

# BRITISH BRYOLOGICAL SOCIETY

PRESIDENT: A. C. CRUNDWELL, Esq., B.A.

## BULLETIN

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#### 1. NOTES FROM THE SECRETARY

By the time this Bulletin arrives 1st January, the date that subscriptions for the year became due, will have passed. Council recommended an increase in subscription rates at the A.G.M. in Exeter where it was proposed and carried unanimously that as from 1 January, 1975 these rates will be £6.00 for Ordinary members and £3.00 for Juniors. This resolution is to be regretted, but as noted in the last Bulletin the constantly rising costs of producing the Journal have made these increases absolutely essential. Family membership subscription remains at £1.00.

If you haven't yet paid for the year please do so now to the Treasurer, Mr R. D. Fitzgerald, Idylwild, St Georges Road, Hexham, Northumberland, NE46 2HG, and save him the bother of writing to remind you. I recommend that members pay by Banker's Order; not only does this method spare you the trouble of remembering to pay each year, but it also makes it easier for Bob Fitzgerald. Banker's Orders can be got from the Secretary or the Treasurer.

In an attempt to cut down printing costs of the Journal it has been decided that in future the Proceedings of the Society and the New Vice-county Records and Amendments to the Census Catalogues will be published in the Bulletin. Thus it is important that libraries of institutions and universities subscribe to the Bulletin as well as to the Journal. So members with connexions with these are urged to make sure this is done; details may be obtained from the Secretary.

It will be noticed that a new section - Letters to the Secretary - appears in this issue. Please make use of it to express your views and ideas.

## 2. PROCEEDINGS OF THE BRITISH BRYOLOGICAL SOCIETY

### THE MEETING AT DRAGUIGNAN, FRANCE, APRIL 1974

The Spring Meeting, organized by Mr P. J. Wanstall, was held at Draguignan, chef-lieu of the Department of Var, France, from 3 to 10 April. Seven British members attended, and we had the pleasure of the company of our French member Monsieur Pierrot for three days.

Draguignan lies 23 km distant from Fréjus, the nearest point on the sea, at about 250 m alt. on the northern edge of a broad, highly cultivated basin of Triassic rocks. Immediately north of the town rolling hills of predominantly Jurassic limestone rise to altitudes of 300–500 m. Northwards the limestone hills continue to rise until, 20 km north of Draguignan, around the spectacular gorge of the river Verdon, they attain an altitude of 1000–1500 m; eastwards the limestone belt passes into the Maritime Alps, while westwards it extends to the neighbourhood of Marseilles and Aix-en-Provence. To the south, bordering the sea, are massifs of hills with acidic rocks and igneous intrusions – the Maures to the west of Fréjus, rising to about 500 m, of Carboniferous and Precambrian grits and shales, and to the east of Fréjus the much more highly dissected Esterel, of Permian shales.

On 3 April we examined the limestone close to Draguignan, and on 4 April the more elevated limestone above the gorge of the Verdon. On 5 April we visited the famous Forest of Ste Baume, 30 km east of Marseilles, on limestone, 670–970 m alt. 6 April was devoted to the low sandy ground north of Puget (6–8 km northwest of Fréjus) and to the low siliceous hills around the gorge of the river Blavet just to the north. On 7 April one party visited the Esterel, which appeared so promising that we revisited it on the 9th, while the other party examined the low-lying limestone country to the west and southwest of Draguignan. On 8 April one party visited the limestone foothills of the Alpes Maritimes between Menton and Sospel, guided by Miss M. Campbell, while the other party visited various places on the coast near St Tropez and in the Maures. On 10 April three of us paid a quick visit to Roquebrune, a spectacular rocky hill which forms a northeastern outlier of the Maures, apparently a neglected site which would repay more thorough examination.

It was scarcely to be hoped that we should make any outstanding discoveries, and many of our most interesting records, so far as distribution in France is concerned, merely confirm old records from the same districts by Boulay or Philibert – e.g. Fissidens serrulatus\* (Ravin de Perthus, Esterel), Epipterygium tozeri (near La Mole, Maures), Timmiella barbuloidea (Brid.) Moenk. (Esterel?†). Mr Crundwell, however, recognised Tortula bolanderi (Lesq.) Broth. (new to Europe) in a shady lane at Ramatuelle, near St Tropez, accompanied by Fissidens algarvicus, Ditrichum subulatum, etc. We saw fewer than ten species of bryophyte which are not known from Britain, in striking contrast to the phanerogam flora, in which non-British species are overwhelmingly predominant.

French authorities (e.g. Flahault, in Coste's Flore de la France) place the boundary of the Mediterranean floristic region about 10 km north of Draguignan. Sunny earth banks and limestone rocks near Draguignan bear many thermophilous species such as Bryum canariense, Crossidium squamigerum Jur., Desmatodon convolutus, Fabronia pusilla Rad. (on olive and Quercus ilex), Grimmia orbicularis, Tortula canescens, Pottia starkeana, Cephaloziella baumgartneri, Southbya tophacea, Funaria pulchella Philib. (not very rare, as the old authorities state, but apparently the common representative of the 'F. muhlenbergii complex' in the district). All these species are frequent, and were seen in many places, accompanied

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\*Except when authorities are cited, the names of the bryophytes are those used in the two British Census Catalogues.

†Not noticed in the field, but noticed by Mr Fletcher amongst Riccias that I sent him to grow, and has also appeared amongst Riccias, probably from the Esterel, that I am growing.

by more widely ranging species such as Aloina aloides, Bryum torquescens Bruch and Grimmia pulvinata. The thermophilous element very quickly disappears on going northwards, and the oak coppice (often very degraded) and limestone pavements above the gorge of the Verdon have an essentially continental European flora such as would be found on the Burgundian hills. Neckera crispa, Orthotrichum affine, O. speciosum and O. striatum, Zygodon viridissimus var. vulgaris (the only form seen during the week), Frullania dilatata and Radula complanata were abundant on tree boles, while Camptothecium lutescens and Hylocomium splendens are abundant on the ground. Rhytidium rugosum was frequent, and Tortula subulata var. graeffii was abundant on earth banks. Almost the only markedly southern species were Leptodon smithii (stunted, and confined to tree bases), Tortula princeps (stunted and rare), and Targionia hypophylla. North of Menton the mediterranean element disappears even more quickly, and in general the bryophyte flora resembles that of the lower limestone hills of eastern France, though marked by the remarkable luxuriance of certain species such as Neckera complanata, which draped Buxus branches with curtains up to 20 cm deep.

The Forest of Ste Baume is famous as an outlier of deciduous forest with beech, elm, ash, Quercus pubescens, holly and yew in a region where Pinus halepensis, Q. ilex, Q. coccifera and sclerophyllous scrub predominate. It occupies steep northern slopes at the foot of a range of cliffs in which is a cave where, according to a very ancient tradition, Saint Mary Magdalene ended her life as a penitent recluse. The site is certainly one with a locally enhanced precipitation (ca. 1000 mm, much of it as snow, which had not completely gone, compared with ca. 560 mm at Marseilles), but it is probably not unique in this respect, and the forest has survived because it has been protected for nearly a thousand years as a 'sacred grove'. The rich corticolous flora included Habrodon perpusillus, Leptodon smithii (luxuriant and fruiting freely), Leucodon sciuroides var. morensis, Radula complanata (highly gemmiferous, as everywhere where we saw it) all abundant, and Tortula virescens. On rocks and on the ground Anomodon viticulosus, Cirriphyllum crassinervium, Isoetecium striatulum and Pterogonium gracile abounded; Myurella julacea var. scabrifolia was mixed with other mosses on rocks. The southern slope of the hill presents a complete contrast, with bare rocky ground and open scrub of Cistus, etc. Phascum curvicolleum, Pottia lanceolata, P. starkeana and Pterygoneuron ovatum (so hoary as to look like a different species from our English plants) were frequent, but pronouncedly mediterranean species were not seen.

The non-calcareous rocks and sandy ground near the coast afforded a great contrast to the limestone. Sunny rocks were often thick with Grimmia spp. including G. commutata, G. laevigata, G. tergestina Tamm., and with Hedwigia ciliata. Campylopus polytrichoides was frequent on rock ledges in the Esterel and at Roquebrune. The following species were frequent or even abundant, and seen in many localities: Bartramia stricta, Barbula acuta, Bryum alpinum (often fruiting), Ceratodon chloropus, Camptothecium aureum (Lag.) B., S. & G., Eurhynchium megapolitanum, Funaria attenuata, F. obtusa, Scleropodium tourettii, Cephalozia stellulifera, Gongylanthus ericetorum. The Esterel also yielded Cephalozia turneri, C. calyculata, Fossombronia angulosa (also in the Maures), F. caespitiformis, F. husnotii and F. pusilla. On seasonally wet ground (usually flat, but occasionally near the bases of steep banks) Riccia crozalsii was frequent, usually accompanied by a larger persistently sterile Riccia which is presumably R. michelii; R. nigrella was very much rarer, seen only in the Esterel and on Roquebrune. Fissidens algarvicus was seen in two localities in the Esterel, and also near St Tropez. Corsinia coriandrina (Sprg.) Ldbg. was frequent in damp ground.

River banks, whether calcareous or not, often yielded Scorpiurium deflexifolium (Solms) Fleisch. & Loeske, Bryum gemmiparum (sometimes without gemmae), and Cinclidotus mucronatus.

Much of the interest of the week's experience lies in seeing some of our most local and unfamiliar British bryophytes growing in abundance, in obviously optimum

conditions, and some of our familiar species growing in unfamiliar conditions. I have already named most of the first category; to them may be added Eurhynchium meridionale, Scorpiurium circinnatum and Tortula cuneifolia. Of the second category perhaps one of the most striking is Bryum alpinum, often abundant on dry rocks (though doubtless copiously irrigated during periods of rain) at very low altitudes. The frequency of Leiocolea turbinata emphasises its strong western Mediterranean tendency. By contrast, Lejeunea cavifolia (the only Lejeuneaceae seen) was very rare and only in exceptionally moist places (close to the stream in the Ravin de Perthus, Esterel) or outside the Mediterranean floristic region (Gorges de Verdon). Habrodon perpusillus is widely distributed in the lowlands of Mediterranean and Atlantic France - we saw it in several places - but its abundance in the Forest of Ste Baume perhaps throws some light on its apparently northern tendency in Britain. We may note that at Ste Baume it had as companions Pterogonium gracile and Myurella julacea, and reflect that all three species occur in the neighbourhood of Killin in Perthshire. On the other hand we may reflect that in view of the abundance of Pterogonium gracile in the forest of Ste Baume its occurrence beneath beech in the New Forest should not surprise us, despite its markedly western and northern distribution in Britain as a whole.

No account of the meeting would be complete without reference to the extraordinary proceedings after an informal dinner on 6 April, when all members from our President downwards, kissed and embraced Mme la Patrone, toasted her in champagne (it was her birthday), and danced far into the night. Some of us may be tempted to say, with Laurence Sterne, 'They order this matter better in France!'

E. W. JONES

#### THE SUMMER MEETING, 1974

##### Caithness

The first week of the meeting was based on Thurso from 25 to 30 August. The aim was to cover ground in the most north-eastern part of Britain, little known to past British bryologists with the notable exception of the Rev David Lillie of Watten. The possibility of refinding some of the rarities recorded by him some seventy years ago added considerable interest to the meeting. About twelve members attended for most of the week; excursions were restricted to the northern and eastern parts of Caithness (v.-c. 109) except for one made by a member to W. Sutherland (v.-c. 108).

25 August. The day was spent on the dunes of Ackergill and Keiss Links fringing Sinclair's Bay. On the main dune ridge of Ackergill Links Hypnum cupressiforme var. tectorum\* and Entodon concinnus were seen, also Bryum bicolor agg.\* on a wooden footbridge. Fixed dunes on the landward side produced Bryum inclinatum and Amblyodon dealbatus. Keiss Links, after we had forded the Burn of Lyth, proved more interesting, the first find being Bryum marratii\* on damp sand by a backwater. Hollows on the fixed dunes nearby contained Scapania aspera, Distichium inclinatum, Encalypta rhabdocarpa, Pottia heimii, Tortella fragilis in quantity, Catoscopium nigrum and Drepanocladus vernicosus. One member concentrated on the ubiquitous oatfields of the county. One such habitat at Skirza, near Freswick Bay, contained Ditrichum cylindricum, Dicranella staphylina, Bryum sauteri\*, B. violaceum and B. rubens.

26 August. The first coastal ravine visited was that of the Dunbeath Water. Boulders in the stream bed a short distance above Dunbeath supported Solenostoma

\*New vice-county record throughout.

cordifolium\*, Scapania subalpina and Barbula spadicea. A small stubble field nearby contained Anthoceros husnotii and Ephemerum serratum var. minutissimum\*. Further upstream the valley became more wooded with considerable sandstone exposure. Shady rock faces supported Lejeunea cavifolia\* and Bartramia pomiformis var. elongata\*, while on the wooded slopes Fossombronia pusilla and Pohlia lutescens\* were noted on soil, Scapania nemorea\* on a boulder and Orthotrichum pulchellum on hazel. By the river, detritus-filled rock crevices yielded Plectocolea paroica\*. Further work was curtailed by heavy rain but one member continued to search oatfields. In one at Buoltach near Latheron, Ditrichum pusillum\*, Pseudephemerum nitidum and Pohlia pulchella\* were collected; another at Spital near Halkirk produced Dicranella staphylina and Bryum sauteri.

27 August. The morning excursion explored the partly wooded valley of the Strath Burn near Watten, from Strath southwards to Scorriclet. On a grassy riverside bank near Strath Weissia microstoma var. brachycarpa\* was detected, considerably extending its known British range. On wooded slopes in the area Plagiothecium laetum\* occurred on soil, and Pohlia rothii\* mixed with P. annotina on a gravelly path. Towards Scorriclet basic flushes were conspicuous and contained Pellia neesiana\*, Trichocolea tomentella, Mnium rugicum\*, Acrocladium stramineum and A. giganteum. A search in a barley field near Strath revealed Bryum sauteri, B. klinggraeffii and B. violaceum. After lunch the party proceeded via Kensary to the Dubh Lochs of Shielton, and extensive Sphagnum-dominated system of treacherous pools on very acid blanket bog. Numerous Sphagna were seen including fine hummocks of S. imbricatum and S. fuscum. Associated species were Pleurozia purpurea, Campylopus brevipilus and gemmiferous Aulacomnium palustre. Tortula ruraliformis was noted on an outbuilding roof at Rowens.

28 August. The Links of Dunnet Bay, a locality well-known to Lillie, were chosen for the main excursion. A young conifer plantation provided shelter from the cold wind and its ditches and damp sandy hollows supported a rich bryophyte flora associated with Primula scotica: Tortella fragilis and T. inclinata were in abundance with Leiocolea bantriensis, Encalypta rhabdocarpa, Barbula revoluta, Catoscopium nigrum, Philonotis calcarea and Drepanocladus vernicosus. Beyond the wood exposed damp hollows contained fruiting Meesia uliginosa and Amblyodon dealbatus. Later in the day other localities yielded Bryum neodamense in quantity on damp gravel by the Loch of Mey, Nowellia curvifolia\* on fallen trees in woodland at Castletown and Campylopus brevipilus and Bryum intermedium on spoil heaps in an adjacent 'flagstone' quarry.

One member ventured into the coastal part of West Sutherland (v. -c. 108) for the day, examining oatfields. In the best of these, at Calgarry Beg near Melvich, Ditrichum cylindricum, D. pusillum\*, Pohlia pulchella\*, Bryum tenuisetum\* and B. rubens were found.

29 August. The sandstone gorge on the River Thurso at Dirlot was the venue for the morning. Here Lillie added Barbilophozia atlantica to the British Flora in 1901, and it was refound growing on dry rocks with Cynodontium bruntonii and Orthotrichum rupestre. Species found in the gorge itself were Cololejeunea calcarea and Seligeria recurvata on damp rock faces, Sphagnum teres in a flush and Polytrichum nanum on damp soil. Dicranella crispa\* c. fr. occurred above the gorge on a sandy footpath. The fine weather prompted an afternoon visit to the north coast at Crosskirk Bay. A small oatfield there contained Dicranella staphylina, Bryum rudemale and B. violaceum, confirming the widespread occurrence of these species in the area. Careful searching of damp cliff-top soil nearby was rewarded with Archidium alternifolium, Tortella flavovirens var. flavovirens, Amblystegium serpens var. salinum, Bryum micro-erythrocarpum, Ephemerum serratum var. serratum\* and Lejeunea patens\* (the last in a damp grassy hollow).

30 August. Hilly ground below Warehouse Hill near Ulbster was chosen for the morning of the final day, and despite thick mist a good number of interesting species

were seen. Patches of marshy ground produced Calypogeia neesiana var. neesiana\*, Chiloscyphus pallidus\*, Cephalozia leucantha and Sphagnum contortum. On mud by a partially drained loch below Warehouse Hill species of interest were Fissidens osmundoides\* and Acrocladium sarmentosum. By Groat's Loch nearby were Fossombronia foveolata\* and Haplomitrium hookeri\*, both with mature sporophytes. An interesting find between the two lochs was Tayloria longicolla freely fruiting on damp peaty patches amongst heather. This species was known to Lillie from three other Caithness localities, but had not been seen in Britain for many years. Another oatfield search at Smerlie near Lybster produced Bryum riparium\*. Weissia rutilans grew on a rock on moorland near Whaligoe, Ulbster. After lunch the final excursion was a rather brief visit to the lower part of the Reisgil Burn at Lybster, a deep ravine cut through base-rich sandstone. Solenostoma pumilum and Hygroamblystegium fluviatile grew on boulders in the stream, while on the damp ledges above grew Blepharostoma trichophyllum, Scapania cuspiduligera\*, Radula lindbergiana, Cololejeunea calcarea, Distichium capillaceum, Gymnostomum recurvirostrum, Eucladium verticillatum, Campylium protensum\* and Rhynchostegiella pumila\*.

During a very enjoyable and interesting week mapping cards were compiled for twelve grid squares and a good number of rare species seen. Much credit must go to Mr J. K. Butler whose expert local knowledge and efficient organisation proved invaluable. Results of the week suggest that further work in the county, particularly in the remote western areas, on the high ground and in other coastal ravines, would be well worthwhile.

DAVID G. LONG

#### Orkney

The second week was held in Orkney (v.-c. 111). Only six members attended and one of them left on 4 September. The terrain was mostly sandstone and predominantly flat, nowhere rising to 1000 feet except on the island of Hoy, the only place where there were interesting gullies or ravines.

1 September. The first area visited was the Sands of Evie. Here we saw Dichodontium pellucidum var. fagimontanum and Tortella flavovirens, the only things worth mentioning. A short walk took us to the Broch of Gurness, at Aiker Ness. Pottia heimii and Grimmia maritima (noted frequently during the meeting) were seen and a fine patch of Pottia recta occurred near the Broch. Bryum microerythrocarpum\* provided a vice-county record. A move was then made to some limestone outcrops at Aikerness. Lejeunea patens and Tortula subulata were the most interesting species seen here. Below the outcrops were calcareous flushes with Drepanocladus aduncus, D. revolvens var. revolvens and Scorpidium scorpioides. We parked for lunch in an old quarry at Arwick and then explored the Hill of Dwarro and Vishal Hill, in pouring rain. Funaria obtusa, F. attenuata, Archidium alternifolium and Bryum alpinum were the only relief in a dull area although Ephemerum serratum agg. was collected, the spores being too immature for identification of the segregate. On our return to the quarry a search among the abandoned ironmongery of Arwick was rewarded with Seligeria recurvata.

The morning of 2 September was spent in the Dale of Cottascarth (R.S.P.B.), a moorland area where many small streams originated, some of them too overgrown to provide bryological habitats. Philonotis calcarea, Cratoneuron commutatum and Grimmia stricta were found although most of the ground was acid. Leiocolea bantriensis and Bryum alpinum were seen and Pohlia rothii\* and P. bulbifera\* were collected on a track near Upper Cottascarth Farm.

After lunch, by kind permission of the owner, Binscarth Wood near Finstown, practically the only patch of woodland on the 'Mainland', was investigated. The stream flowing through the wood was badly polluted and although several species were added to the record card, nothing of interest was seen. We then moved on to the Loch of Wasdale. The shore of the loch was disappointing except for Bryum

klingsgraeffii\* so we followed the stream up Wasdale. Here again the ground was mostly acidic with basic undertones, providing such species as Tortella tortuosa, Trichostomum crispulum and Philonotis calcarea. Grimmia alpicola var. rivularis was seen in the stream, Archidium alternifolium and Dicranella schreberana on the banks and Acrocladium giganteum and Chiloscyphus pallescens in a flush. In an old quarry on the hillside, Ptychomitrium polyphyllum was noted and Campylopus brevipilus occurred on moorland near the quarry.

3 September. A projected visit to Hoy was almost abandoned because of the atrocious weather but a report of qualified optimism from the local Meteorological Office encouraged us to go ahead and in the event we suffered nothing worse than some mist and an unusually vicious plague of midges. The Glen of Greor was chosen for exploration and proved quite rewarding. Nowellia curvifolia was found growing on peat as we climbed up to the Glen. In the Glen itself Antitrichia curtipendula was found, confirming a previous record for the locality. Isoetecium myosuroides var. brachythecioides, Barbula ferruginascens, Bartramia ithyphylla, Fissidens osmundoides, Isopterogyium pulchellum, Trichostomum brachydontium var. littorale, Leiocolea bantriensis, Herberta adunca, Tritomania quinquedentata, Radula lindbergiana and Blepharostoma trichophyllum were seen and the following records for Orkney were made: Plectocolea subelliptica\*, Gymnostomum calcareum\*, Anomobryum filiforme\*, Plagiobryum zieri\*, Mnium stellare\* and Campylium chrysophyllum\*. Dicranella rufescens as found by Sandy Loch after descending from the Glen and Amblystegium juratzkanum was collected near the Pier.

On 4 September some dune areas were investigated. Sandside Bay and Dingieshowe, on the eastern side of the 'Mainland', proved disappointing although Dingieshowe yielded Bryum argenteum var. lanatum\*. The dunes near Bow, on the island of Burray, were better. Here we found Leiocolea badensis\*, L. muelleri, Preissia quadrata, Distichium inclinatum, Amblyodon dealbatus\* and Camptothecium lutescens. Marshy ground to the north of the dunes added Cratoneuron commutatum var. falcatum and Philonotis calcarea, while along the shore Eucladium verticillatum and Amblystegium serpens var. salinum were seen.

A second visit to Hoy was made on 5 September. Half the party chose to explore Berrie Dale, a deep ravine having at its lower end the only natural stand of trees on the island. The remaining members went to look at ground in the region of the Kame of Hoy, to the north. The long trek from the Pier was made by way of the Old Rackwick Road, a mere track rendered more like a watercourse by the recent heavy rains. Confirmation of a record for Hedwigia ciliata was sought along the 'road' but in vain, the only bryophyte of interest seen being Tetraplodon mnioides.

The trees of Berrie Dale, mostly birch, yielded little besides Ulota crispa and the ubiquitous U. phyllantha. The stream normally a mere trickle, was so swollen that crossing it was difficult, even hazardous, so that only the lowest portion of the ravine was workable. Having done what they could, the thwarted Berrie Dale contingent climbed the hillside and crossed the stream above the ravine in order to work down to Rackwick. On the moorland Tetraplodon mnioides was seen again, also some patches of Campylopus brevipilus. Mylia taylori, Bazzania trilobata, B. tricrenata and Lepidozia pinnata were some of the species seen growing on the grassy slopes of Grut Fea. This was an unusual habitat for Lepidozia pinnata. The five miles back to the Pier were made, by arrangement, in the van of an obliging farmer, who then picked up the rest of the party as they were trudging back to the boat.

6 September. The valley bog of Glims Moss was chosen for the last day. The Moss was for the most part unremarkable. Among the many species of Sphagnum noted was a great deal of S. magellanicum. Riccardia palmata grew on the sides of a runnel and where almost unrelieved Sphagnum species gave way to rather more interesting conditions, Leiocolea bantriensis and Calypogeia sphagnicola\* were found. After lunch we tried our luck on the Dee of Durkadale, a fen area two miles north of Glims Moss. Here we found Trichocolea tomentella\* in abundance,

Acrocladium giganteum, Mnium rugicum\* and M. seligeri\*. A short visit was then made to a marshy place near a small lake at Greenay. Scorpidium scorpioides was dominant here and Pottia davalliana\* was found on a nearby track.

It was interesting to note that although several crop fields were searched during the meeting they were found to be virtually devoid of bryophytes.

We are grateful to Mrs A. Thomson, who acted as Local Secretary and to Miss E. R. Bullard who, although not a bryologist, came with us every day and contributed much valuable topographical knowledge and advice.

J. APPLEYARD

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#### THE ANNUAL MEETING, 1974

The annual meeting was held on the weekend of 19-20 October in the Department of Biological Sciences at the University of Exeter, by kind permission of Professor J. Webster. About 50 members attended and on the first day heard a series of six lectures on the general theme of water relations in bryophytes.

Dr D. J. READ: 'Physiological aspects of drought resistance in bryophytes'. Factors contributing to the drought resistance of higher plants and bryophytes were compared and contrasted. Small cell size, small vacuoles, as well as high osmotic content and dense cytoplasm were features associated with resistant cells of higher plants. Although any of these factors might contribute to resistance in bryophytes by lessening the protoplasmic contraction which causes cell damage, they cannot fully explain it, either independently or in combination. Differences in protoplasmic tolerance of dehydration must be the basic cause of different levels of desiccation resistance in bryophytes. Membranes of resistant hepatics appear to have a higher phospho-lipid content than those of susceptible forms and this may confer greater protoplast stability under stress.

The importance of the rate of water loss from a shoot in determining survival was discussed. It was suggested that in many cases the speed with which desiccation occurred was more important to subsequent physiological activity than the absolute level of vapour pressure deficit to which shoots were subjected.

Mr J. W. BATES: 'Sodium uptake and loss in halophytic and glycophytic mosses'. Total digest data for the halophyte Grimmia maritima collected from seashore habitats suggest that it is a 'salt-tolerator' since it contains large amounts of sodium; but most of this seems to be extracellular. The intracellular sodium content of G. maritima from an exposed seashore site (18µg/g air-dry moss) closely resembles that of the glycophyte G. pulvinata from an inland habitat (17µg/g air-dry moss) indicating that the former species is a 'salt-avoider'.

Treatment with artificial seawater solutions led to a marked net uptake of sodium and net loss of potassium from the intracellular fraction in G. pulvinata, but not in G. maritima. With increased calcium concentration the net uptake of sodium into the intracellular fraction was reduced in G. maritima but increased in G. pulvinata. Calcium may have the effect of decreasing the permeability of the cell membrane to other ions. Sodium uptake may be affected by light, external magnesium concentration and the state of hydration of the moss.

Active uptake and loss of sodium were investigated using metabolic inhibitors. Evidence suggests that gametophytes of G. pulvinata have an active sodium uptake mechanism whereas those of G. maritima have an active sodium efflux mechanism.

Dr G. R. STEWART and Dr J. A. LEE: 'The effects of water stress on membrane properties'. A number of different ultrastructural and molecular models for the structure of cell walls were described and an attempt was made to reconcile the known response of bryophytes to variations of water stress with these models.



Mr N. J. COLLINS: 'Photosynthetic activity of tundra mosses as affected by water content, temperature and radiation'. An extensive vegetation dominated by cryptogams has developed at some localities in the maritime Antarctic. In many mosses clear innate markers of seasonal growth are present so that the new growth, and hence net annual production, may be recognized easily. Two contrasting communities have been studied in the field at Signy Island, South Orkney Islands, one dominated by turf-forming mosses and the other by carpet-forming mosses. Net annual dry matter production for turf-forming mosses was 340-660 g/m<sup>2</sup> (this value does not allow for translocation). Translocation is probably insignificant in carpet-forming species so net annual production can be more accurately stated as 220-890 g/m<sup>2</sup>.

The turf-former Polytrichum alpestre experiences temperatures between -5 and +5°C for 80% of the summer; those for the carpet-former Drepanocladus uncinatus are slightly lower. Radiant flux density levels are extremely low for the period from 1800 hrs to 0559 hrs here.

Grown under a temperature régime similar to that experienced in the field, P. alpestre has a temperature optimum for net photosynthesis of about +5°C, while D. uncinatus has an optimum of +15°C. At higher temperatures the optimum for D. uncinatus remains the same, but in P. alpestre it is +15°C. Field water content appears non-limiting to photosynthesis at some sites since the mosses were consistently at or above the water content necessary to maintain maximal rates of net photosynthesis.

Carbon fixation, computed from the combination of the 'cold' response curves for P. alpestre with the micro-climate data, amounts to 315 gC/m<sup>2</sup> in a 120 day season; when the 'hot' curves are used carbon fixation amounts to nearer 1000 gC/m<sup>2</sup> in a 120 day season. There is reasonable correspondence with values for dry matter production.

With a broad response curve allowing net carbon fixation over most of the temperature régime, D. uncinatus is well adapted to the oceanic climate of Signy Island. With its ability to acclimatise to changed temperatures over a period of at most 15 days, P. alpestre may be able to utilise periods of high temperatures more efficiently.

Mrs G. MORTON: 'The spatial arrangement of chalk grassland bryophytes with respect to their water relations'. The objective of this work is to propose an ecological basis from which management plans for chalk grassland nature reserves can be devised, taking account of the bryophyte component. The study site at Aston Rowant National Nature Reserve in the Chilterns has a range of aspects under one treatment, and for one aspect a range of management treatments.

Data analysis by an ordination technique showed stand aspect to be the major source of variation in species composition. Solar radiation, amplified by wind incidence, creates the mesic/xeric gradient found. Management had a modifying influence on the effect of aspect. Increasing biomass caused by winter grazing or by lack of grazing modifies the microclimate, allowing the establishment of species typical of more mesic aspects.

The proportion of rainy days governs the growth of Pseudoscleropodium purum suggesting that differences in response to site moisture régime by various species cause the distribution patterns found. Moisture content of moss samples varies considerably with aspect and with the biomass above the moss.

The drought resistance of several species was tested over 90 days - longer than any dry period occurring in the Chilterns. No species died but the production of new growth after 30 days in a mist unit varied considerably between species. Fissidens cristatus, which occurred throughout the site, showed a steady slow production rate throughout the drought. Mnium undulatum, restricted to sheltered northerly aspects, showed great initial vigour which fell sharply to a net loss in production after long droughts.

Species typical of mesic situations have a greater potential growth rate (competitive ability), whereas those of xeric situations can maintain a constant, slow growth rate even after prolonged drought. The distribution of these types is due to modification in local climate by differences in solar radiation and wind caused by aspect, and changes in biomass of the sward.

It may be possible to manipulate grassland microclimate by management so that desired changes in bryophyte constituents can be induced.

Mr T. J. K. DILKS: 'Ecological aspects of desiccation resistance in bryophytes'. The ability of 17 species of bryophytes to withstand periods of continuous desiccation at known relative humidities in relation to their geographical and ecological distribution, was discussed. Desiccation tolerance was estimated by the length of time before net assimilation (measured on a Warburg respirometer) became negative after up to 24 hours rehydration, by the chlorophyll-a content and percentage survival after 30 days in a glasshouse under mist, and by the chlorophyll-a content after 7 days at 17°C. The resistance to desiccation was also considered in relation to the minimum water content observed in the field, the length of time taken to dry out after rain and the degree of shading indicated by 'fish-eye' photographs. *Hookeria lucens* was the species most susceptible to low water contents, followed by a group of species of Atlantic distribution, several woodland species which grow in the open in the north and west, species of unshaded habitats such as rocks, tree branches and sand dunes, and finally *Rhacomitrium* and *Andreaea* species. A series of experiments on intermittent and interrupted desiccation showed that in tolerant or moderately tolerant species (*Hylocomium splendens*, *Rhytidiadelphus loreus*, *Tortula ruraliformis*) short periods (24 hours) of desiccation each week had little effect on subsequent assimilation or growth, and that a moist period of 24 hours resulted in substantially complete recovery from the effects of a preceding dry period of 6 to 11 days.

The Annual General Meeting was held after tea [see p. 12 for Minutes]. In the evening Professor Webster most generously gave a reception for the participants during which the following exhibits were displayed:-

- Mr N. J. COLLINS: 'The growth of tundra mosses'.  
 Mr A. C. CRUNDWELL and Dr H. L. K. WHITEHOUSE: '*Tortula amplexa* and *T. bolanderi* in pure culture from European sources'.  
 Mr M. V. FLETCHER: 'More mosses from New Zealand'.  
 Mrs G. MORTON: 'Growth of *Pseudoscleropodium purum* monitored photographically'.  
 Dr M. C. F. PROCTOR: 'Hemispherical photography as a tool for studying the light climate'.  
 Dr M. C. F. PROCTOR: 'Scanning electron micrographs of bryophytes'.  
 Dr H. L. K. WHITEHOUSE: '*Ditrichum pusillum* in arable fields'.

G. C. S. CLARKE

The localities visited on the excursion on 20 October were all in v.-c. 3. The first site was Chudleigh Rocks, which is a short stretch of steep wooded valley on Devonian limestone with oak, ash, *Tilia cordata*, etc. *Leptodon smithii*, *Metzgeria fruticulosa* and *Cololejeunea minutissima* occurred as epiphytes; *Pleurochaete squarrosa*, *Trichostomum sinuosum*, *Riccia sorocarpa*, *Weissia longifolia* var. *longifolia* and *Tortula intermedia* were on exposed limestone rocks; and *Cololejeunea rossettiana*, *Lejeunea lamacerina* var. *azorica*, *Marchesinia mackali*, *Isoetecium striatulum*, *Cinclidotus mucronatus* and *Isopterygium depressum* were on damp shaded limestone rocks. The second site was a wooded stretch of the valley of the River Bovey, partly on granite and partly on metamorphosed Culm Measures, part of the site being within the Yarnar Wood National Nature Reserve. *Bryum flaccidum*\* was on an old stone bridge, *Porella pinnata* on large boulders in the river and *Solenostoma triste* on shaded rocks on the bank. The trees along the west side of the river sported a number of epiphytes such as *Hypnum cupressiforme* var. *mamillatum*, *Lejeunea ulicina*, *Radula complanata* and *Neckera pumila*. On the rocky bank alongside the footpath were *Bazzania trilobata*, *Plagiochila spinulosa* and *Trichocolea tomentella*, while *Schistostegia pennata* was found in shady recesses and *Heterocladium heteropterum* var. *heteropterum* on boulders. On the east side of the river *Hedwigia ciliata* was plentiful on rock faces and boulders.

Our thanks go to Dr M. C. F. Proctor for organising and leading the trip, and the Nature Conservancy Council and the Warden of Yarnar Wood for giving us permission to visit the last site,

T. J. K. DILKS

\*New vice-county record.

## MINUTES OF THE ANNUAL GENERAL MEETING, 1974

Minutes of the Annual General Meeting held at 1645 hrs on Saturday 19 October, 1974, in the Department of Biological Sciences, University of Exeter.

PRESENT: Mr A. C. Crundwell (President - in the Chair) and 37 other members.

(1) APOLOGIES: Apologies for absence received from Dr J. G. Duckett, Mr R. D. Fitzgerald, Mr S. G. Harrison, Dr M. Newton, Mrs A. G. Side, Dr A. J. E. Smith and Dr E. V. Watson.

THE LATE DR HUMPHREY MILNE-REDHEAD: The President paid a tribute to Dr Humphrey Milne-Redhead whose death was announced earlier this year.

(2) MINUTES: The minutes of the Annual General Meeting held on 20 October, 1973, in the Department of Biology, University of Keele (published in Bulletin 24), were approved and signed.

(3) MATTERS ARISING: None.

(4) OFFICERS' REPORTS, 1973 (published in Bulletin 24):

The President said that in the past it had been the practice to read Officers' Reports at the A.G.M.; but now they would be published in the Bulletin before the A.G.M. in order to reach a wider audience and save time. The Reports could thus be taken as read but members were invited to question the Officers on their work.

Reported (by the Editor):- That volume 8 part 1 of the Journal of Bryology was still to be published although the typescript had been sent to the publishers last March; several things, including printers' disputes, had caused the delay. Publication of volume 8 part 2 was expected probably in December. It was hoped that volume 8 part 3 would appear next May/June.

Considered (by Mr A. J. Pettifer):- That a reason for the recent relatively low attendance at the Society's field meetings might be their wide distribution, viz. southern France, northern Scotland and Exeter.

Reported (by the President):- That Council had proposals for less inaccessible places for future meetings and these would be discussed under items 8 and 9.

Considered (by Mr B. J. O'Shea):- That the Society be congratulated on the new Bulletin which was a great asset.

(5) ELECTION OF TWO MEMBERS OF COUNCIL:

Resolved:- That as there had been no further nominations for elected members to replace Mr M. O. Hill and Dr E. V. Watson who retired at the end of 1974, Dr M. C. F. Proctor and Mrs A. G. Side, who had been nominated by Council, were duly elected to serve for three years from 1 January, 1975.

(6) ELECTION OF HONORARY MEMBER:

Dr E. W. Jones paid a tribute to Mr E. C. Wallace for his outstanding services to the British Bryological Society. Mr Wallace answered.

Resolved:- (proposed by Dr E. W. Jones, seconded by Mrs J. A. Paton, carried unanimously) That Mr E. C. Wallace be elected an Honorary Member of the Society.

(7) SUBSCRIPTION RATES:

Reported (by the President):- That Council had recommended an increase in subscription rates and had proposed that the new rates be £6.00 for Ordinary members and £3.00 for Junior members. We are likely to have to meet further increases in publication costs in the future so we want to keep our new rates relevant for at least two years. An active member will still get a very good bargain at £6.00; non-active members should make it a better bargain by becoming active, not by resigning from the Society.

Considered (by Dr D. W. H. Walton):- That some learned Societies charge Libraries a comparatively higher price than does the B.B.S.

Reported (by the President):- That we are anxious to charge as high a price as the market will bear, and that we are in constant touch with our publishers on this. Institutional subscriptions are under review.

Considered (by Mr M. Walpole):- That it might be better to raise the ordinary subscription to more than £6.00; we would lose more members now, but there would not be the need for a further increase so soon in the future.

Reported (by the President):- That notice has to be given in order to change the Rules; at this point, in order to raise the ordinary subscription to more than £6.00 from 1 January next it would be necessary to call a Special General Meeting. Next time an increase in subscription rates is required it may be possible to omit the proposed new rates from the Notice, thereby leaving the figure to be agreed upon at the A.G.M.; Council will look into this.

Considered (by Mr M. V. Fletcher):- That perhaps we should have a systematic look at other learned Societies to find out about their membership and subscriptions.

Resolved: - That members with knowledge of the workings of other Societies send suggestions for the improvement of the workings of the B.B.S. to the Secretary.

Resolved: - (proposed by Mr A. C. Crundwell, seconded by Mr J. C. Gardiner, carried unanimously) That as from 1 January, 1975 the subscription rates be as follows: Ordinary members £6.00, Junior members £3.00, Family members £1.00.

(8) PAPER-READING MEETING AND A.G.M., 1975:

Considered: - That Dr S.W. Greene had kindly invited the Society to Birmingham for its Paper-reading meeting and A.G.M., 1975.

Resolved: - That Dr Greene's offer be accepted, the provisional dates to be 18-19 October, 1975.

(9) OTHER MEETINGS IN 1975 AND 1976:

(a) EASTER FIELD MEETING, 1975:

Reported: - That this was in Montgomeryshire in April, arranged by Mr M. O. Hill.

(b) SUMMER FIELD MEETING, 1975:

Reported: - That this was in Wicklow and Wexford. Details would appear in the next Bulletin.

(c) EASTER FIELD MEETING, 1976:

Reported: - That this was to be in north Dorset/Wiltshire, the accommodation to be arranged by Mrs M. Milnes-Smith.

(d) SUMMER FIELD MEETING, 1976:

Reported: - That this might be in the Scottish Border Country in the last week of August.

Considered (by Mr M. Walpole):- That perhaps in future the papers in the Paper-reading meeting might be in a lighter vein.

(10) ANY OTHER BUSINESS:

(a) THANKS:

Resolved: - That we thank Dr M. C. F. Proctor and his wife for the efficient organization of this meeting which has been a great success, Prof. J. Webster for the use of the departmental facilities and Dr G. C. S. Clarke who has been responsible for non-local arrangements.

(b) MEMBERSHIP:

Reported (by the President):- That a publicity leaflet was being prepared and that members able to distribute copies to prospective new members, libraries, field centres, etc., should contact the Secretary.

Considered (by Mr B. J. O'Shea):- That the Society might consider introducing convenanted subscriptions.

Reported:- That this was being considered.

Considered (by Dr Anne Southorn):- That Associate membership of the Society might be an attractive proposition to some potential new members who didn't want to receive the Journal.

Resolved:- That this would be discussed by Council.

(c) OCCASIONAL PUBLICATIONS:

Considered (by Dr S. W. Greene):- That the Society might consider the production of occasional publications containing papers such as those given at today's Paper-reading meeting.

Mr M. Walpole gave a vote of thanks to the Officers of the Society, and the meeting closed at 1807 hrs.

A. R. PERRY,  
Hon. Secretary,  
22 October, 1974.

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TAXONOMIC TEACH-IN, NOVEMBER 1974

The Society's first meeting devoted to taxonomic studies took place on 16 November in the School of Biological Sciences of Thames Polytechnic, London, by kind permission of Mr M. D. Morisetti. We thank Dr Paddy Coker for so expertly making the local arrangements. The meeting, attended by 28 members and guests, was intended to be of assistance to beginners in teaching them something about the practical side of naming bryophytes under the microscope. Talks by experts were followed by question and answer sessions and practical identification of material (participants had been invited to bring along some of their 'problem' specimens).

The meeting was opened by Dr G. C. S. Clarke who introduced the first speaker. Mr A. C. Crundwell on Bryum gave hints on the preparation of material for microscopical study and pointed out some of the problems of identification in the genus, e.g. hybridity. Material collected should be of good quality and if possible bear ripe but not decayed sporophytes. Several species - B. salinum, B. pendulum, B. caespiticium, B. intermedium and B. inclinatum - are indistinguishable sterile. Members of the 'erythrocarpum' and bicolor complexes are unidentifiable without tubers or gemmae.

Dr E. W. Jones reviewed the species of Cephaloziella and of Cephalozia in Britain and showed that although many of the species were easily recognized there were certain groups that often give trouble, e.g. Cephaloziella rubella/hampeana/starkei and Cephalozia ambigua/bicuspidata/lammersiana. He pointed out the importance of sexual structures in identification.

The afternoon session was opened by Dr A. J. E. Smith who gave the results of his recent study of British Ulota species, to be published in a forthcoming paper. He also gave a conspectus of classification of the genus Grimmia in Britain and listed the errors in Grimmia in Dixon's Handbook (especially in the key!).

Mr A. R. Perry showed how the characters used in the identification of Scapania species might best be observed and discussed the importance of lobe decurrence as a key character. He doubted that S. scandica, S. curta and S. mucronata could be separated in the absence of perianths. A key to British species, adapted from Buch, was handed out.

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†Because of the deficiencies in Dixon's key Dr Smith has prepared keys to the Grimmiaceae which are published in this Bulletin.

The majority of those attending the Taxonomic Teach-in joined a field meeting of the London Natural History Society on 17 November by kind invitation of the leader, Mr E. C. Wallace.

The meeting was at Coombe Bottom, Surrey, v.-c. 17. This is a Site of Special Scientific Interest, a woodland area on the scarp slope of the North Downs, the highest part capped with the gravelly Netley Heath deposits. Among the species seen on wood were Dicranum strictum, Bryum flaccidum, Nowellia curvifolia and Plagiothecium curvifolium. Broken pieces of chalk gave us Rhynchostegiella tenella, Fissidens minutulus var. tenuifolius, Tortella inflexa, Seligeria paucifolia and a little S. calcarea. On cleared ground Phascum cuspidatum, Pottia recta, P. truncata and P. intermedia were fruiting well.

In the afternoon we moved a little further west along the escarpment for other terrestrial species. Eurhynchium schleicheri was on loamy soil by the Silent Pool and on the slopes above we saw many typical calcicoles including Brachythecium glareosum, Entodon concinnus, Leiocolea turbinata, Ditrichum flexicaule and Encalypta streptocarpa. We are grateful to Mr Wallace for the interesting finale to a very successful weekend.

I am grateful to Mrs J. E. Smith for preparing the account of the field meeting.

A. R. PERRY

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### 3. FUTURE MEETINGS OF THE SOCIETY

(a) Easter Field Meeting, 1975: Newtown, Powis (Montgomeryshire), 1 - 7 April. Local Secretary: Mr M. O. Hill, Institute of Terrestrial Ecology, Penrhos Road, Bangor, Gwynedd, LL57 2LQ

The Headquarters for this meeting will be at 'Gregynog' the University of Wales conference centre near Newtown. The centre provides full board at a cost of £4.70 per day (£2.50 for students) and there are special rates for members of the University of Wales. We hope that most B.B.S. members will decide to stay at Gregynog and those intending doing so are asked to make their bookings through the local secretary (NOT direct to Gregynog, please) at least a fortnight before the meeting. The local secretary can supply details of other accommodation in the area on request.

Montgomeryshire has until recently been little-worked for bryophytes and most of the localities to be explored during the meeting are still bryologically unknown. The terrain is varied, with wooded valleys, rocky hillsides, cliffs, wet upland and the wide alluvial plains of the River Severn. The area is known to be rich in a number of species which are local in southern Britain. Myrinia pulvinata, Orthotrichum rivulare and O. sprucei are known from the banks of several local rivers. Lead mines support interesting populations of Ditrichum species. It is hoped to see Bryum weigelii, Drepanocladus vernicosus, Encalypta ciliata, Sphagnum contortum, S. subsecundum var. subsecundum, Cryptothallus mirabilis and Porella thuja but there should be plenty more finds of species not hitherto known in the area.

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(b) Summer Field Meeting, 1975: Arklow, Co. Wicklow, Republic of Ireland, 16 - 30 August. Local Secretary: Dr D. Synnott, National Botanic Gardens, Glasnevin, Dublin 9.

Headquarters: Hoyne's Hotel, Main Street, Arklow, Co. Wicklow, Republic of Ireland. Full board (1975 prices) £38.50 per week.

Other accommodation: There is a considerable number of hotels and guest houses in and near Arklow and they are all listed in the pamphlet 'Official Guide to Hotels and Guest Houses' which is available free of charge from the Irish Tourist Board (London address: Ireland House, 150 New Bond Street, London W1Y 0AQ). The Board also produces free pamphlets about accommodation in farmhouses and caravan and camping parks; they can supply details of travel arrangements, too. Early booking - particularly for those taking cars - is recommended.

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(c) Annual General Meeting and Paper Reading Meeting, 1975:

NOTE!! This will not now be held in Birmingham as suggested at the Annual General Meeting, Exeter, 1974; but probably in the University of Reading, with Dr E. V. Watson acting as Local Secretary. Possible dates for this meeting will now be either 20-21 September or 27-28 September. Complete information will appear in the next Bulletin.

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(d) Easter Field Meeting, 1976: North Dorset/Wiltshire area.

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(e) Summer Field Meeting, 1976: Scottish border country, 21 - 28 August.

G. C. S. CLARKE

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4. OTHER BRYOLOGICAL MEETINGS AND COURSES, 1975

(a) Chalkney Wood (Essex) Field Trip:

The Botany group of the Essex Field Club will be visiting this newly designated Country Park to study the bryophyte flora on 9 March. Anyone wishing to join in from the B.B.S. would be very welcome. Meet at 1100 hrs by the road adjoining the southern boundary of the wood (G.R. TL/871272). Leader: Ken Adams, 63 Wroths Path, Baldwins Hill, Loughton IG10 1SH. Tel: 01-508-7863

(b) Field Centre Courses:

- 26 March - 2 April. Nettlecombe Court, Williton, Taunton, Somerset, TA4 4HT. Mosses and Liverworts, Malcolm McFarlane.
- 2 - 9 April. The Drapers' Field Centre, Rhyd-y-Creiau, Betws-y-Coed, Gwynedd, LL24 0BH. Mosses and Liverworts, Dr D. H. Dalby and Dr Anne Southorn.
- 23 - 30 July. Oriulton Field Centre, Pembroke, Dyfed. Mosses and Liverworts, Mr A. R. Perry.
- 13 - 20 August. Preston Montford Field Centre, Montford Bridge, Shrewsbury, SY4 1DX. Mosses and Liverworts, Dr J. G. Duckett.
- 27 August - 3 September. Malham Tarn Field Centre, Settle, Yorkshire, BD24 9PU. Mosses and Liverworts, Dr M. C. F. Proctor.

8 - 15 October. Kindrogan Field Centre, Enochdu, Blaingowrie,  
Perthshire, PH10 7PG. Bryophytes, Mr B. S. Brookes.

Further information about these courses may be obtained by writing to the Wardens of the field centres.

The programme of courses for 1975 at Kindrogan Field Centre is available from our member, Mr Brian S. Brookes, who is Warden there. Individual adults or small groups are welcome at Kindrogan at any time, either as participants in advertised courses or independently.

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## 5. 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, 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 possible loss.

### (2) For sale:

Moss Exchange Club Report: 1902 (5p)

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

British Bryological Society Transactions - annual parts:

Vol. 1 parts 1 - 5 (£1.60 to members, £2.00 to non-members(each), reprint)

Vol. 2 parts 1 - 3 (90p each, limited stock)  
part 4 (£1.50, limited stock)

Vol. 3 parts 1 - 5 (£3.00 each, reprints)

Vol. 4 part 1 (£3.00, reprint)  
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)

Note: Volume 6 part 2 completes the series of B. B. S. Transactions. 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 for P. & P.

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All the above items are available from the B.B.S. Librarian: Dr K. J. Adams,  
63 Wroths Path, Baldwins Hill, Loughton, Essex, IG10 1SH

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#### 6. REFEREES (January 1975)

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
- 48-53: Dr G. C. S. Clarke, Department of Botany, British Museum (Natural History), Cromwell Road, London, SW7 5BD
- 54-56: Mrs Hilary H. Birks, 43 Acrefield Drive, Cambridge.
- 57-61, 75: M. O. Hill, Institute of Terrestrial Ecology, Penrhos Road, Bangor, Gwynedd, LL57 2LQ
- 68-70: D. G. Long, Department of Agriculture & Fisheries for Scotland, Agricultural Scientific Services, East Craigs, Edinburgh, EH12 8NJ

#### Moss Referees:

- 1: M. O. Hill (address above); A. Eddy, Department of Botany, British Museum (Natural History), Cromwell Road, London, SW7 5BD; Dr H. J. B. Birks, Botany School, Downing Street, Cambridge, CB2 3EA

- 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; A. H. Norkett, Department of Botany, British Museum (Natural History), Cromwell Road, London, SW7 5BD  
 10-33: M. F. V. Corley (address above).  
 34, 57-69, 80-89, 91-97, 100-124: E. C. Wallace, 2 Strathearn Road, Sutton, Surrey.  
 35-51, 53: Dr D. F. Chamberlain, Department of Botany, Royal Botanic Garden, Edinburgh, EH3 5LR  
 52: A. C. Crundwell, Department of Botany, The University, Glasgow, G12 8QQ  
 54-56: Dr A. J. E. Smith (address above).  
 70-78, 90: Dr E. V. Watson, Department of Botany, The University, London Road, Reading, RG1 5AQ  
 79: Dr P. D. Coker, School of Biological Sciences, Thames Polytechnic, Wellington Street, London, SE18 6PF  
 98, 99: Dr S. W. Greene, Bryophyte Research Group, Institute of Terrestrial Ecology, Research Gardens Winterbourne, University of Birmingham, P.O. Box 363, Birmingham, B15 2TT  
 125-130, 132-161: Mrs J. Appleyard, Sunnyside, West Horrington, Wells, Somerset, BA5 3ED

#### 7. B.B.S. DISTRIBUTION MAPS SCHEME

During the past two years a considerable amount of recording has been carried out in underworked or unworked areas as will be seen from the situation map in J. Bryol. 8, p. 123. There are, however, some counties from which few or no records have been received. These are -

Buckingham, Cheshire, Gloucester, Northampton, Nottingham, Pembroke, Shropshire, Stafford, Worcester, Ayr, Banff, Caithness, Lanark, N. Aberdeen, Renfrew, all of Eire except Donegal, Kerry, Laois, Sligo, Tipperary, Waterford, W. Galway.

It is stressed that much recording is still required elsewhere as well and information about such areas and record cards (15p for 10) may be obtained from the Mapping Secretary, Dr A. J. E. Smith, School of Plant Biology, University College of North Wales, Bangor, Gwynedd, LL57 2UW.

A. J. E. SMITH

#### 8. CONSERVATION

The following report has been received from Dr Paddy Coker, our representative on the Conservation Committee of the British Lichen Society:

"In response to the Lichen Society's invitation, I attended a meeting of the B.L.S. Conservation Committee on 26 September. Matters of interest to the B.B.S. which were discussed included damage to epilithic bryophytes on sarsen stones as a result of crop spraying, and a proposed ranking for sites of lichenological importance in the British Isles which could well be applied to bryophyte sites. Five categories in decreasing order of importance from 'international' to 'local' were proposed and sites notified to the Nature Conservancy Council for appropriate action. P. D. Coker, 30 September, 1974"

Our representation in conservation recently increased when, by the kind invitation of the Botanical Society of the British Isles, we were able to appoint Dr Coker to their Conservation Committee.

Members who learn of any threats to important bryophyte species or bryological sites should write, giving as many details as possible (including grid reference), to Dr P. D. Coker, School of Biological Sciences, Thames Polytechnic, Wellington Street, London SE18 6PF.

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#### 9. LETTERS TO THE SECRETARY:

From Michael V. Fletcher:

I do not think an account of how I grow my mosses would in itself be useful, since personal idiosyncrasies play a large part in shaping any collection of plants. Visits, personal contact, letters, exchanges and discussion of the plants seem the best way to spread enthusiasm and knowledge. Main features are:

- glass sided shelves in the open air are slightly warmed and with artificial light;
- frequent (1-5 times weekly) coarse high pressure spraying with rainwater;
- choice of an appropriate substratum (anything from bare slate to guinea pig droppings);
- a range from very dry exposed conditions to totally humid air in different frames;
- attention to drainage or waterlogging of plants as appropriate;
- most cultures are impure, containing several associates or adventives in fairly undisturbed competition;
- a few are kept among cacti in another greenhouse, but none in the open air. The most unpredictable and likely to be lost or to become very scarce are short-lived acrocarps. Many have been propagated recently on enclosed sterile pottery clay.

My main concern is to decide the future shape of this unwieldy mass of plants. I think a comprehensive or even complete collection of British bryophytes should be kept going, though not necessarily in one place. It could easily be extended to include European species. Also there now exists in Europe a useful, though not comprehensive, range of southern hemisphere plants which could easily be increased. I think it would also be useful to extend and identify my meagre tropical African gatherings, and to spend more time on the rather more difficult job of growing lichens! I hope that it will be possible to pass on, without losing, parts of my collection in the next few years, before the garden is finally buried under an avalanche of neglected cryptogams. ----Yours, etc.

Michael V. Fletcher, 70 South Street, Reading, Berkshire. 17 July, 1974.

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#### 10. NEW MEMBERS, JANUARY - NOVEMBER 1974

ADAM, Paul, B.A., Botany School, Downing Street, Cambridge, CB2 3EA (Jun.)  
ALEXANDER, L. W. G., B.Sc., 3 Barnton Gardens, Edinburgh, EH4 6AF  
ATKINS, Simon D., 69 Grove Park Road, Mottingham, London, SE9 4NS (Jun.)  
BLOOM, George, B.A., 64 Stevenage Road, Knebworth, Herts., SG3 6NN  
DAY, John J., B.Sc., Loxley, 14 College Avenue, Freshfield, Formby, Lancs.  
DOYLE, Prof William T., Department of Biology, University of California,  
Santa Cruz, California 95064, U. S. A.

EGUNYOMI, Adeyemi, B.Sc., Balewa Post-graduate Hall, University of Ibadan, Ibadan, Nigeria.

FETTES, Miss June A., 235 Midstocket Road, Aberdeen. (Jun.)

FREY, Dr W., D-7401 Mähringen, Hauptstr. 32, West Germany.

GODFREY, M. F., B.Sc., 58 Newton Gardens, R.A.F. Newton, Notts.

GREENE, Mrs D. M., Bryophyte Research Group, Institute of Terrestrial Ecology, University of Birmingham, Research Gardens Winterbourne, P.O. Box 363, Birmingham, B15 2TT (Fam.)

GUERKE, Dr Wayne R., Department of Botany, Southern Illinois University, Carbondale, Illinois 62901, U. S. A.

HARVEY, L. B., B.A., M.Ed., M.Sc., 9 Acton Burnell, Salop.

HENDERSON, A., B.A., 42 Headingley Avenue, Leeds 6.

HUNTLEY, Brian, B.A., Botany School, Downing Street, Cambridge, CB2 3EA (Jun.)

JACKSON, P. E., M.D., B.S., F.R.C.P., Griffons, North Street, Stamford, Lincs.

JOHNSTON, Miss Glenys L., 7 Margrove Walk, Park End Estate, Middlesbrough, Cleveland County. (Jun.)

KELLEY, Dr Carole B., University of California, Thimann Laboratories, Santa Cruz, California 95064, U. S. A.

LANGLEY, D. C. D., 2/117 Heathfield Road, Handsworth, Birmingham, B19 1HL

LIBBEY, Richard P., B.Sc., 143 Gaywood Road, King's Lynn, Norfolk, PE30 2QA

LOWTHER, N. M., 85 Rawlinson Street, Barrow-in-Furness, Cumbria, LA14 2DT

MEADE, Roger, 5 Brookside Avenue, Sutton, Macclesfield, Cheshire, SK11 0HN

MORTON, Mrs G., 1 Venner Cottages, Brock Hill, Bracknell, Berks. (Jun.)

MOTHERSILL, Miss Carmel, 23 Springfield Road, Templeogue, Dublin 6, Republic of Ireland.

MOYLE, Dr Susan, Department of Biology, Va. Commonwealth University, Richmond, VA. 23229, U. S. A.

PETTY, Stephen J., 9 South Waterside, Kielder, Hexham, Northumberland.

RANDALL, Eric A., Assistant Professor, Biology Department, State University College at Buffalo, 1300 Elmwood Avenue, Buffalo, New York 14222.

READDIE, Miss Jennifer D., 34 Braehead Drive, Linlithgow, West Lothian. (Jun.)

RIBBONS, Basil W., B.Sc., M.I.Biol., F.L.S., Department of Botany, The University, Glasgow, G12 8QQ

ROBERTSON, I. H., 6 Invergordon Avenue, East Cosham, Portsmouth, Hants. (Jun.)

RUBERS, Dr W., Instituut voor Systematische Plantkunde, Transitorium 2, Utrecht, Netherlands.

SAVICZ-LJUBITZKAJA, Mrs L. I., Section of Cryptogams, Botanical Institute of the Academy of Sciences of the U.S.S.R., Popov Street 2, Leningrad, P-22. (Honorary)

SKARP, Erik, Skebokvarnsvägen 292, 12434 Bandhagen, Sweden.

SMIRNOVA, Mrs Z. N., Section of Cryptogams, Botanical Institute of the Academy of Sciences of the U.S.S.R., Popov Street 2, Leningrad, P-22. (Honorary)

THOMAS, M. R., 5 Lambley Road, St George, Bristol. BS5 8JQ (Jun.)

VAN DER REIJDEN, Willem R., B.Sc., 116 Inks Green, Chingford, London, E4 9EJ

VOGELPOEL, Drs D. A. J., Institute of Systematic Botany, Transitorium II, Heidelberglaan 2, Utrecht, Netherlands.

WHITTIER, Prof Henry O., P.O. Box 792, Oviedo, Florida 32765, U. S. A.

ZANDER, Dr Richard H., Curator of Botany, Clinton Herbarium, Buffalo Museum of Science, Buffalo, New York State, U. S. A. 14211.

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#### 11. CHANGES OF ADDRESS AND NON-DELIVERY OF THE JOURNAL

Please report to the Secretary all changes of address without delay so that the membership list can be kept up-to-date. Members should also tell the Secretary (NOT Blackwell's!) if their Journal goes astray in the post. Volume 8 part 1 of the Journal was published in November, 1974.

## 12. KEY TO THE BRITISH GENERA AND SPECIES OF THE GRIMMIACEAE

By A. J. E. SMITH

Care must be taken when removing leaves from a stem that the bases are not torn off and left on the stem. The leaves referred to in the key are those from the upper part of the stem but not perichaetial leaves which may be of different shape and areolation from stem leaves. Basal cells are those at the base of the leaf midway between the nerve and the margin. Cell dimensions are of cells midway between nerve and margin about half-way between base and apex (ignoring any hair-point). Where cells are bistratose that part of the lamina appears dark and the cells opaque.

### Key to genera

1. Basal cells of lf sinuose-nodulose Rhacomitrium  
Basal cells smooth to sinuose but not nodulose 2
2. Lvs with thickened plicae on either side of nerve, margin plane, calyptra large, plicate, covering most of the immersed capsule, plants dioecious Coscinodon cribrerosus  
Lvs without plicae, margin plane, incurved or recurved, calyptra small, smooth, capsule exserted or if immersed then plants autoecious 3
3. Lvs without hair-points, nerve conspicuously two-winged at back above Dryptodon patens  
Lvs with or without hair-points, nerve not two-winged at back above Grimmia

### Key to sections and species of GRIMMIA

1. Plants autoecious, capsules usually present, immersed, erect, symmetrical, columella falling with lid 2 (sect. Schistidium)  
Autoecious or dioecious, capsule exserted or if immersed then capsule inclined and gibbous, columella persistent 12
2. Spores 16-28  $\mu\text{m}$ , lvs usually without hair-points 3  
Spores 6-12(-14)  $\mu\text{m}$ , at least uppermost leaves usually with hair-points 6
3. Spores 20-28  $\mu\text{m}$ , nerve percurrent or excurrent G. maritima  
Spores 16-20  $\mu\text{m}$ , nerve ending in or below apex 4
4. Lf margin usually plane, lamina unistratose throughout G. agassizii  
Lf margin recurved below, margin and upper part of lamina bistratose 5
5. Stems not denuded below, lvs ovate, perichaetial lvs scarcely exceeding capsule G. alpicola var. alpicola  
Stems often denuded below, lvs ovate-lanceolate, perichaetial lvs exceeding capsule by ca. 1/3 their length G. alpicola var. rivularis
6. Nerve smooth or with low opaque papillae at back towards apex 7  
Nerve of at least younger lvs with colourless conical papillae at back towards apex 11
7. Plants forming loose, decumbent to suberect, greenish to brownish patches or tufts, hair-points usually present, to 1 mm long 8  
Plants forming dense, dark brown cushions or straggling blackish patches, hair-points very short (to 60  $\mu\text{m}$  long) and often lacking in most lvs 10

8. Lf cells 6-8  $\mu\text{m}$  wide, peristome teeth orange-red, perforated G. conferta  
Lf cells 8-10  $\mu\text{m}$  wide, peristome teeth deep red, perforated or not 9
9. Hair-point smooth to denticulate, cells towards base of lf not or scarcely sinuose, peristome teeth papillose G. apocarpa var. apocarpa  
Hair-point spinulose, cells very sinuose throughout, peristome teeth smooth G. apocarpa var. homodictyon
10. Plants forming dense, dark brown cushions G. atrofusca  
Plants forming blackish, straggling patches G. trichodon
11. Plants reddish or reddish-brown G. stricta  
Plants blackish G. borealis
12. Lvs concave, obovate or oblong-lanceolate, margin plane, hair-point as long as lamina in upper lvs, seta 1 mm or less, capsule inclined,  $\pm$  immersed 13 (sect. Gasterogrimmia)  
Plants lacking above combination of characters 14
13. Lf cells bistratose towards apex, capsule immersed, peristome lacking G. anodon  
Lvs unistratose throughout, capsule partially immersed, peristome present G. crinita
14. Lf margin usually plane or incurved, cells in upper part of lf bistratose, opaque, seta straight 15 (sect. Guembelia)  
One or both margins recurved, cells pellucid, unistratose except at margin and apex, seta arcuate when moist 24 (sect. Rhabdogrimmia)
15. Lvs without hair-points 16  
At least upper lvs with hair-points 17
16. Lf margin erect, apex cucullate G. unicolor  
Lf margin very narrowly recurved, apex flat G. atrata
17. Hair-points of upper lvs very short (to 150  $\mu\text{m}$  long), lvs of  $\pm$  uniform size throughout length of stem G. elongata  
Hair-point usually 1/4 or more length of lamina in upper lvs, lower lvs shorter than upper 18
18. Lvs concave, triangular to lanceolate with broad base, apex obtuse, basal cells towards margin often wider than long G. laevigata  
Lvs keeled or channelled, ovate-lanceolate to linear-lanceolate, apex  $\pm$  acute, basal marginal cells longitudinally rectangular to quadrate 19
19. Basal cells to 3 times as long as wide 20  
Basal cells 4 or more times as long as wide 21
20. Lvs linear-lanceolate to lanceolate, cells 8-10  $\mu\text{m}$  wide, not or only slightly sinuose, spores ca. 12  $\mu\text{m}$  G. montana  
Lvs ovate-lanceolate, cells 10-12  $\mu\text{m}$  wide, spores 8-10  $\mu\text{m}$  G. alpestris
21. Cells 10-12  $\mu\text{m}$  wide, walls of marginal cells near base uniformly thickened 22  
Cells 6-10  $\mu\text{m}$  wide, transverse walls of marginal cells near base more heavily thickened than longitudinal walls 23
22. Lvs not homomallous, seta  $\pm$  straight G. doniana var. doniana  
Lvs  $\pm$  homomallous, seta arcuate G. doniana var. arenaria

23. Lf margin plane or incurved, cells 6–8  $\mu\text{m}$  wide, conspicuous  
hyaline marginal band, 6–10 cells wide, at base of lf G. commutata  
Margin plane or slightly recurved, cells 8–10  $\mu\text{m}$  wide, no  
conspicuous marginal band of cells at base G. ovalis
24. Lvs linear to linear-lanceolate, crisped when dry, hair-point very  
short (to 160  $\mu\text{m}$  long) G. incurva  
Lvs wider, straight to twisted when dry or if crisped then plants  
brown, hair-points variable 25
25. Upper lvs ovate-lanceolate or lanceolate, abruptly narrowed into  
hair-point 26  
Upper lvs lanceolate or narrowly lanceolate, gradually tapering  
into hair-point 28
26. Basal cells 4–8 times as long as wide, capsule ovoid, lid mamillate  
G. orbicularis  
Basal cells 2–4 times as long as wide, capsule ellipsoid or ovoid 27
27. Capsule ellipsoid, lid rostellate G. pulvinata var. pulvinata  
Capsule ovoid, lid shortly conical G. pulvinata var. africana
28. Lvs spirally crisped or curved when dry 29  
Lvs straight or curved but not spirally so when dry 30
29. Plants brownish, hair-points short (to 250  $\mu\text{m}$  long), lvs spirally  
crisped when dry G. torquata  
Plants grey to blackish, hair-points  $\frac{1}{2}$ –1 length of lamina in upper  
lvs, lvs spirally curved when dry G. funalis
30. Hair-points short, to 320(–400)  $\mu\text{m}$  long in upper lvs 31  
Hair-points to as long as lamina in upper lvs 32
31. Lvs often secund when moist, basal cells  $\pm$  sinuose, clusters of  
gemmae frequently present on shoot apices G. hartmanii  
Lvs not secund, basal cells  $\pm$  smooth, gemmae absent G. retracta
32. One margin of lf strongly recurved, other less so or plane, cells  
in upper part of lf opaque, bistratose G. elatior  
Lf margins  $\pm$  equally recurved, cells pellucid, unistratose except  
at margin 33
33. Hair-point strongly denticulate, basal cells to 10 times as long as  
wide, upper cells strongly sinuose G. decipiens var. decipiens  
Hair-point smooth to denticulate, basal cells to 6(–8) times as long  
as wide, upper cells  $\pm$  sinuose or not 34
34. Lf cells incrassate, sinuose throughout G. decipiens var. robusta  
Basal cells less incrassate than upper, smooth to slightly sinuose 35
35. Lvs squarrose when moist, cells not or only slightly sinuose above  
G. subsquarrosa  
Lvs not squarrose, cells sinuose or not above 36
36. Basal cells to 6(–8) times as long as wide G. trichophylla  
Basal cells to 3 times as long as wide 37
37. Hair-point  $\pm$  smooth, short (to  $\frac{1}{4}$  length of lamina) G. stirtonii  
Hair-point denticulate to spinulose (to  $\frac{1}{2}$  length of lamina) G. muehlenbeckii

Key to species of RHACOMITRIUM

1. Lf cells strongly papillose, hair-point if present papillose R. canescens  
Lf cells not or only faintly papillose, hair-point if present papillose or not 2
2. Lvs with hair-points 3  
Lvs without hair-points 5
3. Hair-point coarsely and irregularly toothed, strongly papillose R. lanuginosum  
Hair-point denticulate, not papillose 4
4. Cells towards apex  $\pm$  quadrate, marginal cells near base opaque R. heterostichum  
Cells towards apex rectangular, 3-4 times as long as wide except margin, 1-2 marginal rows near base pellucid R. microcarpon
5. Cells towards apex rectangular, stems with numerous short branchlets R. fasciculare  
Cells towards apex  $\pm$  quadrate, stems without numerous short branchlets 6
6. Lf apex rounded, often dentate R. aciculare  
Apex obtuse, not toothed 7
7. Lf cells unistratose throughout, slightly papillose above R. aquaticum  
Cells bistratose towards apex, at least at margin, not papillose 8
8. Capsule ovoid, lf lamina bistratose above R. ellipticum  
Capsule ellipsoid or shortly cylindrical, lamina bistratose only at margin above R. heterostichum

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CONTRIBUTIONS FOR THE NEXT BULLETIN  
SHOULD REACH THE SECRETARY  
BY 1st JUNE, 1975

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A. R. Perry, Hon. Secretary, Department of Botany, National Museum of Wales,  
Cardiff, CF1 3NP

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