

# BBS Annual Meeting and Conference

9–11 September 2011

**Ray Tangney** reports on last year's Autumn Meeting held at Amgueddfa Cymru – National Museum Wales. Cardiff

More than 30 members and guests attended the 2011 Autumn Meeting; it was a pleasure to welcome Iwona Melosik from the Adam Mickiewicz University in Poznan, Poland. Council, Publications, and Conservation Committee meetings were all held on Friday evening in the Council Chamber of Cardiff University in the Main University Building adjacent to the museum. The programme of talks was held on Saturday in the Icons Suite of the museum.

The full programme of papers was as follows:

**Jeff Duckett** – *Bryophyte inventory and conservation in the Falkland Islands* (p. 37)

**Ray Tangney** – *Mosses of the Falkland Islands* (p. 37)

**Jeff Duckett** – *Liverworts of the Falkland Islands* (p. 37)

**David Bell et al.** – *DNA barcoding of rare British bryophytes* (p. 37)

**Silvia Pressel et al.** – *Liverwort–fungal interactions: the dawn of mycotrophism* (p. 38)



**Jeff Bates** – *Are alien trees in the Azores 'bad news' for epiphytic bryophytes?* (p. 39)

**Des Callaghan** – *The inventory of bryophytes at sites: completeness and survey effort* (p. 40)

The AGM was held at 4.00pm, followed by a meeting of the Tropical Bryology Group. The meeting continued with the conversazione held in the Council Chamber of Cardiff University, where posters and displays were presented by members. This was followed by dinner at a nearby restaurant.

On Sunday a field excursion to the Rhondda/Treherbert area, led by Sam Bosanquet, saw several groups visiting a number of different sites (see p. 40).

I would like to thank the speakers and all those that contributed to the running of the meeting, including Sam Bosanquet for organizing the field trip, Ralph Martin for the organization of the university facilities and accommodation, and Mark Lawley for advice and assistance.



## BRYOPHYTE INVENTORY AND CONSERVATION IN THE FALKLAND ISLANDS

*Jeff Duckett*

## MOSSES/LIVERWORTS OF THE FALKLAND ISLANDS

*Ray Tangney & Jeff Duckett*

See 'Bryophytes Abroad' article on pp. 32–42 of the February 2012 issue of *Field Bryology* (vol. 106).

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## DNA BARCODING OF RARE BRITISH BRYOPHYTES

*David Bell, David Long & Pete Hollingsworth*

DNA barcoding involves sequencing a standard region of DNA as a tool for species identification, and it has also contributed to the discovery of new species.

At the Royal Botanic Garden Edinburgh a major project to obtain DNA barcodes for all of Britain's

△ Pen-tych and Cwm Lluest. S.D.S. *Bosanquet*

liverwort and hornwort species is underway. Contributing to this larger project, a study of the leafy liverwort genus *Herbertus* in Europe demonstrated the utility of DNA barcoding, with subsequent morphological revision, for resolving taxonomy in difficult bryophyte groups and revealing cryptic species, with a species new to science described from Norway and Shetland (see article on pp. 3–14 of the February 2012 issue of *Field Bryology*, vol. 106).

Another project based at RBGE and funded by Defra is using DNA barcoding to address major taxonomic problems for UK BAP-listed bryophytes, including both mosses and liverworts. Preliminary data suggest that in most of the study groups (e.g. *Atrichum*, *Rhytidiadelphus*, *Tortula* and *Barbilophozia*) the effective species limits are supported by DNA barcoding, while in some genera (e.g. *Orthotrichum* and *Marsupella*) additional complexity is being uncovered.

## LIVERWORT–FUNGAL INTERACTIONS: THE DAWN OF MYCOTROPHISM

Silvia Pressel, Jeffrey G. Duckett & Martin Bidartondo

The establishment of symbiotic associations with fungi is considered a key innovation that together with the evolution of stomata, a cuticle and endohydry, drove plant terrestrialization about 475 million years ago (Pirozynski & Malloch, 1975; Smith & Read, 2008; Wang *et al.*, 2010). Fungal associations in liverworts are as diverse as those of vascular plants and their distribution fits closely with current phylogenetic hypotheses: thus, associations with Glomeromycota, hitherto assumed to reflect the ancestral type (Wang & Qiu, 2006), are widespread in the simple and complex thalloids, whilst ascomycetes and basidiomycetes occur in more derived clades; the likely result of secondary acquisitions. The wide host ranges of the ascomycotean associations are in marked contrast to the high host specificity of their basidiomycotean counterparts: leafy liverwort genera associate exclusively with the *Sebacina vermifera* species complex while the derived simple thalloid clade, the Aneuraceae, the crown group of an otherwise fungus-free lineage, associate predominantly with *Tulasnella* species with the rare occurrence of sebacinoids (Bidartondo & Duckett, 2010; Preußing *et al.*, 2010). Our ongoing research on the global diversity of basidiomycetes is revealing considerable molecular diversity in the aneuracean fungi, from both the northern and southern hemispheres, together with intra- and intergeneric differences in the cytology of the associations, including fungal colonization patterns (Pressel *et al.*, 2010), which mirror the considerable genetic diversity in host liverworts (Wickett & Goffinet, 2008).

The recent and completely unexpected discovery that members of the Haplomitriopsida, the earliest divergent lineage of extant land plants, harbour endogone-like fungi (Mucoromycotina), a lineage likely to have diverged earlier than the Glomeromycota, indicates that these fungi formed the ancestral plant–fungal symbiosis (Bidartondo

*et al.*, 2011). The same study by Bidartondo and colleagues showed that endogone-like fungi also occur in the early-divergent simple and complex thalloid genera *Allisonia* and *Neohodgsonia*, and in some hornworts; however, the true extent of endogone-like fungi associations remains to be determined. We are now collecting molecular information on liverwort and hornwort fungi worldwide; our latest sequencing results indicate that associations involving members of the Mucoromycotina are much more widespread than hitherto assumed: thus the derived complex thalloids *Targionia* and *Dumortiera* both associate with endogone-like fungi, whilst both Mucoromycotina and Glomeromycota occur in *Asterella* and the simple thalloid *Fossombronina*. Hornworts also harbour members of both fungal divisions, however, and in contrast to most liverworts, the same hornwort species from different collections often contain different fungi, strongly suggesting a lack of host specificity.

Whatever our ongoing research might reveal about the diversity of fungal associations in bryophytes, the discovery that the Haplomitriopsida harbour endogonaceous rather than glomeromycotean endophytes, has major implications for our understanding of the origin and evolution of this key attribute of land plants. We are currently collaborating on a NERC research project with David Beerling and colleagues at the University of Sheffield aimed at elucidating the origin and evolution of functioning of fungal associations in land plants. The main goals of this project are to provide the first functional analyses of plant–Endogonales associations in the Haplomitriopsida and to establish any functional differences between Endogonales and glomeromycotean associations in liverworts that might have favoured the establishment and success of the latter as atmospheric CO<sub>2</sub> fell and soil organic matter content rose through the early colonization of land by plants.

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## ARE ALIEN TREES IN THE AZORES ‘BAD NEWS’ FOR EPIPHYTIC BRYOPHYTES?

Jeff Bates

The Azores are famous for their evergreen laurel forests (laurisilva) which on Terceira island extend well up into the cloud zone and support a rich flora of epiphytic bryophytes, including several Macaronesian and Azorean endemics. Today, however, the native evergreen forest of the Azores has been reduced to a few percent of its original extent through clearance for building, fuel, agriculture and economic forestry. The talk focussed on three alien tree species which form considerable areas of woodland in Terceira. The trees were *Pittosporum undulatum*, a naturalized invader from South-east Australia that today dominates woodland in the coastal fringe which has a semi-tropical climate; *Eucalyptus globulus*, also from South-east Australia, once widely planted for timber and firewood at medium altitudes; and *Cryptomeria japonica*, a Japanese endemic, now the favoured timber species for the temperate, wet and windy climate of the hills. The study considered whether these trees support significant numbers of epiphytic bryophytes.

Individual trees were sampled systematically along transects in 16 forest areas dominated by these alien trees across the altitudinal range. Cover-abundance of bryophytes was assessed on a simple 7-point scale randomly within one of

the four 50-cm long cylinders comprising the lower 2 m of the trunk surface. The results were compared with published data from a similar study of the main evergreen forest trees, *Laurus azorica* and *Juniperus brevifolia*.

Sixty-seven bryophytes were recorded in total on the 280 alien trees sampled compared with 106 species in native forest, though the latter figure included forest floor and boulder species as well as epiphytes. The numbers of epiphyte species per alien were: *Cryptomeria*, 45; *Pittosporum* (37); *Eucalyptus* (29). Twenty percent of samples from *Cryptomeria* were entirely devoid of bryophytes, probably because of the deep shade experienced in dense plantations. No Azorean endemics were found on the alien trees, but five Macaronesian endemics (two liverworts, three mosses), together with some other interesting bryophytes, were present. The two native tree species supported two Azorean endemics (*Bazzania azorica* and *Leptoscyphus azoricus*) and one Macaronesian endemic (*Lepidozia azorica*) as ‘faithfuls’ and two further Macaronesian endemics (*Andoa berthelotiana* and *Isothecium prolixum*) as ‘preferentials’, whereas the alien trees supported only *Pseudoscleropodium purum* and the Macaronesian endemic *Radula wichurae* as ‘faithfuls’ and another Macaronesian endemic,

*Tetrastichium fontanum*, as a 'preferential'. A constituent of *Eucalyptus* bark apparently stimulates the proliferation of rhizoids by *P. purum*, enabling it uniquely to grow fastened to the trunk.

In a statistical analysis (detrended correspondence analysis) of the bryophyte data from the alien trees, there was an almost complete separation of *Cryptomeria* from the *Eucalyptus* and *Pittosporum* samples which themselves partly overlapped. The sequence of samples along the main axis of the ordination, which correlated strongly with altitude, reflected the following transition: (1) principally on coastal *Pittosporum*, a rather monotonous flora dominated by *Cololejeunea minutissima*, *Marchesinia mackaii* and *Frullania microphylla*; (2) often on *Eucalyptus* at intermediate altitudes, *Aphanolejeunea sintenisii*, *Lejeunea lamacerina*

and *Radula carringtonii*; (3) at moderate altitude, a transition zone involving all three tree species in which *Frullania tamarisci*, *Harpalejeunea mollerii*, *Sematophyllum substrumulosum* and *Lophocolea fragrans* become common epiphytes; (4) principally on *Cryptomeria*, on higher hills, a largely acidophile flora composed of *Drepanolejeunea hamatifolia*, *Hypnum cupressiforme/uncinulatum* agg., *Plagiochila bifaria*, *Telaranea europaea*, *Leucobryum juniperoideum* and *Dicranum scottianum*.

Each of the alien trees supports interesting bryophyte species and assemblages, although their floras are rarely as diverse or lush as those of the native forest trees. It is therefore concluded that consideration should be given to conserving mature examples, particularly of *Eucalyptus* which is no longer planted, for their bryophyte interest.

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## THE INVENTORY OF BRYOPHYTES AT SITES: COMPLETENESS AND SURVEY EFFORT

*Des Callaghan*

Knowledge of the species present within a site is often used to inform decisions that have significant implications for biodiversity conservation. This study surveyed eight woodland sites in north-west England for bryophytes. Searches for species within each site continued until all areas had been approached to within a minimum of 50m and at least 60 min had elapsed since the discovery of

a new species. Survey data were used to build predictive models that provided an estimate of the total number of species present at each site and the time required to compile a complete inventory. The '50 m 60 min stopping rule' consistently produced comprehensive inventories for sites, judging by the numbers of species found and model predictions of the total number of species present. The study suggests that a minor alteration to conventional survey practice and a small amount of data analysis can provide useful assessments of the completeness of bryophyte inventories for sites.

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## FIELD EXCURSION TO THE RHONDDA VALLEY 11 SEPTEMBER 2011

*Sam Bosanquet*

At the time of the *Atlas*, Glamorgan was much the most thoroughly recorded vice-county in south Wales, although some of its northern hectads remained relatively unknown. SS99 was just such a square, but it didn't stand out because of the poor coverage of the rest of the region. By 2011,

it looked like a proper 'white hole', surrounded by squares with more than 150 species recorded. The field excursion aimed to fill in this gap.

The Rhondda Valley is typical of northern Glamorgan, with steep hillsides above a string of valley floor towns, plentiful conifer plantations, remnants of oak woodland, disused quarries and, inevitably, colliery tips. The tips add both to the character of the area and to its bryophyte flora. The Coal Measures vary considerably in their chemistry,



bryophyte species. Highlights included *Schistidium platyphyllum* in a canalized stream, *Bryum bornholmense* in burnt heathland, the second county record of *Loeskeobryum brevirostre* under willows on a stabilized colliery tip, *Archidium alternifolium* and *Cephaloziella hampeana* on trampled spoil, *Sphagnum contortum* collected by Joan Bingley from a flushed, shaley slope and *Blindia acuta* on flushed rocks in a quarry. *Colura calyptrifolia* was scattered on willow bushes, along with *Cololejeunea minutissima* and *Orthotrichum striatum*. Considerable interest was shown in the leaf shapes of *Syntrichia ruralis* var. *ruraliformis*, *S. ruralis* var. *ruralis* and *S. montana*, which grew together in the lower car park.

◁ Malcolm Watling examining *Colura calyptrifolia*.  
*S.D.S. Bosanquet*

▽ The tips above Nant y Gwyddon.  
*Jonathan Sleath*

and the colliery tips support calcicoles next to calcifuges, and species of flushed ground next to those typical of parched substrates. Two groups visited tips, and a total of 45 species was recorded growing directly on colliery spoil or amongst the moss carpet that had developed on the spoil.

Site coverage was optimized by splitting the party into three groups, each of whom covered a different area. One group walked all of about 500 m from the car park in Clydach Vale Country Park and saw more than 120



A second group visited the Nant y Gwyddon, and the colliery tips above it. The Nant y Gwyddon runs through a reasonably rocky gorge, which held species such as *Fissidens osmundoides*, *Jungermannia pumila*, *Lejeunea cavifolia*, *L. lamacerina*, *Plagiothecium curvifolium*, *Saccogyna viticulosa*, confusing *Diphyscium foliosum* and *Trichostomum tenuirostre*, and some impressive patches of *Fissidens bryoides* var. *cespitans*. The tips were flushed in places and supported one of the most remarkable finds of the day – *Drepanocladus polygamus* collected by Peter Martin – as well as the calcicoles *Aneura pinguis*, *Ctenidium molluscum* and *Trichostomum crispulum*. Before the rest of the group arrived, Peter Martin and Jonathan Sleath noted *Zygodon rupestris* growing on an ash tree by the car park.

The final group went furthest north, covering the rocky, coniferized, upland-edge Cwm Llest and the Pen-tych area, close to Blaenrhondda. Notable finds in Cwm Llest included the western species *Campylopus atrovirens* and *Saccogyna viticulosa*, and the calcicoles *Gymnostomum aeruginosum*, *Mnium stellare* and *Preissia quadrata*, as well

as the second Glamorgan record of *Sphagnum angustifolium*, in flushed grassland, and another site for *Bryum bornholmense*. Tom Blockeel collected *Bryum sauteri*\* new to Glamorgan at Pen-tych, and the group noted more *Preissia* there as well. A brief stop at the Nant Ystradferrol, about 1 km east of Pen-tych, produced the day's only *Ditrichum heteromallum* and *Lophozia bicrenata*.

Each of the three parties found species that others had not seen, and the combined total reached an impressive 194 taxa. Because individual sites were recorded separately, nearly 500 records were made, all of which can be used in the future for either an updated Flora of Glamorgan at a finer scale than 10 km squares, or by local conservationists and wildlife groups. All 16 attendees are thanked for keeping things accurate, and for enduring occasional heavy showers. The day certainly demonstrated the remarkable bryophyte diversity of the Rhondda Valley: indeed one member was so taken with the area that she said she was tempted to move house to Treorchy. A resident bryologist would undoubtedly find all manner of exciting mosses and liverworts.



◁ The waterfall in Clydach Vale Country Park.  
S.D.S. Bosanquet