Meeting Report: BBS Annual Meeting and Conference

12-14 September 2014

David Long and Liz Kungu

report on the 2014 Autumn Meeting held at the Royal Botanic Garden, Edinburgh

The 2014 autumn meeting at the Royal Botanic Garden Edinburgh is the second one to be held in Scotland, 12 years after the earlier one, also at RBGE. On the Friday afternoon and evening, meetings were held of the Recording & Conservation Committee, Publications Committee and Education Committee followed by the Council Meeting at 7.30 pm. Next day, a total of 39 participants attended the symposium in the recently refurbished lecture theatre where the BBS was given a warm welcome by Prof. Pete Hollingsworth, Director of Science at RBGE. Hollingsworth emphasized the importance and success of collaboration between BBS members and RBGE scientists, and how bryophyte research, both traditional and molecular, is an important part of RBGE’s work. The seven presentations followed two broad themes, the first and growing part of RBGE’s work. The seven presentations followed two broad themes, the first and growing part of RBGE’s work.

Field Bryology No114 | Nov15

Excursion to Traprain Law

On Sunday 15 September over 25 participants travelled to Traprain Law, near East Linton in East Lothian (v.-c. 82). The hill, 221 metres high, is a prominent landmark rising steeply above the surrounding agricultural countryside. It is a basaltic intrusion of Lower Carboniferous age with extensive rock outcrops on all sides, though the east end has been disfigured by a massive but now disused quarry. The hill was the capital of the Votadini (the region’s dominant indigenous Iron Age tribe) and is regarded as one of the most important hill forts in Scotland. The site was first fortified in the late Bronze Age (ca. 1500 BC) and occupation continued at Traprain through the Iron Age and Roman period until Medieval times. A famous treasure hoard of late Roman silver was found here in 1919 and is now on display in the National Museum of Scotland in Edinburgh.

From the car park we climbed a short distance to the lower north-facing crags with abundant Rebsoula hemisphaerica, along with Anoecteza rupetris, Barbilophozia decipiens and Hedwigia stellata. The primary colonization of modern building surfaces is an important and growing part of RBGE’s work. The seven presentations followed two broad themes, the first and growing part of RBGE’s work.

cost by RBGE’s in-house caterers. The BBS wishes to thank the organisers, staff and caterers at RBGE who provided excellent service and facilities for the meeting.

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Monitoring change in snowbed bryophyte communities in Scotland: the permanent transects seven years on
Gordon Rothero; gprothero@aol.com

In the Scottish mountains a lot of the winter precipitation above 700m is snow and this is redistributed by the wind onto lee slopes where it accumulates. The depth and extent of this accumulation depends on the catchment, which means that those hills with large areas above 1000m tend to have the largest accumulations. As the prevailing winds are from the south and west, the snow tends to accumulate on slopes with a north or north-easterly aspect, slopes which also receive limited insolation except in high summer. As the snow melts in spring and summer, the deepest and most sheltered snow patches persist well into late summer and some will last through the year. This leaves a very short growing season for vascular plants and the ‘snowbed vegetation’ tends to be dominated by bryophytes. From the 1970’s onwards it was clear that the snowbeds were melting out sooner, fewer were persisting through to the next snowfall and the presumption was that this must be having some effect on the plant communities. To try to test this presumption, a project was put together, funded by SNH and with the participation of John Birks and John Arvid Grytnes at Bergen University, and RBGE. As part of this project, in 2007-8, I set up a number of permanent transects and took fixed-point photos of snowbed sites, mostly in the Cairngorms National Park but also further north on Beinn Dearg and Ben Wyvis and further south on Ben Lawers.

The transects were set up across the snowbed vegetation, starting and finishing where possible in areas that were snow-free earlier and crossing areas with the longest snow cover. To avoid the use of fixed markers, the transects were set up...
with natural markers at the start, usually a large rock, and laid out with a 50m pre-stretched perlon cord marked every metre. To aid the resetting of the transect line during any re-survey, the start point and several intermediate plots with distinct features were photographed. Plots along the transect were sampled with a 50 x 50cm quadrat every two or four metres depending on the total length of the transect as some were well over 100m in length. Species cover values were scored using the Domin scale to speed up the recording process as much as possible, and all bryophytes and vascular plants were recorded. In the end, 20 transects were set up and data from a total of 492 quadrats were collected. In addition, fixed point photographs were taken on all the transect sites and on a number of other snowbeds as well.

With Nick Hodgetts, I revisited two of the transects in 2012, both in the Cairngorms, in Coire Domhain and the Feith Buidhe. Both proved relatively easy to set up again and I am confident that the quadrat positions were within a couple of centimetres of the original set up. Only fairly simple analysis of this data has been attempted so far and, not surprisingly after only five years, significant differences are hard to discern. The current project, starting in 2014 and carrying on to 2016, has the aim of continuing this re-survey of the transects but also has a training element. As I drift into my dotage, and with other bryologists with the requisite knowledge no longer in the first flush of youth, it seems sensible to expose some younger bryologists, currently Clare Rickerby, Julie Smith and Oliver Moore, to the wonders of the snowbeds and the genus Marsupella. So far this has been very successful and as well as familiarization with the species, one further transect has been re-surveyed with the ‘trainees’.

By 2016, it is probable that about half of the sites will have been re-surveyed, producing a mass of data which will require some sophisticated analysis to extract any general trends and, multivariate analysis not being my forte, it is fortunate that we have John Birks and John Arvid Grytnes at Bergen University to deal with this element. The site photographs are proving quite difficult to interpret as the appearance of the site varies considerably with the time since the removal of the snow cover but they may well be more revealing over a longer time span.

**Are boreal bryophytes dying of heat in southern Britain?**

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Northern bryophytes such as *Paludella squarrosa* have steadily died out in southern Britain, but many of them disappeared before 1960 when the BBS recording scheme began. In most cases, habitat destruction was the immediate cause of loss. Since 1960, boreal bryophytes have decreased in lowland Britain by about 25%. We matched them with southern
species having similar ecological requirements (‘buddies’). We found no evidence that boreal bryophytes declined more than their buddies. However, the increase of some southern species such as Cryptococcus heteromalla and Coleolejeunea minutissima does suggest that climate change is starting to have an effect on bryophytes.

Reference

Bryophytes and the primary colonization of modern building surfaces
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An overview of the initial colonization of the surface of modern external thermal insulation compound systems (ETICS) and the method of analysis were discussed. So far > 220 different organisms have been identified which are involved in the colonization of such surfaces during the first few years of service. This huge biodiversity was highly unexpected. Prevailing are algae (85 species), especially from the group Trebouxiophyceae and fungi in Ascomycetes (80 species), in particular representatives of the formerly so-called imperfect fungi. Amongst the first colonizers of ETICS surfaces are also some mosses which may grow initially as protonemata only and therefore might be confused for algae. Some of the first mosses to colonize ETICS surfaces include: Orthotrichum anomalum, Hypnum cupressiforme, Tortula muralis, Bryum argenteum, Bryum capillare agg., Tortella tortuosa, Encalypta streptocarpa, Grimmia spp. and Schistidium spp. A short term SYNTHESYS project (GB-TAF-3881) at RBGE is now looking at the genetic aspects of populations of mosses (e.g. Schistidium) growing on modern building surfaces.

Fig. 1 (above). Building showing emerging growth on its surface. W. Hofbauer. Fig. 2 (below left). Schistidium crassipilum, a typical species growing on masonry in already perfect condition. W. Hofbauer. Fig. 3 (below right). Specimens of masonry finishes exposed in Holzkirchen for several years to observe the first traces of growth. W. Hofbauer.

The genera of the Polytrichaceae – recent circumscriptions explained
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Recent molecular phylogenetic studies within the family Polytrichaceae have largely supported pre-existing generic concepts. Exceptions are the genera Polytrichum, Polytrichastrum and Oligotrichum, for which new circumscriptions have been proposed based on unequivocal evidence from molecular data supported by new perspectives on morphology and biogeography. The genus Polytrichastrum G.L. Smith, segregated from Polytrichum in 1971, is retained for P. alpinum and related species (including the second U.K. representative, P. sexangulare), while the species previously placed in Polytrichastrum sect. Aporotheca (including the U.K. representatives P. formosum and P. longisetum) are recognised once more under Polytrichum. A number of sporophyte features support this, including reinterpretations of the peristome and epiphragm characters on which the segregation of Polytrichastrum was based. The peristome and epiphragm structures in Polytrichum and Polytrichastrum as now circumscribed. A. - Polytrichastrum alpinum showing elongated “epiphragm teeth” (et) projecting above dorsal epiphragm surface and attached to long peristome teeth. B. - Immature Polytrichum commune. As in Polytrichastrum, the peristome teeth are always attached to what is developmentally the lateral epiphragm surface (le). However in Polytrichum this part of the lateral surface usually becomes more or less inrolled and flattened onto the dorsal surface at maturity. Small projections homologous to epiphragm teeth (et) may still be present. C. - Mature peristome and epiphragm of Polytrichastrum alpinum. D. - Mature peristome and epiphragm of Polytrichum xanthopilum (previously Polytrichastrum xanthopilum).
Species based conservation programmes need to be founded on a sound and stable taxonomic framework to be effective. Bryophytes (mosses, liverworts and hornworts) represent the earliest-diverging lineages of land plants and have an important ecological role in many ecosystems, but conservation strategies are undermined due to taxonomic problems caused by their diminutive size and subtle distinguishing features, coupled with a general shortage of taxonomic expertise. DNA barcoding involves using one or a few standard regions of DNA as a universal tool for species identification. The ultimate goal is to develop a reference library of DNA barcode sequences against which any unknown samples can be compared for identification. The technique has a broad range of applications from general biological monitoring to identifying fragmented samples for forensic investigations and the illegal trade in endangered species, and it has also contributed to the discovery of new species.

This study used DNA barcoding data (from the rbcL, matK, psbA-trnH & ITS2 barcoding markers) in conjunction with morphological and ecological data to assess the taxonomic status and conservation value of 30 UK priority bryophyte species which displayed some level of taxonomic uncertainty posing barriers to the effective implementation of conservation strategies. Species discrimination was generally high across the species sampled, although amplification of matK was problematic for some moss lineages due to primer specificity. The effective species limits of 16 of the 30 priority species studied were supported by the DNA barcoding data, but additional complexity was encountered with the remaining species, which needs to be addressed for effective allocation of conservation resources. This research shows how DNA barcoding can be a powerful tool for taxonomic science, assisting in the clarification of taxonomic uncertainty and as a result help to more efficiently prioritise the distribution of resources for biodiversity conservation. This is essential for ensuring that distinct endangered species with subtle distinguishing characters are not overlooked and to avoid expending resources in conservation action on dubious ‘species’ that turn out not to be distinct. The resolving power of DNA barcoding also shows the technique’s potential for surveys and monitoring work when morphologically intermediate or aberrant specimens cannot be identified confidently by morphological methods alone.
How rare is *Aneura pinguis*? A report from the RBGE *Aneura* workshop, 11-12 September 2014
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Participants: David Bell, Neil Bell, Anita Bollmann, Laura Forrest, Mikael Giolái, Kristian Hassel, Elizabeth Kungu, David Long, Oliver Pescott, Ana Seneca, Lars Söderström.

Although literature reports for *Aneura pinguis* L. give it an astounding distribution that ranges from the arctic to the tropics, bryologists have long acknowledged that the species represents “a nightmarish problem… probably requiring more than a single lifetime of research for a minimum understanding” (Proskauer, 1971). Indeed the first phylogenies to include more than one representative of *Aneura pinguis* showed that *Aneura mirabilis* (Malmb.) Wickett & Goffinet (*Cryptothallus*), the only confirmed non-photosynthetic bryophyte species, nested within *A. pinguis*. Recent reports of a third *Aneura* species, the Indonesian *Aneura maxima* (Schiffn.) Steph., as widespread within Europe have further complicated the issue.

To examine diversity within *Aneura pinguis*, over 200 *Aneura* accessions have been sequenced for DNA barcoding loci rbcL and matK at the Royal Botanic Garden Edinburgh and the Norwegian University of Science and Technology, Trondheim. Although mostly focused on British and Norwegian accessions, the data set contains samples from around the world, including material of *A. pellioides* (Horik) Inoue from Japan, *A. crateriformis* Furuki & D.G. Long from China, *A. sharpii* Inoue & N.G. Mill. from the United States and *A. maxima* from Java, as well as material determined as *A. maxima* from continental Europe.

Within Europe, at least nine distinct *Aneura* lineages occur in addition to the morphologically distinct *Aneura mirabilis*; seven of these are found in Britain. These are not genetic matches to any of the named taxa that we have sampled, thus ruling out application of the epithets *pellioides*, *crateriformis*, *sharpii* and *maxima*. All lineages can be easily distinguished using standard DNA sequence data. Morphologically, features like oil body size, presence or absence of hyaline thallus margins, rhizoid abundance, position and colour, thallus cross-section shape, and frequency of slime papillae may be characteristic. Many of these characters are best observed from living material, making it difficult to apply them to historic collections.

Of the molecular lineages, only one is considered to match the type concept of *Aneura pinguis*, which was based on collections that Dillenius (1742) described from near Oxford. This true *Aneura pinguis* seems to be ecologically restricted to free-draining and sand-dune habitats. It has not yet been sampled from outside Britain and Ireland.

It is unlikely that all European *Aneura* diversity has yet been sampled, particularly as our samples are predominantly from northern Europe. Furthermore, some lineages have been collected very rarely (perhaps indicating that the lineages themselves are rare); for example a single collection from Cors y Sarnau, Merioneth in Wales forms the sister lineage to *Aneura mirabilis*. Thus collections of *Aneura*, particularly from unusual habitats, are still required.

Acknowledgements
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References