adolf. Priel 324, A-9400 Wolfsberg, Austria.
- Seneca Cardoso, Ana Maria. Instituto de Botânica, Dr. Gonçalo Sampaio, Rua Campo Alegre, 4100 Porto, Portugal.
- Smith, A.C. End House, Shelfhanger Road, Diss, Norfolk, IP22 3EH, England, U.K.
- Strank, Karl Josef. Botanisches Institut, d. R.W.T.H. Aachen, Germany, B.R.D.
- Vasander, Harri. University of Helsinki, Dept. of Peatland Forestry, Unionkatu 40B, SF-00170, Helsinki, Finland.
- Wanstall, Peter. 3, Mellis Road, Thrandeston, Diss, Norfolk IP21 4BU, England, U.K.
- Wattez, J. Roger. 14 rue F.Villon, 80000 Amiens, France.

New Institutional Member

- Botanische Abteilung, Section Phanerogamen, Forschungsinstitut Senckenberg, Senckenberganlage 25, D-6000 Frankfurt, Germany, B.R.D.

Change of Address

- Bell, G.H. State Herbarium & Botanic Gardens, North Terrace, Adelaide, South Australia, 5000.
- Christy, John A. Botany Section, Milwaukee Public Museum, 800 West Wells Street, Milwaukee, WI 53233, U.S.A.
- Cleef, A.M. Hugo de Vries Laboratorium, Sarphatistraat 221, 1018 BX Amsterdam, The Netherlands.
- Cohen Stuart, J.A.F. c/o Ziekenhuis overvecht, Afd. 9, PAAZ, Opname Sec., Parandreef 2, 3563 AZ Utrecht, The Netherlands.
- Cowan, R.S. c/o Nerina Dupreez, 43, Glendoon Road, Cranbourne, Victoria 3977, Australia.

Flatberg, Kjell, I. Department of Botany, University of Trondheim, N-7055, Dragvoll, Norway.

Godfrey, M.F. Stationstraat 42, 6433 JR Hoensbroek, The Netherlands.

Meenks, Jan, L.D. Haganhof 21, 4143 BM Leerdam, The Netherlands.

O'Shea, Brian J. 131 Norwood Road, London SE24 9AF, England, U.K.

Pedersen, Arne. Snippen 7F, N-0566, Oslo 5, Norway.

Stanley, Philip E. 48, Glisson Road, Cambridge CB1 2HF, England, U.K.

Werner, Jean. 32, rue Michel-Rodange, L-7248 Bereldange, Luxembourg.

Zielman, Rudl. Hoevestein 239-3A, 6708 AK Wageningen, The Netherlands.

Deletion

Udar, Ram. India. Deceased.

UNIVERSITY OF COLORADO

Mountain Research Station

Field Courses

THE MOUNTAIN RESEARCH STATION of the University of Colorado will offer field courses in bryology and lichenology during the summer of 1986. Mosses and liverworts of Southeastern Alaska will be taught by Dr. Joannes A. Janssens of the University of Minnesota. This intensive course will take place from 11 through 22 August 1986, in the Alaskan coastal mountains near Juneau and credit is available from either the University of Colorado or the University of Alaska. Lichenology will be taught by Dr. Sam Shushan of the University of Colorado. The course meets two full days each week from 9 June through 8 July 1986, and credit is offered by the University of Colorado. The course takes place in the Colorado Front Range of the Rocky Mountains and is based at the Mountain Research Station.

Information concerning these and other courses or research opportunities in association with the Mountain Research Station can be obtained by contacting Dr. Mark Noble, Mountain Research Station, University of Colorado, Nederland, Colorado 80466, Telephone (303) 492-8841.

FLORA NEOTROPICA

By D. Griffin III

I SHOULD LIKE to bring to the attention of bryologists interested in neotropical floras the very fine publication series, *Flora Neotropica*, and suggest that this series be considered as a place to submit monographs or revisions of neotropical groups. Contrary to the opinions held by some, *Flora Neotropica* is not restricted to revisions of vascular taxa. The goal of the editorial board is to publish high-quality taxonomic treatments for all neotropical plant and fungal groups.

There are a few special requirements, mainly dealing with the minimal number of species treated and format used. Authors interested in this series are encouraged to write to the author or Dr. Ghilleen Prance, New York Botanical Garden, Bronx, NY 10458 U.S.A. for details.

Florida State Museum, University of Florida, Gainesville, Florida 32611, U.S.A.

Desiderata

CAO, Tong is presently at the University of Alberta for two years as a visiting scholar from Shenyang, China. While in Edmonton, he is working on two main projects:

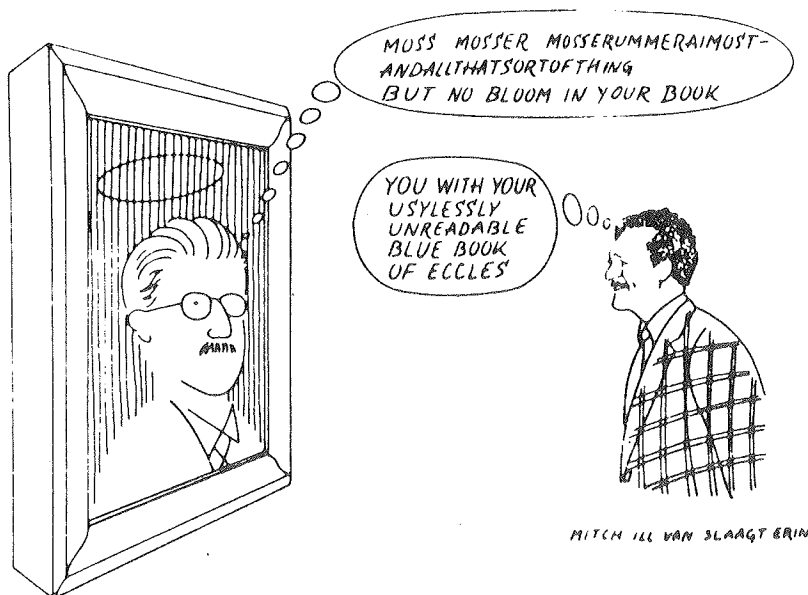
1. An SEM study of *Sphagnum* spores. Fertile, living collections of a variety of species would be much appreciated.
2. A taxonomic revision of *Grimmia* (*sensu lato*) in China and western North America.

We are especially interested in having all specimens possible of the genus that have been collected in China. Anyone having material from this area please let us know, or send it to us: we would be most appreciative.

NORIS SALAZAR is just finishing a revision of *Leucophanes*. We have tried to obtain on loan as much material as possible. However, we may have missed some important collections. We would very much like to have for study and identification any specimens that anyone knows of.

Dale H. Vitt, University of Alberta, Department of Botany, B414 Biological Sciences Centre, Edmonton, Canada T6G 2E9.

MAN IN THE NEWS!



"JOIN THE BLOOM OF THE DAY"

Michiel van Slageren

HE'S MADE IT! - that's why he thinks he is the "bee's knees and the cat's whiskers"! - although it is doubtful if James Joyce would have thought it worth recording in Ulysses. Recording what, do I hear you ask? A Doctorate of Philosophy from the University of Utrecht, no less!!

Normally a short line suffices to record such an everyday event as obtaining a doctorate. But in the present instance, something more seemed called for, as Michiel has been Production Manager of the *Bryological Times* virtually from the time the first issue was produced in 1980 (see *Bryological Times*, 3:8) until last year. So, in congratulating him on his scholastic achievement, I would also like to thank him most warmly for all his help with the printing and distribution of the *Bryological Times* in Utrecht. During this time the size of the print run and, hence, the amount of work involved, has more than doubled, and so it has required good organization to get it printed and distributed quickly and efficiently. I feel sure I speak for all the readership when I say: "Very well done, Michiel, and every success in your career!"

S.W. Greene.

Society News

THE BRYOLOGICAL SOCIETY OF JAPAN elected new officers for two years at the General Meeting in Tottori, July 22, 1985. They are:-

President... S. Inoue
(Prof. Emer. of Kumamoto Univ.)
Secretary .. H. Inoue
(National Science Museum, Tokyo)
Treasurer .. J. Hongo
(National Science Museum, Tokyo)
Auditor Z. Iwatsuki
(Hiroshima University)
Editor H. Deguchi
(Kochi University)
Association Editors ...
N. Kitagawa (Nara Univ. of Education) M. Higuchi
(Hiroshima University)

The Japanese Government decorated our distinguished member, Dr. Shinsuke Hattori, with the Third Order of the Sacred Treasure on the 3rd November, praising him for his distinguished services to bryology. As a memorial to the decoration, a lecture on speciation in the genus *Frullania* in the Pacific regions was made by Dr. Hattori on the 22nd November at the National Science Museum.

Hironori Deguchi, Department of Biology, Faculty of Science, Kochi University, Akebono-cho, Kochi-shi, Kochi 780, Japan.



... IS GOING ON!* The German Research Foundation has granted the continuation of the Bryotrop project. Field studies will be performed in the summer of 1986 in Sabah, the Malayan part of Borneo. Along a transect on Mt. Kinabalu the same field studies will be carried out as in the Peru transect, which will enable a comparison of the bryoflora and vegetation of both regions.

Members of the second Bryotrop project are Dr. W. Frey and Dr. H. Kuerschner (Institute for Systematic Botany and Plant Geography, University of Berlin), Dr. W. Schultze-Motel and M. Menzel (Botanical Museum, Berlin) and Dr. J.-P. Frahm (University of Duisburg). Dr. Schultze-Motel will not participate in the field trip and his place will be taken in Borneo by Dr. Haji Mohamed (University of Kuala Lumpur), who kindly agreed to accompany the expedition and to help with his local experience.

As in 1982, in Peru, special attention will be given to a complete survey of the bryoflora of Mt. Kinabalu from sea level to the forest line with collections in undisturbed areas at 200 m intervals (H. Mohamed, M. Menzel), the zonation of bryophytes and studies on the ecology of epiphytic bryophytes (abundance, light factor, gas exchange, temperature, humidity (J.-P. Frahm), the structure of epiphytic bryophyte vegetation (H. Kuerschner) and also new studies on structural anatomical and morphological adaptations (W. Frey).

J.-P. Frahm, Universität-Gesamthochschule-Duisburg, Postfach 10 16 29, D. 4100 Duisburg 1, B.R.D.

[* For previous contribution : see *Bryol. Times*, 17:6. Ed.]

Recent Publications

Bryophyt. Bibl., 31: 1-216, 1985.

Crypt. Bryol. Lichen., 6 (4): 315-406, 1985; 7 (1): 1-92, 1986.

Herzogia, 7 (1-2): 1-312, 1985.

A number of books was received for review and will be reported on in future issues. [Ed.]

DIARY

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

1986

March 15-16. SBLs. Meeting of collaborators of the Swiss Bryophyte Mapping Project at Zürich, Botanical Institute of the University. Further information from Klaus Ammann, Syst.-Geo-bot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.

April 2-9. BBS. Spring field meeting, East Dereham, Norfolk. Local Sec.: Mr. R. Stevenson, 111 Wootton Rd., King's Lynn, Norfolk PE30 4DJ. For details see Bull. BBS, 47.

May 23-25. SBLs. Bryophyte Mapping Week-end, Porrentruy (NW Switzerland). Further information from Klaus Ammann, Syst.-Geo-Bot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.

June 20-22. SBLs. Annual Assembly, Elm, (Canton Glarus, Northern Central Alps). Further information from Klaus Ammann, Syst.-Geo-Bot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.

July 20-30. DBLWG. Summer field camp nr. Champagnole, French Jura. Further information from Han van Dobben, Maria-plaats 16, 3511 LJ Utrecht, The Netherlands.

July 23-29. BBS. Summer field meeting (1st week), Fort William. Local Sec.: Mr. G.P. Rothero, Benmore Centre, By Dunoon, Argyll, Scotland.

July 28-2 Aug. NBS. Summer excursion - annual meeting, Frös-kog, Dalsland, SW Sweden.

Organizer, T. Hallingbäck. Further information from Sven Fransen, Botaniska Institutionen, Carl Skottsbergs gata 22, 413 19 Göteborg, Sweden.

July 30-5 Aug. BBS. Summer field meeting (2nd week), Gairloch, Wester Ross. Local Sec.: Mr. D.G. Long, Royal Botanic Garden, Edinburgh EH3 5LR. For details of both weeks, see Bull. BBS, 47.

Aug. 26-29/30. CEBWG. Leipzig, DDR. For preliminary announcement, see Bryol. Times, 34:8.

Aug. 28-1 Sept. SBLs. Field Meeting. Fideriser Heuberge (Prättigau, Ct. Grison). Further information from Klaus Ammann, Syst.-Geo-bot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.

Sept. 12-14. BLAM. Field Meeting in Nordschwarzwald, BRD, based on Karlsruhe. Organizer and leader, Dr. G. Philippi, Erbprinzenstr. 13, 7500 Karlsruhe, B.R.D.

Sept. 19-21. Eleventh annual Le-Roy Andrews Foray. Peconic Dunes Camp of Suffolk County, Long Island, New York. Further information from Dr. W.R. Buck, New York Botanical Garden, Bronx, NY 10458-5126, U.S.A.

Sept. 20-21. BBS. A.G.M. and paper-reading meeting. University of Leeds. Local Sec.: Prof. D.J. Cove, Dept. of Genetics, University of Leeds, Leeds LS2 9JT. For preliminary details see Bull. BBS, 47.

Oct. 4-5 or 11-12. SBLs. Taxonomic Workshop with Dr. J. Váňa on *Jungermannia* and *Marsupella*. Zürich, Botanical Institute of the University. Further information from Klaus Ammann, Syst.-Geo-Bot. Institut, Altenbergrain 21, CH-3013, Bern, Switzerland.

Nov. 1-2. BBS. Taxonomic Workshop, University of Reading. Local Sec.: Dr. R. E. Longton, Dept. of Botany, The University, Reading RG6 2AS, Berkshire, England. For details see Bull. BBS, 47.

1987

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, 47.

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 Sessions, July 20-24. For preliminary notice, see Bryol. Times, 23:9. Congress Address: XIV IBC. Bot. Garden and Museum, Königen-Luise-Strasse, 6-8, D-1000, Berlin (West) 33, Germany.

July or Aug. BBS. Summer field meeting, Achill Island, Co. Mayo, and Westport. Local Sec.: Dr. D.M. Synnott, National Botanic Gardens, Glasnevin, Dublin 9, Ireland. For preliminary details, see Bull. BBS, 46.

Sept. BBS. A.G.M. and paper-reading meeting, Wye College, Kent. Local Sec.: Dr. M.A.S. Burton, Paris House, East Malling, Maidstone, Kent ME 19 6AU. For preliminary notice see Bull. BBS, 47.

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.

THE INTERNATIONAL ASSOCIATION OF BRYOLOGISTS publishes The Bryological Times every two months, and the Advances in Bryology every two years. Material for The Bryological Times can be sent at any time, but submission dates for the Advances should be discussed with its Editor, Dr. Norton G. Miller (Albany) U.S.A. 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, Instituut voor Systematische Plantkunde, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands.

THE BRYOLOGICAL TIMES is published in Utrecht and distributed from Beijing (China), Eger (Hungary), Kingston (Tasmania), Missouri (U.S.A.), Reading (U.K.), Tokyo (Japan) and Utrecht. All correspondence concerning mailing to: Rob Kruijt, Instituut voor Systematische Plantkunde, 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 1st of May, 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.