Meeting Report:  
BBS Annual Meeting and Conference  
4-6 September 2015

Martin Godfrey reports on the 2015 Autumn Meeting held at Preston Montford Field Centre

The 2015 meeting was held at the Preston Montford Field Centre in Shropshire, courtesy of the Field Studies Council.  Committee meetings, followed by the Council meeting were held on the evening of the 4th and on the 5th 38 members assembled for a full programme of events including eight talks on a variety of topics from the history of natural history in Shropshire to mosses as model organisms, a sale of donated books which raised over £1300 (with a further £200 + after the event) and on the 6th two field trips – one to the Long Mynd lead by Mark Lawley, the County Recorder, and the other to Whixall Moss led by Martin Godfrey to do BRECOG recording.  The money from the book sale has gone into the Bequest Fund so as to be available for use by members at large.  The society AGM was held on the afternoon of the 5th after the paper reading programme; as well as the more usual agenda items it was particularly pleasing to see the election of Ken Adams and Phil Stanley as honorary members, reflecting their outstanding contributions to the society over many years.  

Jeff Bates brought along his excellent new Mid-Wales Flora and Mark Lawley his latest book, on the history of natural history in the Welsh Marches, on which his talk was based.  

Sadly Juliet Coates, principal investigator of the bryophyte molecular genetics group at the University of Birmingham, who was due to give a talk on Physcomitrella patens, was ill and unable to come but she had recorded her powerpoint presentation for us so we didn’t miss this fascinating view of a bryophyte as a model organism.

The Talks Programme

• The magnificent achievement of the BBS: the 2014 Atlas and its applications. Chris Preston & Oli Pescott
• Physcomitrella patens – a model organism. Juliet Coates
• BRECOG, an update and progress so far. Jeff Bates
• Using some new databases about the BBS and its publications. Phil Stanley
• Forgotten nature, forgotten naturalists of the Welsh Marches. Mark Lawley
• Orchard epiphytes. Robin Stevenson
• Bryophytes in Ghana. Nick Hodgetts

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The Long Mynd Foray

Ten members took advantage of a beautifully clear, sunny day to examine a base-rich flush at the bottom of Rams Batch (SO 422906), which is a side-branch of Minton Batch. There they found plentiful Campylium stellatum and Scorpidium cossonii, along with S. scorpioides, Sphagnum contortum, S. inundatum and other basiphiles. After picnicking on the grassy slope above the flush, we spent a few minutes searching unsuccessfully for Grimmia montana on rocks at the foot of Windy Batch, but all the material collected in hope turned out later to be G. trichophylla. To compensate, we admired a flourishing colony of Schistostega pennata (‘Goblins Gold’) shining a foot or so in from the entrance to a disused burrow beside the path near the top of Minton Batch.

BRECOG recording at Whixall Moss

Eleven members parked up at the moss on a fine sunny day and we walked in to the area known as the “Cranberry Beds”, the least disturbed part of the moss, to do some data collection. The group split into three to cover different habitats, one led by Jeff Bates to record in comparatively undisturbed bog, one led by Martin Godfrey to record on the wetter more disturbed ground, and one lead by Joyce Bates to record the dryer ground. A decent number of quadrats were completed but all noted how dry and rather species-poor the moss seemed, especially the Scottish Contingent who had worked with Jeff on the least disturbed site.

Fig 1. For the bryological excursion on the Sunday Mark Lawley led participants on the Long Mynd.

Fig 2. Joan Bingley diligently making BRECOG records. M. Godfrey.
The “magnificent achievement” of the BBS: the 2014 Atlas and some applications
Oli Pescott & Chris Preston; olipes@nerc.ac.uk

This talk presented an overview of the background to the 2014 Atlas of British and Irish Bryophytes, as well as a brief review of some recent applications of the data collected. Detail on much of the information presented can be found in the introductory chapters of the Atlas, particularly Preston (2014). Other topics covered included analyses of change using distribution data (Hill & Preston, 2014; Pescott et al., 2015—see Fig. 1), work incorporating trends in bryophyte distributions into governmental ‘indicators’ (e.g. Defra, 2016), and a critical look at recent climate change impacts research covering bryophytes (Pearce-Higgins et al., 2015).

References

Physcomitrella patens—a model organism
Juliet Coates; j.c.coates@bham.ac.uk

The transition of plants from water to land was a critical step in the evolution of life. Acquisition of multicellularity was key to surviving the stresses imposed by a non-aqueous environment, such as gravity and desiccation: eventually leading to the acquisition of large and complex forms present in vascular plants.

All land plants evolved a means of dispersal during their life cycle via a desiccation-resistant dispersal structure, usually a spore or seed. This was key to distributing plants across continents, enabling species movement. It is well established that germination of seeds is regulated by signals from the environment, which are integrated via plant hormones, in particular a balance between abscisic acid (ABA) and gibberellins, a group of diterpene-derived hormones. Recently my lab has been uncovering how plant dispersal mechanisms evolved by using the early-evolving model bryophyte Physcomitrella (Physcomitrella patens).

We have shown that environmental signals such as far red light and high temperature inhibit spore germination, as is already known in seeds. However, our data imply that divergent hormone networks have evolved in the half-billion years of land plant evolution to transduce the same environmental signals and give rise to the same developmental output. Furthermore, our results implicate certain volatile hormones in novel quorum-sensing functions in spores, and have uncovered a previously undiscovered role for bacterial-derived compounds in the regulation of spore germination.

Our work also demonstrates that conserved protein “nodes” may exist within these divergent hormone networks. Such proteins are ancient and versatile: the Physcomitrella proteins can substitute for the function of their homologues in the model flowering plant Arabidopsis. We have shown that these proteins have also been co-opted into flowering plant-specific roles, regulating multicellular root branching via interaction with root-specific flowering plant proteins. This has important implications for agriculture in the future.

BRECOG, an update and progress so far
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Nine years ago this BBS project was launched at Preston Montford with the following aims: 1, to collect data on the habitats of the common bryophytes of Britain and Ireland; 2, to record the frequency and timing of their fruiting; 3, to compare their physiological responses to some standardised environmental stresses, and 4, to attempt a classification of bryophyte ‘communities’. Considerable progress has been made on all aspects. The talk focussed on some selected results of the field studies that involve sampling percentage cover of bryophytes within replicated quadrats and making some simple environmental measurements.

By the end of August 2015 some 890 microhabitat samples had been recorded, each based on an average 5.4 quadrats (4765 in total) and encompassing 204 hectares. Among the 510 taxa recorded to date the ten most
frequent are Kindbergia praetonga (257 samples), Hylocomium splendens (232), H. jutlandicum (215), Dicranum scoparium (206), Thuidium tamariscinum (203), Rhytididendus squarrosum (202), Brachythecium rutabulum (174), Hylocomium splendens (150), Mnium hornum (150) and Calliergonella cuspidata (144). Three ecological factors (altitude, exposure to sunlight, pH) were selected from the dataset to illustrate its value for making interspecific comparisons.

Almost all species show strong positive or negative abundance patterns with increasing altitude. Some such as Amblystegium serpens, Bazzania trilobata and Frullania dilatata exhibit a marked restriction to lower altitudes, although probably for different reasons. Common taxa showing increasing abundance at higher altitudes include Brachytrichum chrysocoma and Andreaea rupestris. However, this trend is less clear in others such as Racomitrium lanuginosum, probably because altitude does not influence bryophytes directly but is a surrogate for a group of loosely correlated habitat factors related to temperature and length of the growth season. A plea was made for further contributions from high altitude sites in Scotland and Ireland to improve habitat coverage.

The insolation factor was explored by means of polar bubble charts. For a given species the abundance in the pH range 3-6 with few records exceeding pH7. However, there are many subtle variations on these patterns. Epiphytes (e.g. Homalothecium lutescens, Necker cripta, Thamnobryum alopecurum) generally occur on substrata with pH values of 6-7.9, whereas calcicolous species (e.g. Hylocomium splendens, Polytrichum commune) show maximum abundance in the pH range 3-6 with few records exceeding pH7. However, there are many subtle variations on these patterns. Epiphytes (e.g. Metaglossia furcata) invariably show narrow pH amplitudes (5-7 units) related to normal bark properties, but some tolerate higher or lower pH values when they grow on other substrata such as soil or rock, though usually at low cover. Two-dimensional bubble graphs were used to display variations on these patterns. Epiphytes (e.g. Metaglossia furcata) invariably show narrow pH amplitudes (5-7 units) related to normal bark properties, but some tolerate higher or lower pH values when they grow on other substrata such as soil or rock, though usually at low cover. Two-dimensional bubble graphs were used to display the pH and electrolyte (measured as electrical conductivity) relationships of some aquatic and semi-aquatic bryophytes. The soligenous flush species Sphagnum fallax tolerates a relatively wide pH range (3.4-6) but only very low electrolyte concentrations. In comparison, the ‘acid stream’ moss, Racomitrium aciculare, is actually a neutrophile, occurring over the pH range 4.5-7.8 and with maximum abundance between pH 6 and 7. The ‘spring’ species Philonotis fontana overlaps and extends even higher (pH 5.4-8.3). The common flush species Calliergonella cuspidata occurs over a similar pH range to P. fontana but unlike all the foregoing, also tolerates high electrolyte concentrations. In this respect it partially overlaps the tufa (travertine)- forming species like Cootoneurn filicinum and Psilotrichella commutata which grow in waters with a pH always exceeding pH 6.5 and also with significant electrolyte concentrations.

All the results presented are provisional as the project is now planned to run until the end of 2017. Some 62 individuals and groups have contributed records. It is to be hoped that in the final two years further bryologists can be encouraged to contribute data from their favourite habitats.

The Cumulative Index of BBS publications and searching for text strings in all the volumes and parts of BBS periodicals
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A demonstration of the Cumulative Index was made using a laptop connected to the Internet to www.lumiweb.com. The index of some 60,000 items is publically available as a searchable PDF and covers all periodicals from the beginning of the Society as the Moss Exchange Club (MEC) in 1896 to the present. The website also has lists of other Society information including Presidents, Secretaries, Census catalogues, other publications (non-periodicals) together with pagination details of the following periodicals: MEC Reports (1896-1922), BBS Reports (1923-1945), Transactions of the British Bryological Society (1947-1971), Journal of Bryology (1972-present), Bulletin and Field Bryology (1963-present).

The second part of the demonstration was to show how it is now possible to search for simple text strings throughout the Society’s periodicals, listed above. All the pages of these publications have now been scanned, and the scans subjected to OCR (Optical Character Recognition) so as to produce a large database (about 10 Gb as PDF) available for searching using the laptop. The OCR procedure provides moderately accurate rendition (~90%) of the text for modern volumes, the accuracy of the older (before 1915) volumes being often less than 80%, this probably being due to the unusual fonts and formats used and the somewhat poorer quality of the print.

The demonstration showed how it was possible to search for the text string “Long Mynd” and to output all the “finds” of that text string. About 120 finds were found, this search taking less than 10 seconds on the laptop.

Forgotten nature, forgotten naturalists of the Welsh Marches
Mark Lawley; mrlyrology@gmail.com

Drawing on his recently published Wildlife in the Marches (2015), Mark Lawley discussed social conditions and personal circumstances that tend to produce naturalists, with particular reference to Arthur William Weyman (1860-1935), a founding member of the Moss Exchange Club, who found Cetrulinia cuspidata in the River Teme at Ludlow in 1890.

References
Orchard epiphytes
Robin Stevenson; crs111@talktalk.net

Robin started by showing a map of his study area, followed by a flow chart illustrating (rather roughly!) some of the processes involved in the recruitment of bryophytes, before going on to discuss the factors why orchards are so useful in studying them.

These included the fact that trees are regularly spaced, and in discrete rows, making it easy to find individual trees again; the age of the trees may be known; within a single orchard soils and microclimate will be uniform; their management (i.e. use of sprays etc) is known, and half-standard trees are totally accessible. He then reminded the audience of previous findings from his studies on East Anglian orchards, as published in Field Bryology (Stevenson & Rowntree, 2009).

More recently he has attempted to follow up on the assertion that those species reproducing by means of ‘heavy’ vegetative propagules are liable to spread more slowly than those species reproducing by spores. As such species colonise (or re-colonise) an area then it is likely that the initial colonisation process will probably be random, and individual plants rare or very rare. Subsequent colonisation, however, is likely to be localised around these initial inoculations, resulting in the production of clusters of colonies, although random contributions from outside will continue to occur.

Mapping of over 500 individual trees in a single pear orchard was undertaken and where colonies occurred adjacent to each other it was assumed that this was the result of internal spread (though it could – of course – be the result of two random colonisation events). The fact that the trees are more or less equally spaced means that a colonising ‘jump’ from tree to tree is equally probable in any direction. Colonised trees were then ‘linked’ together on maps, demonstrating clusters showing the size and directions of spread of individual species; however, in the absence of statistical analysis, their significance remains unresolved.

Smaller-scale studies attempting to record the number of actual colonies per tree of selected species such as Bryum moravicum and Orthotrichum lyellii also gave results which suggested that short distance spread from tree to tree may be important, but the all-important statistical backup was again not available. (The data are freely available to anyone with appropriate levels of statistical expertise who may wish to work with them!).

Another smaller scale study, looking at colonisers of apples, pears, and oak trees suggested that the number of preferential epiphytes per species was fairly constant, at about 45%, but that the only preferential epiphytes which come anywhere near to being ubiquitous are Orthotrichum affine and Ulota bruchii s.l.

Frullania dilatata, Orthotrichum lyellii, O. striatum and Cryphaea heteromalla come close but it is obvious that most of the ‘obligate’ epiphytes, even today, are rare, though the differing percentage values indicate relative differences within the ‘rare’ category, particularly as between differing host species. Ulota ‘bruchii’, for instance, occurs at least twice as frequently on oak as on either Bramley apples or Conference pears, whilst Orthotrichum pulchellum is about five times more frequent than on the other two phorophytes. Orthotrichum lyellii, on the other hand, occurs at least twice as frequently on the Bramley apples studied as on either of the other two species.

Robin concluded by suggesting a number of reasons why orchards are fruitful areas for studying bryophyte recruitment and colonisation, and then handed out envelopes containing a Snakes and Ladders board showing the hazards facing a colonising diaspore.

References

Bryophytes of Atewa Forest, Ghana
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Atewa Forest in Ghana is one of the largest remaining intact areas of rainforest in West Africa. It is a source of food and water for five million people, with the headwaters of three major rivers within its boundaries, and full of interesting rare plants and animals. The conservation charity A Rocha Ghana is at the forefront of a campaign to protect this important resource and centre of biodiversity. It is under many threats, the most serious of which is a proposal for industrial bauxite mining. A Rocha, WWF and many others have joined together to call on Ghana’s government to protect Atewa and declare it a National Park.

A ‘rapid biological assessment’ of the forest, published in 2007 (McCullough et al., 2007) provided information about birds, mammals, reptiles, flowering plants and some invertebrate groups, but nothing about bryophytes. I therefore volunteered my services, and spent three weeks in Ghana in March 2014 doing a survey of Atewa Forest, in association with A Rocha Ghana and the University of Ghana Department of Botany.

Local knowledge was used to target parts of the forest likely to be rich in bryophytes. Relatively dry, disturbed lowland forest close to the town of Kibi supported a limited bryophyte flora. There was much evidence of illegal mining and farming activities. Tracksides often have the colonist liverwort Lepidozia succida, and a variety of common small mosses occur on fallen dead wood. Epiphytes are rare, because most trees of any size have been felled. The richest areas of lowland forest are in valleys next to streams, where the humidity is relatively high and disturbance is often less. Here, damp streamside rocks are well clothed with bryophytes, two of the most common species being the liverworts Lophoziuyana nigricans and Plagiochila integerrima.

The diversity of bryophytes increases markedly with altitude. Even though the Atewa Hills are of no great height (up to about 860m), they are high enough and forested enough for cloud to gather frequently around the summits. This provides a locally humid environment rich in pendent mosses, especially Meteoriaceae and Neckeraeaceae, and liverworts such as Plagiochila.
Wye, which enters from the north as little more than a brook, then heads south, curving round and growing into a wide lowland river as it leaves the county at Rhydspence near Hay-on-Wye. Most of the county lies to the east of the Wye and has a moderately oceanic climate with annual rainfall 900-1,000 mm. To the west of the Wye, the Elan Valley has a markedly oceanic climate, with average rainfall 1,800 mm. Most of the county lies above 300 m. There are no mountains, and the highest elevation, 660 m, is in Radnor Forest just 10 km from the English border.

Because of the large size of the party, we split into 3 groups on most days and into 4 groups on the Saturday and Monday. In addition, the epiphyllous leafy liverworts, with Cololejeunea spp., Colura spp., Drepanolejeunea spp., Lepzolejeunea spp., etc. Canopy species include abundant Campylopus savannarum, Macromitrium sulcatum and Groutiella laxotorquata, often with small Lejeuneaceae such as Lejeunea brennii and Ceratolejeunea calabariensis creeping through them. Standing and fallen dead wood is also much richer than at lower altitudes. Similar communities also grow in patches of swamp forest and by pools at the bottom of valleys and in hollows.

A total of 164 taxa were found, of which about 13 species of liverwort and 45 species of moss are new to Ghana. These include a new species of Cololejeunea that will be described in a future paper. This survey therefore contributes further evidence for the importance of Atewa Forest and the necessity for conserving it and managing it properly. It is hoped to follow up this brief survey with further fieldwork over the next few years and by developing the relationship with botanists in Ghana.

For a fuller account see Journal of Bryology 38: 211-22 (2016).

Reference