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OF THE
BRITISH
BRYOLOGICAL SOCIETY

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Edited by M.J.M. Yeo

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BRITISH BRYOLOGICAL SOCIETY

The British Bryological Society exists to promote the study of mosses and liverworts. The Society was constituted in its present form in 1923, replacing the Moss Exchange Club founded in 1896.

Two Field Meetings, each usually of a week's duration, are held every year in districts of bryological interest. In addition, two weekend meetings are held in the autumn, one for the Annual General Meeting, the presentation of papers and fieldwork, and the other for practical instruction in the examination and identification of bryophytes.

Members of the Society are entitled to receive the Society's *Journal* and its *Bulletin* free of charge, to borrow books, periodicals and specimens from the Society's library, to consult on borrow specimens from the Society's herbarium, and to consult the Society's panel of referees for assistance in the identification of specimens.

The subscription, due in advance on 1 January each year, is £20.00 for Ordinary members, £10.00 for Senior members, Junior members and Student members and £1.00 for Family members (who do not receive the *Journal*).

Applications for membership should be addressed to the Membership Secretary, from whom further particulars may be obtained.

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PRESIDENT: Mr T.L. BLOCKHEAD, 9 Ashford Long Close, Dares, Sheffield, S17 3NF.

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CURATOR: Miss R. CLIFFE, Department of Botany & Systematic Botany, National Museum & Gallery Cardiff, Cathays Park, Cardiff, CF1 3NP.

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READING CIRCLE SECRETARY: Mr R.J. FISK, 1 Paradise Row, Ringsfield, Beccles, Suffolk, NR34 8LQ.

RECORDERS: Mr G.P. KOTHENDO, Strathbung, Glenmassan, By Dinnon, Argyll, PA29 3RA (Mosses); Mr T.R. BLACKBROCK, Countryside Council for Wales, Plas Penrhos, Ffordd Penrhos, Bangor, Gwynedd LL57 2LQ (Hepatics).

RECORDING SECRETARY: Mr R.D. PORLEY, English Nature, Foxhold House, Cranham Common, Hatcham, Berkshire, RG9 9SL.

WEB SITE EDITOR: Dr A.J. NEWTON, Department of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD.

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HERBARIAN: Mr L.T. ELLIS & Dr A.J. NEWTON, Department of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD.

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British Bryological Society web address:
<http://www.britishbryologicalsociety.org.uk/>

The cover illustration is of *Marchantia germanica* from V. Schimper's *Wasser und die Pflanzenwelt*, 1895.



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Editor: M.J.M. Yeo, Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough, PE1 1JY, UK; e-mail: marcus.yeo@jncc.gov.uk

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BRITISH BRYOLOGICAL SOCIETY

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31 DECEMBER 2000

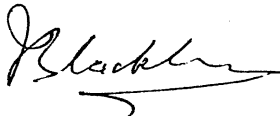
	2000 £	1999 £
GENERAL FUND		
INCOME		
Interest	2,540	1,921
Grants	-	2,000
Subscriptions	11,387	11,448
Sales of publications, etc.		
<i>Journal of Bryology</i>	9,956	9,191
<i>Census Catalogue</i>	542	2,160
Other publications	795	291
Lenses and forceps	674	580
Reading Circle	95	192
Postage and sundries	291	438
AGM and other meetings	<u>2,342</u>	<u>2,701</u>
	<u>28,622</u>	<u>30,922</u>
EXPENDITURE		
Printing and distribution		
<i>Journal of Bryology</i>	14,943	14,774
<i>Bulletin</i>	2,322	3,419
<i>Census Catalogue</i>	-	4,318
<i>English Names</i>	-	204
<i>Symposium Volume</i>	-	3,827
Purchases for resale (publins, lenses and forceps)	480	1,105
Library purchases	30	90
AGM and other meetings	2,725	2,826
Officers' expenses	960	1,060
Reading Circle	129	81
Insurance	286	282
Return of overpaid subscriptions	40	70
Legal fees	1,029	870
Bank charges and sundries	<u>249</u>	<u>163</u>
	<u>23,193</u>	<u>33,089</u>
SURPLUS/DEFICIT FOR YEAR	5,429	(2,167)
Less unrealised loss on investments	793	-
NET SURPLUS/DEFICIT FOR YEAR	<u>£4,636</u>	<u>(£2,167)</u>
BEQUEST AND DONATION FUND		
Bequests and donations	-	2,371
Interest	1,839	1,949
Awards	(165)	(11,555)
SURPLUS/DEFICIT FOR YEAR	1,674	(7,235)
Less unrealised loss on investments	171	-
NET SURPLUS/DEFICIT FOR YEAR	<u>£1,503</u>	<u>(£7,235)</u>

BRITISH BRYOLOGICAL SOCIETY

STATEMENT OF AFFAIRS AS AT 31 DECEMBER 2000

	2000 £	1999 £
GENERAL FUND		
Balance as at 1 January	44,509	46,676
Surplus/Deficit for year	<u>4,636</u>	<u>(2,167)</u>
Balance as at 31 December	<u>49,145</u>	<u>44,509</u>
BEQUEST AND DONATION FUND		
Balance as at 1 January	43,544	50,779
Surplus/Deficit for year	<u>1,503</u>	<u>(7,235)</u>
Balance as at 31 December	<u>45,047</u>	<u>43,544</u>
	<u>£94,192</u>	<u>£88,053</u>
REPRESENTED BY:		
Cash at National Westminster Bank	323	5,953
Girobank	-	1,236
National Savings Investment Account	-	49,875
National Savings Treasurers Account	-	42,473
COIF Investment Fund	43,809	-
COIF Fixed Interest Fund	19,974	-
COIF Deposit Fund	<u>37,087</u>	-
	101,193	99,537
Plus payment in advance	<u>459</u>	-
	<u>101,652</u>	<u>99,537</u>
Less current liabilities		
Publication cost of <i>J. Bryol.</i> (net)	7,460	11,484
NET ASSETS	<u>£94,192</u>	<u>£88,053</u>

J.M. BLACKBURN, I.P.F.A.
Treasurer



INDEPENDENT EXAMINER'S REPORT TO THE TRUSTEES OF THE BRITISH BRYOLOGICAL SOCIETY

I report on the accounts of the British Bryological Society for the year ended 31 December, 2000, which are set out on pages 2-3.

Respective responsibilities of the trustees (British Bryological Society Members of Council) and the examiner

As the charity's trustees you are responsible for the preparation of the accounts; you consider that the audit requirements of section 43(2) of the Charities Act 1993 (the Act) does not apply. It is my responsibility to state, on the basis of procedures specified in the General Directions given by the Charity Commissioners under section 43(7)(b) of the Act, whether particular matters have come to my attention.

Basix of the independent examiner's report

My examination was carried out in accordance with the General Directions given by the Charity Commissioners. An examination includes a review of the accounting records kept by the charity and a comparison of the

accounts presented with those records. It also includes consideration of any unusual items or disclosures in the accounts, and seeking explanations from you as trustees concerning any such matters. The procedures undertaken do not provide all the evidence that would be required in an audit, and consequently I do not express an audit opinion on the view given by the accounts.

Independent examiner's statement

In connection with my examination, no matter has come to my attention:

(1) which gives me reasonable cause to believe that in any material respect the requirements

- (i) to keep records in accordance with section 41 of the Act; and
- (ii) to prepare accounts which accord with the accounting records and to comply with the accounting requirements of the Act.

have not been met; or

(2) to which, in my opinion, attention should be drawn in order to enable a proper understanding of the accounts to be reached.

R.N. Gutteridge, F.C.A.



April 2001

ARTICLES FOR BULLETIN 78

Items for inclusion in the January 2002 issue of the *Bulletin* should be sent to me at the address below by **7 December 2001**. Wherever possible, material should be provided as word-processing files, either on disk or by e-mail.

Marcus Yeo, Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough, PE1 1JY; e-mail: marcus.yeo@jncc.gov.uk.

REPORTS OF OFFICERS FOR 2000

a) GENERAL SECRETARY'S REPORT

2000 was another successful year for the Society, although one again tinged with sadness by the deaths during the year of a number of members, among them two honorary members, Mr A.C. Crundwell and Dr H.L.K. Whitehouse. On a happier note, a full programme of well-supported meetings was held, including a workshop on bryological illustration tutored by Jean Paton.

The year saw the beginning of a review of the policies and practices of the Society in several areas.

Council approved an investment strategy, drawn up by the Treasurer, which aims to ensure that the Society's finances are able to meet anticipated commitments for the next five years and that they maintain their value. The visible sign of this will be seen in the accounts, which show a transfer of balances from standard 'bank accounts' to a range of accounts which should, in time, show a better return for the Society. (Members will also be pleased to hear that the Secretary has agreed with the Inland Revenue that the Society will be able to benefit from the new Gift Aid scheme which will enable the Society to increase its income from subscriptions without any increase in costs to members. Details will be given in the next *Bulletin*.)

A review of sub-committees and working groups of Council started with the formation of a joint Conservation and Recording Committee in place of two former committees. This review is intended to ensure that the committees have clear objectives and, most importantly, to ensure that their members are subject to regular re-appointment so that all members of the Society who wish to do so have the opportunity to participate in their working, and to give a well-earned rest to those present members who have contributed for many years. It is appropriate here to acknowledge the great amount of work that such long-serving members have put into the Society.

The publishing agreement with Maney continued to work very well, and talks have started between the Executive, the Journal Editor and Maney on the renewal of the contract and on examining ways of developing the relationship. In co-operation with staff from Maney, measures were initiated to ensure that there will be no recurrence of the situation that arose between the Society and its former publishers.

Finally, I would like to acknowledge the help that I have had from Martha Newton, my predecessor in the office, and from the Executive and the other members of Council, which has made my first year in office as painless as possible.

M.A. Walton, February 2000

b) TREASURER'S REPORT

Notes on the Accounts for 2000 (see pp 2-3 of this *Bulletin*)

1. Income in the General Fund in 2000 exceeded expenditure by £5,429, following a year in which no exceptional items of expenditure were met. Interest rates were steady during the year. However, a significant change was made in the way the Society manages its funds. Council agreed at its September meeting to transfer the Society's investments from National Savings into the Charities Official Investment Fund (COIF).
2. COIF is a registered charity, operating under a scheme approved by the Charity Commissioners, to manage the funds of other charities, in order to meet the investment needs of charity trustees for security, income and growth. It has three distinct funds. The Investment Fund invests in good quality stocks and shares and is intended for long-term growth. The Fixed Interest Fund is a high interest fund not intended for growth. The Deposit Fund is for funds that need to earn a good rate of interest but which may be needed at short notice.

Approximately 50% of the General Fund and the Bequest Fund has been placed in Investment Fund Accumulation Shares. The remaining 50% of the General Fund has been placed in the Deposit Fund. The remaining capital of the Bequest Fund has been invested in Fixed Interest Income Shares, the interest earnings from which are added to the accumulated interest in the Deposit Fund where it is available for meeting awards made by the Bequest Committee.

3. The year 2000 was the second year of the new printing contract for the *Journal* with Maney. The net cost to the Society was £4,987, made up as follows:

	£	£
Cost of members' copies (£18 per member)		11,156
Editorial expenses		<u>3,787</u>
		14,943
Income from royalties (20% of institutional sales of £25,346)	5,069	
Contribution to editorial expenses	4,000	
Sales of back copies	<u>887</u>	<u>9,956</u>
		<u>£4,987</u>

The net result is that institutional sales, equivalent to £8.18 per member, reduced the £18 basic cost to £9.82. This compares with £9.62 in 1999, as a result of increased membership and the very marginal increase in institutional sales.

4. Sales of the new *Census Catalogue* continue to be healthy. Of the 571 copies bought, just under 200 remain unsold at the end of the year.
5. Sales of publications, lenses and forceps were exceptionally high in 2000.
6. The £480 under Purchases for Resale was the cost of 200 offprints of *An annotated check-list of the Hepaticae and Anthocerotae of Europe and Macaronesia*.
7. Further legal fees resulting from the dispute with Blackwells were met during the year. £500 was paid in respect of Blackwells costs and £529 for barrister's fees. No account has yet been submitted for our own solicitor's charges.
8. Quoted Investments:

	Unrestricted Funds (General Fund)	Restricted Funds (Bequest Fund)	Total Funds
	£	£	£
Invested October 2000			
COIF Accumulation Shares	25,000	20,000	45,000
COIF Fixed Interest Shares		<u>19,746</u>	<u>19,746</u>
	<u>25,000</u>	39,746	64,746
Net unrealised loss	<u>793</u>	<u>171</u>	<u>964</u>
	<u>24,207</u>	<u>39,575</u>	<u>63,782</u>

The stock market had a poor year compared with recent years, with a general decline in market values. As a result of this, and the initial cost of making the investment, the

value of the COIF Accumulation Shares showed a fall at the end of December 2000, which is reflected above. It should be remembered that the Investment Fund is for long-term growth and there will be inevitable fluctuations in value.

9. Officers' expenses:

	Telephone £	Postage £	Stationery £	Printing £	Travelling £	Total £
Martha Newton (General Secretary)	6	23	1	28	-	58
Rod Stern (Conservation Officer)	20	11	-	77	39	147
Roy Hurr (Treasurer)	42	26	14	29	-	111
Mike Walton (General Secretary)	12	60	9	63	-	144
Mark Pool (Membership Secretary)	52	64	-	3	-	119
John Blackburn (Treasurer)	38	26	14	20	-	98
David Holyoak (Conservation Officer)	5	2	-	-	48	55
Total	175	212	38	220	87	732
Ken Adams (Librarian) (postage and packing recovered in sales but shown in Postage and sundries)						228
						<u>£960</u>

10. Payments in 2000 from the Bequest and Donations Fund amounted to £165. The total committed by the fund but not paid at the end of the year was £950. At the end of 2000 the accumulated and uncommitted interest available for awards amounted to £4511.
11. £459 was paid for the removal of the late Alan Crundwell's books to Peterborough for cataloguing. This expense has been treated as a payment in anticipation of income and carried forward to 2001.

J.M. Blackburn, March 2001

c) BIBLIOGRAPHER'S REPORT

Recent Bryological Literature 95, 96, 97 and 98 have appeared in the *Journal of Bryology*; number 99 is in press and number 100 is in preparation. I am grateful to all those who have sent me references or reprints for inclusion in these lists. Special thanks are owed to the staff of the Botany Library at the Natural History Museum, London, for their co-operation and assistance. I much appreciate receiving details of papers and books that I may have overlooked.

From number 100 onwards, Recent Bryological Literature will be compiled in collaboration with my friend and colleague at NHM, Dr Angie Newton.

L.T. Ellis, February 2001

d) BULLETIN EDITOR'S REPORT

Two issues of the *Bulletin* were published in 2000: number 74 in February and number 75 in July. Both issues contained 64 pages. This is the maximum number of pages that can be accommodated without incurring additional costs for binding.

It is gratifying that I receive a consistent influx of material for inclusion in the *Bulletin*. During 2000, in addition to the usual Society business, there were interesting and informative articles on the taxonomy of the *Schistidium apocarpum* complex in the British Isles (Tony Smith), the sandstone bryophytes of the Petite-Suisse in Luxembourg (Nick Hodgetts, Andy Jackson and Ron Porley), the identification and distribution of *Drepanocladus revolvens* and *D. cossonii* (Tom Blockeel), and the occurrence of *Gymnocolea acutiloba* in Scotland (Gordon Rothero). I hope that I continue to receive articles of this sort in the future.

Marcus Yeo, March 2001

e) CONSERVATION OFFICER'S REPORT

Following extensive discussions, a proposal to merge the Conservation and Recording Committees was accepted by Council of the BBS at its meeting on 8 September 2000. The same meeting of Council also accepted new terms of reference for the combined 'Conservation and Recording Committee', and for the Conservation Officer and Recording Secretary. The membership of the new committee will be broadly representative of those actively involved with conservation and recording, including both amateur and professional bryologists, and will represent England, Scotland, Wales and Ireland. The main conservation agencies should also be represented, and there should be NGO representation. The chair of the new committee will alternate every two years between the Conservation Officer and Recording Secretary.

During the year, the list of proposed Special Areas of Conservation (SACs) in the UK was extended to include additional sites to protect rare and threatened bryophytes, providing increased protection especially for *Petalophyllum ralfsii*. It was particularly welcome that several of these sites were also newly notified as SSSIs. As Conservation Officer, I took every opportunity through the year to join with Plantlife and other conservation organisations to stress the need for more effective statutory protection of important sites for bryophytes, as SSSIs, SACs, or both.

The year saw a substantial and very welcome increase in the scale of collaborative work on threatened bryophytes being carried out under Biodiversity Action Plans (BAPs). I have been much involved at various levels with some of these activities, along with several other BBS members and partner organisations. Following the appointment of Dr Jenny Duckworth as 'Fungi and Lower Plants Officer', Plantlife began work on no fewer than 14 additional bryophyte species, with studies involving several BBS members working for them as Project Officers. The appointment of Gill Stevens as a full-time 'EN Cryptogamic BAP Officer' at the Natural History Museum is also resulting in increased activity and co-ordination of work on several other BAP bryophyte species, with initial work concentrating on metallophytes among others. The project for *ex situ* conservation of bryophytes at RBG Kew Wakehurst Place also began in earnest following their appointment of Jane Burch.

Work on the bryophyte Red Data Book for Britain continued at JNCC, with its publication

now expected in May 2001. In Ireland a combined initiative from the Environment and Heritage Service (Belfast) and National Parks and Wildlife (Dublin) started to undertake extensive new field research in order to build up a sufficient body of information to allow preparation within a few years of a Bryophyte Red Data Book for all of Ireland.

A copy of the *Code of Conduct for the Conservation and Enjoyment of Wild Plants* was sent to all BBS members in the UK and Ireland. The Conservation and Recording Committee has considered the implications for the BBS's own Code of Practice, and has agreed to recommend to Council that it should replace the BBS *Code of Conduct*.

Contributions were made, along with those of other BBS members, to discussions on a range of other issues related to bryophyte conservation, including muir burning, large-scale use of moss in horticulture, and the implications of the forthcoming Countryside and Rights of Way Act.

One meeting of the Conservation Committee was held, on 8 September 2000, jointly with the Recording Committee. Earlier the same day an inaugural 'BBS Technical BAP Meeting' was held in order to discuss measures required for delivery of Species Action Plans for bryophytes and their habitats under the UK BAP. In addition to these meetings, I attended the meeting of Plantlife Link in March 2000 (and sent a written submission to the meeting in September 2000), and several BAP Steering Group and other meetings relevant to bryophyte conservation.

D.T. Holyoak, February 2001

f) CURATOR'S REPORT

Voucher specimens incorporated this year were 457 mosses and 115 hepatics. There were 16 loans of 133 mosses and six hepatics.

K. Cliffe, January 2001

g) JOURNAL EDITOR'S REPORT

Four parts of the *Journal of Bryology* (volume 22), comprising the full annual allowance of 320 pages, were published in 2000. The total of 50 papers (27 main papers, 23 bryological notes) published, contrasts with the number of manuscripts submitted (69) during the same period. These figures indicate a continuing strong position of the journal in terms of its popularity with authors. Perhaps underlining this success is the improvement to citation figures resulting from the recent changes to the *Journal*. Compared to the situation in 1996, it has risen from 125th among 142 plant science journals to 85th out of 136. Over the same period the 'impact factor' has risen from 0.256 to 0.551 and the 'immediacy index' has increased from 0.02 to 0.25. These improvements are important from the marketing point of view, as authors in academic institutions are encouraged to publish in 'high impact' journals, and we should therefore continue to attract the best authors. Our publishers have indicated that institutional subscriptions to the *Journal* have remained buoyant. It is satisfying to record that the occasional column 'New national and regional bryophyte records' gathered momentum in 2000, with publication of numbers 2 and 3, and there are further parts to follow shortly. Article two in the 'Bryophyte Profiles' series was also published and a third article is in preparation. Further contributions to this series are welcome. Once again I am indebted to

Associate Editors and Referees alike for devoting their precious time to the maintenance of standards in the *Journal*.

J. W. Bates, March 2001

h) LIBRARIAN'S REPORT

Sales

TBBS (parts)	27	Special Volume 4: Mosses in English Lit.	5
<i>J. Bryology</i> (parts)	11	Special Volume 5: English Names (2nd ed.)	34
Census Catalogue (Corley & Hill)	1	Bryology (Linn. Soc.)	5
Census Catalogue (Blockeel & Long)	36	Mosses & Liverworts of Woodland	8
Census Catalogues (old)	6	German/English Glossary	-
Hepatics of Europe and the Azores	1	Microscope Techniques	20
Hepatics of Europe and Macaronesia	4	x20 lenses	22
BBS <i>Bulletins</i>	24	Stainless steel forceps (Patterson)	3
BBS Library Catalogue	3	Stainless steel forceps (Idealtek)	20
Moss Wall Charts	8	Eye-piece graticules	-
Special Volume 1: Jubilee	3	BBS ties	2
Special Volume 2: Chromosomes	8	Car stickers	5
Special Volume 3: Tropical Bryophytes	5		

Loans

35 mm slides	3	Micrometer slide	2
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A record 97 parcels were dispatched during 2000, nearly a third of them generated by e-mail. Would members please note that: a) payment should not be sent with UK orders, as in many cases postage exceeds the cost of the items, and the actual cost of post and packing is included on each invoice; b) there is a limit of 50 photocopies/person of library material, as the librarian provides photocopies as a personal service. If a greater number is required members should borrow the item(s) and arrange for their own photocopies.

Several members each year report loss of their x20 lenses, or occasionally that the triplet lens pack has fallen out. On buying a new lens it is recommended that a brightly coloured neck-length ribbon be attached. To foil the loss of the lenses use a soft pencil rubber pressed hard against the retaining ring to unscrew it, spot the thread with nail varnish and rapidly reassemble (but don't get it on or between the lenses!).

Other members spend a fortune on Idealtek forceps, not being able to resist using them as darts to impale their toes. To reform the delicate points, buy a carborundum sharpening block from an ironmonger, and grind the tips back down to a fine point. Then pressing them together, push them into a small cork, piece of polystyrene or elder pith for their protection.

Ken Adams, February 2001

i) MEMBERSHIP SECRETARY'S REPORT

The year 2000 has seen a continuation (although at a much slower rate) of 1999's increase in numbers. The net gain this time was eight, a total which seems disappointing when set against

the number of new members who joined during the year. The shortfall is partly accounted for by the deaths of no less than eight members; unfortunately two of these were our Honorary Members Dr Harold Whitehouse and Mr Alan Crundwell, both of whom will be particularly sadly missed. There was also a considerable number of deletions for non-payment.

On a more positive note, no less than 51 members joined during 2000. The majority of these were British, but there was still a useful leavening of overseas members among them. It is gratifying to see that the Society is well thought of abroad as well as at home. As in 1999, a good number (unfortunately I have not recorded the exact figure, but it is something over half of the total) joined via the BBS website; this is obviously an increasingly useful resource.

2000 was my first year as Membership Secretary, a post I approached with considerable trepidation! I am most grateful to my predecessor, Mike Walton, for his unfailing help through the year. In addition, my thanks go to Tony (A.V.) Smith, who first computerised the records; if they had still been in a manual format I do not think I could have coped!

The following table, a continuation of that produced by Mike Walton for last year's Report, shows the changes in membership over the last ten years.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
New members										
UK	19	26	24	27	27	24	13	14	37	37
Overseas	9	4	11	18	9	16	7	18	34	14
TOTAL GAINED	28	30	35	45	36	40	20	32	71	51
Members lost by:										
Death	3	4	2	2	4	5	3	12	1	8
Resignation	11	9	3	4	14	11	7	18	7	13
Other	9	13	19	11	14	15	17	24	24	22
TOTAL LOSSES	23	26	24	17	32	31	27	54	32	43
Total overseas members	190	186	187	202	209	215	226	224	245	240
Total UK members	352	360	370	383	380	382	368	348	366	379
NET TOTAL	542	546	557	585	589	597	594	572	611	619
Comprising:										
Honorary	12	11	11	11	10	11	10	10	12	11
Ordinary & Junior	512	513	524	545	549	559	557	544	578	585
Family	18	22	22	29	29	27	25	18	21	23
Turnover ratio x 100	9	10	11	11	12	12	8	15	17	15

Mark Pool, February 2001

j) READING CIRCLE SECRETARY'S REPORT

2000 was a fairly average year. Four new members have joined but one has died so membership has increased to 41. However, two accounts are suspended because of lack of funds and will be closed if there is no response to a last reminder. It would help if members

not wishing to continue with the Reading Circle were to tell me, rather than let things just lapse and waste postage on reminders. Contents of 19 issues of five journals (plus *Evansia*) have been issued. Photocopies of 47 papers totalling 501 pages were sent to 17 members.

Financial statement

Income:

Opening balance	£249.16
Credit (cheques received etc.)	<u>£95.00</u>
Total	<u>£344.16</u>

Expenditure:

Photocopying	£41.95
Postage	£66.70
Transfer of balance of Theo Arts' a/c to General Fund	<u>£10.27</u>
Total	<u>£118.92</u>

Balance of members' accounts	<u>£225.24</u>
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Richard Fisk, 5 January 2001

k) REPORT OF THE RECORDER FOR HEPATICS

A total of some 86 new records has been registered for 2000. This is somewhat fewer than last year. Of the new records, 29 were updates of bracketed entries in the *Census Catalogue*. There was a good sprinkling of records from south Wales, largely due to the activity of Sam Bosanquet, and David Holyoak was again active in Northern Ireland.

	New records collected in 2000	New records collected pre-2000	Deletions
England	26	6	-
Wales	17	8	-
Scotland	11	2	-
Ireland	14	4	1
Total	68	20	1

Among the highlights of the new records registered in 2000 were a number of rare and scarce taxa, including *Fossombronia husnotii* (Dorset), *Geocalyx graveolens* (West Sutherland), *Haplomitrium hookeri* (Pembrokeshire), *Lophozia capitata* (Dorset), and *Pallavicinia lyellii* (Pembrokeshire). *Gymnomitrium obtusum* was recorded from a rather isolated locality in Shropshire. *Lophocolea bispinosa* was found in North Hampshire, and records continue to accumulate for *L. semiteres* with new finds for four counties in south and east England.

Thanks are due to Jean Paton and David Long for help with difficult material.

T.H. Blackstock, March 2001

D) REPORT OF THE RECORDER FOR MOSSES

The number of additions and updates to the vice-county lists is down on last year, but 1999 was something of an anomaly with much recording in Ireland and the inevitable updating of records following the new *Census Catalogue*. Something of the same pattern exists this year, with further substantial work in Ireland by David Holyoak and a significant number of updates, though many fewer as a proportion of the whole compared with 1999. It would seem that vice-county recording is in a relatively healthy state.

	New records collected 1999-2000	New records collected pre-1999	Updated records	Deletions
England	81	13	40	1
Wales	9	2	9	-
Scotland	31	3	24	-
Ireland	61	8	27	-
Total	182	26	100	1

In such a long list there are many records of interest that could be picked out, particularly those of local importance, but only a few can be mentioned here. The records for *Schistidium crassipilum* continue to flow in and there seems no doubt now that this is the common species over much of lowland Britain. In Cornwall, records worthy of mention are new sites for *Fissidens monguillonii* and *Ulota calvescens*, a big extension of range for the latter, and *U. coarctata* was refound in West Sussex. Further north, in the Malverns, a new site was found for *Hedwigia ciliata* var. *ciliata*, prompting thoughts that this taxon may not be as rare as the current records suggest. One of the few existing sites for *Tortula cernua* was found to extend over the border into Derbyshire. In Wales the most significant find was *Tortella densa* on the Great Orme, new to Wales.

In Scotland, a sortie north by Nick Hodgetts and Ron Porley produced new sites for the rarities *Seligeria brevifolia* and *Heterocladium dimorphum* within a few metres of each other in East Perthshire. Survey work on *Didymodon mamillosus* produced an extension of the known site into Mid Perthshire, and other important records include new sites for *Schistidium atrofusum* in Banffshire and *Orthotrichum obtusifolium*, on aspen, in East Inverness-shire. In Ireland, survey work by David Holyoak in the mainly limestone areas of Fermanagh and Leitrim produced a crop of interesting records including *Brachythecium appleyardiae* (new to Ireland) and new sites for *Weissia rostellata*, *Seligeria oelandica*, *Ephemerum cohaerens*, *Timmia norvegica* and *Daltonia splachnoides*. Elsewhere, a second Irish locality was found for *Octodiceras fontanum* in Galway.

Most people send in vouchers that are a pleasure to deal with but there are some issues which I think need further debate and I hope to open this subject in the next issue of the *Bulletin*. My thanks again to all the referees who do a great deal to make my life easier, and provide good service to the membership.

Gordon Rothero, February 2001

m) RECORDING SECRETARY'S REPORT

The number of completed recording cards received from members was the lowest for several years, only 82. Despite reminders, not all BBS excursion records are submitted (Bude was submitted). To balance this, at the end of 2000, there are 55 Regional Recorders covering 103 vice-counties, which is the best coverage ever. Thus only nine vice-counties remain unallocated in England, Wales and Scotland. The Channel Isles is also covered, but Irish vice-counties are still largely vacant. We need to keep the National Database updated, so please do your duty and send in completed cards.

The National Biodiversity Network (NBN) is now on-line and heralds a new era in data management. The bryophyte database was part of the pilot project, and is now fully up and running. Anyone can now look at the distribution of British bryophytes on the web, and can access other information alongside. A password is needed to access sensitive data, such as locality information, but Regional Recorders and other members can apply for a password so making it truly accessible to the Society.

The year also saw the merging of the separate Conservation and Recording Committees into a joint Conservation and Recording Committee. This will bring together in a much more co-ordinated way two important functions of the Society. Conservation and recording are very closely linked and, on a practical level, it will mean that the same people have only to attend a single meeting.

Ron Porley, February 2001

FUTURE MEETINGS OF THE SOCIETY

Members are reminded to read the BBS Safety Code, which is published in *Bulletin 43* and is available from local secretaries for inspection during BBS meetings. Please inform local secretaries well in advance if you intend to join a meeting, even if you are not staying at the headquarters accommodation.

SUMMER FIELD MEETING 2001, FIRST WEEK, Lanarkshire and Renfrewshire, 28 July - 3 August

Local secretary: Keith Watson, Flat 1/2, 31 Kelvindale Gardens, Glasgow, G20 8DW; tel: 0141 945 5721 (home), 0141 287 2658 (work); e-mail: keith.watson@cls.glasgow.gov.uk.

Provisional itinerary:

VC 77 (Lanarkshire); accommodation: New Lanark area

28 July: Southern Uplands (hill country to ca 700 m)

29 July: Clyde Valley Woodlands (ancient woodlands)

30 July: bogs and bings (raised bogs and mine wastes)

Glasgow (VC 77 mostly); accommodation to be arranged
31 July: Glasgow area (Possil Marsh, Garscadden Wood and urban)

VC 76 (Renfrewshire); accommodation to be arranged
1 August: Misty Law and Calder Glen (Clyde Muirshiel Regional Park woods and hill country)
2 August: Loch Thom and Lunderston Bay (coastal woodlands and open habitats)

The Lanarkshire habitats cover high country where some subalpine species may still linger; there are also some extensive blanket bogs with species such as *Hypnum imponens*, *Bryum weigelii*, *Sphagnum fuscum* and *S. affine*. Clyde Valley woodlands (oak and elm types) are very rich in bryophytes and should be rewarding.

The bogs and bings day covers the plateau area to the east of Glasgow, with good raised bogs, local rock outcrops and a number of mine waste 'bings' which often have a rich moss flora; species may include *Sphagnum pulchrum*, *S. affine* and *Buxbaumia aphylla*.

Glasgow provides an opportunity to visit a few interesting sites in an urban context, including the nature reserve of Possil Marsh with a number of old records (including *Sphagnum riparium*); ancient woodlands and mires at Garscadden may be of interest; urban areas could also be checked.

The first of the two days in Renfrewshire will focus on upland semi-natural habitats on Misty Law (ca 550 m) and associated valley woodlands and flushes. The final day will visit the wetter west, where the uplands meet the coast, with some wooded glens (old record for *Hamatocaulis vernicosus*).

Potential attendees should note that several of the excursions involve walking in upland country and also some steep valleys. The weather in Scotland is often wet at the time of year (but good day length). The trips will involve a fair bit of travelling, so car sharing is sensible, especially if attendees wish to visit a number of local sites.

SUMMER FIELD MEETING 2001, SECOND WEEK, Skye, 4-11 August

Local secretary: Nick Hodgetts, Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough, PE1 1JY; tel: 01733 866805 (work), 01476 407142 (home); e-mail: nick.hodgetts@jncc.gov.uk.

There will be two headquarters hotels for this week's meeting. The first four nights (Saturday 4 August - Tuesday 7 August) will be based at the Toravaig Hotel (formerly the Hairy Coo Backpackers Hotel). This offers comfortable and inexpensive, if fairly basic, bed & breakfast accommodation on the Sleat Peninsula (bar meals are available in the evening but there is no restaurant as such), and is an ideal base from which to explore the Atlantic oakwoods of the area, the Torrin limestone and the southern mountains. We should see many of the typical oceanic woodland species and no doubt the area can still throw up some surprises. The beautiful *Campylopus shawii* is a particular speciality of the area. It is hoped to arrange a boat excursion to Soay, which is bryologically little-known except for a small number of anonymous records from the 1930s and 1940s and records from a day-trip by Prof. Birks in 1987.

For the second part of the week (the nights of Wednesday 8 August - Friday 10 August) we will be moving north to Carbost, where our headquarters will be the Taigh Ailean Hotel (pronounced 'Tee Allan'), not very far from the famous Talisker distillery. This hotel offers much more reasonable rates than the majority of the hotels on the island but is small, accommodating only 13 people at a time, so book early if you wish to stay here. This is a good base for Trotternish, Mcleod's Tables and numerous coastal ravines and cliffs. *Bryoerythrophyllum caledonicum*, *Didymodon icmadophilus*, *Eurhynchium pulchellum* and many other interesting species grow on the Trotternish ridge, and *Myurium hochstetteri* occurs on some coastal ledges.

If you would rather stay elsewhere, or if the headquarters hotels become booked up, there are numerous bed & breakfast establishments all over the island, details of which are available from the local secretary or in many guidebooks and websites. Please contact me as soon as possible if you would like to attend all or part of this meeting, especially if you want to stay at either or both of the headquarters hotels, as I will be handling the bookings. If you are joining the meeting but staying elsewhere, I would also appreciate you contacting me so that I can ascertain numbers for excursions.

ANNUAL GENERAL MEETING AND SYMPOSIUM 2001, National Museum & Gallery of Wales, Cardiff, 7-9 September

Local secretary: Roy Perry, 35 Cardiff Road, Dinas Powys, Vale of Glamorgan, CF64 4DH, UK; tel/fax: +(44) 029 2051 3382; e-mail: perrybbscardiff@aol.com.

The general plan of the weekend is as follows:

7 September: Members arrive in Cardiff; meetings of special groups/committees.

8 September: Paper-reading meeting in National Museum & Gallery of Wales, followed by the AGM, and later a wine reception and conversazione.

9 September: Field excursion; members leave.

People who have agreed to speak on 8 September are:

- Jesus Muñoz (Real Jardín Botánico, Madrid) - 'The genus *Grimmia*: taxonomy, biogeography and phylogenetic relationships'.
- Jan Kučera (University of South Bohemia, České Budějovice, Czech Republic) - 'Taxonomic problems and findings in the European species of *Didymodon*, particularly the *D. rigidulus* group'.
- Jonathan Sleath (Kingstone, Hereford) - 'BBS field excursion to Tenerife, 2001'.
- David Rycroft (Department of Chemistry, University of Glasgow) - '*Plagiochila* in Europe (and beyond)'.
- Brian O'Shea (London) - 'Sematophyllaceae: a tropical moss family with species in Britain'.
- Rod Stern (Chichester) - 'Bryology of South Wiltshire'.

The paper-reading meeting will be followed by the AGM (see below for details). There will be a wine reception in the Museum in the evening, and an opportunity for members and guests to examine the bryophyte holdings of BBSUK and NMW (Head of Cryptogams: Dr Ray Tangney) during the Conversazione, for which posters are invited. Some fieldwork may

be arranged for Sunday 9 September if the restrictions caused by the recent epidemic of foot and mouth disease are lifted in time. If not, the local secretary will arrange some other diversion.

Accommodation has been reserved in a Hall of Residence of Cardiff University which is within comfortable walking distance of the Museum and which has ample parking facilities. Details for registration, travel, accommodation and submission of posters may be obtained from the local secretary.

The ANNUAL GENERAL MEETING will be held at 4.30 p.m. on Saturday 8 September 2001 in the ICON suite of the National Museum & Gallery of Wales, Cardiff.

AGENDA

1. Apologies for absence
2. Minutes of the last AGM, Reading, 2000 (see pp 19-25 of this *Bulletin*)
3. Matters arising
4. Reports of Officers for 2000 (see pp 4-14 of this *Bulletin*)
5. Report from Council
6. Election of Officers (see pp 27-28 of this *Bulletin*)
 - a) Vice President
 - b) General Secretary
 - c) Treasurer
 - d) Conservation Officer
 - e) Curator
 - f) Librarian
 - g) Meetings Secretary
 - h) Membership Secretary
 - i) Recorder for Hepatics
 - j) Recording Secretary
7. Election of Elected Members of Council (see pp 27-28 of this *Bulletin*)
8. Place and date of the next Annual General Meeting
9. Other future meetings
10. Any other business

SPRING FIELD MEETING 2002, Isle of Wight, 13-20 March

Local Secretary: Mrs Lorna Snow, Ein Shemer, Upper Hyde Farm Road, Shanklin, PO37 7PS; tel: 01983 863704; e-mail: snow@shemer.freesevice.co.uk. Rod Stern and Howard Matcham will be assisting as field leaders.

Headquarters: Channel View Hotel, Hope Road, Shanklin, PO37 6EH; tel: 01983 862309; fax: 01983 868400.

Due to the general shortage of single rooms, the numbers booked into the Channel View Hotel will be limited to 20. There is plenty of alternative hotel or B&B accommodation within a short distance. Details can be obtained from the local secretary. Members should make their own arrangements and advise Lorna Snow where they are staying, for how long, and whether they have a car. Privately booked ferry charges are high. Most hotels can arrange a ferry-inclusive package which reduces the cost. If members can share a car this also helps.

There will be an informal get-together in the HQ hotel at about 8.45 p.m. on Wednesday 13 March. It is hoped that Dr Colin Pope, the Isle of Wight Ecology Officer, will give a short illustrated introduction to the ecology of the Island. The Island (VC 10) is compact, and no two places are much more than 20 miles apart. It is a microcosm of southern England, with ancient woodlands, chalk grasslands, wetlands, estuaries and cliffs all in close proximity. The maritime nature is felt right across the Island and a strong south-westerly influence is apparent in the distribution of many species. Air pollution levels are low. Visits will be made to rich ancient woodland sites, exposed coastal cliffs with springs and greensand outcrops, relict wetland sites, and medieval churchyards. We shall be hoping to find *Acaulon triquetrum* at St Catherine's Point, *Conardia compacta* in the Landslip, and *Leptodontium gemmascens*, among others. There are quite a number of species that were found in 1964 and have not been seen since. *Blasia pusilla*, *Lophocolea fragrans*, *Fissidens celticus* and *Philonotis marchica* also occur in the area. Recording will be on a 1-km square or site basis, and the records will be incorporated in the update of the Isle of Wight Flora at present being undertaken.

If any member would like to concentrate on a particular species or type of site, please let Lorna Snow have details, and endeavours will be made to arrange suitable site permissions, etc.

Members should assemble at the Channel View Hotel at 09.15 each morning ready to depart at 09.30.

The Island is covered by OS Maps Outdoor Leisure No 29, and the smaller scale Landranger No 196. Details of the programme will be sent later to those attending.

SUMMER FIELD MEETING 2002

Arrangements for the summer meeting 2002 have been affected by uncertainties arising from the foot and mouth epidemic. The possibilities of a week-long meeting in west Wales are being investigated.

ANNUAL GENERAL MEETING AND SYMPOSIUM 2002, Royal Botanic Garden, Edinburgh, 13-15 September

Local secretary: Dr David G. Long, Royal Botanic Garden, Edinburgh, EH3 5LR; tel: 0131 248 2861; fax: 0131 248 2901; e-mail: d.long@rbge.org.uk.

Plans for this meeting are now being formulated. One idea under consideration is to give the meeting an international flavour, in relation to taxonomy, floristics, exploration and conservation of bryophytes in the tropics and other countries, particularly the present and past contributions made by the BBS and British bryologists. During the evening it is hoped that there will be an opportunity to look at the Edinburgh bryophyte herbarium. Posters and exhibits on any aspect of bryology are welcome, but especially any with an international theme.

Some fieldwork in SE Scotland will be arranged for the Sunday. Details for registration, travel, accommodation and submission of posters will be in the summer 2002 *Bulletin*, but may be obtained from the local secretary before that.

MINUTES OF THE ANNUAL GENERAL MEETING, READING, 2000

Minutes of the Annual General Meeting held at the Department of Plant Sciences, University of Reading, at 4.30 p.m. on Saturday 9 September 2000.

PRESENT: Mr T.L. Blockeel (President, in the chair) and 38 other members.

1. **APOLOGIES FOR ABSENCE:** Apologies had been received from Dr K.J. Adams, Dr J.W. Bates, Dr M.O. Hill, Mr H.W. Matcham, Miss J.M. Ide, Dr M.C.F. Proctor, Prof. M.R.D. Seaward, Mr A.V. Smith, Mr C.C. Townsend and Mr M.J. Wigginton.

The meeting observed a minute's silence to respect the memory of the following members of the Society who had died since the last AGM: Mr P. Colles, Mr A.C. Crundwell, Dr M.H. Fulford, Dr P. Geissler, Dr W.J. Hoe, Dr E.V. Watson, Dr H.L.K. Whitehouse, Mr H.R. Williams and Mrs R. Smith, the wife of Dr A.J.E. Smith, an Honorary member of the Society.

2. **MINUTES OF THE MEETING ON 11 SEPTEMBER 1999:** The minutes were approved as a correct record of the meeting and signed by the President.
3. **MATTERS ARISING:** In response to a question from Dr M.E. Newton about the Society's action against Blackwells, the former publishers of the *Journal*, Mr Blockeel said that he would report on the matter in his report from Council.
4. **REPORTS OF OFFICERS FOR 1998:** All reports had been published in *Bulletin* 75, and gave rise to the following comments:
 - a) **General Secretary:** Mr Walton thanked Dr Newton for the help that she had given to him in the period during which he had been taking over the duties of the office of General Secretary from her.
 - b) **Treasurer:** Mr Blackburn had prepared the accounts on behalf of Mr Hurr, the former Treasurer. He said that the drop in the Society's assets during the year was accounted for by exceptional items of expenditure and should not be seen as a cause for concern.

Note 4 - In response to a question from Dr Newton, Mr Blackburn said that the income from sales of back numbers of the *Journal* that was shown in the accounts was in respect of copies sold by the Librarian. No income had been received from Maney for sales of back numbers that they hold. Mr Walton said that the Executive was aware of the matter and would be contacting Maney.

Note 6 - Dr Newton said that, in her opinion, the costs for the production of the *Census Catalogue* did not reflect the true picture, and that they should be increased by £509 for the additional 28 pages that were published subsequently as a supplement to *Bulletin* 73, and further increased by the additional cost of postage for those pages and the additional 3% cost to the Society for any credit card sales. Mr Blackburn pointed out that a 3% surcharge was added to the

charge for purchasers who paid by credit card. Mr Blockeel responded that the 28-page paper of supplementary records was not a part of the *Census Catalogue*. It had been submitted as a paper for publication in the *Bulletin* in the normal way, and had been printed separately for economic reasons, as this had been cheaper than binding it in with the rest of the *Bulletin*. Dr Newton said that, had the supplement been included in the *Catalogue*, the costs of producing it would have been paid by the purchasers and not by the Society and that, therefore, the costs of the *Catalogue* had not been recouped. Mr Long said that the paper was similar to the lists of vice-county amendments that were published each year in the *Bulletin*, and it could have been incorporated with those lists. Dr Holyoak added that he regarded the supplement as equivalent to the normal recorders' update lists. Dr Newton said that she did not wish to pursue the matter further, having recorded her view that the costs of producing the *Catalogue* had not been recouped as was suggested in the Notes to the Accounts.

The remaining Officers' Reports were accepted without question or comment and the Officers were thanked by Mr Blockeel for the work that they had undertaken through the year.

5. **REPORT FROM COUNCIL:** Mr Blockeel reported on the work of Council through the year, as follows:

- a) **Back numbers of *Journal of Bryology*:** Mr Blockeel reported that the costs for Blackwells' solicitors had been agreed and paid at £500, and that no charge had yet been made by the Society's solicitor.
- b) **Funding of the editorial office of *J. Bryol.*:** The Society agreed a new contract with Maney for the publication of the *Journal*, which came into force in January 1999, and provided for, among other items, a contribution by Maney of £4,000 towards the Society's costs. The financial outcome of the new contract during 1999 was apparent from the Treasurer's report (net costs of £5,723). Subsequently, Council, in conjunction with the Editor, had agreed that funding of the editorial office should be placed on a more formal basis. Detailed arrangements had been agreed. In a nutshell, the £4,000 is transferred to an editorial fund which is administered by the Editor to pay for the salary of the Editorial assistant and other capital costs.

The current contract with Maney would continue in its present form until the end of next year, 2001. One of Council's most important tasks over the next 12 months would be to consider the options of renewal or renegotiation of the contract.

- c) **Merger of the Conservation and Recording Committees and review of the terms of reference of the Conservation Officer and the Recording Secretary:** Following a proposal by Mr R.D. Porley, the Recording Secretary, Council had agreed that the former Conservation and Recording Committees should be merged. The rationale for this was that the activities of the two committees complement each other, and there had been practical difficulties in

organising separate meeting of the two committees. The merger would ensure that recording activities have a proper conservation focus. There will continue to be a Conservation Officer and a Recording Secretary. Council had agreed the terms of reference for the new committee. Full details would appear in the next *Bulletin*.

- d) **British Bryological Society web site:** Council had agreed to register the domain name www.BritishBryologicalSociety.org.uk at a maximum cost of £33 initially plus £16 pa (at present rates) subsequently.
- e) **Future of the BBS herbarium:** The Society's herbarium had been on permanent loan to the National Museums and Galleries of Wales in Cardiff since 1971. Its future had been a cause for concern for some years, for two reasons. The first was the need for proper curation of the specimens. Many of the older packets were now badly worn and in some cases disintegrating. Curation is expensive, and could not be undertaken by NMGW while the herbarium remains the property of the Society. The second potential problem was the future of the herbarium if NMGW were at some future time unable to provide storage for it on a loan basis.

Council had, therefore, agreed that ownership of the herbarium would be transferred permanently to NMGW, subject to a number of conditions. Most importantly these were that the herbarium would retain its separate identity (as BBSUK) and that members would continue to have the right to borrow specimens. A transfer document had been drawn up by NMGW and formalities should be concluded in the near future.

Dr Longton asked about the implications for the future of the herbarium if NMGW proposed to dispose of it. Dr Clarke responded that, after the herbarium had been donated to NMGW, it would become part of the national heritage and, as such, could not be disposed of without an act of Parliament. Donating it to NMGW was probably the best possible way to protect the herbarium's future.

- f) **Dr Harold Whitehouse's slides and bryological archives:** Members who had attended the AGM would be familiar with the stereoscopic slide collection which Dr Harold Whitehouse developed over many years and showed at meetings such as this. Council was therefore particularly pleased to be able to report that a set of Dr Whitehouse's slides, and a large part of his bryological archives, had been donated to the Society by his daughters Anne Whitehouse and Jane Cooper. To ensure permanent care of the slides, Council had agreed that ownership (and copyright) should be transferred to NMGW. The Society would retain the right to publish copies of the slides, and members would be able to borrow them on certain conditions. Dr Jonathan Sleath had agreed to sort and catalogue the slides, and had been doing some very good experimental work in scanning the slides onto disk.

Dr Newton asked about the possibility of publishing pictures made from the slides as Dr Whitehouse had hoped to do. Dr Sleath said that correspondence

that he had seen suggested that Dr Whitehouse had contacted several publishers but that the responses suggested that it had not been viable. Dr Sleath added that developments in technology might, however, now make it possible to publish the slides (for example, on the Society's web site). Mr Lawley, making the point that not all members had access to the web site, asked whether or not it would now be possible to publish the pictures on paper. Mr Blockeel suggested that these were matters that would need to be considered by the Publications Committee. Several points of detail about copyright issues were raised and would be cleared with NMGW. Dr Chatfield added that credit should be given to Dr Whitehouse as the originator of the images if they were published in any format.

Thanks were given to Dr P.E. Stanley, Dr C.D. Preston and Dr Sleath for their time and efforts in sorting out Dr Whitehouse's effects.

Dr Clarke asked about the future of the Society's own archives which had been stored at NMGW. Mr Blockeel replied that Council would consider the matter.

- g) **Investment policy:** Mr Blackburn, the Treasurer, had done a huge amount of work during the year in researching the Society's investment strategy. Council had agreed to his recommendation that the Society's principal funds, as currently invested with National Savings, should be withdrawn and re-invested with the Charities Official Investment Fund (COIF). This was a 'Common Investment Fund' under the terms of the 1993 Charities Act, and was a registered charity whose objective was to manage the funds of other charities. There were three separate funds: equity-based, fixed-income stocks, and sterling deposits. The performance of the COIF during the past decade would have generated very substantial amounts of additional income for the Society.

Mr O'Shea asked whether or not the Society could control the stocks in which its balances were invested. Mr Blockeel said that it could not but that, whilst COIF was not operated as an ethical fund, the Trustees avoid investment in companies whose main business is in armaments, gambling or tobacco.

- h) **Index to *J. Bryol*:** Dr P.E. Stanley had been working for many years to compile an Index of the Society's publications. As well as being a very useful publication from a practical viewpoint, it would also be a very significant document for the history of the Society, reflecting as it would the Society's activities over more than a century.

Council had approved expenditure of up to £5,000 for the publication of the Index. Publication and printing costs had risen sharply over recent years, and Council had given considerable thought to ways of distributing the Index within an acceptable budget. It was Council's intention that all members who wish to have a copy should receive one free of charge, although it might be necessary to ask them to pay the costs of postage and packing.

- i) **Systematics and whole-organism biology:** In March the Society received a letter from Dr Peter Crittenden, the retiring President of the British Lichen

Society, expressing concern at the current state of 'systematics and whole-organism biology' in the UK. This concerned the trend away from a system of teaching based around groups of organisms (e.g. bryophytes) to one organised around themes (e.g. molecular biology, genetics). One consequence had been the decline in traditional taxonomic skills. This was a large and complex issue, and one on which many views were held.

Mr Blockeel had canvassed the views of many of the Society's members who are based in institutions, and had replied formally to Dr Crittenden, saying that members of the Society shared his concerns and that the Society was willing, in principle, to be involved in further action.

The most recent development was that the Society had now been invited by Sir David Smith, President of the Linnean Society, to attend a meeting on these issues in October, and Council had agreed that a representative should attend.

- j) **Countryside and Rights of Way Bill:** The Society had received representations from the Joint Committee for the Conservation of British Invertebrates suggesting that the Bill included provisions that appeared to place severe restrictions on the ability of amateur and professional botanists to collect specimens for identification and/or vouchers. Council believed, however, that in practice, provided the current policies and good practices are adhered to, the effects of the Bill if and when it became law would be no more restricting than present laws.

Council was in contact with English Nature to see whether or not the BBS policies on collection and conservation could be amended to help members to comply with the law whilst not being unduly restricted in their activities.

- k) **Bequest of Mr H.R. Williams:** A former long-standing Canadian member, Mr H.R. Williams, had left a bequest of \$Can1000 in his will which, when received, would be added to the Bequest Fund.
- 6. **WEB SITE EDITOR:** Having considered a report on page 28 of *Bulletin 75*, the AGM approved the establishment of the office of Web Site Editor as a member of Council, with the duties set out in the report, and approved the appointment of Dr A.E. Newton to the office. Mr Long was thanked for the work that he had carried out as Editor since the site's foundation.
 - 7. **THE FUTURE OF THE OFFICE OF BIBLIOGRAPHER:** In accordance with the recommendations in a report on page 24 of *Bulletin 75*, the AGM agreed that the holder of the office of Bibliographer should no longer be a member of Council, that the post might be shared by more than one person at any one time, that there should be no limit to the time that holders can hold office, and that Council would appoint the holders of the office, whose appointments would be subject to renewal every two years. Mr Blockeel reported that Council had resolved to appoint Dr A.E. Newton to share the office of Bibliographer with Mr L.T. Ellis, the present office holder. Thanks were expressed to Mr Ellis for the considerable amount of work that he had carried out in the 11 years for which he had held office.

8. **ELECTION OF OFFICERS:** Council nominated the present holders for the offices that were subject to re-election as follows: Mr M.M. Yeo (Bulletin Editor), Dr J.W. Bates (Journal Editor), Mr D. Wrench (Meetings Secretary), Mr R.J. Fisk (Reading Circle Secretary), Mr T.H. Blackstock (Recorder for Hepatics) and Mr G.P. Rothero (Recorder for Mosses). Council also nominated Mr M. Pool (Acting Membership Secretary) for formal election to the office of Membership Secretary. The Secretary had received no other nominations and the foregoing were duly elected. It was reported that Dr Newton had pointed out to Mr Walton in transferring the Secretary's documents to him that the Recorder for Hepatics should have been re-elected at the last AGM and it was agreed, in the case of that office, that Mr Blackstock should be re-appointed for the balance of the year 2000 and for the year 2001.
9. **ELECTION OF ELECTED MEMBERS OF COUNCIL:** Council nominated Sqn Ldr M.F. Godfrey and Dr C.D. Preston for two of the three vacancies for Elected Members. It was reported that a third member had agreed to be nominated but had withdrawn at the last minute and that it had not been possible for another to be approached in the time available. Sqn Ldr Godfrey and Dr Preston were elected, and the Executive Committee was given the authority to co-opt a third elected member.
10. **ELECTION OF HONORARY MEMBERS:** Council submitted the names of two members for election as Honorary Members of the Society: Dr M.O. Hill and Prof. Z. Iwatsuki.

Mr Blockeel said that Dr Hill had been proposed in recognition of his contribution as President for the period 1990-1991, as Recorder for Mosses for the period 1976-1985, as joint author of the 1981 *Census Catalogue*, and as joint author of the *Atlas of the Bryophytes of Britain and Ireland*. He also drew attention to the service that Dr Hill had performed for BBS members with the genus *Sphagnum*, including his work in refereeing the genus for many years, and his authorship of the account for the genus in Dr A.J.E. Smith's *Flora*.

In the case of Prof. Iwatsuki, who had been a member of the Society since 1966, Mr Blockeel said that his name had been put forward in recognition of his status as a leading figure in Japanese and Asian bryology for the past four decades, his authorship of *Colored Illustrations of Bryophytes of Japan*, and the role that he played in seeing through the press Akira Noguchi's recent five-volume *Illustrated Moss Flora of Japan*, to which he had added a considerable amount after Noguchi's death, after volume 2 had appeared. He had also had a role in promoting bryology internationally as one of a small group of bryologists that was instrumental in founding the International Association of Bryologists, in which he had always played an influential role and of which he had served as Vice-President. Lastly, Mr Blockeel drew attention to his contribution as Director of the Hattori Botanical Laboratory since 1992 and in continuing the publication of the internationally important *Journal of the Hattori Botanical Laboratory*.

11. **PLACE AND DATE OF THE NEXT ANNUAL GENERAL MEETING:** Mr D. Wrench said that this had been arranged for 8 September 2001, at the National Museums and Galleries of Wales in Cardiff.

12. **OTHER FUTURE MEETINGS:** Mr Wrench referred to the meeting in Tenerife in the Canary Islands on 16-23 February 2001, and to the spring field meeting in the Isle of Wight on 4-11 April 2001, both of which were advertised in the *Bulletin*. Mr R.C. Stern said that arrangements for the latter meeting were well in hand and that details of accommodation would be available at the conversazione.

The summer field meeting would be held in early August 2001. The first week, led by Mr N. Hodgetts, would be on the Isle of Skye. The details of the second week had yet to be finalised.

Members were also reminded of the forthcoming bryological workshop, which would be tutored by Mrs J. Paton on 11 November 2000 at Imperial College, Silwood Park.

Mr Wrench thanked the local organisers of the recent meetings for their hard work: Mrs Paton and Dr Holyoak (spring field meeting, Bude), Mr Raistrick (summer field meeting, Grange-over-Sands), and Dr O'Leary and Dr Longton (AGM and paper reading meeting, Reading).

13. **ANY OTHER BUSINESS:**

- a) **New Liverwort Flora:** Members had welcomed Mrs Paton's Flora 12 months previously. It was reported that it had received marvellous reviews and had been described by one reviewer as the 'best liverwort flora ever published in Europe', and that Mrs Paton had been awarded the Jill Smythies award of the Linnean Society in May. Mrs Paton had brought the medal for members to inspect if they wished to do so. Warmest congratulations were again extended to her.
- b) **Dr E.V. Watson memorial prize:** Dr Longton announced that the Botany Department at the University of Reading had decided to raise funds to endow a prize in honour of Dr Watson. Dr Watson, who had taught at Reading from 1946 until 1979, had been a devoted member of the Society since 1946. He had been a very effective teacher at Reading, and had great strengths as a teacher and illustrator of bryophytes. The fund would be publicised in the *Bulletin* so that members who wished to contribute could do so.
- c) **British Bryological Society records:** Dr Preston reported that the records were now available through the National Biodiversity Network gateway on the internet.

Thanks for ensuring the success of the meeting were expressed by Mr Blockeel on behalf of everyone present to Dr O'Leary and Dr Longton.

There being no other business, the meeting was drawn to a close at 5.45 p.m.

M.A. Walton, General Secretary, October 2000

PUBLICATIONS COMMITTEE

At its meeting on 21 April 2001, Council approved the following revised terms of reference and membership arrangements for the Publications Committee.

Terms of reference

The Committee is an advisory group that is responsible for monitoring all of the publishing activities of the Society, and for making recommendations to the Council to ensure that the Society's publishing activities meet its objectives and that they are as cost-effective as possible.

Its particular activities will include:

1. To evaluate proposals for new publications, including proposals for marketing, and to make appropriate recommendations to Council.
2. To establish appropriate production dates for new publications and to monitor progress to ensure that, insofar as it is practicable, deadlines are achieved or, where it becomes clear that they cannot be met, to recommend appropriate alternative action.
3. To review the Society's periodicals (currently, *J. Bryol.* and the *Bulletin*) on a regular basis to ensure that they continue to meet the Society's objectives, that they remain attractive and informative, and that they are held in high regard within the bryological 'community'.

Membership

The membership of the Committee shall comprise the Bulletin Editor, the Journal Editor, the Web Site Editor, the Treasurer and three other 'appointed' members who shall be appointed by Council and who, ideally, will have experience of publishing matters.

Each of the appointed members (who need not be members of Council) shall be appointed by Council for a period of three years. Members who are subject to re-appointment may serve for consecutive terms without any restriction on their total length of service but, at the time that appointments are made, the Council must consider all suitable candidates. One of the existing three members will be subject to reappointment at the autumn Council meeting in 2001, one in 2002, and the third in 2003. Thereafter, each appointed member will be subject to reappointment in the third year after he/she is appointed.

Rules for the frequency and conduct of meetings

The Committee shall elect a Chairman and Secretary from among its members who will organise meetings and keep records.

Normally the Committee will meet once in advance of each Council meeting. It will report the progress of projects regularly to Council, normally in the form of minutes recorded at each meeting.

BEQUEST AWARDS

Funds are available in the Society's Bequest Fund **with the object of promoting bryology**, for providing financial support in activities such as recording, attending meetings and undertaking fieldwork and research, both in Britain and abroad, and in enabling the results of these activities to be published.

The Bequest Committee cordially invites applications, especially from students and those under 25 years of age, for any work which does not form part of a professional employment. Awards may be made to members of the Society (preferably amateurs) or exceptionally, at the discretion of the Bequest Committee, to individuals or organisations outside the Society. Applications should state how the award would be used, and include a budget setting out the proposed expenditure and the financial support needed, in as much detail as possible.

Recent awards include support towards the publication of a bryophyte Flora of South Wiltshire, help for a Serbian member to carry out a bryophyte survey in northern Serbia, and assistance for postal costs incurred in verifying specimens collected during the Uganda expeditions.

The Committee strongly urges you to apply for an award, even if you are unsure that your work meets its criteria. The funds are there for your use. Applications should be sent to the Bequest Committee through the Treasurer (at present John Blackburn - see address inside the front cover of the *Bulletin*) who will be pleased to give further information or advice if required.

JEFF DUCKETT

ELECTION OF OFFICERS AND ELECTED MEMBERS OF COUNCIL

Mr D.G. Long (Vice-President) will become President in 2002.

The terms of eight other Officers, the General Secretary, the Treasurer, the Conservation Officer, the Curator¹, the Librarian, the Membership Secretary, the Recorder for Hepatics, and the Recording Secretary, expire at the end of 2001. The present incumbents are all eligible for re-election. The Meetings Secretary has resigned as a result of pressure of work, and it will, therefore, also be necessary to elect a new Meetings Secretary.

Three Elected Members of Council will retire at the end of 2001, and neither Dr R.A. Finch nor Mr M. Lawley nor Mr H.W. Matcham is eligible for re-election in this capacity until two years have elapsed. Sqn Ldr M.F. Godfrey has resigned as an Elected Member of Council as a result of pressure of work, and it will also, therefore, be necessary to elect a replacement for the remaining one year of the term for which he was elected. Additionally, in accordance with

¹ Following the transfer of the herbarium to NMGW, Cardiff, Council will be reviewing the implications for the office of Curator, and a report will be put to the next AGM.

the resolution of the AGM in 1999, the Executive Committee co-opted Dr R. Tangney as an Elected Member of Council, and this AGM is asked to confirm his election for the remaining year of his two-year term.

Members are invited to submit nominations for Officers and Elected Members, sending them to the General Secretary of the BBS, Mr M.A. Walton, Ivy House, Wheelock Street, Middlewich, Cheshire, CW10 9AB, to arrive no later than 11 August 2001. A nomination must not be made without the consent of the person whom it is wished to nominate. If elections are needed, they will be held at the AGM in Cardiff, on 8 September 2001.

RECENT DEATHS

We are sorry to announce the deaths of:

Mr P. Bowes, who joined the Society in 1986, and whose bryological work was carried out in NE Yorkshire where, in particular, he carried out a detailed survey of Fen Bog, in the North York Moors National Park.

M.L. Castelli, a long-serving member of the Society, who joined in 1963 and made a valuable contribution to the knowledge of the bryoflora of the French Alps.

Dr Ilma Stone, a member of the Society for nearly 30 years, who was elected as an Honorary Member in 1982. Dr Stone will be remembered for her collaboration with Dr G.A.M. Scott which led to the publication of *The Mosses of Southern Australia*, for her studies in families such as the Ditrichaceae and the Pottiaceae and, latterly, for her many papers on the Fissidentaceae.

REFEREES (JULY 2001)

The refereeing service is intended to provide assistance to members who have genuine difficulty in naming their collections. **It is not intended as a 'free-for-all' identification facility**, least of all for bulk collections. Please therefore respect the following guidelines when submitting material.

- If possible, avoid sending large quantities at any one time. Do not send material if you are not prepared to examine it yourself in advance.
- Please ensure that fragile specimens are adequately protected in the post. This applies particularly to material with lumps of soil attached. It is dispiriting to open a packet and find nothing but a pile of dust inside! Small boxes or tins are ideal for protection from crushing.
- Please label all packets clearly with full collection details, including habitat, locality, altitude and at least a 10-km grid reference.
- Always enclose a stamped addressed envelope (or label), even if material is sent to universities or institutions. Otherwise you may not receive a reply.

The General Referee will help beginners who are having difficulty in placing their material in a genus. If you encounter any other problems send it to the appropriate Recorder: Mr Tim Blackstock for hepatics (Countryside Council for Wales, Plas Penrhos, Ffordd Penrhos, Bangor, Gwynedd, LL57 2LQ) or Mr Gordon Rothero for mosses (Stronlonag, Glenmassan, By Dunoon, Argyll, PA23 8RA).

The numbers below refer to genera in *A Check-list and Census Catalogue of British and Irish Bryophytes* by T.L. Blockeel & D.G. Long (1998).

GENERAL REFEREE

H.W. Matcham, 21 Temple Bar, Strettington, near Chichester, W Sussex, PO18 0LB.

HEPATIC REFEREES

- 1, 64-69, 75-82:** Dr M.E. Newton, c/o Department of Botany, Liverpool Museum, William Brown Street, Liverpool, L3 8EN. (All mail to be marked 'Private'.)
2-5, 9, 11-17, 52: T.L. Blackstock, Countryside Council for Wales, Plas Penrhos, Ffordd Penrhos, Bangor, Gwynedd, LL57 2LQ.
6-8, 10, 18, 19, 32, 36-38, 50, 51, 53, 83-86: D.G. Long, Royal Botanic Garden, Inverleith Row, Edinburgh, EH3 5LR.
20-29, 39, 45, 46: M.F.V. Corley, Pucketty Farm Cottage, Faringdon, Oxfordshire, SN7 8JP.
30, 31, 33-35, 47-49, 70-74: G.P. Rothero, Stronlonag, Glenmassan, By Dunoon, Argyll, PA23 8RA.
40-44, 54-63: N.G. Hodgetts, 55 Norton Street, Grantham, Lincs, NG31 6BX.

MOSS REFEREES

- 1-10, 156-160:** Dr M.O. Hill, Monks Wood Experimental Station, Abbots Ripton, Huntingdon, PE17 2LS.
11-33: G.P. Rothero, Stronlonag, Glenmassan, By Dunoon, Argyll, PA23 8RA.
34, 35, 67-70, 187-195: Dr A.J.E. Smith, School of Biological Sciences, Brambell Building, University College of North Wales, Bangor, Gwynedd, LL57 2UW.
36, 71-89, 104-111: N.G. Hodgetts, 55 Norton Street, Grantham, Lincs, NG31 6BX.
37-66: Dr D.F. Chamberlain, Royal Botanic Garden, Inverleith Row, Edinburgh, EH3 5LR.
90-98, 112, 175-186: Dr D.T. Holyoak, 8 Edward Street, Tuckingmill, Camborne, Cornwall, TR14 8PA.
99-103: A. Orange, Department of Biodiversity & Systematic Biology, National Museum & Gallery Cardiff, Cathays Park, Cardiff, CF1 3NP.
113-146: R.D. Porley, English Nature, Foxhold House, Crookham Common, Thatcham, Berkshire, RG15 8EL.
147-155, 161-174: T.L. Blockeel, 9 Ashfurlong Close, Dore, Sheffield, S17 3NN.
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RECORDING MATTERS 20

There are a number of changes to the network of Regional Recorders:

- 12: Fred Rumsey, Department of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD.
- 17: Derek Hill, Gwynfryn, Colley Way, Reigate, Surrey, RH2 9JH.
- 35: Sam Bosanquet, Dingestow Court, Monmouth, Monmouthshire, NP25 4DY.
- 44: Graham Motley, Countryside Council for Wales, Cantref Court, Brecon Road, Abergavenny, Monmouthshire, NP7 7AX.

A warm welcome to the incoming Regional Recorders, and many thanks to Roy Perry who has passed on Monmouthshire and Carmarthenshire but continues to cover Glamorgan. There has been one resignation: Martin Godfrey, VC 39, reluctantly resigns due to work pressures - many thanks to him. Jeremy Roberts wishes to pass on VC 70, again due to commitments elsewhere, and therefore is looking for someone to take on Cumberland. His contribution is much appreciated, and he would like to see someone replace him rather than leave the county without a contact. Alan Crundwell's recent death left VC 12 without a Recorder, but Fred has kindly (if not bravely) agreed to take over, and the late Harold Whitehouse, who contributed a lifetime's work to Cambridgeshire, also passed away in 2000, leaving VC 29 vacant. Both these giants of bryology have done so much for recording in Britain and overseas and were devoted field bryologists in every sense of the word; their achievements will live on. **If anyone would like to take on VCs 29, 39 or 70, please let me know.**

The remainder of *Recording Matters 20* will deal with the proposed arable bryophyte survey, introduced in the previous *Bulletin*.

National and regional arable bryophyte survey

The purpose of the survey is to address the paucity of knowledge of the bryophyte flora of arable land in the British Isles.

The success or otherwise of this project depends largely on how many members participate and how many fields we can cover. Initially, we will be running a pilot survey, aiming to cover the arable-dominated areas of eastern Britain and selected areas elsewhere in the country. Therefore we will be looking for fewer participants in the first year, but will need volunteers who are willing to 'trial' methodologies. We are aiming to develop a systematic approach which will achieve a level of objectivity enabling analysis of the data.

The Society has many enthusiastic field bryologists, so we should be able to achieve excellent coverage in the second to fourth years when the project is fully rolled out. Hopefully, local recording groups will consider putting arable fields in their meeting itineraries, and during national excursions I hope there will be an opportunity to visit arable fields. It is appreciated that arable fields are not the first choice of habitat to survey for many recorders, but this is precisely the reason why this survey is needed. Knowledge to date is based on the efforts of a few, dedicated individuals, and the vast majority of the country is unknown as regards its arable bryophytes. This project is therefore going to be fun too - who knows what we will turn up!

An important element of the selective national survey is to survey minor crops, so if you live in or know of an area that is, for example, devoted to a root crop, or a market garden crop such as asparagus, please have a look at those fields. For most crop types we don't have any data whatsoever on the bryophytes they support. I am also keen that we get good geographical coverage of organic fields. We hope to find previously unknown 'good' fields as a result of the survey, so don't restrict yourselves to fields you already know to have high bryophyte interest (but by all means do include them). It is also vital that we record all arable fields visited even if they support no bryological interest. Therefore, if you have to look at 20 arable fields before you find anything of interest, make a record of this. The farmed landscape is dynamic, and what is a good field today may not be so in five years time. More extensive recording may help us to understand such changes, and answer such questions as should we be trying to protect individual fields or should we be advocating low-input sustainable agriculture over large areas - or a combination of both? Hopefully, by the autumn, access restrictions due to the current foot and mouth outbreak will have eased. Make every attempt to contact the farmer to gain survey permission and explain the purpose of the survey. I will be contacting various people in the newly formed Department of Environment, Food and Rural Affairs and other agricultural organisations to make them aware that such a project is to take place.

The national survey will run for four years, commencing with a pilot in autumn 2001. The pilot survey will highlight any problems in methodology. In brief, the following approach is proposed; the methodology given here is only an outline - we are developing detailed protocols/methodologies at the moment which will be distributed in the survey pack.

1. **Repeat of a survey carried out in Kent in the 1970s by Trudy Side.** Since this is a local project it is envisaged that the South-East Group will co-ordinate it, but other members are quite welcome to participate; just let Gill Stevens, the Group Leader (Roy Hurr or Malcolm Watling), or me know so we can co-ordinate the work. Having a 25-year-old dataset gives us a unique opportunity to look at changes in the arable bryophyte flora of Kent. Since we will be working to a past methodology this survey can begin in autumn 2001; the original was completed within two seasons.
2. **Systematic national survey.** Year 1 will consist of a pilot survey. Based on satellite imagery we have a good guide as to where arable land is concentrated in Britain. It is anticipated that in the first year an enthusiastic band of potato-bryologists will join up! Using satellite imagery as the basis, we will work within 100-km squares, and ask recorders to select four 10-km squares within these areas which as far as possible cover various soil types/geology. The recorder/s will then select a tetrad (either G, R, I or T) in each 10-km square, and within this tetrad survey four arable fields. This gives a total of 16 arable fields per 100-km square. Soil samples will also be collected, and labelled packets of soil can be sent to a central point for pH determination. In years 2 to 4 we hope many more people, using a refined methodology, will then get involved.
3. **Selective national survey.** The above systematic survey is the minimum requirement, but in addition to this each recorder has the freedom to record any other arable fields they wish; the fields may be in their own 'patch' or in other areas of the country - but please ensure the Regional Recorder gets the information, and ideally make contact before your visit to avoid duplication (although two people surveying the same field at different times may produce interesting results). It is envisaged that this part of the

project will target minor crops, organic fields and good stubble fields which were not picked up in the systematic survey.

Before the autumn I will produce 'survey-packs' which will be distributed to those who will be involved with the pilot survey and any others who have expressed an interest in the project. The pack will include custom-designed arable bryophyte recording cards for piloting, detailed guidance on methodologies, and a 'crib-sheet' to give some pointers with identification. We also intend to hold an arable bryophyte workshop in late autumn 2002 to evaluate the pilot survey which will act as a springboard for the launch of the full survey.

At the end of the four-year project we hope to have a much better understanding of the status of arable bryophytes in Britain, in terms of distribution, and association with various crop types, soil types and management regimes. Without this basic information we will be much less effective when trying to influence conservation policy. Finally, assuming accurate location details are recorded, we will have the option of returning to the same fields in the future as part of a surveillance programme.

Gill Stevens, the Cryptogam Biodiversity Officer at the Natural History Museum, will also be fulfilling an invaluable liaison role by keeping members in touch with progress and generally offering encouragement and support. Please can people let me or Gill know if you are interested in taking part in the BBS arable bryophyte survey. I had some enthusiastic responses to my article in the last *Bulletin*, but in particular would like to hear from those in eastern Britain (from Lossiemouth southwards!) who would like to be involved in the pilot survey. We may well be taking it upon ourselves to approach some of the more active field bryologists so be prepared! Gill can be contacted at the Natural History Museum, Dept of Botany, Cromwell Road, London, SW7 5BD, e-mail G.Stevens@nhm.ac.uk, tel. 0207 942 5894. We have set up a small committee, consisting of Chris Preston, Mark Hill and myself, to consider the methodological aspects of the project.

Ron Porley, *English Nature, Foxhold House, Crookham Common, Thatcham, RG19 8EL*; e-mail: ron.porley@english-nature.org.uk.

A BRYOPHYTE ATLAS OF EXMOOR

Irene G. Perry (2001). *Bryophyte atlas of Exmoor National Park*. Minehead: Exmoor Natural History Society. ISBN 0 9512893 1 4. Price £8.50 plus £1 postage & packing (please make cheques payable to the Exmoor Natural History Society).

Until recently there has never been a full tetrad-based survey of the bryophytes of Exmoor. This has now been remedied in fine style by our member Irene Perry from Minehead, whose *Bryophyte Atlas of Exmoor National Park* was published earlier this year by the Exmoor Natural History Society. Mrs Perry and a small band of helpers have spent some seven years on the project; in the course of their work they have visited every tetrad in the National Park at least once, and in most cases twice or more. The resulting atlas covers a total of 395 taxa (288 mosses, 105 liverworts and two hornworts). As Mrs Perry states in her introduction,

recording is continuing, so other taxa will no doubt be recorded in due course. Each species has a map and brief habitat notes; helpfully, the maps differentiate between old and recent records. There is a useful introduction, together with several maps which show habitats, geology, rivers, and the density of recording so far.

The book is attractively produced in A5 format on good-quality paper. A particularly helpful feature is the inclusion of a section of colour photographs; these show twenty different species together with a habitat shot of a typical Exmoor stream. It is also good to see that English, as well as Latin, names of species are used; this is likely to be of particular help to beginners. All in all, I can thoroughly recommend Mrs Perry's book to anyone interested in the bryology of Exmoor. Hopefully it will provoke enough extra research for there to be a second edition!

MARK POOL

SHROPSHIRE BRYOFLORA

A bryological tour through Shropshire is a travelogue of interesting sites in Shropshire - a 'what to see and where to go' for bryologists visiting the county for a few days.

An annotated check-list of Shropshire bryophytes summarises the distributional status of all species known to occur, with brief details of records for species which are scarce or rare in the county, plus a round-up of literature and herbarium sources.

For Nerds, these documents are available as Word and Excel files. For Neanderthals, I can supply unbound paper copies. Please ask for the electronic form by preference, as it's much easier and cheaper to send them that way. I do not intend to charge for either form of document, but I'm sure John Blackburn would gladly accept a small donation to the BBS.

Mark Lawley, 12A Castlevue Terrace, Ludlow, SY8 2NG; e-mail: m.lawley@virgin.net.

NEW VICE-COUNTY RECORDS AND AMENDMENTS TO THE CENSUS CATALOGUE

All undated records are based on specimens collected in 2000; for specimens collected in earlier years the year of collection is given before the collector's name. Where the specimen bears a collector's number, this is given after the collector's name. All specimens are deposited in BBSUK, except where otherwise indicated. Numbers and nomenclature follow Blockeel & Long (1998), *A Check-list and Census Catalogue of British and Irish Bryophytes*.

HEPATICA

T.H. BLACKSTOCK

- 1.1 *Haplomitrium hookeri*, with *Campylium stellatum* and *Ctenidium molluscum* in base-rich flush, Caeau Pentre Galar, SN13, (45), 1999, Guest.

- 4.1 *Blepharostoma trichophyllum*, on vertical side of boulder *ca* 1.0 m above summer level of river in open deciduous woodland, by Cladagh River below Marble Arch, H13, (H33), Holyoak 00-89.
- 7.3 *Kurzia trichoclados*, on peaty banks, SW side of Skaith, Waulkmill Bay, Mainland, Orkney, HY30, (111), Newton, McCance *et al.*
- 8.1 *Lepidozia reptans*, on bank, near Echnaloch, Burray, ND49, (111), 1966, Bullard, comm. McCance.
- 8.3 *Lepidozia cupressina*, in block scree, N end of the Blorenge, SO21, (35), Bosanquet; robust cushions with *Lepidozia reptans*, *Bazzania trilobata*, *Scapania cf gracilis* and *Tetraphis pellucida* on heather-bilberry covered scree, N side of Carn Goch, Bethlehem, SN62, (44), 1994, Graham.
- 9.1 *Bazzania trilobata*, gorge, Owennashad River, S00, (H6), 1999, Wrench.
- 9.2 *Bazzania tricrenata*, on open bank in wooded ravine, *ca* 320 m alt., Talla Linns, NT12, (78), Long 29104.
- 10.8 *Calypogeia arguta*, on clayey soil on side of ditch, Staunton Harold, South Wood, SK32, (55), 1990, Ballard; on bank of small side gully in wooded ravine, *ca* 340 m alt., Talla Linns, NT12, (78), Long 29110.
- 12.6 *Cephalozia lunulifolia*, rotting tree trunk in deciduous woodland, The Thicks, Wantisden, TM35, (25), Fisk & Turner.
- 14.1 *Cladopodiella fluitans*, deep pools in raised bog, Monegal Bog, H28, (H36), 1988, Weyl, comm. Holyoak; bog pool, Garron Plateau, D21, (H39), 1988, Weyl, comm. Holyoak.
- 14.2 *Cladopodiella francisci*, on peat bank, Cramer Gutter, SO67, (40), Lawley.
- 16.1 *Hygrobiella laxifolia*, on nearly horizontal top of large rock exposed in middle of stream in deciduous wood, sheltered by steep bank, 210 m alt., Morton Wood, 2 km SE of Holmfirth, 0.5 km W of Hepworth, SE10, (63), 1995, Finch.
- 17.1 *Odontoschisma sphagni*, with *Lophozia ventricosa* amongst *Sphagnum* in upland mire, Nantillyndir Farm, SN84, (44), 1994, Graham; on *Sphagnum* in relict bog, Monanee Lake, *ca* 7 km N of Ardmore, X28, (H6), 1999, Blockeel 28/221.
- 18.1 *Cephalozia spinigera*, amongst *Sphagnum capillifolium* and *Mylia anomala*, Clooncoe Wood, L. Rinn, N19, (H29), 1980, Lockhart, comm. Holyoak.
- 21.3 *Barbilophozia floerkei*, on grassy bank, Durkadale, Mainland, Orkney, HY32, (111), Newton, McCance *et al.*
- 21.8 *Barbilophozia barbata*, derelict wall-line, above Coed Ty Canol, Llanthony Valley, SO22, (35), Bosanquet; with *Pleurozium schreberi* and *Rhytidiadelphus squarrosus* on heathy bank, below Llethr brith, SN65, (44), 1999, Iliff, comm. Motley.
- 23.10 *Lophozia capitata*, on wet peat among *Juncus bulbosus*, near Stroud Bridge, Wareham Forest, SY89, (9), Edwards.
- 23.11 *Lophozia incisa*, on wet decaying log, by Grwyne Fawr, Blaen y Cwm, SO22, (35), Bosanquet.
- 24.7 *Leiocolea badensis*, amongst *Gymnostomum calcareum* and *Aneura pinguis*, encrusted with tufa in disused quarry, 50 m alt., 1 km N of Thomastown, S54, (H11), Lockhart 00/8a.
- 24.8 *Leiocolea turbinata*, wet sandstone cliff, Cilcenni Dingle, SO14, (43), Lawley.
- 25.1 *Gymnocolea inflata*, in a wet depression in heathland, beneath *Erica tetralix*, Dunwich Heath, TM46, (25), Stauss.
- 28.1 *Anastrophyllum minutum*, in mixed bryophyte mat in block scree N of summit, the Blorenge, SO21, (35), Bosanquet.
- 29.3 *Tritomaria quinquedentata*, among rocks near small stream on heathy cliff-slope, Rusey Cliff, SX19, (2), O'Leary, det. Paton; on unshaded top of low sandstone

- boulder forming part of low wall of cashel in open grassland, S of Crossmurrin Nature Reserve, H13, (H33), Holyoak 00-413.
- 30.1 *Jamesoniella autumnalis*, on acidic boulder in woodland, Manor Wood, the North, SO50, (35), Bosanquet.
- 32.3 *Jungermannia pumila*, on small embedded stone in wet ground, close to left bank of outlet of loch, Durkadale, Mainland, Orkney, HY22, (111), Newton *et al.*
- 32.6 *Jungermannia exsertifolia* subsp. *cordifolia*, on pebble just above shallow flowing water of unshaded inlet stream at edge of lake, by NW edge of Lough Macnean Lower, H03, (H33), Holyoak 00-297.
- 32.11 *Jungermannia hyalina*, on sandstone rock in dull oak woodland, Coed y Person SSSI, SO21, (35), Bosanquet; woodland bank, Nant y Frith, SJ25, (50), 1999, Hodgetts & Porley 3456.
- 34.1 *Marsupella emarginata* a var. *emarginata*, on damp vertical gritstone at base of block scree on N-facing hillside, 500 m alt., SE of Lough Atona, H12, (H33), Holyoak 00-171A; b var. *aquatica*, on wet rocks in burn, small ravine in pine forest, ca 120 m alt., Coille na Glas-leitire, Loch Maree, NH06, (105), Long 29202; on unshaded gritstone boulders shallowly submerged in and just above water of quick-flowing stream, ca 475 m alt., outlet from Lough Atona, H12, (H33), Holyoak 00-179.
- 34.11 *Marsupella adusta*, the third record listed for H40 in *Bulletin BBS 75*: 42 is an error and should refer to H36, as follows: on steep unshaded base of small outcrop of metamorphic rock on exposed summit, ca 610 m alt., just SW of summit of Dart Mountain, H69, (H36), Holyoak 99-698, conf. Paton, comm. Holyoak.
- 35.2 *Gymnomitrium obtusum*, on acid rock in block scree, 500 m alt., Catherton Common, Clee Hill, SO97, (40), Sleath.
- 35.4 *Gymnomitrium crenulatum*, on shady N face of blocks in scree, NW edge of Carn Ingli, SN03, (45), Bosanquet.
- 38.4 *Scapania cuspiduligera*, thin turf on spoil, E side of S quarry, Gilvern Hill, SO21, (35), Bosanquet.
- 38.5 *Scapania scandica*, on partially embedded boulder in field, Durkadale, Mainland, Orkney, HY32, (111), McCance.
- 40.2 *Lophocolea bispinosa*, (female), damp grassy area near ditch, near Dibden Inclosures, New Forest, SU30, (11), Sanderson.
- 40.3 *Lophocolea heterophylla*, on low dead twig of *Salix cinerea* at base of N-facing heathy slope, Meenameen Scarp, H05, (H33), Holyoak 00-317.
- 40.4 *Lophocolea semiteres*, (female), with *Blasia pusilla*, *Calliergonella cuspidata* and *Eurhynchium praelongum*, frequent in damp areas of old gravel pits, ca 10 m alt., Asheldham, TL90, (18), 1987, Pyner; (female), on low soil ridge under *Betula*, ca 105 m alt., S side of Greenham Common, SU46, (22), Long 29320; (male), on a fallen birch bole in woodland, Felthorpe Common, TG11, (27), 1999, Hall; (male), sandy bank by path, ca 10 m alt., Swanholme Pits, Lincoln, SK96, (53), Hodgetts 3594.
- 40.5 *Lophocolea fragrans*, with *Jubula* on wet rocks in ravine, ca 55 m alt., Glen Maye, SC27, (71), Blockeel 29/416.
- 42.1 *Geocalyx graveolens*, among boulders on heathy N-facing slope, S of Lochan na Claise Domhain, NC56, (108), 1993, Averis.
- 46.3 *Plagiochila asplenoides*, on bank of stream in woodland, Skeffington Wood, SK70, (55), 1995, Ballard.
- 46.4 *Plagiochila britannica*, on stone, by stream below NE-facing bank shaded by trees (including ash), ca 70 m alt., Kilpatrick Braes (basalt), NS47, (99), Rycroft 00012; on

- damp limestone wall at N edge of mixed deciduous and coniferous woodland, N of Glencar Lough, G74, (H29), Holyoak 00-508.
- 46.7 *Plagiochila spinulosa*, extensive patches on acidic rocks with *Diplophyllum albicans*, *Dicranella heteromalla* and *Mnium hornum* in rocky stream gorge, Carmarthen Fan, Llanddeusant, SN82, (44), 1993, Graham.
- 46.8 *Plagiochila killarniensis*, on edge of inclined rock face on N-facing slope, ca 20 m alt., W end of Glen Maye, SC27, (71), Blockeel 29/419; facing SW, on base of rock face, 230 m alt., in sheltered wooded valley of the Allt Inneir, the Trossachs, NN50, (87), Rycroft 00005.
- 53.3 *Porella arboris-vitae*, Coed Detton, Knighton, SO27, (40), 1999, Lawley.
- 54.4 *Frullania fragilifolia*, on rock in block scree, above Morfa Bychan, Pendine, SN20, (44), Bosanquet.
- 54.5 *Frullania dilatata*, on trunk of ash tree along woodland ride, Launde Park Wood, SK80, (55), Ballard.
- 56.1 *Marchesinia mackaii*, pure mats on vertical rock face kept damp by splashes from dripping overhang, Dinas, SN74, (44), Bosanquet & Motley.
- 62.2 *Cololejeunea rossettiana*, on rock of cliff-face, Bachowey Gorge, SO14, (43), Lawley.
- 62.3 *Cololejeunea minutissima*, with *Frullania dilatata* on trunk of small tree in N-facing deciduous woodland, ca 150 m alt., Coppett Hill, Goodrich, SO51, (36), Port; on *Salix cinerea* in thick hedge, Telpyn, near Marros, SN10, (44), Bosanquet.
- 64.4 *Fossombronina husnotii*, by path in Bere Wood, SY89, (9), Edwards.
- 64.5 *Fossombronina pusilla*, on soil exposed in flush with patchy *Juncus effusus* on damp grassland slope near *Corylus* scrub, W of Marble Arch, H13, (H33), Holyoak 00-168.
- 64.6 *Fossombronina maritima*, soil on cliff top near path, above S side of Rocky Valley, between Boscastle and Tintagel, SX08, (2), Paton.
- 64.9 *Fossombronina incurva*, compacted sandy soil, caravan site in pasture woodland, Denny Wood, New Forest, SU30, (11), Stern & Sanderson; with low mosses on compressed soil of trackway in dune grassland, Ynyslas, SN63, (46), Holyoak & Hodgetts 00-41.
- 66.2 *Pellia neesiana*, sandy bank of recently excavated ditch, with *Fossombronina foveolata* and *Riccardia chamedryfolia*, 10 m alt., Kirby Moor, TF26, (54), Rieser & Lammiman.
- 67.1 *Pallavicinia lyellii*, amongst rank *Molinia* on cut-over raised mire, Esgyrn Bottom, SN93, (45), 1999, Sutton.
- 68.1 *Moerckia hibernica*, in bryophyte mat on tufa, in spray zone of Hen rhydd Waterfall, Nant Lled SSSI, SN81, (42), Bosanquet.
- 69.1 *Blasia pusilla*, on low clay bank by damp track, with *Phaeoceros laevis*, below Headless Hill, Highmeadow Woods, SO51, (35), Bosanquet.
- 73.1 *Metzgeria fruticulosa*, growing through *Orthotrichum* on old elder, upper edge of Happy Valley, SP80, (24), Higgs; on elder with *Frullania dilatata*, Brandon Marsh, SP37, (38), Turner.
- 75.1 *Sphaerocarpos michelii*, compacted sandy soil, caravan site in pasture woodland, Denny Wood, New Forest, SU30, (11), Stern & Sanderson; scattered plants over several square metres of wet pulverised cinders and fine silver sand, with *Plantago coronopus* and *Barbula convoluta*, on NE extension of the main car park by East Heath Road, just W of Hampstead Ponds, Hampstead Heath, TQ28, (21), Adams, first found by C. Bowlt in 1998.
- 82.1 *Marchantia polymorpha* b subsp. *ruderalis*, in chinks of garden paving, ca 5 m alt., Venn, Aveton Clifford, SX74, (3), Pool; among cobbles near parish church, ca 95 m

- alt., George Nympton, SS72, (4), Pool; open fen, Smallburgh Fen, Smallburgh, TG32, (27), Hall & Strauss; on sandy soil on the banks of a disused flooded sand/gravel pit, Lynford, TL89, (28), Strauss; Laughton Common, SK89, (54), Kirby, comm. Rieser; in crevices of pavement, ca 5 m alt., near the harbour, Peel, SC28, (71), Blockeel 29/40; c subsp. *montivagans*, forming large masses in stream, Cwm Nant-du, Sugarloaf, SO21, (35), Bosanquet; among *Cratoneuron filicinum* in springhead, ca 730 m alt., S-facing slopes of the summit ridge, Mickel Fell, NY82, (65), Blockeel 29/456.
- 84.4 *Riccia fluitans*, old flooded sand pit, Traad Point, H98, (H40), 1992, Wolfe-Murphy, det. Weyl, comm. Holyoak.
- 85.1 *Anthoceros punctatus*, in seepage zone on coastal cliffs at junction of Carboniferous Limestone and quartzite, Ragwen Point, SN20, (44), 1999, Morgan; on vertical clay bank by marshy area, Silverines Meadows, near Goulceby, TF27, (54), Rieser & Lammiman.

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MUSCI

G.P. ROTHERO

- 1.2 *Sphagnum affine*, on bank of gill, 180 m alt., Tilberthwaite, NY30, (69), Blewitt, conf. Hill.
- 1.7 *Sphagnum teres*, amongst *S. palustre* and *Aulacomnium palustre* on peat under birch, 60 m alt., N of Annagh Lough, H31, (H30), Cross, det. Lockhart; in fen beside lough with *Carex rostrata*, Meenameen Lough, W end, H05, (H33), Holyoak 00-224.
- 1.9 *Sphagnum girgensohnii*, on wet rocky bank, 180 m alt., Tholt-y-Will Glen, SC38, (71), Blockeel 29/441; in poor fen by lake with *S. subnitens*, Loughnabrook, Garron Plateau, D21, (H39), 1988, Weyl.
- 1.12 *Sphagnum warnstorffii*, in *Schoenus* fen, 40 m alt., Errisbeg, NE side of Lough Nalawney, L64, (H16), Long 28458, conf. Hill.
- 1.13 *Sphagnum capillifolium* a subsp. *capillifolium*, in wet, peaty ground among *Juncus*, 270 m alt., Bar Brook, Big Moor, SK27, (57), Blockeel 28/399, conf. Hill.
- 1.17 *Sphagnum molle*, Moneystachan Bog, C90, (H40), 1987, Corbett, det. Weyl.
- 1.19 *Sphagnum compactum*, on peat in *Calluna* heath, 310 m alt., E of Akermoor Loch, NT42, (79), Corner.
- 1.21 *Sphagnum inundatum*, in pools in lagg zone of bog, Glims Moss, Linnabreck, Mainland, HY32, (111), Newton & McCance.
- 1.23 *Sphagnum contortum*, in damp runnel in calcareous flush, 335 m alt., SW of Aghavogil, G85, (H29), Holyoak 00-699; in wet fen beside lough, Meenameen Lough, W end, H05, (H33), Holyoak 00-227.

- 1.29 *Sphagnum pulchrum*, edge of pool on raised bog, Ballynahone, H89, (H40), 1985, Weyl.
- 1.32 *Sphagnum angustifolium*, at edge of blanket mire with *Betula nana*, 270 m alt., Spadeadam (RAF restricted area), NY67, (70), Corner & Roberts, conf. Hill; in wet heath on bank of burn, 310 m alt., Abhainn a'Chnocain, ca 100 m below Loch Odhar, NC20, (108), Rothero 10005; with *S. fallax*, Dungonnel Dam, Garron Plateau, D21, (H39), 1988, Anderson, det. Weyl.
- 2.1 *Andreaea alpina*, on rocks by waterfall in wooded ravine, 395 m alt., Talla Linns, NT12, (78), Long 29118.
- 2.2 *Andreaea rupestris* a var. *rupestris*, on slate rocks, 595 m alt., Snaefell, near the summit, SC38, (71), Blockeel 29/401.
- 2.4 *Andreaea mutabilis*, on rock on summit ridge, 950 m alt., Sgurr na Banachdich, Cuillins, Skye, NG42, (104), Hodgetts 3573.
- 2.6 *Andreaea rothii* a subsp. *rothii*, on acid rock, 400 m alt., Catherton Common, Clee Hill, SO67, (40), Sleath; on grit boulder in block scree, 720 m alt., Mickle Fell, S side of summit ridge, NY82, (65), Blockeel 29/444; on rock, 195 m alt., Smailholm Crags, NE of St Boswells, NT63, (80), 1971, Corner; on acid rocks on hillside, 300 m alt., Loch an Fhir Bhallaich, Glen Brittle, NG42, (104), Hodgetts 3564.
- 4.1 *Polytrichum alpinum*, in grazed moorland, 460 m alt., Cefn Hill, Michaelchurch Escley, SO23, (36), 1988, Post; on grassy bank in field, Durkadale, Mainland, HY32, (111), Newton & McCance.
- 4.4 *Polytrichum commune* b var. *perigoniale*, on dry, bare ground on moorland bank, 355 m alt., Salter Sitch, Totley Moss, SK27, (57), Blockeel 29/381.
- 4.8 *Polytrichum strictum*, in wet heath with *P. longisetum*, *Sphagnum papillosum* and *S. capillifolium*, Scotton Common, SK89, (54), Lammiman & Rieser; on disturbed blanket peat with *Campylopus introflexus*, 500 m alt., Alport Moor, Bleaklow, SK19, (57), Blockeel 29/371; on peaty soil, Pilmoor SSSI, Helperby, SE47, (62), Blackburn.
- 8.1 *Tetradontium brownianum*, on underside of inclined slate rocks on stream bank, 180 m alt., Tholt-y-Will Glen, SC38, (71), Blockeel 29/442.
- 9.1 *Diphyscium foliosum*, on soil on rock ledge, Jutland Plantation, near Knighton, SO37, (40), Lawley.
- 12.1 *Pleuroidium acuminatum*, on vertical soil of river bank, Sruh Croppa River, H13, (H33), Holyoak 00-256.
- 12.2 *Pleuroidium subulatum*, on mud by burn near outflow from loch, Burn of Hillside, Durkadale, Mainland, HY22, (111), Newton & McCance.
- 14.1 *Ditrichum cylindricum*, on old track over moorland, S of Moneyduff, G83, (H29), Holyoak 00-564.
- 14.6 *Ditrichum heteromallum*, on face of gritstone rock on N-facing hillside, 600 m alt., SE of Lough Atona, H12, (H33), Holyoak 00-187.
- 14.9 *Ditrichum flexicaule*, on low rock ledge in old Magnesian limestone quarry, 60 m alt., Lindrick Common, near South Anston, SK58, (63), Blockeel 29/481; on large boulder at base of steep slope, 720 m alt., Mickle Fell, S side of summit ridge, NY82, (65), Blockeel 29/457; in close-cropped calcareous turf, 5 m alt., Aberlady Bay, near sewage works, NT48, (82), Long *et al.* 29428.
- 16.1 *Distichium capillaceum*, on thin soil in deep crevice in N-facing sandstone scarp, Meenameen Scarp, W end, H05, (H33), Holyoak 00-216.
- 16.2 *Distichium inclinatum*, on damp stony ground in old Magnesian limestone quarry, 55 m alt., Lindrick Common, near South Anston, SK58, (63), Blockeel 29/487.

- 20.1 *Rhabdoweisia fugax*, crags E of Loch Loch, NN97, (89), Lawley, conf. Porley.
- 20.2 *Rhabdoweisia crispata*, on thin soil on granite beneath boulder on N-facing slope, N end of Carn Galver, SW43, (1), Holyoak; in N-facing scree, Titterstone Clee Hill, SO57, (40), Lawley; on acid rocks with *Racomitrium* spp, *Diplophyllum albicans*, Afon Tywi, Ystrad Ffin, Rhandirmwyn, SN74, (44), 1997, Graham.
- 20.3 *Rhabdoweisia crenulata*, in rock crevice by waterfall in wooded ravine, 340 m alt., Talla Linns, NT12, (78), Long 29111.
- 25.7 *Dicranella staphylina*, on disturbed stony soil, Marble Arch, by visitor centre, H13, (H33), Holyoak 00-145.
- 28.1 *Kiaeria falcata*, on rocks towards top of mountain, 950 m alt., Sgurr na Banachdich, Cuillins, Skye, NG42, (104), Hodgetts 3574.
- 29.13 *Dicranum montanum*, on *Betula pendula*, Dowles Brook, N side, Wyre Forest, SO78, (40), Lawley.
- 31.9 *Campylopus atrovirens* b var. *falcatus*, on boulder with *Diplophyllum albicans*, Fair Head undercliff, D14, (H39), 1988, Anderson, det. Weyl.
- 34.2 *Fissidens viridulus*, in disused marl/chalk pit, Stanningfield, TL85, (26), Fisk, conf. Smith; on soil and dead wood at edge of *Salix* carr beside lough, Rinn Lough, N end, N09, (H29), Holyoak 00-767b.
- 34.4 *Fissidens pusillus*, on stone plinth with *Tortula marginata*, Stowe Landscape Gardens, Temple of Worthies, SP63, (24), 1996, Higgs; on rocks in stream, Gelligynon fawr, Twyn Llawan, SN72, (44), 1994, Graham; on vertical rock face at edge of stream, 45 m alt., Glen Maye, SC27, (71), Blockeel 29/417; on mica-schist rock ledge, 920 m alt., Glas Tulaichan, Glas Choire Beag, NO07, (89), Hodgetts 3584.
- 34.6 *Fissidens incurvus*, in sheep-cropped limestone grassland, Stonegrave, SE67, (62), Blackburn, conf. Blockeel.
- 34.9 *Fissidens rivularis*, on shaded stone in small stream in woodland, 145 m alt., Trans yr Hebog, Lisvane, Cardiff, ST18, (41), Orange 12730.
- 34.10 *Fissidens monguillonii*, on firm earth on bank of river, R. Tamar just N of Greystone Bridge, SX38, (2), Holyoak.
- 35.1 *Octodicerus fontanum*, on rocky SE shore close to lough margin, 8 m alt., Lough Donaghmeave, L64, (H16), Ryan, det. Lockhart.
- 37.1 *Eucladium verticillatum*, on mortar of well-head, forest S of Brandon, TL78, (26), Fisk.
- 38.1 *Weissia controversa* c var. *densifolia*, in crevices at base of wall of old building below galvanised-iron roof, Druncrow West, H05, (H33), Holyoak 00-402.
- 38.5 *Weissia brachycarpa* a var. *brachycarpa*, on steep soil at edge of path in scrub, Upper Lough Erne, S of Carragh, H32, (H33), Holyoak 00-322, conf. Blockeel, new to Ireland; b var. *obliqua*, on sandy soil near flooded gravel pit, Bowthorpe sand and gravel pits, Colney, TG10, (27), Hall, det. Strauss.
- 38.7 *Weissia rostellata*, on mud in ditch by lough, Carrickaport Lough, SE edge, H00, (H29), Holyoak 00-747.
- 38.12 *Weissia longifolia* a var. *longifolia*, on open clay soil on flat ground near quarry, Southwell, Isle of Portland, SY67, (9), Holyoak; on soil in limestone grassland, Wenlock Edge, Much Wenlock, SO69, (40), Sleath.
- 39.2 *Tortella densa*, in dry, open limestone grassland on SW-facing slope with *Helianthemum canum*, *Weissia controversa*, *W. longifolia*, 150 m alt., Great Orme's Head, SH78, (49), Stevens & Yeo, new to Wales.
- 39.8 *Tortella flavovirens* a var. *flavovirens*, isolated cushions in sand dunes, Langline Burrows, SN20, (44), 1996, Graham.

- 40.3 *Trichostomum tenuirostre* a var. *tenuirostre*, on stones in small tributary in wooded ravine, 320 m alt., Talla Linns, NT12, (78), Long 29105.
- 45.1 *Pseudocrossidium hornschuchianum*, on compacted gravelly ground by track, 30 m alt., foot of Laxey Glen, SC48, (71), Blockeel 29/414; on tarmac at edge of minor road, County Bridge, S of Garrison, G95, (H29), Holyoak 00-582.
- 46.2 *Bryoerythrophyllum ferruginascens*, on calcareous boulder on bank of burn, 240 m alt., Black Burn, below Long Gill, Newcastleton, NY48, (80), Long *et al.* 29277.
- 48.1 *Hymenostylium recurvirostrum*, in crevice of basic rock, 140 m alt., Corra Linn, Falls of Clyde, New Lanark, NS84, (77), 1967, Corner, conf. Chamberlain.
- 49.1 *Anoetangium aestivum*, on thin soil over limestone rocks on N-facing slope, 400 m alt., S of Glencar Lough, G74, (H29), Holyoak 00-632.
- 51.2 *Gymnostomum calcareum*, on damp tufa in quarry, 50 m alt., 1 km N of Thomastown, S54, (H11), Lockhart.
- 54.1 *Didymodon acutus* s.l., Cranham Woods, (33 in ()), 1916, Knight & Duncan, det. Kučera; on stony ground on limestone knoll, 105 m alt., Salthill Quarry, Clitheroe, SD74, (59), Blockeel 29/464, det. Kučera.
- 54.3 *Didymodon rigidulus*, on mortared wall of bridge, Cladagh River below Marble Arch, H13, (H33), Holyoak 00-90.
- 54.4 *Didymodon nicholsonii*, on gravel drive, Ketley's Farm, Bewl Water, TQ73, (16), Hendy, conf. Matcham; on stonework by river, Linton Lock, Linton-on-Ouse, SE46, (62), Blackburn; on damp tarmac at edge of road, Glencar Waterfalls, G74, (H29), Holyoak 00-504; on tarmac at edge of parking area by lough, NW edge of Lough Macnean Lower, H03, (H33), Holyoak 00-296.
- 54.5 *Didymodon mamillosus*, on boulders associated with low limestone crags, 550 m alt., Meall an Fhiodhain, crags on west side, NN52, (88), Rothero 10001, conf. Hodgetts.
- 54.14 *Didymodon spadiceus*, on forest road in woodland, 15 m alt., College Wood, Wragby, TF17, (54), Lammiman & Rieser; on fen peat in old ditch, 275 m alt., NW end of Akermoor Loch, NT31, (79), 1995, Corner, conf. Chamberlain.
- 54.17 *Didymodon ferrugineus*, in limestone quarry, NW of Ceeneithin, SN51, (44), Graham; on soil in disused limestone quarry, 50 m alt., Wath, near Hovingham, SE67, (62), Blackburn, conf. Chamberlain.
- 55.1 *Scopelophila cataractae*, on wet bank of mine waste, 100 m alt., Laxey, near the Lady Isabella Wheel, SC48, (71), Blockeel 29/407.
- 58.4 *Aloina ambigua*, on chalky bank behind science labs in grounds of private school, Ramsgate, TR36, (15), 1989, Watling; on calcareous spoil heap in abandoned car-park, New Fletton, behind B&Q store, Peterborough, TL19, (31), Hodgetts 3469; on brick rubble in disused brick pit, Eye, near Peterborough, TF20, (32), Hill; on spoil heap in old Magnesian limestone quarry, 55 m alt., Armstrong Quarry, Steetley, SK57, (57), Blockeel 29/496.
- 60.5 *Tortula marginata*, on sandstone block by old railway line, Benthall Edge Wood, near Ironbridge, SJ60, (40), Lawley.
- 60.8 *Tortula muralis* b var. *aestiva*, on brick wall near old rifle range, Church Wood, Blean, near Canterbury, TR16, (15), 1995, Watling.
- 60.10 *Tortula cernua*, on bare lime waste in old Magnesian limestone quarry, 55 m alt., Steetley, 3 km N of Whitwell, SK57, (57), Blockeel 29/505.
- 60.12 *Tortula lanceola*, on open soil on ledge on calcareous rocks, 400 m alt., Tulaich Hill, Blair Atholl, NN86, (88), Porley & Hodgetts 02214.
- 60.15 *Tortula modica*, on soil over boulder, Roundton, SO29, (47), Lawley, conf. Chamberlain.

- 61.2 *Microbryum davallianum*, on soil on ledge on rocky bank by sea, 8 m alt., foot of Milldown Burn, Coldingham, NT96, (81), Long 28997.
- 61.3 *Microbryum rectum*, in sheep-cropped limestone grassland, Stonegrave, SE67, (62), Blackburn.
- 62.2 *Hennediella macrophylla*, on compacted soil on bank under trees, Whatfield, TM04, (26), Fisk, conf. Blockeel.
- 62.3 *Hennediella heimii*, in dune slack, Teesmouth, Redcar, NZ52, (62), Blackburn; on wet bank by shore with *Amblystegium serpens*, Pickie, Bangor, J48, (H38), Weyl.
- 65.7 *Syntrichia laevipila* b var. *laevipilaeformis*, on *Salix* on wet ground at edge of pool by railway bridge, 15 m alt., River Don, 1.5 km NE of Conisbrough, SK59, (63), Blockeel 29/471.
- 65.8 *Syntrichia papillosa*, on elder by track, 75 m alt., Glen Maye, SC27, (71), Blockeel 29/420; on old sycamore by road, 15 m alt., Glen Nevis, Fort William, NN17, (97), Rothero 10004.
- 65.9 *Syntrichia latifolia*, on shaded asphalt by track, 60 m alt., Kirk Michael, approach to Spooyt Vane, SC38, (71), Blockeel 29/423; on ash and alder at edge of water, Bonet River, 2 km SW of Manorhamilton, G83, (H29), Holyoak 00-579.
- 66.1 *Cinclidotus fontinaloides*, on tree roots in flood zone of river, 1 m alt., River Yare at Whitlingham Country Park, Trowse, Norwich, TG20, (27), Stevenson.
- 67.1 *Coscinodon cribrosus*, on dry, S-facing, slaty cliffs high above beach, 100 m alt., crag south of Marros, SN20, (44), Hodgetts 3477; in crevices of old wall above coastal slopes, 1 km SE of Niarbyl, SC27, (71), Blockeel 29/438.
- 68.5 *Schistidium apocarpum*, on large boulder on bank of river, 120 m alt., River Derwent below Calver, SK27, (57), 1996, Blockeel 25/021; on raised concrete block, 30 m alt., Ravensfield Park, SK49, (63), Lake, det. Smith.
- 68.6 *Schistidium trichodon*, on limestone boulder on steep slope, 720 m alt., Mickie Fell, S side of summit ridge, NY82, (65), Blockeel 29/450, conf. Smith.
- 68.8 *Schistidium pruinsum*, on dry, S-facing, basic igneous rocks, 400 m alt., Craig Varr, upper crags, Kinloch Rannoch, NN65, (88), 1994, Rothero 94126, conf. Smith.
- 68.11 *Schistidium robustum*, on clints in limestone pavement, 260 m alt., Hutton Roof Crags, SD57, (60), Hodgetts 3578; on limestone boulder, 720 m alt., Mickie Fell, S side of summit ridge, NY82, (65), Blockeel 29/451, conf. Smith.
- 68.14 *Schistidium frigidum* a var. *frigidum*, on calcareous rocks in small ravine, 275 m alt., Ledbeg River, E of Lyne, Assynt, NN64, (108), Rothero 99058, det. Smith.
- 68.15 *Schistidium atrofusum*, on exposed S-facing limestone rocks in ravine, 350 m alt., Water of Ailnack, Delnabo, Tomintoul, NJ11, (94), Rothero 10011.
- 68.16 *Schistidium crassipilum*, on the dam wall, Crowdy Reservoir, SW18, (2), Townsend 00/160; on flat tomb in churchyard, Stratford Tony, SU02, (8), 1998, Townsend 98/186; on concrete wall, 2 m alt., Church Norton, near Selsey, SZ89, (13), 1984, Matcham; on concrete block at edge of damp birch/willow scrub, 115 m alt., Greenham Common, SU56, (22), Hodgetts 3582; on wall of churchyard with *Orthotrichum cupulatum* and *Grimmia pulvinata*, Charlton on Otmoor, SP51, (23), 1999, Townsend 99/1; on wall, Stibbington, TF09, (31), Gilbert, det. Hodgetts; on horizontal limestone slab on chest tomb, Peterborough Cathedral, TL19, (32), Hodgetts 3472; on limestone wall, Mill Lane, Prestbury, Cheltenham, SO92, (33), 1963, Townsend; on stone near river, River Arrow at Titley, SO35, (36), Lawley, conf. Smith; on concrete, Cramer Gutter, SO67, (40), Lawley; on stone gatepost, 135 m alt., Marros, SN20, (44), Hodgetts 3478; on rocks in scree, 580 m alt., Llyn d'ur Arddu, Snowdon, SH65, (49), 1967, Townsend, conf. Blom; on concrete slab, 140 m alt., King

- Lud's Entrenchments, SK82, (55), 1985, Hodgetts 465, conf. Smith; on concrete roof, 70 m alt., Gillamoor village, SE69, (62), Blackburn, conf. Smith; in calcareous flush by burn, 260 m alt., Black Burn, foot of Rough Gill, Newcastleton, NY48, (80), Long *et al.* 29282; on limey wall by water butt, 245 m alt., Spottiswoode House, NT64, (81), Long 29289; on low serpentine outcrop in coastal dunes, 10 m alt., Aberlady Bay, near sewage works, NT48, (82), Long *et al.* 29430; on calcareous rock, Ghlinne Bhig, Fealar, NO07, (89), Lawley, conf. Smith; on boulder, Abhainn Mhungasdail, Bunnavoulin, NM55, (97), Lawley, conf. Smith; on S-facing cliffs, 200 m alt., Creag an Sturra, Kilmelford, NM81, (98), 1998, Hodgetts 3324; on concrete wall in churchyard, 15 m alt., Teangue Church, Sleat, NG60, (104), Hodgetts 3503; on limey soil in quarry, Millpark, NW of Roscrea, (H18), 1978, Holyoak, conf. Smith; on limestone boulder on grassy slope, Glenade Lough, NW side, G84, (H29), Holyoak 00-502; on concrete fence post near roadside, Owenbreen River, H13, (H33), Holyoak 00-251.
- 69.3 *Grimmia laevigata*, from a stone-tiled roof, 'Rest for the Tired' shop, Hay-on-Wye, SO24, (42), Sleath.
- 69.16 *Grimmia orbicularis*, delete 57, the voucher (on dry SW-facing limestone outcrops, Cressbrook Dale, 1968, H.J.B. & H.H. Birks, (BBSUK)) is *G. pulvinata*, comm. Blockeel.
- 69.19 *Grimmia trichophylla*, on ironstone wall, Little Brickhill churchyard, SP93, (24), 1995, Higgs, det. Smith; on sandstone boulder in wall, S of Crossmurrin Nature Reserve, H13, (H33), Holyoak 00-140.
- 69.21 *Grimmia hartmanii*, on steep, damp, granite rock on slope close to river in woodland, Draynes Wood, SX26, (2), Holyoak.
- 69.25 *Grimmia curvata*, on boulder on loch shore, 730 m alt., Loch Avon, W end, NJ00, (94), Long 29155.
- 70.2 *Racomitrium aciculare*, on surface of sandstone gravestone, flat on ground, Rosary Cemetery, Norwich, TG20, (27), Fisk & Stevenson.
- 70.6 *Racomitrium sudeticum*, on slate rocks, 595 m alt., Snaefell, near the summit, SC38, (71), Blockeel 29/402.
- 70.7 *Racomitrium affine*, on acid rocks on hillside, 300 m alt., Loch an Fhir Bhallaich, Glen Brittle, NG42, (104), Hodgetts 3565; on sandstone boulder on moorland slope, SE of Carricknagower Lough, H05, (H33), Holyoak 00-320.
- 70.8 *Racomitrium heterostichum*, on boulder by moorland stream, 350 m alt., Snaefell, near Bungalow Station, SC48, (71), Blockeel 29/403; on boulder by burn, 210 m alt., Black Burn below Long Gill, NY48, (80), Long *et al.* 29283; on boulder on loch shore, 730 m alt., Loch Avon, W end, NJ00, (94), Long 29157; on sandstone boulder in limestone grassland, S of Crossmurrin Nature Reserve, H13, (H33), Holyoak 00-136.
- 70.11 *Racomitrium ericoides*, on top of mortared gritstone wall with *R. lanuginosum*, Montserrat, Bolton, SD61, (59), Lowell, conf. Smith; in mossy carpet on rock by burn, 225 m alt., Black Burn below Long Gill, NY48, (80), Long *et al.* 29273.
- 71.1 *Ptychomitrium polyphyllum*, on N-facing roof tiles, 35 m alt., Iping Church, near Midhurst, SU82, (13), 1992, Matcham.
- 74.1 *Blindia acuta*, on intermittently flushed sandstone rock, County Bridge, S of Garrison, G95, (H29), Holyoak 00-583; on damp boulder by river in ravine woodland, just below Marble Arch, H13, (H33), Holyoak 00-149.
- 75.1 *Seligeria pusilla*, on shaded limestone, Dark Gill, N of Helmsley, SE58, (62), Blackburn.
- 75.2 *Seligeria acutifolia*, on damp limestone beneath overhang at base of crag in woodland above lough, Lough Gill, E shore, W of Moneyduff, G73, (H29), Holyoak 00-549.

- 75.3 *Seligeria brevifolia*, on base-rich schistose rock surface on N-facing crag in coire, Glas Tulaichan, NO07, (89), Porley & Hodgetts 02270, conf. Blockeel.
- 75.11 *Seligeria oelandica*, on thin tufaceous film on limestone pebbles in open flush on N-facing slope, N of Glencreawan Lough, H05, (H33), Holyoak.
- 80.1 *Physcomitrium pyriforme*, on soil in flat grassy pasture, 5 m alt., near Loch nan Eala, Arisaig, NM68, (97), Long 29251; in disturbed sandy area in grassland, Marble Arch, by visitor centre, H13, (H33), Holyoak 00-169.
- 81.1 *Aphanorhagma patens*, on mud between rocks at base of dam, Coolree Reservoir, W of Newbay, T02, (H12), Holyoak 00-775; on soil near edge of river, R. Shannon, E bank at Drumsna, M99, (H29), Holyoak 00-760.
- 83.1 *Ephemerum recurvifolium*, on soil bank in field, Wenlock Edge, SO69, (40), Lawley.
- 83.2 *Ephemerum sessile*, on drying mud at edge of reservoir, Coolree Reservoir, W of Newbay, T02, (H12), Holyoak 00-773a; on mud at edge of lough amongst sedges, Rinn Lough, NW end, N09, (H29), Holyoak 00-761.
- 83.3 *Ephemerum cohaerens*, on soil of low bank beside river, R. Shannon, N of Jamestown, M99, (H29), Holyoak 00-758.
- 83.5 *Ephemerum serratum* a var. *serratum*, on mud in ditch by lough, Carrickaport Lough, SE edge, H00, (H29), Holyoak 00-748.
- 88.1 *Splachnum sphaericum*, on sheep dung in open blanket bog, NW of Crockauns, G74, (H29), Holyoak 00-650.
- 88.2 *Splachnum ampullaceum*, on cow dung in soligenous flush, The Rhos, Cnwch, Elan Village, SN96, (42), Woods.
- 93.1 *Pohlia elongata* a subsp. *elongata* var. *elongata*, on soil on ledges of sandstone crag, Carmarthen Fans, SN80, (44), 1997, Graham, conf. Hodgetts.
- 93.6 *Pohlia drummondii*, on soil beside track, Glaslyn, SN89, (47), Lawley, conf. Holyoak.
- 93.10 *Pohlia bulbifera*, on soil at bottom of quarry, Benthall Edge Wood, near Ironbridge, SJ60, (40), Lawley; on thin soil over limestone in disused quarry, 50 m alt., 1 km N of Thomastown, S54, (H11), Lockhart.
- 93.14 *Pohlia flexuosa*, on steep soil at base of N-facing sandstone crag, ESE of Bronagh, G93, (H29), Holyoak 00-465.
- 93.16 *Pohlia lutescens*, on vertical soil bank by track, N of Benaughlin, H13, (H33), Holyoak 00-348.
- 93.17 *Pohlia lescuriana*, on soil on low bank beside track in clearing, woodland N of Tutwell, SX37, (2), Holyoak; on vertical clay bank of river with *Dicranella schreberiana*, Little Avon River, Lower Wetmoor NR, Wickwar, ST78, (34), Martin.
- 93.19 *Pohlia wahlenbergii* a var. *wahlenbergii*, on chalky soil on track in woodland, 51 m alt., Hindolveston Wood, TG02, (27), Ellis & Mott.
- 96.1 *Anomobryum julaceum* a var. *julaceum*, on wet rock by stream, Cardingmill Valley, Church Stretton, SO44, (40), Lawley.
- 97.13 *Bryum algovicum* var. *rutheanum*, on sandy soil near flooded gravel pit, Bowthorpe sand and gravel pits, Colney, TG10, (27), Strauss; on stable dunes with *Scleropodium purum*, *Homalothecium lutescens*, Pembrey Burrows, near Llanelli, SN30, (44), 1993, Graham.
- 97.17 *Bryum imbricatum*, on thin soil at edge of track, S of Crossmurrin Nature Reserve, H13, (H33), Holyoak 00-135.
- 97.18 *Bryum intermedium*, on wall in limestone quarry, E of Croglin, NY54, (70), Lawley, conf. Holyoak.

- 97.20 *Bryum capillare* b var. *rufifolium*, Peakadaw, on thin soil over limestone on S-facing crag, G84, (H29), Holyoak 00-462; in crevices at base of wall of old building below galvanised-iron roof, Drumcrow West, H05, (H33), Holyoak 00-403.
- 97.27 *Bryum pallescens*, on steep clay/sand bank by pool in gravel pit, Dungeness, TR01, (15), Holyoak 00-798; Bowthorpe sand and gravel pits, Colney, TG10, (27), Stevenson & Strauss, det. Blockeel; on thatch under galvanised netting, Orwell, TL35, (29), Hill.
- 97.28 *Bryum pseudotriquetrum* b var. *bimum*, in calcareous flush at edge of road, NE of Lough Achork, H05, (H33), Holyoak 00-211.
- 97.34 *Bryum gemmiferum*, on steep sand bank by river, Duff River, E bank, W of Tullaghan, G75, (H29), Holyoak 00-500.
- 97.37 *Bryum dunense*, on damp sand between shingle ridge and railway embankment, W of Blue Anchor, ST04, (5), Holyoak 00-785; on disturbed soil of bank in grassland, Dungeness, TR01, (15), Holyoak 00-794; on disturbed soil on track, Thetford Heath, TL88, (26), Fisk.
- 97.38 *Bryum radiculosum*, on crumbling concrete by road bridge, Lady Craigavon Bridge, H32, (H33), Holyoak 00-164.
- 97.39 *Bryum rudemale*, on disturbed stony soil, Marble Arch, by visitor centre, H13, (H33), Holyoak 00-148.
- 97.41 *Bryum klinggraeffii*, on soil of low bank by river, R. Shannon, N of Jamestown, M99, (H29), Holyoak 00-759.
- 97.45 *Bryum bornholmense*, on gravelly soil in woodland ride, 'Pine Wood', E of Canterbury, TR15, (15), 1991, Watling, conf. Holyoak.
- 97.46 *Bryum rubens*, on disturbed stony soil, Marble Arch, by visitor centre, H13, (H33), Holyoak 00-144.
- 101.3 *Rhizomnium pseudopunctatum*, in mildly base-rich runnels in bog with *Bryum pseudotriquetrum*, *Brachythecium rivulare*, Waun Du, Mynydd Myddfai, SN83, (44), 1997, Graham; on margin of calcareous, spring-fed fen with *Calliergonella cuspidata*, *Drepanocladus cossonii* and *Tomentypnum nitens*, 100 m alt., Pollardstown Fen, N71, (H19), 1998, Lockhart; in moss carpet in open calcareous flush with *Equisetum palustre*, S of Glencar Lough, G74, (H29), Holyoak 00-636.
- 102.2 *Plagiomnium affine*, on wooded bank above reservoir with *Eurhynchium praelongum*, 235 m alt., Clubbiedean Reservoir, woodland on S side, NT26, (83), Rothero 10006; on soil at base of *Phragmites* and *Salix* on lough margin, Kilturk Lough, S shore, H32, (H33), Holyoak 00-163.
- 102.5 *Plagiomnium ellipticum*, on stone by chalk stream, 26 m alt., Welton Vale, near Louth, TF28, (54), Lammiman & Rieser; Clune Bog, NT19, (85), Weston.
- 112.4 *Philonotis caespitosa*, on mud in ditch by lough, Carrickaport Lough, SE edge, H00, (H29), Holyoak 00-749.
- 112.5 *Philonotis fontana*, on open ground in *Calluna* - *Ulex minor* heath, Greenham Common, SU56, (22), Porley, conf. Blockeel.
- 114.2 *Timmia norvegica*, on thin soil over limestone with other bryophytes on W-facing rocky slope, 340 m alt., SE of Aghadunvane, G85, (H29), Holyoak 00-546.
- 116.1 *Zygodon viridissimus* b var. *stirtonii*, on wall of church, Great Welnetham, TL85, (26), Fisk.
- 116.2 *Zygodon rupestris*, on hawthorn in old hearthstone workings, Colley Hill, Reigate, TQ25, (17), Hurr; on wych-elm in limestone ravine, 360 m alt., Water of Ailnack, Delnabo, Tomintoul, NJ11, (94), Rothero 10009.

- 116.3 *Zygodon conoideus*, on *Sambucus* in mixed woodland in deep valley, 120 m alt., River North Esk, opposite Hawthornden Castle, NT26, (83), Long & Rothero 29328; on *Fraxinus* by river in steep-sided, wooded valley, 130 m alt., The Devil's Glen above Ashford, near waterfall, T29, (H20), Long 29462.
- 117.2 *Orthotrichum striatum*, on branch of *Corylus* in scrub on lough edge, Lough Gill, E shore, G73, (H29), Holyoak 00-558.
- 117.7 *Orthotrichum obtusifolium*, on aspen close to track in aspen woodland, 250 m alt., Invertromie RSPB reserve, Kingussie, NN79, (96), Rothero 10007.
- 117.9 *Orthotrichum cupulatum* a var. *cupulatum*, on concrete edge of canal, Grand Union Canal, Wolverton, SP84, (24), Higgs, conf. Hodgetts; on large limestone boulder in grassland, Marble Arch, by visitor centre, H13, (H33), Holyoak 00-143; b var. *riparium*, on horizontal mortared stone of bridge top, Upper New Bridge, SX38, (2), Holyoak; on concrete, Pitsford Reservoir fishing lodge, SP77, (32), Higgs, conf. Hodgetts; on rocks in river, River Leven, upstream of church at Hutton Rudby, NZ40, (62), Blackburn; on limestone boulders in grassland at lough edge, Upper Lough Erne, S of Carragh, H32, (H33), Holyoak 00-323.
- 117.10 *Orthotrichum rivulare*, on rock in beck, Kilton Beck, Clarkson's Wood, Liverton mines, Cleveland, NZ71, (62), Blackburn.
- 117.11 *Orthotrichum sprucei*, on *Alnus* on river bank, Bonet River, below Gortgarrigan Bridge, G83, (H29), Holyoak 00-577.
- 117.13 *Orthotrichum tenellum*, on elder by stream, Grange Farm, Knapwell, TL36, (29), Hill.
- 118.1 *Ulotia coarctata*, on branch of *Salix caprea* with *Microlejeunea ulicina*, *Ulotia crispa* and *Dicranoweisia cirrata*, 60 m alt., disused sand and gravel pit, Shellbridge Road, Slindon, SU90, (13), Matcham, conf. Porley.
- 118.3 *Ulotia crispa*, on bole of ash tree by towpath, 70 m alt., Chesterfield Canal, Low Spring, SK58, (63), Blockeel 29/512.
- 118.4 *Ulotia bruchii*, on elder, Hartshill Hayes, SP39, (38), Turner; on ash, Burwell Wood, Burwell, TF38, (54), Lammiman & Rieser.
- 118.5 *Ulotia calvescens*, on branch of *Salix cinerea* in willow carr, Penhale camp, E edge, SW75, (1), Holyoak 00-423, new to England.
- 118.6 *Ulotia hutchinsiae*, on rock on hillside, 600 m alt., Lochan na Lairige, Lawers NNR, (88), Lammiman & Rieser.
- 118.7 *Ulotia phyllantha*, on *Salix*, Brandon Marsh, Coventry, SP37, (38), Turner.
- 119.1 *Hedwigia ciliata* a var. *ciliata*, on large, sloping gneiss slab with *Polytrichum juniperinum*, 270 m alt., Malvern Hills, 400 m SE of Worcestershire Beacon, SO74, (37), Fraser, conf. Porley.
- 119.2 *Hedwigia stellata*, Long Mynd, western, SO38, (40), Shoubridge; on rock in wet heathland, 150 m alt., Sithean More, Sleat, Skye, NG50, (104), Hodgetts 3561; on rocks by stream, 170 m alt., Gleann Dubh, Inchnadamph, Assynt, NC22, (108), Long 29179.
- 120.1 *Fontinalis antipyretica* b var. *gracilis*, on basalt in small stream, Garron Plateau, D21, (H39), 1999, Holyoak 99-823.
- 122.1 *Cryphaea heteromalla*, Long Mynd, western, SO38, (40), 1996, Kingsbury.
- 123.1 *Leucodon sciuroides* a var. *sciuroides*, on old apple tree, Lurkenhope, near Knighton, SO27, (40), Lawley.
- 129.1 *Homalia trichomanoides*, on SE-facing bank on shore of small loch, Durkadale, Mainland, HY22, (111), Newton & McCance.
- 133.1 *Hookeria lucens*, at base of willow with *Eurhynchium praelongum*, Letch Moor, West Stow, TL77, (26), Fisk.

- 135.1 *Daltonia splachnoides*, on *Salix cinerea* amongst tall *Vaccinium myrtillus* and *Luzula sylvatica* in block scree below N-facing sandstone crag, Culcarrick Scarp, H05, (H33), Holyoak 00-242.
- 136.1 *Myrinia pulvinata*, on silty base of alder on S bank of river with *Orthotrichum rivulare*, 150 m alt., River Dee at Crogen, SJ03, (48), Benoit.
- 143.3 *Anomodon viticulosus*, on rock at base of limestone crag in woodland, Hanging Rock, H13, (H33), Holyoak 00-126.
- 144.2 *Heterocladium wulfsbergii*, on wet rocks in river by castle, 165 m alt., West Okement River, Okehampton, SX59, (4), 1990, Pyner; on rocks near water level in ravine, 15 m alt., Groudle Glen, Onchan, SC47, (71), Blockeel 29/395.
- 144.3 *Heterocladium dimorphum*, at base of boulder in late-snow area below mica-schist crags in N-facing coire, 920 m alt., Glas Tulaichan, Glas Choire Beag, NO07, (89), Hodgetts 3545.
- 145.1 *Thuidium abietinum* a subsp. *abietinum*, in short turf on S-facing bank of ancient earthwork, 140 m alt., Trundle Hill, Goodwood, SU81, (13), 1987, Matcham.
- 145.3 *Thuidium delicatulum*, Gogbatch, Longmynd, SO49, (40), Kingsbury.
- 145.4 *Thuidium philibertii*, in short turf on calcareous sand dunes, Cloughy, J65, (H38), Weyl; in dune grassland, Balmaclary, C63, (H40), 1990, Synnott.
- 147.1 *Palustriella commutata* a var. *commutata*, amongst spring vegetation at edge of stream, 24 m alt., Dysart Wood, S side of R. Nore, 3 km downstream of Thomastown, S53, (H11), Wyse Jackson, conf. Lockhart.
- 153.1 *Amblystegium serpens* b var. *salinum*, on flat, open, sandy soil near top of limestone quarry, Southwell, Isle of Portland, SY66, (9), Holyoak; on sandy soil, South Gare, Coatham, Redcar, by the lighthouse, NZ52, (62), Blackburn, conf. Blockeel.
- 153.3 *Amblystegium tenax*, on rock by small stream, 40 m alt., between Rushen Abbey and Silverdale, SC27, (71), Blockeel 29/428.
- 154.1 *Leptodictyum riparium*, on top of small sandstone rock at lough edge, Carrickaport Lough, SE edge, H00, (H29), Holyoak 00-744.
- 157.3 *Drepanocladus sendtneri*, in slack with *Carex elata*, Balmaclary NNR, C63, (H40), 1990, Weyl.
- 157.5 *Drepanocladus revolvens*, Hopesay Common, north end, SO48, (40), 1998, Shoubridge; in montane flush with *Calliargonella cuspidata*, *Dicranella palustris*, 350 m alt., Black Mountain, Dinefwr, SN71, (44), 1993, Graham; Scotton Common, SK89, (54 in ()), 1931, Allison, conf. Blockeel; in flush with *Philonotis calcarea*, *Palustriella commutata*, Widdybank Fell, NY83, (66), Turner; in fen by burn, 195 m alt., Dowlaw Moss, NT86, (81), Long 28970, conf. Blockeel; in calcareous flush on NE-facing hillside, 520 m alt., E slope of Truskmere, G74, (H29), Holyoak 00-710.
- 157.6 *Drepanocladus cossonii*, beside moorland stream, 460 m alt., Cefn Hill, Michaelchurch Escley, SO23, (36), 1988, Post, conf. Blockeel; in basic flush, Durkadale, Mainland, HY32, (111), Newton & McCance.
- 158.1 *Hamatocaulis vernicosus*, on edge of in-filled loch with *Juncus* and *Carex rostrata*, 190 m alt., Knochewart Loch, NS24, (75), Payne, (E), conf. Blockeel; in mire S of Little Loch, 210 m alt., Brother & Little Lochs SSSI, NS55, (76), Payne, (E), conf. Blockeel; in flush, Loch Ashie, NH63, (96), Geddes, (E), conf. Blockeel.
- 159.1 *Tomentypnum nitens*, at edge of base-rich flush with *Palustriella commutata*, 75 m alt., SW of Llanbister Road Station, SO17, (43), Forster-Brown, det. Woods.
- 160.2 *Sanionia orthothecioides*, in coastal heathy grassland, Brough of Deerness, Mainland, HY50, (111), McCance, det. Rothero.

- 161.3 *Hygrohypnum luridum* a var. *luridum*, on rocks beside stream, Cwm Tai dam, Llangadog, SN72, (44), 1979, Woods; on shaded, concrete wall-capping, 30 m alt., foot of Laxey Glen, SC48, (71), Blockeel 29/413.
- 163.1 *Scorpidium scorpioides*, in calcareous flush with *Carex* spp, N edge of Glencreawan Lough, H05, (H33), Holyoak 00-302.
- 164.1 *Calliergon stramineum*, in small flush on N-facing slope, 600 m alt., SE of Lough Atona, H12, (H33), Holyoak 00-182.
- 164.3 *Calliergon cordifolium*, Lake Green, Sandown, SZ58, (10), 1992, Sanderson, conf. Blockeel.
- 166.1 *Isoetecium myosuroides* b var. *brachythecioides*, on sandstone at base of N-facing crag, Culcarrick Scarp, E part, H05, (H33), Holyoak 00-250.
- 168.2 *Homalothecium lutescens*, on edge of limestone scree on SE-facing hillside, NW of Marble Arch, H13, (H33), Holyoak 00-166.
- 169.3 *Brachythecium glareosum*, on soil on ledge of limestone crag on N-facing hillside, 400 m alt., S of Glencar Lough, G74, (H29), Holyoak 00-634; in moss mat growing over limestone in *Corylus* scrub, E of Pollreagh, H13, (H33), Holyoak 00-153.
- 169.12 *Brachythecium appleyardiae*, on ledge beneath overhangs on steep limestone crag shaded by *Fraxinus/Corylus* woodland, Hanging Rock, H13, (H33), Holyoak 00-128, conf. Blockeel, new to Ireland.
- 170.2 *Scleropodium cespitans*, on stonework by small waterfall in chalk stream, 26 m alt., Welton Vale, near Louth, TF28, (54), Lammiman & Rieser.
- 172.4 *Rhynchostegium confertum*, on concrete block, Hanging Rock, H13, (H33), Holyoak 00-124.
- 173.10 *Eurhynchium crassinervium*, on top of mortared stone wall of bridge, Cladagh River below Marble Arch, H13, (H33), Holyoak 00-91.
- 175.1 *Entodon concinnus*, on edge of limestone scree on SE-facing hillside, NW of Marble Arch, H13, (H33), Holyoak 00-167; on calcareous sand dunes, Cloughy, J65, (H38), Weyl.
- 178.1 *Platdictya jungermannioides*, on ledge under overhang on N-facing sandstone crag, Culcarrick Scarp, E part, H05, (H33), Holyoak 00-248.
- 179.1 *Orthothecium rufescens*, on damp limestone at base of N-facing crags, N of Glencreawan Lough, H05, (H33), Holyoak 00-278.
- 180.5 *Plagiothecium curvifolium*, on damp, rotting wood on ground in woodland, Garadice Lough, N edge, H11, (H29), Holyoak 00-764.
- 180.9 *Plagiothecium cavifolium*, on steep, damp, granite rock on slope close to river in woodland, Draynes Wood, SX26, (2), Holyoak.
- 180.11 *Plagiothecium nemorale*, at base of *Crataegus* in *Corylus* scrub on rocky limestone slope, Crossmurrin Nature Reserve, SE part, H13, (H33), Holyoak 00-201.
- 190.4 *Hypnum lacunosum* b var. *tectorum*, on rock on land-slipped coastal cliff, 10 m alt., Bantham Ham, Thurstlestone, SX64, (3), Bates & Proctor 3960; in *Calluna* - *Ulex minor* heathland on soil with some base-influence, Greenham Common, SU56, (22), Porley, conf. Smith; on bank on steep limestone hillside, 440 m alt., Craig Leek, Braemar, NO19, (92), Long & Rothero 28255.
- 190.6 *Hypnum andoi*, on oak bole at edge of wood, 15 m alt., Mintlyn Wood, SE side, TF61, (28), Finch; on old log, 75 m alt., Ballaglass Glen, SC48, (71), Blockeel 29/399.
- 190.9 *Hypnum imponens*, on fallen trunk and in heathy grassland in dappled shade under oak, beech and holly, Burnham Beeches, SU98, (24), Rumsey.
- 190.11 *Hypnum lindbergii*, on side of path, Glenariff Waterfalls NNR, D22, (H39), Synnott.

- 192.1 *Ctenidium molluscum* c var. *condensatum*, in stony flush in wooded ravine, 365 m alt., Talla Linns, NT12, (78), Long 29115.
- 193.1 *Hyocomium armoricum*, on damp rock, Allt a'Ghlinne Bhig, Fealar, NO07, (89), Lawley.
- 194.4 *Rhytidiadelphus loreus*, on steep grassy bank on side of old pit, 10 m alt., Thetford, old gravel pit on N side of rugby ground, TL88, (28), Stevenson.

Contributors of moss records in 2000

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A FUNGUS TO LOOK FOR

The following excerpt is from an article by Alick Henrici which was published in Volume 2(1) of *Field Mycology*, a publication of the British Mycological Society, and is published with the permission of the Editor of that publication.

"I am grateful to Joyce Pitt for the basis of the following note: *Mniacia jungermannia* is a discomycete parasitic on leafy liverworts, which will not be found without a deliberate search. It is a splendidly vivid turquoise blue and unmistakable, but so small that it needs a hand lens to detect it. It is listed in the 1992 *British Lichen Flora* where it is given as a mostly upland species in Northern Britain, western and montane in Europe. However, it appears to be a non-lichenised member of the Leotiaceae also present in southern lowland habitats. Joyce writes: 'Visits to highly acid woods in Kent in January and February have produced colonies on almost every occasion. Any damp sandy bank with a thin green carpet of *Cephalozia bicuspidata* or *Diplophyllum albicans* seems to host this delicate little blue disc. So far I have recorded it at eight sites in Kent (Tonbridge Wells Sands and the Greensand ridge).' She has also found it in Surrey, and after seeing it in Kent Jo Weightman has promptly found it in Hereford. It would be interesting to learn more of its true distribution."

If members find the fungus, the editor of *Field Mycology*, Geoffrey Kibby (British Mycological Society, Joseph Banks Building, Royal Botanic Gardens, Kew, Surrey, TW9 3AE; e-mail FieldMycol@aol.com) would be pleased to have details of the find or, indeed, of any other microfungi on bryophytes.

A useful reference is *Microfungi on Miscellaneous Substrates* (1998) by Martin B. Ellis and Pamela J. Ellis which lists 72 microfungi, including four myxomycetes, growing 'on or with bryophytes'.

MIKE WALTON

AN EPIPHYLLOUS MOSS IN NORFOLK

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Porley (1996) has recently described the first known example of an epiphyllous bryophyte from the British Isles.

In April 2000, the moss *Hypnum resupinatum* was discovered growing as an epiphyll on the lower leaves of a bramble (*Rubus fruticosus* agg.), in the Holkham Dunes National Nature Reserve, on the north Norfolk coast (at national grid reference point TF 88819.44945). The bramble was growing very close to a water-filled ditch, and immediately underneath a young oak tree whose semi-horizontal branches were covered by epiphytic mosses, including *H. resupinatum*. The bramble leaves in question were only a few centimetres above ground level.

The ground under the bramble was also moss-covered. However, although some of this moss cover invested the lower stems of the bramble, there was no direct connection between these lower-stem epiphytes and the undoubtedly epiphyllous *H. resupinatum*.

Few moss species are truly epiphyllous, but often grow onto the leaves from the neighbouring twigs. All epiphylls seem to prefer tough leathery or evergreen leaves with a long life-span, avoiding those with non-wettable surfaces. Tropical epiphylls are usually restricted to the leaves of young trees, shrubs, and long-lived herbs, all of which require shade and high humidity, and they are therefore largely confined to the understorey and the lower parts of the canopy (Gradstein, 1992); they are particularly common around streams (Pócs, 1982).

In these respects the Norfolk occurrence is 'normal', since the leaves of bramble are frequently perennial, and the leaves in question were in a position whose micro-climate was undoubtedly both humid and shaded. What is surprising about this record, however, is that it is from the comparatively dry, eastern part of Britain.

Vegetative propagation by gemmae and shoots is very common in tropical epiphylls, as is the possession of a variety of devices for the absorption and retention of water (Thiers, 1988). This, however, is not the case with *H. resupinatum*, which possesses neither specialised gemmae for vegetative reproduction, nor any special features for water retention. It seems likely that the colonisation of the bramble leaves took place from fragments detached from the overlying tree branch.

The Norfolk occurrence of epiphyllous *H. resupinatum* may be an example of a 'one-off' occurrence, where local circumstances combined to create the right micro-climatic conditions and opportunities for colonisation. However, given the common occurrence of brambles in damp situations beneath overhanging trees with epiphytic mosses, it seems likely that the condition may be more frequent, and has simply been overlooked, since the habitat is an uninviting one that is possibly not much frequented by bryologists. The *Quercus robur* - *Pteridium aquilinum* - *Rubus fruticosus* woodland type (Rodwell, 1991) should, perhaps, be investigated in more detail.

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BRYOPHYTES OF ARABLE FIELDS: CURRENT STATE OF KNOWLEDGE AND CONSERVATION²

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SUMMARY

Bryophytes are a characteristic component of cultivated land in Britain, but knowledge of their status, distribution and ecology lags well behind that of arable vascular plants. At least 17 liverworts and hornworts and 73 mosses have been recorded on arable land, representing about 9% of the total British and Irish bryoflora. Many of the species also occur in other habitats. Bryophytes of arable land are well adapted to regular disturbance by virtue of ephemeral lifestyles and compressed life-histories. They produce a variety of sexual and asexual propagules and can form a persistent diaspore bank in the soil. The typical arable bryophyte community includes the liverworts *Riccia glauca* and *R. sorocarpa*, and the mosses *Barbula convoluta*, *B. unguiculata*, *Bryum argenteum*, *B. bicolor*, *B. klinggraeffii*, *B. rubens*, *B. subapiculatum*, *Dicranella schreberiana*, *D. staphylina*, *Diurichum cylindricum*, *Entosthodon fascicularis*, *Ephemerum serratum* var. *minutissimum*, *Microbryum rectum*, *Tortula acaulon* and *T. truncata*. Some arable species are very rare, such as the Biodiversity Action Plan priority species *Didymodon tomaculosus*, *Ephemerum stellatum* and *Weissia multicapsularis*. These, and others such as *Anthoceros* spp and *Sphaerocarpos* spp, are more-or-less restricted to arable habitats, and thus are particularly vulnerable to changes in agricultural management.

There is ample anecdotal evidence that arable bryophytes are in decline in Britain and

² This article is based on a talk given by Ron Porley at the arable plant conference *Fields of Vision*, held in Cambridge in 1999.

mainland Europe. It is suggested that changes in sowing and harvesting times and the use of agrochemicals are factors contributing to the decline, but the demise of stubble fields has probably had the greatest negative impact on the arable bryoflora. More survey work is needed in both Britain and Ireland to understand the distribution and status of bryophytes in different crop types and under various management regimes, particularly in relation to organic farming. The presence and efficacy of the diaspore bank under different agricultural regimes is also an area ripe for research.

INTRODUCTION

This paper reviews the rather small body of knowledge concerning arable bryophytes in Britain and Ireland. Those involved in farm wildlife conservation frequently express mild surprise at the suggestion that cultivated land may harbour mosses, liverworts and hornworts. This is, no doubt, partly due to their small size and their ephemeral nature; as a consequence, they are relatively inconspicuous unless present in abundance. Cultivated land does, however, support a characteristic suite of arable bryophyte species. In Britain, one of the earliest references to bryophytes of arable land is by Richards (1928) who even then suggested that arable bryophytes in Middlesex might not be as common as they once were. He observed that 'unfortunately in Middlesex bare soil is not often left undisturbed and therefore very few examples of ephemeral communities have been found'.

A problem at this time was that taxonomic knowledge of some bryophyte groups was rather rudimentary, and many of the most characteristic arable species were simply not known. In another early study, Schelpe (1959) investigated the ecology of bryophytes on arable land in Oxfordshire, but again it is clear that many species were overlooked. It was not until the 1960s and later that groups such as the *Bryum erythrocarpum* aggregate (Crundwell, 1962; Crundwell & Nyholm, 1964) were elucidated, and other species such as *Dicranella staphylina* (Whitehouse, 1969) were only described as new to science relatively recently. In 1974 and 1975, Side (1977) carried out some pioneering work on bryophytes in arable fields in Kent. She noted that the lack of any baseline knowledge of bryophytes on cultivated land in Kent precluded any conclusions as to how the bryoflora might be changing under the intensive agricultural regimes that were on the ascendancy.

There is often debate over the status of vascular arable plants in Britain, and whether they are natives or introductions. Less controversy surrounds arable bryophytes. Although many of the small bryophytes that grow on soil, such as *Ephemerum*, *Tortula*, *Microbryum* and *Weissia*, are unknown as subfossils in Britain (Dickson, 1973), there is no question of their native status, although it is likely that they have increased as a result of agricultural activities which maintain bare soil. However, it has been suggested that the liverwort *Sphaerocarpos* is a long-established introduction (Hill *et al.*, 1991), and that man has played a role in the global dispersal of this species through agriculture (Paton, 1999). Only two plants of arable land are regarded as certain introductions: the liverwort *Riccia crystallina* (Paton, 1999) and the moss *Chenia leptophylla* (Hill *et al.*, 1992), but both are rare plants. *Anthoceros*, a hornwort, is exceptional amongst the bryophytes in that spore records extend back to the Cromerian stage of the Pleistocene (300,000 years ago), including the two later interglacials and the Flandrian. In the Netherlands, *Anthoceros* and *Riccia* spores have been found together in the same post-Atlantic agricultural horizons (ca 5,000 years ago), in association with pollen of such angiosperms as *Centaurea cyanus*, *Plantago* and cereals. In this context such spores are considered as indicators of agriculture (Koelblod & Kroeze, 1965), as they may also be in the British Isles (Dickson, 1973).

Although arable land covers a large proportion of the land surface in Britain and Ireland, knowledge of the bryoflora is still very patchy, and only a few bryologists consistently record in this habitat. Much work in recent years has been done by the late Harold Whitehouse, who has perhaps done more than anyone else in Britain to raise the profile of arable bryophytes.

THE BRYOPHYTE FLORA OF ARABLE FIELDS

A review of the relevant literature, together with fieldwork by the author, has revealed some 17 liverworts and hornworts and 73 mosses which have been recorded in arable habitats. This represents about 9% of the total British bryoflora. Some of the species are of casual occurrence, and undoubtedly further species will be found. However, most of the 90 species are frequently encountered on cultivated land and some are only rarely found in other habitats.

Several species can be considered members of a typical arable bryophyte community. These are the liverworts *Riccia glauca* and *R. sorocarpa*, and the mosses *Barbula convoluta*, *B. unguiculata*, *Bryum argenteum*, *B. bicolor*, *B. klinggraeffii*, *B. rubens*, *B. subapiculatum*, *Dicranella schreberiana*, *D. staphylina*, *Ditrichum cylindricum*, *Entosthodon fascicularis*, *Ephemerum serratum* var. *minutissimum*, *Microbryum rectum*, *Tortula acaulon* and *T. truncata*. Where conditions are favourable for bryophyte growth, these species can usually be found, at least on arable field margins, although many sites will not support the full range of species. Some of the species are relatively new additions to the British bryoflora. For example, *Dicranella staphylina* was not recognised until the 1960s, but records have increased steadily and it is now known from 128 vice-counties in Britain and Ireland (Blockeel & Long, 1998). *Dicranella schreberiana* was for many years considered to be a very rare northern plant in Britain, but once bryologists learnt how to recognise it, it began to be recorded in numerous southern counties (Jones, 1991). Similarly, *Ditrichum cylindricum* was found in arable fields across the country once bryologists became familiar with it in a sterile condition, and today it is known from all but two vice-counties in Britain (Blockeel & Long, 1998).

Even amongst these more-or-less constant members of the arable community, there are some subtle geographical differences in distribution. For example, *Entosthodon fascicularis* appears to be more common in southern Britain, and *Bryum klinggraeffii* tends to be more frequent in eastern England. By contrast, *B. sauteri* shows a western distribution in Britain, and also has many records from the Weald. In Cornwall it tends to be associated with paths, woodland margins and Cornish hedges in close proximity to arable land, as well as in the fields themselves. A few species are characteristic of arable land under specific conditions, such as *Bryum riparium*, which is found in fields subject to flooding by streams (Hill *et al.*, 1994). However, caution should be exercised in interpreting distribution patterns, since recording of arable bryophytes is distinctly patchy, and Ireland in particular is poorly recorded. The distribution of arable land in Britain and Ireland undoubtedly has a significant effect on the distribution of bryophytes of cultivated ground, although many of the species also occur commonly in woodland rides, in quarries, along tracks, and on disturbed ground in many other habitats. It is also interesting to note that there are similarities between the British arable bryoflora and those of other countries as far apart as Slovakia and Québec (Whitehouse, in press).

Several species are highly characteristic of arable fields and are only rarely found in other habitats. A good example is *Sphaerocarpos*. This distinctive liverwort is, with the exception of the Isles of Scilly, more-or-less restricted to south-east England from the Wash west to

Dorset, and south Wales. *S. texanus* is the rarer species, and is listed as Vulnerable in Britain (Church *et al.*, 2001). There are more records for *S. michelii*, which can be very persistent (Bates, 1995), although it may be declining in Britain. Both species are highly characteristic of cabbage and flower-fields in the Isles of Scilly (Hill *et al.*, 1991) but are not mentioned in the National Vegetation Classification section on arable communities (Rodwell, 2000), presumably because they had died back before field recording was undertaken. The hornworts *Anthoceros agrestis* and *A. punctatus* are also typically found in arable habitats, particularly on damp clays, but tend to be very local and sporadic in appearance. In central Europe, Bisang (1998) presents evidence that agricultural management is the most important predictor of hornwort occurrences, and that weather conditions and soil characteristics are less relevant.

Three species which are strongly associated with cultivated land are listed as priority species within the UK Biodiversity Action Plan (UK Biodiversity Steering Group, 1995; UK Biodiversity Group, 1999). The British and Irish endemic *Didymodon tomaculosus* was described as new to science very recently (Blockeel, 1981), and is now known from three vice-counties in England (Derbyshire, South-west and Mid-west Yorkshire) and two vice-counties in Ireland (Offaly and Kildare); all localities are in arable fields. All collections to date are female, and sporophytes are unknown. It possesses distinctive rhizoidal gemmae (tubers) which have been present in all gatherings, and thus *D. tomaculosus* should not be confused with other similar species. *Ephemerum stellatum* has been recorded from five vice-counties in England (South and North Hampshire, West and East Sussex, West Kent) and one vice-county in Ireland (South Kerry). It has been seen recently only in South Hampshire and West Sussex, although an attempt to find it in 2000 in the latter county was unsuccessful. In England it is known from a single locality in each county; the two most recent records are from arable fields. This plant is considered to be globally rare, and is known perhaps from less than ten localities worldwide (Hill *et al.*, 1994). The third species, *Weissia multicausularis*, has been recorded from nine scattered vice-counties in England and Wales. Endemic to western Europe, it has declined markedly in Britain and has been seen recently in only two vice-counties (West and East Cornwall) where populations are precariously small (Holyoak, 1999). All three species are in need of further survey to establish their precise status in Britain and Ireland.

SOME FEATURES OF THE ECOLOGY AND REPRODUCTIVE BIOLOGY OF ARABLE BRYOPHYTES

Farmland is a transient habitat subjected to regular disturbance, and arable bryophytes are well adapted to such a regime. A feature of many of the bryophytes typical of cultivated land is the production of asexual propagules, either as tubers (rhizoidal gemmae), bulbils or gemmae (Whitehouse, 1966). Such structures are particularly prevalent within the genera *Bryum*, *Dicranella*, *Ditrichum* and *Pohlia*. Asexual propagules are important in enabling the plants to persist through unfavourable periods and rapidly colonise new ground when conditions become suitable. With the notable exception of the work by Bisang in Switzerland (see below), the bryophyte component of the diaspore bank in arable fields has received relatively little attention (During, 1997). There is, however, ample evidence that bryophyte diaspore banks exist in a variety of other habitats. During & ter Horst (1983) showed that there is a bryophyte diaspore bank in chalk grassland soils, which is presumed to consist chiefly of vegetative propagules. Jonsson (1993) presented evidence of a diaspore bank in a boreal forest, a relatively stable ecosystem with low frequency of disturbance.

Bisang (1995, 1996) investigated bryophyte diaspore banks in arable fields by removing soil samples and *in vitro* culture. Although she made no attempt to identify the type of diaspore from which the cultured plants were derived, she presumed that species frequently producing sporophytes on the study sites, such as *Anthoceros agrestis*, *Riccia* spp, *Ephemerum serratum* var. *minutissimum*, *Tortula truncata* and *T. acaulon*, developed from spores present in the soil. However, species rarely or never producing sporophytes on the study sites, including *Bryum* spp and *Dicranella* spp were presumed to have regenerated from asexual propagules or gametophyte fragments. Furthermore, several bryophytes were found to be present in the diaspore bank but were not recorded from the surface vegetation, including *Bryum klinggraeffii*. She concluded that the presence of a bryophyte diaspore bank is essential for the local survival of a number of species, particularly the hornwort *Phaeoceros carolinianus*, which is more-or-less confined to arable fields.

Although very little work has been done on arable soils, it is likely that there is a persistent diaspore bank. Some of the earliest work on persistent bryophyte diaspore banks in soil was undertaken by Furness & Hall (1981) who studied *Physcomitrium sphaericum*, the spores of which remain buried in submerged mud of reservoirs for long periods of time and germinate only in years of drought when mud is exposed. Similarly, spores of *Micromitrium tenerum* may survive for decades in the soil (Schmidt & Kohn, 1993). It seems that species differ considerably with respect to the longevity of their spores in soil, and that larger spores of at least some annual shuttle species may survive longer than species with smaller spores such as the fugitive *Funaria hygrometrica*, the spores of which apparently die within a few years (During, 1986). There is also evidence that tubers have the ability to remain viable for long periods of time. Whitehouse (1966) cites an example of a tuber of *Bryum bornholmense* germinating after 12 years in a herbarium. More extraordinary is the conclusion reached by Whitehouse (1984) that a tuber of *Dicranella staphylina*, present in stored soil samples (Bristol, 1919), germinated after a period of nearly 50 years. There is also some evidence that tubers and spores are able to survive the passage through an earthworm's digestive tract (During *et al.*, 1987), and thus propagules can be brought to the surface and taken down into the soil by such activities. Bisang (1996) found most bryophyte diaspores to be 0-25 cm below the surface in arable fields. At greater depths the diaspore bank is considerably depleted, and germinated propagules from deeper zones show less vigour. Arable land is regularly disturbed by ploughing to about 25 cm, which will have the effect of distributing diaspores within the soil profile. She also found that the farming regime had a major influence on species composition at various depths within the soil profile, and that species may be represented in the diaspore bank but not on the surface of the field. During & ter Horst (1983) and During *et al.* (1987) reported the same phenomenon in other habitats, where tuber-bearing species may be very abundant in the diaspore bank, while their above-ground populations are extremely sparse. However, in regularly disturbed habitats, such as arable fields, above-ground shoot densities may be considerably higher (During, 1995).

Out of the 73 mosses recorded in arable habitats, 58 are known to produce sporophytes. Species that produce sporophytes freely, such as *Entosthodon fascicularis*, *Funaria hygrometrica*, *Tortula acaulon*, *T. truncata*, *Microbryum curvicolle* and *Ephemerum serratum* var. *minutissimum*, are probably represented in the diaspore bank as spores. These species are all monoicous, and lack specialised asexual propagules. Indeed, there is a correlation between sexuality and tuber or gemmae production; of the mosses recorded in arable habitats, only two monoicous species, *Fissidens taxifolius* and *Leptobryum pyriforme*, are known to produce asexual propagules. Most of the tuber-bearing mosses found in arable habitats are dioicous,

and in many of these species sporophytes are rare or unknown. In such cases it seems safe to assume that the diaspore bank consists largely, if not exclusively, of tubers.

Most arable liverworts are monoicous but those that are dioicous (*Blasia pusilla*, *Lunularia cruciata* and *Phaeoceros carolinianus*) possess asexual propagules in the form of gemmae or perennating tubers. *Blasia pusilla* possesses two types of gemmae: a stellate form that is packed with starch and is short-lived, and ellipsoidal gemmae that contain abundant lipid droplets and protein reserves and retain viability for several months (Duckett & Renzaglia, 1993). *Sphaerocarpos* is rather a specialised case. Although this liverwort is dioicous, and produces no specialised asexual propagules, it has evolved permanently coherent spore tetrads consisting of two males and two females. *Sphaerocarpos* is sexually dimorphic, with male plants being much smaller than female. Upon germination of the spore tetrads there is a greater chance that male and female plants will remain together in mixed clumps, thus optimising fertilisation opportunity. However, it has been shown that in *S. texanus* there is a deviation from the expected 1:1 sex ratio in favour of females (McLetchie, 1992); this may be due to higher susceptibility of males to environmental conditions, to their competitive inferiority to females, or to differential resource allocation to the sexes in the spore tetrad.

The various reproductive strategies shown in arable bryophytes as a group are linked to their adaptation to the regular disturbance which is a feature of cultivated land. Many demonstrate ephemeral lifestyles and compressed life-histories that enable them to germinate, mature rapidly, and produce spores (followed by adult mortality) within very short periods. Water availability is an important limiting factor for bryophytes; the reliance on water for fertilisation is one of the most fundamental aspects in which bryophytes differ from phanerogams. Arable fields, particularly in eastern parts of Britain, are arid habitats, and thus sporophyte production occurs during the autumn through to early spring. The above-ground gametophyte is also very sensitive to desiccation, particularly in liverworts, and most die back completely by March or April. The winter ephemeral *Sphaerocarpos* is typical of this strategy, germinating in the autumn and senescing in the early spring, and completing its life cycle in a matter of months. During (1979, 1992) has developed a theoretical classification of life histories in bryophytes based on parameters such as reproductive effort (asexual and sexual), size and numbers of spores, and annual production of biomass. Much more work is needed in determining these parameters for bryophytes, but a number of life strategies can be distinguished. A large number of arable bryophytes are represented by the annual shuttle strategy. This is characterised by a short life-span, a high investment in sexual reproductive effort and sporophyte production, the absence of asexual reproduction, and production of a few, large-sized spores at an early reproductive age, normally less than a year. Species showing this type of life strategy include *Tortula acaulon*, *T. truncata*, *Microbryum curvicolle*, *Ephemerum serratum* var. *minutissimum*, *Physcomitrium pyriforme*, *Entosthodon fascicularis*, and the liverworts *Riccia sorocarpa* and *Sphaerocarpos texanus*. The other life history strategy well represented in arable bryophytes is the ephemeral colonist, where the species are very short-lived above ground but maintain themselves by subterranean tubers, often forming a considerable diaspore bank in the soil. Fruiting is rare but if it occurs large numbers of small spores are produced. The tuberous *Bryum* species, such as *Bryum rubens*, *B. subapiculatum*, *B. klinggraeffii* and *B. violaceum*, exemplify this type of life strategy. They are characterised by a moderately short life span, high reproductive effort in asexual and sexual production, asexual reproduction mostly in early stages of the life cycle, small and very persistent spores, and large asexual propagules. Other typical ephemeral colonists include *Bryum bicolor*, *Barbula convoluta* and *Dicranella staphylina*.

Dispersal of arable bryophytes is clearly of great importance in the colonisation of new sites, but little is known of their ability to spread to neighbouring fields by spore liberation. Clearly the more isolated sites become, the less chance a spore has of finding an appropriate substrate for establishment and development. A useful discussion of spore dispersal in bryophytes is given in Longton & Schuster (1983). Miles & Longton (1992) counted spores trapped on sticky slides released from colonies of *Atrichum undulatum* and *Bryum argenteum*, and confirmed a leptokurtic distribution of spores, where spore catch is high in the immediate vicinity of the colony, but declines rapidly with increasing distance. However, they estimated that between 85 to 95% of the spores were dispersed to unknown distances beyond the trapping areas. Stoneburner *et al.* (1992) estimated that 94% of spores from *Atrichum angustatum* fell within 2 m of the colony centres, and 1% from 15 m, at the perimeter of their sampling zone. They also argued that under suitable conditions it is likely that dispersal distances may be much greater than the distances indicated in their study. Many arable mosses possess immersed and/or cleistocarpous capsules with relatively large spores; it is reasonable to speculate that dispersal distances may be less than in than those mosses with setae that lift the capsule above the boundary laminar layer. Furthermore, some of the ephemerals that have been investigated, including *Tortula acaulon*, *T. truncata* and *Physcomitrium pyriforme*, produce comparatively low spore counts in the range of 5,000-10,000 (Longton & Schuster, 1983). Spore production is normally seasonal, although this is apparently not detectable in the soil spore bank (During *et al.*, 1987; During, 1997). Dispersal distances of rhizoidal tubers are likely to be extremely short, although the extent to which earthworms and other animals facilitate the dispersal of diaspores is very difficult to assess (During, 1995).

IMPACT OF MODERN AGRICULTURE ON ARABLE BRYOPHYTES

Although definitive evidence of a decline in arable bryophytes in Britain is lacking, many bryologists concur that they are much scarcer in arable habitats than they were in the past. Regional bryophyte floras (e.g. Bates, 1995) allude to a decline in certain arable species, particularly the hornworts, but without a baseline it is difficult to quantify the scale of loss. It is not unreasonable to suggest that the factors implemented in the decline of the vascular arable flora, such as changes in traditional crop sowing times, loss of fallow land and stubbles, decline in crop rotation practises, and the increasing reliance on chemicals to control weeds and to boost yields of modern crop varieties (Wilson, 1992, 1993), are also operating on bryophytes.

Timing of cultivation

The most important factor impacting on bryophyte richness is the crop-growing cycle. A perusal through county bryophyte floras and the *Atlas of the bryophytes of Britain and Ireland* (Hill *et al.*, 1991, 1992, 1994) consistently cite stubble as the main habitat for many arable species. Jones (1991) noted that stubble fields once remained unploughed as late as November, enabling ephemeral species to develop, but that the practice now is to plough and re-seed within weeks of harvest. Thus in early winter there are large areas of arable where a single bryophyte cannot be found. Many mosses that propagate from spores germinate in the autumn, and mature and produce sporophytes over the winter period, from November to February, so that, depending on weather conditions, spores can be dispersed in late autumn through to early spring. Species such as *Ephemerum* will germinate and develop very rapidly so that ripe sporophytes are typically abundant in autumn (Hill *et al.*, 1994), although capsules can be found at other times of the year (*Ephemerum* has persistent protonema). If

conditions are suitable, fruiting material of some annual shuttle species, such as *Microbryum rectum*, can sometimes be found in early summer, although this is not typical. If cultivation interrupts this life cycle, incorporation of spores into the diaspore bank will be prevented. For some species, cultivation in late autumn (October) is beneficial, since this will bring buried spores to the surface. This is particularly the case with hornworts and *Sphaerocarpos*, plants that appear to be in particular decline. Bisang (1995) recommended ploughing in late autumn to allow sporophyte production, especially for *Phaeoceros carolinianus*, in arable fields in central Europe. *Sphaerocarpos* is a winter ephemeral, germinating in the autumn and senescing in early spring. Spring crops are often sown up to a month earlier than was traditionally practised, before the spores have had time to fully mature.

It has already been noted that the hornworts (*Anthoceros*, *Phaeoceros*) in particular appear to be declining in arable habitats (e.g. Brewis *et al.*, 1996; Killick *et al.*, 1998; Wigginton, 1995). In Britain they generally behave as summer annuals, germinating in early summer and producing sporophytes in early winter. The agricultural treatment that a crop receives therefore has considerable impact on hornworts. Cultivation and harvesting times are probably limiting factors, and it has also been suggested that herbicide application may be damaging (Bisang, 1992; Bates, 1995).

Herbicides

The response of bryophytes to herbicide application is complex, and a review is given by Brown (1992). Although bryophytes generally absorb water and nutrients over the entire gametophyte surface, chemicals may be bound to cell walls or inactivated by other physiological processes. Preliminary work suggests that some bryophytes are susceptible to certain herbicides applied at the manufacturer's recommended dose, and therefore as a precautionary approach chemicals should be considered as potentially harmful. Since many bryophytes undergo their main period of growth during autumn through to early spring, which is generally outside the window of herbicide application to control vascular weeds, they may avoid contact (with the notable exception of hornworts). What effect, if any, herbicides have on the diaspore bank is unknown, although one may infer a gradual depletion.

Fertilisers

Bryophytes are capable of utilising a range of inorganic and organic nitrogen compounds (Brown, 1992), although there is at present only a limited understanding of the assimilation of nutrients under field conditions (Brown & Bates, 1990). It is difficult to disentangle the indirect and direct effects of additions of fertiliser on bryophytes, and more work is required. However, it is a reasonable assumption that vascular plant competition, including that of the crop, will be considerably enhanced by fertiliser addition. Small acrocarpous bryophytes typical of arable land are poor competitors (Grime *et al.*, 1990) and thus would be expected to decline; studies on other habitats have indicated that increased nutrients do lead to a loss of certain bryophytes (During & Willems, 1986; Brown, 1992). In conventional cereal crops bryophytes are more-or-less confined to crop margins and corners that have escaped, or suffer less from, fertilisers and herbicides, and in this respect have much in common with vascular arable plants. The bryoflora of margins bordering and overhung by trees is typically less diverse than unshaded open margins, often being visually mossy, but dominated by a few ubiquitous species. Such differences may be due to leachate from the canopy of leaves and input of nutrients from leaf fall, in addition to shading and amelioration of the microclimate.

NEXT STEPS

It is generally acknowledged that the distribution and status of many vascular arable plants in Britain and Ireland is poorly known. Knowledge of arable bryophytes lags far behind.

Arable mosses and liverworts are physically much smaller than most vascular plants so they can potentially exploit open, disturbed ground over a much wider range of habitats, including gardens, flower beds, tracks, rides, quarries, banks, lake and reservoir margins, and open patches in grassland. A diaspore bank means colonists and shuttle species are able to quickly exploit suitable, often impermanent conditions. Apart from a few notable exceptions, such as *Didymodon tomaculosus*, *Ephemerum stellatum*, *Weissia multicapsularis*, *Sphaerocarpos* and hornworts, it is unlikely that the more widespread, characteristic arable bryophytes would decline to the point where, individually, they would be classified as threatened (World Conservation Union, 1994). However, as part of a typical arable assemblage of vascular and non-vascular plants, it is conceivable that they could become threatened at the community level. The generally accepted view amongst bryologists is that the typical arable field bryophyte assemblage is much less frequently encountered than in the past. Bryophytes have been neglected in comparison to vascular arable plants in terms of biological survey of arable fields; this imbalance should be addressed as a priority before the situation becomes acute.

Survey

Nationally, survey coverage of arable habitats for bryophytes is very patchy, and farmland tends not to attract the botanical recorder unless they have a particular interest. In this context there is currently underway extensive survey of arable fields in North-East Yorkshire (Blackburn, pers. comm.) and Suffolk (Fisk, pers. comm.). Targeted survey is, however, required across the country to provide a better understanding of the distribution, population size and status of arable bryophytes. It is hoped to engage members of the British Bryological Society in a nationwide survey in the near future. The three species that have published Species Action Plans (UK Biodiversity Steering Group, 1995; UK Biodiversity Group, 1999) require targeted work immediately, and it is also desirable to focus on *Sphaerocarpos* and the hornworts. The work by Side (1977) has provided a unique arable bryophyte flora baseline for Kent, and it would be particularly informative if it were to be repeated. It is not known whether arable fields noted for vascular plant interest also support a notable bryophyte flora. A site for Grass-poly *Lythrum hyssopifolium* in Cambridgeshire supports a number of typical arable bryophytes, including *Riccia subbifurca* (Preston & Whitehouse, 1986). However, a brief inspection of an arable field Site of Special Scientific Interest in Somerset, notified for its vascular plant interest, showed the bryophyte component to be virtually absent (pers. obs.) although this may have been influenced by the timing of the visit. A useful exercise would therefore be to evaluate arable fields of known vascular plant interest for their bryophyte interest. However, it is important to note that a bryological survey needs to be conducted from autumn through to spring, which is often outside the period deemed desirable for vascular plant survey.

Crop type

The particular crop type and management regime are major determinants of the bryophyte assemblage. Most arable bryophytes are recorded from stubble fields, largely because cereals (barley, oats and wheat) constitute a large proportion of arable land-use. Other crops can be

locally important, such as flower fields in the Isles of Scilly (Paton, 1969), cabbages, cauliflower, and sugar-beet. A perusal of new vice-county records given in the BBS *Bulletins* from the years 1979-1999 also lists potato, bean, turnip, leek and rape fields. Recent examination of an asparagus field in Suffolk revealed a community of bryophytes including *Sphaerocarpos michelii* growing on cultivated ridges. *Sphaerocarpos* appears to be often associated with non-cereal crops, including leek, rape and a Brussel sprout allotment. However, Bisang (1998) suggested that a paucity of Swiss hornwort populations in crops such as potato, beet-roots and maize may be due to compaction of the soil during the growing season by heavy machinery. The value of set-aside for bryophytes needs evaluation, although it is likely that any land left uncultivated for more than two seasons will be dominated by vascular plants with the less competitive bryophytes on the decline. In Scotland, *Anthoceros agrestis* has been recorded in set-aside, but the period for which the fields were uncultivated is unknown. Undersown crops also need to be evaluated, since these appear to provide favourable conditions for bryophytes (pers. obs.). Survey effort therefore needs to cover a representative sample of crop types and management regimes on a regional basis.

Soils

More information is also needed on soil types, structure and pH. Bisang (1998) reviews some data on soil characteristics, particularly in relation to hornwort occurrence in the Swiss Plateau. Most British floras suggest arable bryophytes are characteristic of neutral to slightly acid loams, clays and sands. Typical arable bryophyte assemblages can also be found over chalk and limestone (pers. obs.) although this may indicate surface leaching. Fitter (1985) remarks that the stubble field bryophyte flora is poor on the Cotswolds, but much richer on the chalk where such species as *Dicranella schreberiana*, *Tortula floerkeana* and *Pterygoneurum ovatum* are found.

Organic farmland

Work in Bavaria (Albrecht & Mattheis, 1998) suggests that organic farming holds promise for rare vascular plants, and preliminary work in Britain also supports this (Kay & Gregory, 1999). However, there are few data available on the bryophyte interest of organic fields. Given that the area of land in the UK under organic regimes is likely to increase in response to a demand for organic produce, there is a need to establish the importance of organic land for arable bryophytes. One organic farm in Oxfordshire revealed very few bryophytes, although surprisingly there was an abundance of the common pleurocarps *Eurhynchium praelongum* and *Brachythecium rutabulum*. These species are thought not to be represented in the diaspore bank, or at least in low quantities (During *et al.*, 1987). Their presence above ground may be explained by fragments of shoots in the diaspore bank, incorporated as a result of mechanical weeding of the crop. A much greater sample of organic farms needs to be assessed before any conclusions can be drawn.

Diaspore banks

In regularly disturbed habitats, such as arable fields, it is assumed that regeneration of bryophytes occurs largely from the diaspore bank. Although ephemeral colonists are likely to regenerate from tubers, and annual shuttle species from spores, gametophyte fragments with resting buds, protonemal gemmae and persistent protonema may also play a role. Little is known of the nature of the diaspore bank under different cultivation regimes, and whether

certain management practises lead to a depletion of spores and asexual propagules over time.

Taxonomy

In such an under-worked habitat as arable land, it is possible that species will turn up that were previously overlooked (e.g. Whitehouse, 1976) or even new to science (Blockeel, 1981; Whitehouse, 1969). Species thought to be geographically restricted, such as *Didymodon tomaculosus*, may prove to be more widespread. Crundwell (in Whitehouse, in press) reports the possible occurrence of the non-British *Bryum demarettianum* (Arts, 1992) in an arable field in Somerset; unfortunately a herbarium specimen cannot be traced. *Anthoceros caucasicus*, recently reported new to the Netherlands and representing a considerable range extension (During *et al.*, 1996), is also likely to be found in the British Isles (Paton, 1999).

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