

# BRITISH BRYOLOGICAL SOCIETY

PRESIDENT: MRS J. A. PATON, M.Sc.

## BULLETIN

No. 27. January, 1976

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#### 1. NOTES FROM THE SECRETARY

Several changes in Council structure came into force on 1 January, 1976. One important change is that we now have a new Treasurer. Mr R. D. Fitzgerald, who ably did the job for 10 years, has now been replaced by Dr W. D. Foster, Department of Pathology, Macclesfield Hospital, Prestbury Road, Macclesfield, Cheshire, SK10 3BL, to whom all subscriptions should now be sent. The changeover from one Treasurer to another will of course be a bit slow, so if you or your bank have already paid up for 1976 to Mr Fitzgerald, this is in order for the present. If, however, you haven't yet paid, please send your subscription now to Dr Foster (ordinary £6.00, junior £3.00, family £1.00). Eventually new Banker's Order forms will be issued.

Another change that should be noted is of Recorder for Mosses. Mr Crundwell has now resigned, and all vouchers should now be sent to Mr M. O. Hill, Institute of Terrestrial Ecology, Penrhos Road, Bangor, Gwynedd, LL57 2LQ.

On page 2 will be found the Income and Expenditure Account and Balance Sheet for the year ended 31 December 1974. We apologise that this has been so long appearing but the Treasurer was unable to produce it in time for his 1974 Report owing to the lateness in receiving final accounts from Blackwell's.

INCOME AND EXPENDITURE ACCOUNT

INCOME

To Subscriptions	
Sales of Journal	1560.55
" " Census Catalogues	36.58
" " Maps and Cards	50.33
" " Separates	
Interest 3% Savings Bonds	27.00
" " "	8.40
" Save and Prosper Units	27.68
" Drayton Comm.	6.09
" Lloyds 3rd Unit Trust	39.96
" Added for Deposit a/c	
Donations to Library Fund	
Royalties	
Postages	
Sundries	
Royal Society Grant	

1784.01
1647.46
139.79
109.13
165.02
29.23
8.70
13.74
10.22
500.00
<u>4407.30</u>

BALANCE SHEET

LIABILITIES

Subscriptions received in advance	
Sundry Creditors	62.22
Library Fund	2083.33
General Fund	<u>2100.55</u>
Add profit	828.55
	<u>2929.10</u>

Idylwild, Hexham, R.D. Fitzgerald  
Northumberland Hon. Treasurer

28 May 1975

£5008.11

YEAR ENDED 31st DECEMBER 1974

EXPENDITURE

By Printing Journal, Vol 8, Pts 1 & 2	3262.67
Stationery and Circulars	173.02
Library Expenses	10.50
Postages	103.96
Subs. overpaid	11.25
Paper Meeting	6.00
Typing	9.45
Xeroxes	1.90

3578.75

Excess of Income over Expenditure

828.55

4407.30

31st DECEMBER 1974

ASSETS

Cash at Bank	395.21
Dep. a/c at Bank plus Interest	1777.24
£120 - 7% Savings Bonds at Cost	120.00
£900 - 3% " " "	654.39
500 Omnium Deferred Units at Cost	459.37
1600 Save and Prosper Units at Cost	530.00
1350 Lloyds 3rd Units at Cost	1071.90

£5008.11

Audited and found correct, Hon. Auditor - Lloyds Bank Ltd,  
S. Matthewson Rowlands Gill,  
4 July 1975 Tyne & Wear

## 2. PROCEEDINGS OF THE BRITISH BRYOLOGICAL SOCIETY

### THE MEETING AT NEWTOWN, POWIS, APRIL 1975

The spring meeting was based on Gregynog, near Newtown, a country house belonging to the University of Wales. In all, about 35 members attended, though there were seldom more than 20 on the excursions. The excursions were mainly in Montgomeryshire (v.-c. 47) with sorties into Shropshire (v.-c. 40) and Merioneth (v.-c. 48). Except where stated below localities are in v.-c. 47.

2 April. Members drove to Llawryglyn and explored the wooded valleys above Gwernafon. Dicranodontium denudatum, Fissidens celticus, Anastrepta orcadensis, Lepidozia pearsonii, L. pinnata, Odontoschisma denudatum\* and Scapania umbrosa were found on banks and rotten wood. A small ravine, difficult to negotiate without getting wet and hard to climb out of without getting muddy, provided Tetraxis browniana\* on dripping rocks. Next stop was Dylife. To our surprise the public house was being "antiquated" and its plastic trappings removed. The bar was a trestle table. Refreshed, we drove down to Pennant and explored the valley below Ffrwd Fawr. Banks and flushes produced Polytrichum nanum, Sphagnum subsecundum var. subsecundum\*, Barbilophozia barbata, Diplophyllum obtusifolium\*, Marsupella funckii and Scapania scandica\*. Eurhynchium alopecuroides grew in a stream, and on rocks nearer Ffrwd Fawr members saw Campylopus subulatus, Gymnomitrium concinnum\*, G. obtusum\* and Plagiochila punctata.

3 April. The morning stop was Roundton, a small rocky dolerite hill near Church Stoke. Rocks and earth at the base of the hill produced Philonotis capillaris, Rhodobryum roseum and Frullania fragilifolia. On the south side of the hill, members were gratified to find Tortula canescens\* in some quantity and with perfect capsules. There were several other xerophilous and thermophilous plants, including Bryum elegans\*, Encalypta vulgaris, Grimmia conferta\*, Pottia lanceolata\*, Pterogonium gracile, Weissia crispa var. aciculata\*, W. microstoma\* and Barbilophozia barbata. Sheltered habitats nearby produced Eurhynchium speciosum\* and Plagiopus oederi\*. In the afternoon the party split up, a contingent visiting Snailbeach Mines (v.-c. 40) where they recorded Pottia starkeana\*. The majority, however, went up Ashes Hollow on the Long Mynd (also v.-c. 40), accompanied by Mr. J.R. Packham and Mr. C.A. Sinker. On the way up we saw Bryum flaccidum\*, Grimmia montana, Mnium seligeri, Philonotis calcarea, Zygodon conoideus, Leiocolea bantriensis and Reboulia hemisphaerica. By the time we reached the top, snow had covered up Bryum weigellii, a speciality of the area. Mr. Sinker instructed us where to dig, and we soon came on its elegant pink mats.

A Council meeting was held at Gregynog in the evening.

4 April. Having driven long distances on the previous days it was pleasant to visit the valley above Mochdre, near Newtown. Here we were led by Mr. R.R. Lovegrove of the R.S.P.B., who had kindly sought permission of numerous land owners, enabling us to go for three miles in continuous woodland, uninterrupted by roads or houses. Lower down the stream had cut into damp calcareous shales, which supported a characteristic flora, including Gymnostomum aeruginosum, Isopterygium depressum, Mnium stellare, Neckera crispa, Pohlia cruda, Rhynchostegiella teesdalei, Porella cordaeana, P. laevigata and P. platyphylla. Plagiothecium latebricola\* was also seen in the lower part

\* New vice-county record throughout.

of the valley. Higher up the banks became acid and we saw little of note. In the afternoon we visited the Dugwm Rock near the top of the same ridge. The Dugwm, like the Mochdre valley, had not been explored previously for bryophytes, and was a complete surprise. Members expected to find an acidic rocky outcrop suitable for Grimmia spp. What they found instead was a deep, sheltered, highly calcareous gorge with sheets of fruiting Cratoneuron commutatum and Ctenidium molluscum and Hygrohypnum luridum. In more specialised habitats were a number of uncommon and rare species, including Amblystegiella sprucei\*, Anomobryum concinnum\*, Barbula spadicea, Grimmia conferta, Orthothecium intricatum, Philonotis calcarea\*, Blepharostoma trichophyllum, Cololejeunea calcarea\*, Leiocolea bantriensis\*, Plagiochila punctata, P. tridenticulata\* and Scapania aspera.

5 April. When we awoke the world had been purified by a good fall of snow. The planned excursion was postponed. Instead, members explored the Severn valley, from Newtown down towards the English border. River banks in various places produced Epipterygium tozeri\*, Myrinia pulvinata, Orthotrichum rivulare, O. sprucei, Scleropodium caespitosum and Tortula stanfordensis (all seen several times). Meanwhile another party visited Llanymynech Hill, recording Barbula acuta, Funaria muhlenbergii, F. pulchella\*, Pleurochaete squarrosa, Pottia bryoides\*, P. davalliana\*, P. recta\*, Leiocolea muelleri\* and - a complete surprise - Scapania calcicola\* in its first British station outside Scotland. In the afternoon, one party went to Sweeney Mountain (v.-c. 40), recording Gyroweisia tenuis, Tortula marginata and Nardia geoscyphus\* on sand rocks. Nearby, Leucodon sciuroides was seen on an apple tree. Another party went to Cwm Llech near Pennant Melangell. In open woodland an ash tree had recently fallen, and on branches about 6 m above the base grew Habrodon perpusillus\* and Zygodon viridissimus var. vulgaris. Presumably this would be their natural habitat in climax woodland, rather than on the isolated tree boles which are their familiar habitat at present.

6 April. Next day most of the snow had melted and we went to the north end of Lake Vyrnwy. In valleys and on rocks a number of interesting plants were seen, including Anoetangium aestivum\*, Cryphaea heteromalla, Isopterygium pulchellum, Sphagnum warnstorffianum, Lepidozia pearsonii and Riccardia latifrons. A surprising find was Cryptothallus mirabilis on the surface of the litter in a very dark spruce plantation. Probably it had been exposed by heavy rains earlier in the season. On the way over to Llanymawddwy cars stopped briefly at Bwlch y Groes (v.-c. 48), and Grimmia conferta\* and Pohlia elongata were found by the road. The valley of the Afon Pumryd (v.-c. 48) was less interesting than had been expected, with only Atrichum crispum, Bryum bornholmense\*, Eurhynchium alopecuroides, Isopterygium pulchellum, Seligeria recurvata, Anastrepta orcadensis, Hygrobiella laxifolia and Marsupella funckii worthy of mention.

7 April. First stop was Clegyrnant, near Mynydd Rhiw Saeson. There was little that we had not seen earlier on the meeting, but Dicranella subulata, Drepanocladus revolvens var. intermedius\*, D. vernicosus, Rhabdoweisia denticulata, Anthoceros husnotii\* and Barbilophozia atlantica were additions. Finally we went to Cwm Cywarch (v.-c. 48), whose magnificent crags swarmed with orange climbers like spider mites. Savage sleety squalls kept most of the field to the lower ground, where they found Barbilophozia barbata, Cephaloziella stellulifera, Leiocolea muelleri and Scapania scandica. Those who reached the crags reported Campylopus setifolius, Dicranodontium denudatum var. alpinum, Ditrichum zonatum, Rhacomitrium ellipticum, Bazzania tricenata, Blepharostoma trichophyllum, Cephaloziella pearsonii, Gymnomitrium concinnum, G. crenulatum, G. obtusum and Herberta adunca.

On various days members had stopped by the River Severn on their way back to Gregynog. Grimmia retracta, Tortula laevipila var. laevipiliformis\* and T. papillosa\* were found in this way near Welshpool, and Fissidens crassipes near Newtown. One member in particular searched - mainly by the Severn and Wye - for tuberous mosses. Many vice-county records resulted: Bryum sauteri 42\*, B. violaceum 43\*, 47\*, Dicranella staphylina 42\*, 43\*, and Tortula stanfordensis 37\*, 40\*, 42\*, 43\*. Mid Wales in general, and Montgomeryshire in particular, had hitherto been rather neglected. It was agreeable to find that the neglect was undeserved.

M. O. HILL

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#### THE SUMMER MEETING, 1975

The Summer meeting was held from 16 to 30 August. It was centered at Arklow, Co. Wicklow. Six people attended. In the following account Irish National Grid references are given. Localities are in v.-c. H. 20 unless otherwise stated.

17 August. David McArdle (1890) reported that Lough Bray (32/1315) in north Wicklow was rich in hepatics. He recorded 67 species including Frullania fragilifolia, Porella thuja, Bazzania trilobata, Harpanthus, Herberta adunca, Marsupella sphacelata, Moerckia hibernica and Pallavicinia lyellii. None of these species was among the 27 hepatics recorded on the 17th. The ground about the upper lake was searched from the shore to about one third the way to the top of the cliffs and further into some of the gullies. Barbilophozia floerkei, Calypogeia neesiana var. neesiana\*, Lepidozia trichoclados, Lophozia incisa, Sphenobolus minutus, Dicranum scottianum, Isothecium holtii and Sphagnum fimbriatum were the most notable species found. Boggy, N-facing fields at Glencree (32/1615) had Cephalozia leucantha\*, C. pleniceps\*, Lepidozia sylvatica\* and Riccardia latifrons\*. Oak woodland in the valley bottom inter-planted with conifers had Plagiochila spinulosa, Solenostoma sphaerocarpum, Eurhynchium alopecuroides and Isothecium holtii. Dr. Pitkin pointed out Riccia huebenerana at Vartry reservoir (32/1903) where Fossombronia foveolata\* was also found.

18 August. The Devil's Glen (31/2398) is a deep, wooded river-glen running W. - E. In the river, the Vartry, Porella pinnata is abundant. Dark shaded streams have Jubula hutchinsiae. Lophocolea fragrans is on large flat rocks in deep shade. Neckera crispa and Marchesinia mackaii were found on one outcrop by the river path. Anthoceros laevis\*, Cephalozia hampeana, Diplophyllum obtusifolium, Frullania fragilifolia, Lejeunea lamacerina var. azorica, Lophozia incisa, Metzgeria conjugata, Nowellia curvifolia, Porella laevigata, Riccardia palmata, Riccia glauca\*, Solenostoma triste, Tritomaria quinque-dentata, Cirriphyllum crassinervium, Eurhynchium alopecuroides and Pterogonium gracile were all found in the stretch of over a mile between the castle and the waterfall. Pennycomequick Bridge (31/2778) had Tortella tortuosa; sand-dunes nearby had Eurhynchium megapolitanum and Brachythecium albicans\*; clay banks of streams on the west of the road had Epipterygium tozeri\* and Funaria fascicularis.

\* New vice-county record throughout.

19 August. Spent in Wexford (H. 12). The river, clay banks and scrub west of the bridge south of Clonough Bridge (31/2066) produced Cryphaea heteromalla, Epipterygium tozeri\*, Fontinalis squamosa, Leskea polycarpa\*, Orthotrichum stramineum, Metzgeria fruticulosa, Pellia neesiana and Riccardia sinuata. Rocky sea shore and clay banks at Clones Strand (31/2464) had Barbula tophacea, Desmatodon convolutus and Pottia crinita and an as yet unidentified maritime Bryum. The bryophytes of Tara Hill (31/2162) are calcifuge. An undistinguished list includes Dicranoweisia cirrata. Tortula ruraliformis was on a tiled roof in shade. At a forestry track and gateway south of Killinierin (31/1665) Anthoceros laevis\*, A. husnotii\*, Fossombronina wondraczeckii, Lejeunea ulicina and Metzgeria fruticulosa were found. The first Irish record was made of the segregate of Bryum bicolor with numerous small yellow bulbils, first noted in 1948 from Cassington, Oxfordshire (Trans. Br. bryol. Soc. 1, 245-6, 1949). At Pallis Bridge (31/1168) Dicranella schreberana, Hynum lindbergii, Orthotrichum striatum and Thuidium delicatulum\* were noted at roadside and scrub. Streams and moorland at Croghan (31/1271) on the south side of Croghan Mt. had Acrocladium stramineum, Breutelia, Campylopus atrovirens, Fontinalis antipyretica var. gigantea\*, Sphagnum contortum, Calypogeia muellerana\* and Scapania irrigua.

20 August. The North Prison (31/0392), which is a west-facing lakeless corrie on Lugnaquilla, was the objective. We crossed the Avonbeg River in Glenmalur at Baravore Ford and struck up through the forestry plantation and over the ridge on the left to the stream, beyond which we picked up the path to the high ground. There is a stiff climb for about 200 ft. and then a level or gently rising part past the stream from Art's Lough (31/055938) until the 1300ft contour is reached. Here there is a waterfall and ascent is to the east of it over very rough and steep but not difficult or dangerous ground. Then we had a further long trudge over rising ground until we took a west branch of the stream at about 1700ft. and a stiff climb to 2700ft. over the spur that runs NW from the summit. We descended into the North Prison in swirling fog and very stiff winds which made mopping somewhat unpleasant and even a little difficult. Gymnomitrium obtusum\* was found on the ridge and Anastrepta orcadensis\* (very rare) in the corrie. Drepanocladus exannulatus, Polytrichum alpinum, Sphagnum quinquefarium, S. robustum, Anthelia julacea, Gymnomitrium crenulatum and Lophozia alpestris were also found but there was little variety to compensate for the arduous ascent.

21 August. A Juncus marsh at the west end of the Upper Lake at Glendalough (31/0996) had Sphagnum fimbriatum, S. squarrosum and Haplomitrium hookeri\*, the last growing with Scapania irrigua on sandy peat. Weissia controversa var. densifolia\* was on lead-mine waste of which the roadway is made. Marsupella funckii was on banks by the roadway. At the east end of the Upper Lake there is some rocky woodland which produced Metzgeria fruticulosa, Plagiochila spinulosa, Sphagnum girgensohnii, S. quinquefarium and Cynodontium bruntonii. About the stream and waterfall nearby (31/1196) Dicranella rufescens, Isoetecium holtii, Hygrobiella laxifolia and Marsupella aquatica were noted (the Hygrobiella record for H. 20 in the Census Catalogue has not been traced).

22 August. Willow carr and oak woodland at the E. end of L. Dan (32/1602) was explored. Acrocladium cordifolium, Atrichum crispum, Drepanocladus uncinatus, Funaria obtusa, Hygrohypnum ochraceum, Isoetecium holtii, Sphagnum molle\*, Thuidium delicatulum, Cryptothallus\* and Lejeunea lamacerina var. azorica were found. The afternoon was spent at Luggala above L. Tay (32/1508). This is a deep wooded gorge with a swift stream of cascades and pools, large granite boulders and flat rock faces. Dumortiera is recorded from here but we did not see it. Atrichum crispum, Eurhynchium alopecuroides, Fontinalis

squamosa with capsules, Isothecium holtii, Douinia ovata, Marsupella aquatica and Plectocolea paroica were in and by the stream, Dicranum fuscens, D. scottianum and Plagiochila punctata on wooded slopes and Hygrobiella on wet sloping rock in steep woodland. Nowellia and Tritomaria exsectiformis were on rotten logs and Frullania fragilifolia on a fallen tree-trunk.

23 August. The Avonbeg R. at Greenan (31/1487) produced Bryum argenteum var. lanatum\*, Dicranella rufescens, D. palustris, Rhynchostegiella pumila, Fissidens polyphyllus, Lejeunea lamacerina var. azorica, L. ulicina and Metzgeria fruticulosa. The Ow R. at Aughavannagh (31/0784) produced Atrichum crispum, Mnium affine, Plagiothecium denticulatum, Fossombronia wondraczekii\* and Pellia neesiana.

24 August. Rathduffmore Bog (31/0182) is the only surviving piece of raised bog in Co. Wicklow. Much of the ground is cut over and has Sphagnum squarrosum, Cephalozia macrostachya\*, Cephaloziella hampeana, C. subdentata\*, Lepidozia setacea, L. sylvatica, L. trichoclados, Pallavicinia lyellii, Riccardia latifrons, R. multifida, R. palmata, R. sinuata and Scapania irrigua. On the intact bog Mylia taylori, Sphagnum magellanicum and two small hummocks of S. imbricatum\* were found. Blasia pusilla was on the side of a drain. Rahill Fen (21/8784) in H. 13 is  $\frac{1}{4}$  mile S. of Yellowford Crossroads to the west of the T42. The rare sedge, Carex appropinquata, grows there. Rich fen species, Acrocladium giganteum, Bryum pseudotriquetrum, Scorpidium scorpioides, Drepanocladus revolvens, Mnium pseudopunctatum\* and Brachythecium mildeanum\* were seen. Camptothecium lutescens was found on clay banks. Other notable species were Bryum klinggraeffii\*, Dicranella schreberana\*, Hylocomium brevirostre, Sphagnum squarrosum, Chiloscyphus pallescens\* and Leiocolea turbinata. Holdenstown Bog (21/8785) nearby is in H. 20. It is a poor fen for the most part with Acrocladium stramineum, Leptodictyum riparium and Sphagnum squarrosum but the vegetation at the centre approaches that of raised bog with Polytrichum alpestre, Sphagnum rubellum and Cephaloziella hampeana. A stretch of the Aughrim R. (31/1379) had Dichodontium pellucidum, Fissidens viridulus, Fontinalis squamosa, Grimmia alpicola var. rivularis, Hygrohypnum luridum, Hyocodium flagellare, Chiloscyphus polyanthos, Porella pinnata, Solenostoma pumilum and Hygroamblystegium fluviatile.

25 August. L. Ouler is a corrie lake at 1900ft. under Tonelagee (32/00). It is bounded on the south and west sides by high cliffs with numerous flushes, wet rocks and block scree. These have Amphidium mougeotii, Ctenidium molluscum var. condensatum, Diphyscium foliosum, Anthelia julacea, Barbilophozia floerkei, Calypogeia trichomanis\*, Gymnomitrium obtusum, Lepidozia pearsonii\*, L. trichoclados, Marsupella sphacelata, M. ustulata\*, Plagiochila punctata, Plectocolea obovata and Tritomaria quinqueidentata. Leptodontium flexifolium was found on burnt peat and Grimmia patens on boulders by the lake. Disused buildings and mine waste at the old lead workings below L. Nahanagan (31/0998) had Gymnostomum recurvirostrum, Weissia controversa var. densifolia and Cephaloziella stellulifera\*. An unusual Dicranella varia with stems over 8 cm long, showing 5 - 6 annual growth increments was found on a dripping bank on the north side of the road.

26 August. The day was spent in Wexford (H.12). Duffcarraig rocks on the coast (31/2158) had Grimmia maritima, Tortella flavovirens and Leiocolea turbinata. Near the bridge on the L3 east of Courtown (31/1856), Omalia, Neckera pumila, Plagiothecium succulentum, Tortula laevipila and T. latifolia\* were on trees by the roadside or in the deep wooded gorge under the bridge.

Carraiganeagh Rock (31/1557) is an Ordovician sandstone. It is partly quarried. Bartramia pomiformis was abundant on ledges and in crevices. Also found were Dicranoweisia cinnata, Epipterygium tozeri, Orthotrichum pulchellum\*, Metzgeria fruticulosa and Radula complanata. A boggy field at Whitewood (31/0454) had Acrocladium cordifolium, Drepanocladus exannulatus var. exannulatus and Pellia neesiana. The R. Bann is a tributary of the Slaney. At a bridge north of Camolin (31/0753), Dicranella rufescens\*, Epipterygium tozeri, Funaria attenuata\*, Orthotrichum sprucei\*, O. diaphanum and Porella pinnata\* were found. Sphagnum contortum and Drepanocladus exannulatus var. exannulatus were found in the valley at Slieveboy (31/0258). A bridge  $\frac{3}{4}$  mile NE of Knock Brandon (31/0763) had fine tufts of Distichium capillaceum\*. Bryum radiculosum was found nearby. A quarry at Cummer Vale (31/0666) had Barbula hornschurchiana, Hypnum lindbergii, Lophozia bicrenata and Riccia sorocarpa.

27 August. In H. 13,  $\frac{3}{4}$  mile E. of the Nine Stones (21/8254) a stream has dug out a V-shaped defile on the N. side of Mt. Leinster. Funaria obtusa\*, Anthelia julacea\*, Barbilophozia floerkei\*, Lepidozia trichoclados, Lophozia incisa\*, Nardia compressa\*, Riccardia latifrons and R. multifida\* were recorded. On the Wexford side (H. 12) of Mt. Leinster at Cloroge (21/8449) flat moorland and forest tracks, drains and walls had Bartramia pomiformis, Ditrichum cylindricum, Drepanocladus fluitans var. falcatus\*, Gymnocolea inflata, Lepidozia trichoclados\* and Marsupella funckii\*. A stream and boggy field on SE side of Black Rock Mt., H. 12 (21/8650), had Dichodontium pellucidum, Cephalozia connivens\*, Lepidozia setacea\* and Riccardia latifrons.

28 August. The morning was spent in Glencullen R. Glen at Enniskerry (32/2118). This area is covered with calcareous drift. The river flows between steep banks and is approached from the T43 by an open forestry road. Brachythecium glareosum, B. mildeanum\*, Philonotis calcarea, Leiocolea badensis and Plectocolea hyalina were found on the track and Barbula spadicea, Cratoneuron commutatum, Eucladium, Fissidens rufulus\*, F. curnowii\*, Rhynchostegiella teesdalei, Trichostomum crispulum var. elatum\*, T. tenuirostre, Solenostoma triste and S. pumilum by the river. Powerscourt waterfall (32/2012), a favourite collecting ground for 19th century bryologists, is an impressive cascade. The cliffs in the immediate area of the fall are rather dangerous with loose rock and unstable boulders. It has the usual Wicklow species of acid rock and swift-flowing stream. The following were noted, Eurhynchium alopecuroides, Isoetecium holtii, Rhynchostegiella pumila, Cephaloziella starkei, Nardia compressa, Nowellia curvifolia and Solenostoma sphaerocarpum. Orthotrichum lyellii and Leucodon sciuroides were on the oaks in the park. Ephemerum serratum var. serratum was found at the dried up northern end of the Vartry reservoir (32/2006).

29 August. A badly poached Sphagnum fen to the N. of Avoca (31/2181) had Dicranum bonjeanii, Drepanocladus exannulatus var. rotae\*, Sphagnum fimbriatum, Splachnum ampullaceum, Cephaloziella stellulifera, Lepidozia setacea, Riccardia latifrons, R. multifida and large mats of Solenostoma crenulatum. Chiloscyphus pallescens\* was found in a small marshy field nearer Avoca. South of Avoca the river is polluted with washings from the copper mines. Woodland, railway track and riverside here had little that was unusual.

During the meeting a list was compiled for the Arklow town area, sea wall, riverside, waste ground and fields. It includes Barbula hornschurchiana\*, B. microerythrocarpum\*, Funaria fascicularis, Tortula ruralis and Dicranella rufescens.



I wish to thank Dr. Pitkin for his help on the meeting and Mrs. Paton and Mr. Perry for dealing so cheerfully with the extra work that a small but long meeting imposed on them.

D. SYNNOTT

#### REFERENCE

- McArdle D. (1890). Hepaticae of Loughbray, Co. Wicklow. J. Bot. 28, 356 - 360.
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#### THE ANNUAL MEETING, 1975.

The annual meeting was held on the weekend of 20 - 21 September in the Plant Science Laboratories at the University of Reading by kind permission of Professor V.H. Heywood. About forty-five members and guests attended on the Saturday when the President introduced six speakers, summaries of whose papers are given here.

Dr. E.V. WATSON (Department of Botany, University of Reading): 'Changing views on the evolution of the Bryophyta'. This paper was concerned with 'macro-evolution', or the general questions of the origin of the Division Bryophyta and the inter-relationships between major orders of both liverworts and mosses. Attention was drawn to the contrast between the relatively conservative statements which continued to appear in many modern textbooks and the highly iconoclastic views put forward in some contemporary papers. A good example of the latter was 'A new look at Evolution and Phylogeny in Bryophytes' by W.C. Steere. The co-existence of so manifestly contradictory statements could only lead to confusion in the minds of students. Examples were given of such contradictions, both as regards putative origins of the group and in connection with evidence for inter-relationships. By contrast, the position some sixty to seventy years ago was seen to have been a much more stable one. Older authors such as Cavers, Campbell and Bower were cited. Whilst adhering to a particular body of morphological evidence in reaching their conclusions, some of these authors (e.g. Cavers) were more cautious in making their pronouncements than they had sometimes been given credit for. The modern tendency was to undervalue morphological evidence and, in extreme cases, to attempt to undermine the basic tenets of morphology. Some reasons for this were sought.

Mr. M.O. HILL (Institute of Terrestrial Ecology, Bangor): 'Why is Sphagnum considered to be a difficult genus?'. Various inter-related factors have contributed to make Sphagnum difficult in Britain: unfamiliar morphology, out-of-date floras that either lump too much or split too much, great plasticity, and two pairs of taxa that have not been properly understood even by the experts. Plasticity is undoubtedly the basic problem; several pairs of good species can only be separated by 'soft' characters, none of which is individually reliable. British sphagnologists have incorrectly interpreted the distinction between S. rubellum and S. capillaceum - which intergrade completely - and between S. auriculatum and S. subsecundum - which, if properly interpreted, are genuinely distinct with no intermediates.

Dr. R.E. LONGTON (Department of Botany, University of Manitoba): 'Reproductive biology and evolutionary potential in the Bryophyta'. Bryophytes are commonly considered to evolve slowly. This paper assesses three factors which have been suggested as important in limiting their evolutionary flexibility, the first being the dominance of a haploid generation incapable of shielding recessive alleles in a heterozygous condition. This consideration applies only to genes expressed in the gametophyte while cytological data raise the possibility that most modern bryophytes may be gametophytically at least diploid following doubling of ancestral chromosome complements. In connection with the second point, that evolutionary potential may have been reduced by a widespread abandonment of sexuality, data are reviewed that suggest that most moss species and many liverworts produce spores in vast numbers at least in part of their range. There is little direct evidence of spore germination leading to establishment of mature gametophytes in the field, but bryophytes which produce spores freely appear in general to be more successful than those which do not, suggesting that sexual reproduction is effective in the former group. Thirdly, it has been suggested that inbreeding may severely reduce genetic flexibility in the ca 50% of mosses and ca 20% of hepatics which are monoecious. Little is known about population structure and the incidence of outcrossing in such taxa. However, the occurrence of hybrid sporophytes in several groups of monoecious mosses, and the degree of ecological and morphological variation in certain mosses and liverworts, indicate that inbreeding is by no means obligate throughout the monoecious forms. Further studies are required to clarify the issues discussed. Meanwhile, it is suggested that the patterns and processes of microevolution in bryophytes may prove more similar to those in flowering plants than is sometimes supposed.

Dr. N.W. ASHTON and Dr. D.J. COVE (Department of Genetics, University of Cambridge): 'Auxotrophic and developmental mutants of Physcomitrella patens'. Thirty biochemical mutants have been isolated in the haploid monoecious moss Physcomitrella patens: five nicotinic acid auxotrophs (nic<sup>-</sup> mutants), four p-aminobenzoic acid auxotrophs (pab<sup>-</sup> mutants), four adenine auxotrophs (ade<sup>-</sup> mutants), two nutritionally dependent strains which are repaired by proline or arginine (prg<sup>-</sup> mutants), three nitrate non-utilizers (nat<sup>-</sup> mutants) and twelve strains which are resistant to the amino acid analogues, D-serine and p-fluorophenyl alanine.

Eight crosses involving six different auxotroph strains, one of which is also chlorophyll deficient (yellow) have been performed. All of the parental strains are self-sterile but cross-fertile in certain combinations. Progeny from the crosses have been analysed but no linkage has been detected. Self-sterility segregates as a pleiotropic effect of the nic and pab mutations.

Two categories of mutants which are abnormal with respect to gametophore production have been isolated. Mutants of one class produce few or no gametophores (gam<sup>-</sup> mutants); mutants of the other class produce many more gametophores than usual (ove mutants). There are two groups of gam<sup>-</sup> strains. Some can be made to produce gametophores, either by culturing them in the vicinity of an ove strain or by the supply of a cytokinin. The other type is unaffected by either treatment.

One cross involving a gam<sup>-</sup> strain has been made. However, most gametophore developmental mutants are sterile. We are therefore attempting to devise a means of genetic analysis, independent of the sexual cycle, which entails the production of diploid protonemata by the fusion of protoplasts.

Professor G.K. BERRIE (Fourah Bay College, Sierra Leone): 'Spore dispersal and perennation in West African species of Riccia'. Professor Berrie's paper is to be published in full in the Journal of Bryology and will, therefore, not be summarised here.

Dr. A.J. HARRINGTON (Department of Botany, University of Ibadan): 'Vegetational zonation and the bryophytes of West Africa'. The major vegetation zones of West Africa are determined primarily by climate, in particular by the mean annual rainfall and its seasonal distribution.

In the dry Sahel and Sudan savanna zones, the few bryophytes recorded occur mainly in riverain habitats or as ephemerals which develop during the wet season, e.g. Riccia spp. A more varied bryophyte flora is found in the Guinea savanna zone and includes such characteristic species as Riccia intermedia E.W. Jones and Erythrodontium barteri (Mitt.) Broth. The absence of bryophytes from large areas of savanna is undoubtedly due to the annual burning in the dry season.

In the forest zone, the majority are epiphytic. They can be divided into two groups; sun or high epiphytes which are usually restricted to the crowns of taller trees (e.g. Diplasiolejeunea spp., Calymperopsis spp.), and shade or low epiphytes which grow on tree trunks and branches in the shade (e.g. Plagiochila spp., many Lejeuneaceae and mosses such as Neckeropsis spp. and Pilotrichella spp.). Bryophytes also occur on living leaves, decaying wood, disturbed soil and termite mounds, and rock outcrops and boulders.

The richest bryophyte assemblages of West Africa are found in forests at altitudes above 1200 m., e.g. in the Loma Mountains of Sierra Leone.

The Annual General Meeting was held after tea. In the evening members were the guests of Professor Heywood and Dr. E.V. Watson at a conversazione at which the following exhibits were displayed:

Dr. A.J.E. SMITH: 'A comparison of maps showing distributions based upon vice counties and 10 Km grid squares'.

Dr. A.J.E. SMITH: 'A provisional atlas of bryophytes'.

Dr. A.J.E. SMITH: 'A checklist of British mosses - Sphagnaceae to Entodontaceae'.

Dr. A.J.E. SMITH: 'Illustrations for a new British and Irish Moss Flora'.

Mr. A.R. PERRY: 'Bryologists at work - photographs from the B.B.S. album'.

Dr. H.L.K. and Mrs. M.P. WHITEHOUSE: 'Aspects of the ecology and distribution of Tortula (Hyophila) stanfordensis'.

Dr. J.G. DUCKETT: 'Photographs of British bryophytes'.

Mr. M.V. FLETCHER: 'A collection of living Tortulas'.

Dr. E.W. JONES and Dr. F. ROSE: 'The mystery of Plagiochila ambagiosa solved'.

Dr. M.E. NEWTON: 'Heterochromatin in Pellia'.

Dr. E.W. JONES: 'Some African bryophytes and their distribution'.

Dr. E.V. WATSON: 'A few thalloid hepatics from the living collections at Reading'.

The Society is very grateful to Dr. Watson who acted as local secretary, not only for the organisation of this most successful meeting, but also for making the arrangements for members to stay in Reading University's Wantage Hall over the weekend. This new innovation was very much appreciated by all who took advantage of it.

G.C.S. CLARKE

Three localities were visited on the excursion of 21 September. All were in the area W.S.W. of Reading where Tertiary gravels prevail, limiting the flora to more or less acidophile species. Most habitats were abnormally dry after the exceptional summer. The first locality visited was Silchester Common (v.-c. 12), where the most rewarding ground was in the valley bottom. Here Cryptothallus mirabilis was found under birches, seven species of Sphagnum were noted in the bog, including S. nemoreum and S. fimbriatum; and in the alder carr Radula complanata, Pellia neesiana, Chiloscyphus pallescens c.per.†, Acrocladium cordifolium, Ulota bruchii and U. crispa agg. were seen.

At Tadley Common (also in v.-c. 12) the dried-out 'damp heath' bore extensive patches of Gymnocolea inflata c.per., Campylopus brevipilus and, locally, Cephaloziella starkei and C. subdentata. In the low-lying boggy western end of the common Sphagnum spp. were locally much intermixed with the liverworts Mylia anomala, Lepidozia setacea (female plants) and Odontoschisma sphagni. Some healthy tufts of Dicranum spurium occurred.

In Wasing Woods (v.-c. 22) only the southern extremity was effectively explored and the 'moss layer' was much dried out. The best finds were Leucobryum juniperoideum, growing with L. glaucum (sometimes mixed in a single cushion), and Dicranum polysetum. Liverworts included Calypogeia fissa, C. muellerana, Riccardia pinguis and Scapania undulata, but nothing of great interest. Vegetation on the adjacent gravel-pit area was too undeveloped as yet.

E. V. WATSON

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#### MINUTES OF THE ANNUAL GENERAL MEETING, 1975

Minutes of the Annual General Meeting held at 1650 hrs on Saturday 20 September, 1975, in the Palmer Building, University of Reading.

PRESENT: Mr A. C. Crundwell (President - in the Chair) and 39 other members.

(1) APOLOGIES: Apologies for absence received from Dr K. J. Adams, Dr H. J. B. Birks, Dr P. D. Coker, Mr N. J. Collins, Mr R. D. Fitzgerald, Mr S. G. Harrison, Dr M. C. F. Proctor, Mr E. C. Wallace and Mr M. Walpole.

CONDOLENCES: The President announced the death, last December, of Kjeld Holmen and paid a tribute to him.

(2) MINUTES: The Minutes of the Annual General Meeting held on 19 October, 1974, in the Department of Biological Sciences, University of Exeter (published in Bulletin 25), were approved and signed.

(3) MATTERS ARISING: None.

(4) CHANGES IN COUNCIL STRUCTURE:

Reported (by the President):- That in October 1973 a Working Party had been formed to investigate how the Council might best run the affairs of the Society and that it had made a number of recommendations. Two of these that had been adopted by Council were that it formed an Executive Committee whose function was to decide on matters of immediate importance, and a

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† The chromosome number of the material of Chiloscyphus pallescens was later counted by D. T. Steel and found to be 18.

Strategic Planning Committee which was to look into matters requiring long-term consideration.

(5) PROPOSED ALTERATIONS TO RULES:

Reported (by the President):- That in order to give the Rules greater flexibility and to allow a larger number of Elected Members to serve on Council, it recommended the adoption of the following two alterations and two additions to Rule 5(c):

(a) The six elected members shall ordinarily serve for two [instead of three as at present] years, three [instead of two] being elected at each Annual General Meeting.

(b) Elected members who have served the full term shall not be eligible for re-election for two [instead of one] years after their term of office.

(c) Retiring officers shall not be eligible for election as elected members until after an interval of two years.

(d) Officers are eligible for election to another office immediately after retiring from an office.

Resolved (proposed by Dr E. V. Watson, seconded by Dr A. J. Harrington, carried unanimously):- That these alterations and additions to the Rules be adopted en bloc.

(6) OFFICERS' REPORTS FOR 1974:

Reported (in answer to Mr A. J. Pettifer):- That £75 had been granted to each of two applicants to the Warburg Memorial Fund over the last year.

Reported (in answer to Mr A. J. Pettifer):- That the Society's Photograph Album was still being added to and would be on view at the Conversazione.

Resolved:- That since the Reading Circle was floundering the Secretary would attempt to revitalize it. (Fourteen members at the meeting agreed to subscribe if this could be done.)

Considered:- Whether Lindbergia and Herzogia should also be included in the Reading Circle distribution besides Revue Bryologique et Lichénologique, Journal of the Hattori Botanical Laboratory and Bryologist.

(7) ELECTION OF OFFICERS, 1976-7:

(a) VICE-PRESIDENT:

Resolved (unanimously):- That Prof. P. W. Richards be elected as Vice-President.

(b) TREASURER:

Considered (by the President):- That Mr R. D. Fitzgerald was resigning as Treasurer. He had done a great deal for the Society during his 10-year term of office and we owe him a great debt.

Resolved (unanimously):- That Dr W. D. Foster be elected as Treasurer.

(c) RECORDER FOR MOSSES:

Resolved:- That Mr M. O. Hill be elected to replace Mr A. C. Crundwell who was resigning as Recorder for Mosses.

Dr J. G. Duckett gave Mr Crundwell a vote of thanks.

(d) MEETINGS SECRETARY:

Considered:- That Dr G. C. S. Clarke wished to resign as Meetings Secretary but that he would be willing to exchange offices with our Bibliographer, Dr Duckett.

Resolved:- That Dr J. G. Duckett be elected as Meetings Secretary, and Dr G. C. S. Clarke be elected as Bibliographer.

Mr M. O. Hill gave Drs Clarke and Duckett a vote of thanks.

(e) OTHERS:

Resolved:- That as all other Officers had expressed their willingness to serve again they be re-elected.

(8) ELECTION OF MEMBERS OF COUNCIL:

Considered:- That Dr Foster's election as Treasurer had created a third vacancy in the Elected Members.

Resolved:- That as there had been no further nominations for Elected Members, Mr N. G. Collins, Mr D. G. Long and Miss H. M. Lucking, nominated by Council, were elected to serve for 2 years from 1 January, 1976.

(9) PLACE AND DATE OF ANNUAL GENERAL MEETING, 1976:

Proposed (by Dr J. G. Duckett, seconded by Dr A. J. E. Smith):- That the A.G.M. should in future be held on the Saturday of the Spring Meeting rather than at the present time.

Considered:- That when the A.G.M. was held in Spring, as in the past, attendances at the Spring meetings were higher than now. That a larger cross-section of the membership is able to attend Autumn meetings because there are usually fewer commitments at that time of the year. That overseas members can often attend Autumn meetings but not Spring ones.

A vote was taken on the proposal, and this was defeated (4 votes for, 36 against).

Resolved:- That the A.G.M. and Paper-reading meeting, 1976, be held at Bangor, north Wales, 25-26 September, and arranged by Drs Duckett and Smith.

(10) OTHER MEETINGS IN 1976 AND 1977:

(a) SPRING FIELD MEETING, 1976:

Reported:- That this was based on Knutsford, Cheshire, 7-14 April, and arranged by Dr W. D. Foster.

(b) SUMMER FIELD MEETING, 1976:

Reported:- That this was based on Melrose, Roxburghshire, 21-28 August, and arranged by Mr D. G. Long.

(c) SPRING FIELD MEETING, 1977:

Considered:- That this might be in Dorset or south Wiltshire.

(d) SUMMER FIELD MEETING, 1977:

Considered:- That this might be one week based on Blair Atholl arranged by Dr P. D. Coker, followed by a week further north, possible in Elginshire or Banff, towards the end of July or the beginning of August.

(11) ANY OTHER BUSINESS:

(a) PUBLICITY:

Reported:- That the new Prospectus was now available and that members should distribute copies to potential new members.

(b) TAXONOMIC TEACH-IN, CARDIFF, 1975:

Reported:- That arrangements for this meeting were well in hand but that the number of potential participants was discouragingly small.

(c) THANKS:

Resolved:- That we thank Dr Clarke for making the long distance arrangements for this meeting, and especially Dr Watson, the Local Secretary, for his expert organization.

(d) ANNUAL DINNER:

Considered:- That it might be possible to hold a dinner occasionally though not necessarily annually. That it might be feasible to try it out at the next Paper-reading Meeting in Bangor.

(e) JOURNAL OF BRYOLOGY:

Reported (by the Editor):- That the next part of the Journal was due out in November and would have 90 pages.

(f) MEMBERSHIP LIST:

Reported (by the Secretary):- That we are waiting for the membership to settle down after the recent rises in subscription rates before producing a new membership list, but that it was hoped to do this next year and distribute free copies to members.

(g) MORE THANKS:

Dr E. V. Watson thanked Ivan Truman, Susan Gateby and other staff of the University of Reading, and Dr G. C. S. Clarke and Mr Perry for their help in making arrangements for this meeting.

(h) NEW CENSUS CATALOGUES:

Reported (in answer to Mr B. J. O'Shea):- That there was no immediate chance of new editions of the Census Catalogues, and that we should await, at least with regard to the Moss C.C., the production of Dr A. J. E. Smith's new Moss Flora.

(i) MR A. C. CRUNDWELL:

Dr E. W. Jones gave a vote of thanks to our President for his expert chairing of Annual General Meetings, and for all the work he has done on our behalf.

The meeting closed at 1823 hrs.

A. R. PERRY,  
Hon. Secretary,  
24 September, 1975.

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#### TAXONOMIC TEACH-IN, NOVEMBER 1975

The second taxonomic workshop was held on 15 November in the Department of Botany, University College, Cardiff by kind permission of Prof. A.G. Smith, and arranged by the Secretary. It was attended by 17 members and 5 invited guests. As with the first meeting the speakers spoke about various 'difficult' genera, pointing out the problems within them, the pitfalls to avoid and characters to look for in naming material, and how to prepare material for microscopical study.

Dr. A.J.E. Smith briefly outlined the sections of the genus Mnium and provided a key for their determination. Characters for the separation of the species of the section Plagiomnium were discussed and a key to the species handed out. The difficulties involved in the identification of the plants became evident on examination of herbarium material.

Prepared slides of British species of Fissidens were provided by Dr. Smith for the second session, and the means of discriminating the difficult pairs of species, F. viridulus and F. bryoides, F. crassipes and F. rufulus, F. cristatus and F. adianthoides were dealt with.

In the afternoon Mr. M.O. Hill spoke about the genus Sphagnum, emphasising characters that can be used in the field. Of special value are the pigmentation of the antheridial leaves, the general habit, and the orientation and shape of the stem leaves. The best way to identify the species is by first recognising the sections of the genus to which they belong. Until some experience has been gained, microscopic characters for identifying the sections may be found difficult to observe.

Fifteen people took to the field on 16 November in order to try to put into practice some of the hints in identification that they had assimilated on the previous day. The morning stop was a boggy hillside on the south-west side of Mynydd Eglwysilan, about 4½ miles north-west of Caerphilly, v.-c. 41, specially chosen for the seven Sphagnum species that were known to occur there. The locality was unfortunately extremely exposed and therefore unpleasant, so although ten species of Sphagnum were recorded, including S. teres, the Secretary was not altogether popular. Much of his former popularity was restored, however, by his choice of pub for lunch where most of the party congregated at noon. This was the Rose and Crown, Eglwysilan, which greeted us with a roaring fire, an extremely jovial clientèle and some excellent sandwiches. Mr. Hill won affection from the locals by handsomely contributing to a raffle of items for charitable causes, to an auction of an article of clothing and to the ensuing jollification.

In the afternoon we looked at an old lead mine and the adjoining woodland on limestone south of Pen-how, Draethen Forest on the east side of Caerphilly (v.-c. 41). This was bryologically disappointing.

Thanks are due to all those who made the weekend a success, and especially to Mr. Hill and Dr. Smith. The Society's Curator, Mr S. G. Harrison, had generously arranged for participants to visit the National Museum of Wales on the Saturday evening to see the B.B.S. Herbarium; to him we are very grateful.

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A. R. PERRY

### 3. FUTURE MEETINGS OF THE SOCIETY

(a) Easter Field Meeting, 1976: Knutsford, Cheshire, 7 - 14 April.  
Local Secretary: Dr. W.D. Foster, Department of Pathology, Macclesfield Hospital, West Park Branch, Prestbury Road, Macclesfield SK10 3BL

Plans are now well ahead for this meeting. An interesting range of sites has been selected both to the east and west of Knutsford and we are hoping to be able to add very considerably to the mapping scheme for this under-recorded part of the country. A list of the main accommodation was given in the last Bulletin (No. 26); please contact the local secretary if you are hoping to attend and he will send you a finalized programme in due course. He will also attempt to answer queries about accommodation, etc. Early booking is strongly recommended.

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(b) Summer Field Meeting, 1976: Melrose, Roxburghshire, 21-28 August.  
Local Secretary: Mr D. G. Long, Royal Botanic Garden, Edinburgh, EH3 5LR

Melrose, in addition to being an attractive and historic town, is a convenient centre for exploring the diverse habitats occurring in south-east Scotland. The aim of the meeting is primarily to work new ground (most of the area is very under-recorded) but also to sample the varied terrain and geology. The Cheviot Hills provide much virgin territory; while the lower parts provide habitats such as the locally abundant 'basic fens' (Camptothecium nitens, Sphagnum warnstorffianum), acid blanket bogs (Dicranum bergeri, Cephalozia macrostachya), base rich ravines, basaltic outcrops and basic rocks by the River Tweed (Barbula nicholsonii, etc.). Pollution is virtually unknown here and many epiphytes such as Tortula papillosa are abundant.

Accommodation in Melrose is as follows:

H. Q. Burt's Hotel, Market Square (full board £42 per week at 1975 prices)

Slightly less expensive:

2. Bon Accord Hotel, Market Square

3. Kings Arms Hotel, High Street.

More luxurious and expensive:

4. George and Abbotsford Hotel

5. Waverley Castle Hotel.

Other accommodation includes several guest houses, a central camping site and Youth Hostel. Full details can be had from The Borders Tourist Association, 66 Woodmarket, Kelso, Roxburghshire.

Would people who are hoping to go please inform the local secretary who can help with travel arrangements. There is no railway station at Melrose. Although there is a good choice of accommodation, early booking is strongly advised for this popular tourist area.

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(c) Annual General Meeting and Paper Reading Meeting, 1976: University of North Wales, Bangor, Gwynedd, 25-26 September. Local Secretary: Dr J. G. Duckett, School of Biology, University College of North Wales, Bangor, Gwynedd, LL57 2UW

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(d) Easter Field Meeting, 1977: Wiltshire and Dorset, April.

G. C. S. CLARKE

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#### 4. FIELD CENTRE COURSES, 1976

- 7 - 14 April. The Draper's Field Centre, Rhyd-y-creuau, Betws-y-Coed, Gwynedd, LL24 0BH. Mosses and Liverworts, Dr D. H. Dalby.
- 14 - 21 July. Orielton Field Centre, Pembroke, Dyfed. Mosses and Liverworts, Dr D. H. Dalby.
- 20 - 27 August. Preston Montford Field Centre, Montford Bridge, Shrewsbury, SY4 1DX. Mosses and Liverworts, Dr J.G. Duckett.
- 29 September - 6 October. Kindrogan Field Centre, Enochdu, Blairgowrie, Perthshire, PH10 7PG. Bryophytes, B. S. Brookes.

Further information may be obtained from the Wardens of the Field Centres.

The course at Kindrogan is run by our member Mr Brookes, who is Warden there. There is a rich variety of habitats in the vicinity of Kindrogan and many of these will be examined including stone walls, rivers, woodlands, moorlands, mountains and mire systems. The fee is £39.00 inclusive of board, accommodation and all academic facilities.

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## 5. JOURNAL OF BRYOLOGY

We are proposing to make the following changes in the Notice to Contributors to the Journal of Bryology:

Publishers' names should be given for books not more than 10 years old.

For papers likely to exceed 2 pages in print, a running title of not more than 50 letters should be suggested by the author.

Closing dates for the receipt of manuscripts for consideration for the next part to be 1 May and 1 November.

The reason for making the closing dates two months earlier than hitherto is in order to ensure that parts are published in the calendar year on the cover.

H. L. K. WHITEHOUSE  
H. J. B. BIRKS

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## 6. LIBRARY SALES AND SERVICE

Members wishing to borrow papers from the Library should indicate when a xerox copy would do instead of the original. With bound journals this would save enormously on postage and also reduce postal damage. The cost of xerox copies is 5p per page. It should be noted that the Librarian is under no obligation to supply xerox copies but may do so at his discretion.

Would any member wishing to consult the Library in person please write to the Librarian, Dr K. J. Adams, 63 Wroths Path, Baldwins Hill, Loughton, Essex, IG10 1SH, or telephone (01-508-7863) at least three days in advance.

### (1) FOR LOAN:

(a) A large selection of bryological books and reprints; loan period 6 months. Library catalogue may be borrowed from the Librarian (return postage).

(b) Transparency collection, list available (s.a.e.). 624 slides in the collection. Loan charge 25p plus return postage. Only 50 slides may be borrowed at once to minimise loss.

### (2) FOR SALE:

British Bryological Society Reports: 1927, 1928, 1934, 1935 (13p each)  
1944/5 (25p)

Transactions of the British Bryological Society - annual parts:

- Vol. 1 parts 1 - 5 (£1.60 to members, £2.00 non-members (each))
- Vol. 2 parts 1, 3 (90p each, limited stock) [part 2 is out of print]  
part 4 (£1.50, limited stock)
- Vol. 3 parts 1 - 5 (£3.00 each)
- Vol. 4 part 1 (£3.00)  
part 2 (£1.50)  
parts 3 - 5 (£2.00 each)
- Vol. 5 part 1 (£2.00)  
parts 2 - 4 (£3.00 each)
- Vol. 6 parts 1 & 2 (£3.00 each)
- Vol. 7 parts 1 - 4 (£2.50 each)
- Vol. 8 parts 1 & 2 (£3.00 each)

Volume 6 part 2 completes the series of Transactions of the British Bryological Society. Volume 7 part 1 (1972) continues the series but is renamed Journal of Bryology.

Postage and packing is extra on all orders. Standard packing charge 7p per one to five parts for Jiffy Bag.

- Duncan, J. B. (1926). Census Catalogue of British Mosses, 2nd ed. (13p plain, 18p interleaved, limited stock)
- Paton, J. A. (1965). Census Catalogue of British Hepatics, 4th ed. (38p plain, 43p interleaved)
- Sherrin, W. R. (1946). Census Catalogue of British Sphagna. (5p)
- Warburg, E. F. (1963). Census Catalogue of British Mosses, 3rd ed. (38p plain, 43p interleaved)

**POSTAGE EXTRA.** If including cash with order please allow sufficient extra for postage and packing.

**DONATIONS:** Authors are encouraged to present the Library with copies of bryological books and papers they have written, and the Librarian will be pleased to receive donations of works that members may have as duplicates.

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## 7. CONSERVATION OF WILD CREATURES AND WILD PLANTS ACT 1975

It is now illegal under this Act for any person to uproot a moss or liverwort without the permission of the landowner or occupier, or their servant. "Uproot" is defined by the Act as "pull up, dig up or remove the plant with its roots from the land on which it is growing." Thus, presumably, one is now not allowed to collect without permission a bryophyte still attached to its substrate. Licences to collect for scientific or educational purposes may be granted by the appropriate authorities.

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## 8. REFEREES (January 1976)

Specimens sent to the referees should have a 4- or 6-figure grid reference in addition to the locality description. THEY SHOULD ALWAYS BE ACCOMPANIED BY A STAMPED, ADDRESSED ENVELOPE, EVEN IF MATERIAL IS SENT TO UNIVERSITIES OR INSTITUTIONS.

The General Referee will help beginners who are having difficulty placing their material in a genus. The numbers below refer to genera in the current editions of the Census Catalogues.

General Referee: Mrs A. G. Side, 82 Poplicans Road, Cuxton, Rochester, Kent, ME2 1EJ

### Hepatic Referees:

- 1-9, 14-19, 21-30, 66, 67, 76-82: Dr J. G. Duckett, School of Plant Biology, University College of North Wales, Bangor, Gwynedd, LL57 2UW  
10-13, 20, 31-33, 45-47, 62, 71-74: Mrs J. A. Paton, Trekewny, 31 Dobbs Lane, Truro, Cornwall, TR1 3NB  
34-44, 63-65: M. F. V. Corley, Pucketty Farm Cottage, Faringdon, Oxon., SN7 8JP  
49-53: Dr G. C. S. Clarke, Department of Botany, British Museum (Natural History), Cromwell Road, London, SW7 5BD  
54-56: Mrs Hilary H. Birks, 16 Greystoke Road, Cambridge, CB4 1DS  
57-61, 75: M. O. Hill, Institute of Terrestrial Ecology, Penrhos Road, Bangor, Gwynedd, LL57 2LQ  
68-70: D. G. Long, The Herbarium, Royal Botanic Garden, Inverleith Row, Edinburgh, EH3 5LR

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2-7, 131: M. O. Hill (address above).  
8-9: Dr A. J. E. Smith, School of Plant Biology, University College of North Wales, Bangor, Gwynedd, LL57 2UW  
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79: Dr P. D. Coker, School of Biological Sciences, Thames Polytechnic, Wellington Street, London, SE18 6PF  
98, 99: Dr S. W. Greene, c/o I.M.E.R., 4 Craighall Terrace, Edinburgh.  
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CONTRIBUTIONS FOR THE NEXT BULLETIN  
SHOULD REACH THE SECRETARY  
BY 1st JUNE, 1976

## 9. LETTERS TO THE SECRETARY

From Mr M. Walpole:

I think it is a very retrograde step that the proceedings of the Society, New Vice-county Records and Amendments to the Census Catalogues will in future be published in the Bulletin rather than in the Journal. Whilst appreciating that the costs of producing the Journal are rising substantially it will have the effect of altering the whole basis on which the Society is run.

We have to be careful that like so many other National Societies the B.B.S. does not generate into a Society whereby any graduates can put forward their ideas and papers on topics which are of no interest whatsoever to the majority amateur membership. I have thought for a long while that the B.B.S. is one of the few Societies which genuinely caters for the amateur members, but after .... the news of changes in the Journal I have my doubts whether this happy state of affairs is going to continue. -----Yours, etc.

M. Walpole, 68 Outwoods Road, Loughborough, Leics.      6 March, 1975.

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From Dr S. R. J. Woodell:

We have been carrying out a small-scale trial for a proposed Botanical Society of the British Isles "Network Research" scheme, aimed at surveying the floras of railway and canal, and possibly river, bridges. The B.S.B.I. has approved the scheme in principle, but now want a more extended trial. They have suggested that Surrey, Berks., Bucks. and Oxon., and Shropshire be mainly used, but this does not exclude the possibility of people looking at bridges elsewhere. They have suggested that the British Bryological Society be approached to see if they would be willing to collaborate. This letter is a response to that suggestion and I am writing to you to see whether you can 'test the pulse' of the B.B.S. on the scheme.

The aim of the scheme is to obtain an idea of the status of the floras of bridges. Bridges contain a variety of habitats, exemplified by the parapet, vertical walls, sloping buttresses, retaining walls, etc.

I am producing a revised recording sheet, based on past experience. Eventually we hope the data can be transferred to 80-hole punchcards. Recorders will be asked to provide information on, for example, the age of the bridge, materials of construction, repairs, traffic frequency, aspect, slope, etc. In addition they will be asked to carefully record the flora of selected areas of the bridges, if possible sampling several sites on each bridge. Clearly not all bryologists will want to sample Higher Plants but data collected for each group of plants separately will be very useful.

One final thing we would like is to use one species as an assay of habitat conditions, and we have chosen the fern Phyllitis scolopendrium since it is very widespread on walls. We want a measure of the longest frond to be found together with its position on the bridge. This has been chosen as an easily recognisable species, and frond length is an unambiguous character simple to measure.

I hope some B.B.S. members will be willing to help. I shall have a supply of data sheets in the Spring; please write for some. ----- Yours, etc.

S. R. J. Woodell, Botany School, South Parks Road, Oxford, OX2 3EA.  
6 January, 1976.

# A KEY FOR THE IDENTIFICATION OF BRITISH SPHAGNA USING MACROSCOPIC CHARACTERS

By M.O. Hill

In Britain, the species of Sphagnum are not hard to name in the field. Admittedly, there are a number of pairs of species which cannot always be separated without a microscope, but the great majority can be named by an experienced observer at a glance. Unfortunately, it is not possible to explain the peculiarities which permit this rapid identification, as many of them depend on visual cues which are quite subtle. The beginner must therefore submit to the tedium of making a detailed examination. A microscope makes matters easy, and must always be used in cases of real doubt. But macroscopic examination trains the eye, and helps the user to develop his competence in the field.

It is with this aim that the following key is presented. To be sure, the key is not completely reliable, but it should allow most specimens to be named without much difficulty. Well grown plants in full illumination should key out easily. Well grown plants in shade are sometimes more difficult, but with a little care should key out correctly. Scraps fished out of ditches are perhaps best reserved for the microscope until some experience has been gained.

Like Gaul, the key is divided into three parts. First a "general key" assigns the plants either to a section, or to one of four colour groups. Within the colour groups, the sections are keyed out, along with some of the species. Allowance has been made for green forms of normally coloured plants. In the third part, the species are keyed out within their natural sections.

The species are those of Warburg's (1963) Census Catalogue, but with five modifications. S. capillaceum and S. rubellum are very hard to separate, and no attempt is made to keep them apart here. S. subfulvum is doubtfully British (A.R. Perry, pers. comm.), and is omitted. S. majus has been added to the British list, but is unfortunately not separable from brownish forms of S. cuspidatum without microscopic examination. S. contortum var. platyphyllum is completely distinct from var. contortum, and is treated as a full species. S. subsecundum var. subsecundum is completely distinct from var. inundatum and var. auriculatum, and is treated as a separate species. Var. inundatum is hard to separate from var. auriculatum without a microscope, and is treated here merely as a form of S. auriculatum.

## Acknowledgement

I prepared a draft "field key" to British Sphagnum in response to a request from colleagues in the former Nature Conservancy (now Nature Conservancy Council) at Bangor. The present key is mostly new, and is not a rewritten version of the previous one. But without the initial stimulus it would not have been written.

## Reference

Warburg, E.F. (1963) Census Catalogue of British Mosses,  
ed. 3. British Bryological Society.

GENERAL KEY  
(keys to sections are given at end)

1. Branch lvs ovate or elliptic, concave, cucullate, at least 1 mm wide;  
stem cortex easy to see with lens, occupying about  $\frac{1}{3}$  -  $\frac{1}{2}$  diameter  
of stem (pull stem in half to see this); stem lvs large, lingulate,  
exceeding 1 mm long Sect. Sphagnum  
Branch lvs various, if wider than 1 mm then stem cortex  $\frac{1}{4}$  diameter  
of stem or less; stem lvs various, sometimes large and lingulate 2
2. Lvs reddish or flecked with red 3  
Lvs without any trace of red pigment 4
3. Red pigment crimson or rose pink; yellowish tints absent except  
sometimes in unhealthy plants; stem crimson, brownish or green;  
branches straight or hanging Sect. Acutifolia  
Red colouring  $\pm$  coppery; lurid yellow tints often present; stem dark  
brown or black; branches curved, often strongly so, like horns  
S. auriculatum
4. Lvs orange, yellowish, ochre or orange-brown, at least in part 5  
Lvs green or plain brown 6
5. Stem darker than lvs, brown or black, at least in part Group A  
Stem pale or reddish throughout Group B
6. Stem dark brown or black, at least in part Group C  
Stem pale or reddish throughout Group D

GROUP A  
(Stem dark; lvs orange, yellowish,  
ochre or orange-brown)

1. Compact plant, rarely exceeding 6 cm high; stem lvs very small,  
0.4 - 0.7 mm; branches squeezed together in tufts and pointing  
upwards so that stem is concealed and individual capitula are often  
hard to discern (peaty banks and damp heathland, avoiding permanently  
waterlogged ground) S. compactum  
Laxer; stem lvs larger, or if less than 0.9 mm then plant slender,  
with curved branches and easily visible capitula 2
2. Fulvous brown plant; stem lvs  $\pm$  cuneate, conspicuously tattered  
across truncate apex (arctic-alpine, very rare) S. lindbergii  
Colour various; stem lvs lingulate or triangular, apex rounded or  
acute, not conspicuously tattered 3
3. Stem lvs triangular, acute; branch lvs clearly arranged in five  
ranks along branches, much modified and recurved when dry;  
branches regularly in fascicles of 4; bright orange or rarely  
yellow plant (raised bogs in western Britain and Ireland, valley  
bogs in Dorset; rare but locally abundant) S. pulchrum  
Stem lvs triangular or lingulate, rounded; branch lvs not in five  
ranks, hardly modified when dry; branches in fascicles of 3 - 6;  
colour various 4

4. Shoots with enlarged terminal bud, resembling nose cone of a missile concealed among comal branches; branch lvs ovate, not concave, with distinct acumen which is slightly recurved or sometimes  $\pm$  squarrose; branches straight; stem lvs lingulate, appressed to stem (base-rich marshes) S. teres

Terminal bud not enlarged; branch lvs ovate or elliptic, often concave, lacking an acumen, not recurved; branches straight or curved; stem lvs triangular or lingulate, often  $\pm$  spreading (many habitats including base-rich marshes) Sect. Subsecunda

#### GROUP B

(Stem pale or reddish; lvs orange, yellowish, ochre or orange-brown)

1. Stem reddish or flecked with crimson 2  
Stem lacking red colour 3
2. Lvs bright yellowish orange; stem lvs hanging S. recurvum  
Lvs dingy; stem lvs erect Sect. Acutifolia
3. Small greenish plant with ovate, concave branch lvs; branches mostly in fascicles of 3, rarely exceeding 8 mm; pendent branches hardly differentiated from spreading branches, green, not appressed to stem; stem lvs conspicuously spreading, 2 - 3 times as long as stem is wide (strip off branches to see this) S. tenellum  
Not as above 4
4. Lvs bright orange-brown; branches mainly in fascicles of 3, with only 1 pendent branch per fascicle (raised bogs, very rare) S. balticum  
Colour various, if orange-brown then branches in fascicles of 4 - 6 with 2 - 3 pendent branches per fascicle 5
5. Spreading branches  $\pm$  curved; branch lvs secund, pointing towards centre of curve of branch, not, or hardly modified when dry; stem lvs obtuse, hanging or spreading Sect. Subsecunda  
Branches straight or hanging; branch lvs not secund, appressed when wet, recurved when dry; stem lvs acute,  $\pm$  uniformly hanging (coloured forms of S. recurvum which lack a red stem do occasionally have obtuse stem lvs, but this is rare) S. recurvum

#### GROUP C

(Stem dark; lvs plain brown or green)

1. Branches markedly curved Sect. Subsecunda  
Branches straight or hanging 2
2. Compact plant, rarely exceeding 6 cm high; stem lvs very small, 0.4 - 0.7 mm; branches squeezed together in tufts and pointing upwards so that stem is concealed and individual capitula are often hard to discern (peaty banks and damp heathland, avoiding permanently waterlogged ground) S. compactum  
Laxer (occasional compact forms occur); stem lvs larger, 0.9 mm or more 3



3. Stem lvs  $\pm$  erect, triangular, acute S. plumulosum  
 Stem lvs variously oriented, obtuse 4
4. Branch lvs squarrose (i. e. bent back in middle; this gives the  
 branches a "prickly" appearance) Sect. Squarrosa  
 Branch lvs patent or imbricated 5
5. Shoots usually with enlarged terminal bud, resembling nose cone  
 of a missile concealed among comal branches; branch lvs ovate,  
 not concave, with distinct acumen which is slightly recurved or  
 sometimes  $\pm$  squarrose (marshes, indicative of base-rich flushing) S. teres  
 Terminal bud not enlarged; branch lvs ovate or elliptic,  
 lacking a recurved acumen 6
6. Stem lvs erect, appressed to stem; pendent branches strongly  
 differentiated, whitish, straight, appressed to stem; slender  
 brown plant often in hummocks (raised and blanket bogs in  
 northern England and Scotland; raised bogs in Ireland and Wales) S. fuscum  
 Stem lvs spreading or hanging, or if erect then pendent branches  
 not clearly differentiated from spreading; often robust and not  
 hummock forming Sect. Subsecunda

GROUP D  
 (Stem pale or reddish; lvs plain  
 brown or green)

1. Stem reddish Sect. Acutifolia  
 Stem green or pale brown 2
2. Stem lvs conspicuously tattered or cleft at apex (this is easily  
 seen with lens; pull off top of capitulum and observe lvs at top  
 of decapitated stem) 3  
 Stem lvs with apex entire or slightly fringed 4
3. Stem lvs hanging,  $\pm$  triangular, apex cleft S. riparium  
 Stem lvs erect, lingulate or spatulate, apex tattered but not  
 cleft Sect. Acutifolia
4. Branch lvs squarrose (i. e. bent backwards in middle) when wet;  
 this gives the branch a "prickly" appearance 5  
 Branch lvs sometimes modified and recurved when dry (in members  
 of Sect. Cuspidata), but not squarrose when wet 7
5. Stem lvs triangular 6  
 Stem lvs lingulate Sect. Squarrosa
6. Stem lvs erect, acute, 0.9 mm or more S. plumulosum  
 Stem lvs hanging, obtuse, very small, 0.4 - 0.7 mm (areas of  
 high rainfall, rare) S. strictum

7. Compact plant with stem hardly elongating below capitulum;  
branches squeezed together in tufts and pointing upwards 8  
Not markedly compact; stem elongating below capitulum;  
branches spreading or hanging 9
8. Stem lvs very small, hanging, 0.4 – 0.7 mm Sect. Rigida  
Stem lvs exceeding 0.9 mm, spreading or erect Sect. Acutifolia
9. Pendent branches not markedly differentiated from spreading  
branches, green, not appressed to stem 10  
Pendent branches clearly differentiated, green or whitish,  
appressed to stem (to see them, pull off a capitulum; young  
pendent branches project downwards next to stem at base of  
capitulum) 12
10. Branch lvs narrowly lanceolate; limp plant with "drowned kitten"  
habit; sometimes submerged as an aquatic; when growing in  
terrestrial habitats the lvs at apex of branches are rolled into  
a tight cusp. S. cuspidatum  
Branch lvs ovate or elliptic; not usually limp and kittenish;  
sometimes submerged as an aquatic, and then with a gross,  
tumid habit; lvs at apex of branches not rolled into a tight cusp 11
11. Slender plant; branches mostly in fascicles of 3, rarely  
exceeding 8 mm; branch lvs 0.8 – 1.5 mm; stem lvs spreading,  
large for size of plant, 2 – 3 times as long as stem is wide S. tenellum  
Usually larger; branches in fascicles of 3 – 5, often exceeding  
8 mm; branch lvs 1.3 – 2.5 mm; stem lvs spreading or appressed,  
not conspicuously large for size of plant, 1 – 2 times as long as  
stem is wide, or if longer then plant robust Sect. Subsecunda
12. Stem lvs erect Sect. Acutifolia  
Stem lvs spreading or hanging 13
13. Spreading branches usually ± curved; branch lvs secund, pointing  
towards centre of curve of branch, not, or hardly modified when  
dry; stem lvs obtuse, ± spreading Sect. Subsecunda  
Branches straight or hanging; branch lvs not secund, appressed  
when wet, recurved when dry; stem lvs usually acute, ± uniformly  
hanging Sect. Cuspidata

#### Sect. SPHAGNUM

A very distinct and easily recognised section. Only S. compactum,  
S. auriculatum and S. squarrosum are likely to be confused with it.  
S. compactum has minute triangular stem leaves. S. squarrosum differs  
in its narrower stem cortex and non-cucullate apex of branch lvs.  
S. auriculatum differs in its narrow stem cortex and often ± spreading  
stem lvs. The stem lvs of Sect. Sphagnum are very thin, and lack the  
mechanical strength to be spreading except in compact forms, whose stem  
may not elongate sufficiently to allow stem lvs to lie against it.

1. Pigment present in lvs 2  
Lvs completely green 6
2. Colour pinkish orange or dull crimson, at least in capitulum 3  
Colour yellowish or ochre 4

3. Colour dull crimson, affecting mature branches as well as capitulum, changing to mud brown in weak alkali (e.g. solution of household bicarbonate); mature branches blunt (plant of acid bogs on deep peat) S. magellanicum  
 Colour pinkish orange, often  $\pm$  confined to capitulum and male branches, not altering in weak alkali; mature branches  $\pm$  pointed (very common in many habitats) S. palustre
4. Yellowish or ochre colour well marked, affecting whole plant 5  
 Colour rather obscure 6
5. Mature branches blunt; colour often rather dull (common plant) S. papillosum  
 Mature branches tapering; colour strongly ochre or brown (rather rare plant forming compact hummocks on northern and western bogs) S. imbricatum
6. Mature branches  $\pm$  blunt, not tapering; branch lvs elliptic, with broad apex; plant of acid bogs and moors, rarely in shade S. papillosum  
 Mature branches tapering; branch lvs ovate or elliptic, apex broad or narrow; in a wide range of habitats, including woods and mesotrophic marshes (field distinction between these two is not always possible, though with experience a high level of accuracy can be achieved; in autumn and winter well illuminated S. palustre is relatively easy to recognise by its pinkish colour, but in summer the pink tinge vanishes) S. palustre

#### Sect. RIGIDA

This section is distinguished by its minute, hanging, rounded stem lvs, 0.4 - 0.7 mm. Only in S. subsecundum are the stem lvs otherwise this small, but S. subsecundum differs in its slender habit and curved branches.

1. Stem pale; branch lvs ovate, squarrose, with broad base and narrower, recurved acumen (areas of high rainfall, very rare except in western Scotland and Ireland) S. strictum  
 Stem dark brown or black, rarely pale; branch lvs ovate or elliptic, squarrose or (more often)  $\pm$  appressed S. compactum

#### Sect. SQUARROSA

Both species have large (1.2 mm or more) lingulate stem lvs. As in Sect. Sphagnum the dorsal surface of the hyaline cells is resorbed, making the lvs thin and weak. In consequence they lie appressed to stem except in compact forms. S. auriculatum often has lingulate stem lvs, but these are stronger,  $\pm$  concave and spreading. S. palustre and S. girgensohnii can at times be confused with Sect. Squarrosa, and are included in the key.

1. Robust green or slightly brownish plant; stem 0.7 - 1.2 mm. diam; branch lvs usually squarrose, 1.7 - 3.1 x 1.0 - 1.8 mm 2

Plant slender or medium sized, greenish yellow or brown, rarely completely green; stem 0.5 – 0.7 mm diam; branch lvs  $\pm$  appressed, occasionally squarrose, 1.0 – 2.3 x 0.5 – 1.2 mm 3

2. Stem cortex occupying  $1/3 - \frac{1}{2}$  diameter of stem; branch lvs with cucullate apex S. palustre  
Stem cortex  $\frac{1}{4}$  diameter of stem or less; branch lvs not at all cucullate S. squarrosum
3. Stem usually dark brown; lvs often ochre; stem lvs not torn at apex, lacking discrete patches of pigmentation at basal angles; branches normally in fascicles of 4 – 5 (greenish forms can be hard to separate from S. squarrosum; their identity is often easiest to determine in the field, as coloured plants are usually present in immediate vicinity) S. teres  
Stem pale; lvs  $\pm$  green; stem lvs usually torn at apex, or if  $\pm$  entire then with discrete patches of brown pigment at basal angles; branches normally in fascicles of 3 – 4 S. girgensohnii

### Sect. CUSPIDATA

Except for S. balticum, S. pulchrum and S. tenellum, terrestrial forms normally have uniformly hanging stem lvs. Except in S. balticum, S. riparium and S. tenellum, the branch lvs are lanceolate or narrowly ovate, and rarely exceed 0.9 mm wide. A useful character, not applicable in submerged forms, nor in S. tenellum, is that the branch leaves usually bend back conspicuously on drying. Plants whose branch lvs do this can safely be assigned to Sect. Cuspidata. The section is not likely to be confused except with Sect. Subsecunda (q.v. for differences).

1. Small green plant; branch lvs ovate, concave; stem lvs spreading; branches in fascicles of (2-) 3 (-4), the pendent not appressed to stem, hardly differentiated from spreading S. tenellum  
Not as above 2
2. Plant orange, yellow or golden brown 3  
Plant green or dingy brown 6
3. Stem darker than lvs, dark brown or coppery, at least in part 4  
Stem pale or flecked with red 5
4. Stem lvs cuneate with truncate apex (arctic-alpine) S. lindbergii  
Stem lvs triangular with acute apex (raised bogs in western Britain and Ireland; valley bogs in Dorset) S. pulchrum
5. Branches mostly in fascicles of 3; stem lvs  $\pm$  spreading (raised bogs, very rare) S. balticum  
Branches in fascicles of 4 – 5; stem lvs hanging 9
6. Stem lvs conspicuously cleft at apex (swampy ground in north and east, rare) S. riparium  
Apex of stem lvs rounded or acute, not cleft 7
7. Pendent branches not markedly differentiated from spreading branches; often  $\pm$  submerged; when growing in terrestrial habitats the lvs at tips of branches are rolled into a tight cusp; flaccid plant with "drowned kitten" habit 8

Pendent branches well differentiated, appressed to stem; rarely submerged; lvs not rolled into cusp; not especially flaccid 9

8. Plant green S. cuspidatum

Plant dingy brownish olive (probably S. cuspidatum, but may be worth checking microscopically for S. majus, which when stained has numerous (ca 10 per cell) easily visible pores in hyaline cells of branch lvs) \*

9. Stem lvs acute S. recurvum  
Stem lvs rounded 10

10. Stem sometimes flecked with red; plant normally slender S. recurvum  
Rather more robust than S. recurvum, stem not flecked with red (formerly in Lancashire, now thought to be extinct; must be checked microscopically by (e.g.) ventral pores of branch lvs 2 - 5  $\mu$ m as opposed to 5 - 9  $\mu$ m in S. recurvum - intense staining is necessary to see them in either species) S. obtusum

### Sect. SUBSECUNDA

Until some experience has been gained, this is a troublesome section to recognise, as S. auriculatum is exceptionally plastic, and can be confused with many other species. Microscopically it is distinct from all except S. subsecundum in its unistratose stem cortex. In a great many cases, Sect. Subsecunda can be recognised by the plants having markedly curved branches. Branches are often straight in S. auriculatum, but this usually has a dark stem or a tumid habit. Depauperate forms in damp woodland may resemble S. recurvum or S. plumulosum but are usually distinct in their  $\pm$  concave, obtuse stem lvs.

1. Plant rather gross and tumid; leaves  $\pm$  concave, imbricated; pendent branches not or hardly differentiated from spreading branches 2  
Plant not gross and tumid; leaves usually secund or patent, occasionally concave and imbricated; pendent branches  $\pm$  clearly differentiated 3
2. Branches in fascicles of 2 - 3; stem lvs broadly elliptic; colour usually green with slight brown tinge (very rare plant of base-rich marshes, often with Drepanocladus revolvens) S. platyphyllum  
Branches in fascicles of 3 - 5; stem lvs lingulate; colour very variable, often yellow or coppery (very common in many habitats, including base-rich marshes) S. auriculatum
3. Stem dark brown or black, at least in part 4  
Stem green or pale brown throughout 5
4. Stem lvs 0.5 - 0.9 mm, hanging; slender plant with curved branches on which the lvs are secund or subsecund, pointing towards centre of curve (base-rich marshes, often with S. teres, uncommon) S. subsecundum  
Stem lvs 1.0 - 1.5 mm, hanging or spreading; habit various, branches curved or straight, leaves variously secund, patent or imbricated (very common in many habitats) S. auriculatum

5. Spreading branches curved, with  $\pm$  second leaves pointing towards centre of curve (base-rich marshes, often with Drepanocladus revolvens and Scorpidium scorpioides, frequent; should be checked microscopically until familiar) S. contortum
- Branches curved or straight, leaves variously secund, patent or imbricated (well pigmented forms almost invariably have dark brown or black in some stems, but green forms can be hard to separate from S. contortum) S. auriculatum

### Sect. ACUTIFOLIA

Several species have anthocyanin (rose-red pigment), which, when present, is a good way of identifying the section. A chemical test is that it turns blue in alkali, whereas reddish pigments sometimes found in S. auriculatum and S. recurvum are unmodified. Other characters are the highly differentiated, straight pendent branches with whitish imbricated leaves, and the mostly erect stem leaves. These characters may be absent in compact forms, but, taken together, they ordinarily suffice to recognise the section. S. teres (see under Sect. Squarrosa) can resemble S. girgensohnii. S. tenellum can resemble green forms of S. capillaceum, but differs in the strongly spreading stem lvs and lack of pendent branches.

- |  |                        |
|--|------------------------|
| 1. Brown plant with dark brown stem  | 2                      |
| Stem reddish or pale   | 3                      |
| 2. Stem lvs triangular, acute  | <u>S. plumulosum</u>   |
| Stem lvs lingulate, obtuse   | <u>S. fuscum</u>       |
| 3. No trace of red pigment present, either in stem or in lvs;<br>stem lvs lingulate or spatulate   | 4                      |
| Red pigment present, or if absent then stem lvs triangular   | 6                      |
| 4. Stem lvs conspicuously tattered at apex, or if $\pm$ entire then<br>with discrete patches of brown pigment at basal angles  | 5                      |
| Stem lvs not conspicuously tattered, though sometimes $\pm$<br>fringed; discrete patches of brown pigment lacking (green<br>forms of normally reddish plants)                          | 6                      |
| 5. Stem lvs spatulate, widest above base, conspicuously tattered<br>round most of upper lf; brown pigment absent except in male<br>branches  | <u>S. fimbriatum</u>   |
| Stem lvs lingulate, widest at base, tattered only across<br>truncate apex; brown pigment often present in discrete patches<br>at basal angles of stem lvs, as well as in male branches | <u>S. girgensohnii</u> |
| 6. Compact plant with branches pointing upwards and concealing<br>stem; pendent branches not, or hardly differentiated from<br>spreading   | 7                      |
| Stem usually visible; pendent branches clearly differentiated  | 8                      |

7. Stem lvs large, normally widest above base, exceeding 1.5 mm  
(rare except in western Scotland and Ireland) S. molle  
Stem lvs normally widest at base, shorter than 1.5 mm 8
8. Stem lvs lingulate, with broad rounded apex 9  
Stem lvs  $\pm$  triangular 10
9. Relatively robust plant; stems commonly 0.6 - 0.9 mm diam;  
if top of capitulum is pulled off, the lvs at top of decapitated  
stem appear rather short, c. 1 -  $1\frac{1}{2}$  times as long as broad;  
branch lvs ovate, with broad base (hill districts of north and  
west, both in marshes and forming large tussocks on sheltered  
banks; should be checked microscopically until familiar; a  
useful character is that hyaline cells of branch lvs have 7 - 13  
pores per cell in middle of lf, as opposed to 4 - 7 (-9) in the  
other red species) S. robustum  
Slender though sometimes forming large hummocks; stems  
0.4 - 0.6 mm diam; stem lvs at top of decapitated stem often  
relatively longer; branch lvs ovate or elliptic (widespread in  
many habitats, lowland as well as upland) 12
10. Stem cylinder green (occasionally red-flecked in exposed  
situations); branches mainly in fascicles of 4 - 5 (except when  
obviously depauperate); plant of well drained ground, especially  
on steeply sloping banks in woodland and by streams S. quinquefarium  
Stem cylinder usually pigmented; branches mainly in fascicles  
of 3 - 4; often in wet places, but can grow on steep, well  
drained banks 11
11. Red pigments equal or weaker at centre of capitulum than in  
surrounding branches, or plant completely green or brown;  
relatively untidy plant with branch lvs (0.9 - )1.2 - 2.7 mm;  
stem lvs sharply triangular with inrolled margins at apex;  
autoecious, commonly fruiting; male branches not brightly  
coloured S. plumulosum  
Red pigments usually stronger at centre of capitulum than in  
surrounding branches (plant is rarely completely green);  
usually a neat plant with branch lvs (0.6 - ) 0.9 - 1.4 mm;  
stem lvs often triangular - lingulate and rather blunt; dioecious,  
seldom fruiting; male branches conspicuous, with dark crimson  
lvs 12
12. Branch lvs not markedly five-ranked S. capillaceum  
Branch lvs markedly five-ranked 13
13. Neat, elegant plant of base-rich flushes in the uplands; branch  
lvs ovate with narrow apex, very strongly and strikingly five-  
ranked in fresh material though this is less obvious in dried  
specimens (often mixed with S. contortum and S. teres; until  
familiar, should be checked microscopically by small round  
pores 2 - 6  $\mu$ m near apex of branch lvs) S. warnstorffianum  
Common in many habitats; branch lvs ovate or elliptic, usually  
without a markedly narrow apex S. capillaceum

