



A bryological stroll through time in the Welsh Marches

Mark Lawley takes us on a historical and floristic tour of the bryophytes to be found in the beautiful but often overlooked scenery of the Welsh Marches.

Explanations of why organisms look like and behave as they do survive longest and best when they are founded upon temporal classifications of natural processes rather than spatial classifications of form. How else, indeed, can we link cause with consequence? As Proust (1927) observed *‘A literature which is content with “describing things”, with offering a wretched summary of their lines and surfaces, is, in spite of its pretension to realism, the furthest from reality, the one which impoverishes and saddens us the most ... for it abruptly severs communication between our present self, the past of which objects retain the essence and the future in which they encourage us to search for it again’*.

Evolution, ecological succession, changes in organisms’ features as they grow and mature, understanding extant landscapes as products of thrusting, faulting, volcanic activity, weathering and erosion of the earth’s crust, changes in peoples’ ideas as consequences of the

circumstances they live in – all these temporal processes bring coherence to notions of how and where humankind fits into the natural world. Moreover, understanding earlier interpretations of nature and anticipating how our own ideas may develop in future *‘[reveal] beauty as a property not of material forms but of the ideas anticipating and energy connecting them ... linking past and present in endless ribbons of time, so that we may understand as well as enjoy a myriad of organic effects as they appear on the world’s stage, flourish, and fade into the past’* (Lawley, 2009a).

Only by examining the natural world about us may we distinguish our mental from our environmental worlds. Humankind is part of the natural world, not a centrepiece of it, and naturalists who interpret nature best do so by placing themselves at the periphery of that world. *‘What should they know of England, who only England know?’* asked Kipling (1891), and indeed all our notions become enriched when fertilized from without. Most people, though, steadfastly



△ Disused quarry at Nash Rocks. *Xiaoqing Li*

ignore wild nature and follow Alexander Pope's maxim that '*the proper study of mankind is man*' (Pope, 1773), preferring to concern themselves with human affairs and artefacts rather than natural forms and events. Such anthropocentric outlooks thrive as well today as in bygone times. Naturalists, for example, like to presume that white gaps are as significant as black dots on their beloved distribution maps rather than admit such gaps indicate absence of evidence, and also that when a species is discovered in a particular place for the first time, it must have arrived there recently. Perhaps it had, but perhaps not, even in a comparatively well-explored country like Britain.

As much and well as any branch of natural history, bryology enables us to more clearly see our place in nature, for this apparently insignificant branch (or backwater) of natural history lies far removed from human affairs, and is no practical use in solving our daily problems or allaying our

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concerns and assuaging our cares. For this very reason – indeed for none other – bryology offers an ideally oblique and unbiased perspective of humankind's place in nature. Looking for these little plants in wild country as the wind blows on one's face and sighs through the trees is a tonic for mind and body alike. And apart from deriving health and well-being, a naturalist can make new discoveries – new not only for himself but for everyone's understanding of what lives around us, and where and how and why.

The green cloak of wonderfully varied countryside in the Welsh Marches harbours a diverse bryoflora which has hardly yet been evaluated, and the naturalist of today feels encouraged to compare the discoveries of long ago with what has come to light recently, and anticipate what may still await discovery as he follows his predecessors through shady woods, by sequestered streams, and over quiet hills.

Early bryologists in the Welsh Marches

The first bryological expedition that we know of in or through the Welsh Marches took place in 1726, when Johann Jakob Dillen ('Dillenius', 1684–1747) and Samuel Brewer (ca 1669–1743) accompanied Littleton Brown (1698–1749) on a journey to North Wales, an excursion which brought a number of bryophytes to first public notice when Dillenius's *Historia Muscorum* appeared in 1741. Brown was a native of Bishops Castle in west Shropshire, and vicar of Kerry, Montgomeryshire, so perhaps Dillenius and Brewer met up with Brown when they reached the Welsh border from Oxford. William Sherard wrote that '*Mr Brown ... is the keenest botanist I have met with ... Dr Dillenius has been a moss-cropping with him: he has an excellent eye*'. Unfortunately, though, we know nothing of what Brown found in the Welsh Marches, for his herbarium and papers are lost; nor is it clear how

many of the bryophytes found on the excursion in 1726 can be attributed to Brown's keen eye.

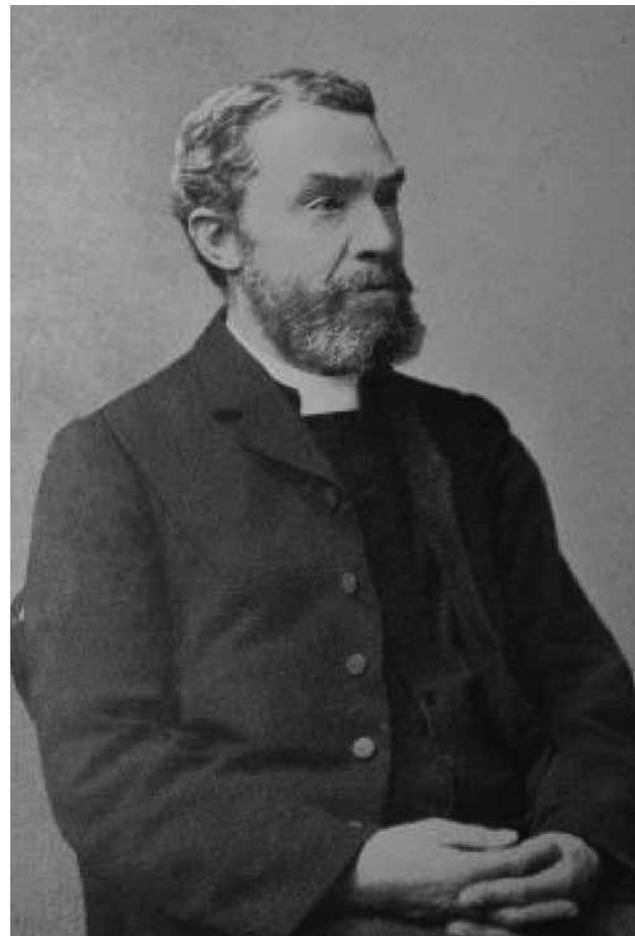
After Littleton Brown, another priest, the Reverend Edward Williams (1762–1833) was Shropshire's next accomplished bryologist. Williams, a distant relative of the naturalist Thomas Pennant, was inducted to the livings of Battlefield and Uffington near Shrewsbury in mid-Shropshire, which were in the gift of his half-brother, John Corbet of nearby Sundorn Castle. Williams found and collected 117 mosses and 23 liverworts in Shropshire, and compiled the county's first (unpublished) list of bryophytes. His discoveries included *Ricciocarpos natans* at Eaton Mascott (SJ5305) in 1802, as well as *Antitrichia curtipendula* at Haughmond Hill (SJ5414) and Acton Burnell (SJ5301). Williams also found *Targionia hypophylla* on 'Pontsert Hill' (probably Pontesford Hill, SJ4005) where it grows to this day.

With Williams in his grave, Shropshire's bryological world had fallen silent by the mid-19th century. To the south, though, in north-west Herefordshire, a third priest, the Reverend James Frederick Crouch (1809–1888) rekindled the embers of local, investigative bryology. He became rector of Pembridge near Leominster in 1849, taking up bryology in the 1860s and laying a foundation for Ley's list of Herefordshire mosses in Purchas & Ley's *Flora of Herefordshire* (1889). Crouch also occasionally ventured west over the Welsh border. His contributions to the sum of bryological knowledge came not so much in finding rarities, but elucidating which species occurred where in the districts around his home. Like Williams before him, he was one of a minority of bryologists who noticed liverworts as well as mosses, and his herbarium at Hereford Museum contains 20-odd liverworts, including *Trichocolea tomentella* from Lyonshall Park (SO3256) near Kington in 1863. Other

liverworts that he collected found their way into Ley's herbarium.

A fourth priest, the Reverend Augustin Ley (1842–1911) of Sellack near Ross-on-Wye in south Herefordshire was the foremost bryologist of the Welsh Marches for over 30 years from the 1870s. He set about recording the local flora, finding innumerable species new to his home county and neighbouring shires, and made considerable progress towards discovering which mosses grow where along and near the Welsh border. Ley was encouraged from boyhood in his botanical interests by his maternal uncle Augustin Prichard, and added *Oxyrrhynchium schleicheri* (which we now know is fairly frequent along the Welsh border) to the British list, this

▽ Reverend Augustin Ley (1842–1911).



moss having been hitherto confused with *O. bians*. Ley's botanical career culminated in the *Flora of Herefordshire* (1889), in which he was solely responsible for a detailed, annotated list of mosses, and he also listed subsequent additions to Herefordshire's known bryoflora in the *Transactions of the Woolhope Naturalists' Field Club* of 1905.

From the Woolhope hills (SO53 and 63) south-east of Hereford, or on nearby Shucknall Hill (SO5943), Ley discovered the mosses *Aloina ambigua* and *A. rigida*, *Bryum torquescens*, *Entosthodon muhlenbergii*, *Microbryum floerkeanum*, *Pottiopsis caespitosa*, *Pterygoneurum ovatum* and *Weissia multicapsularis*. Other notable discoveries from Herefordshire included *Bryum uliginosum* at Pontrilas (SO3927), *Myrnia pulvinata* from beside the River Wye at Clifford (SO2445), *Orthotrichum obtusifolium* at Hentland (SO5426), Pencombe (SO6052) and Perrystone (SO6229/6329), and *Thuidium recognitum* at Hope Mansell (SO6219).

Like many other bryologists of his generation who bryologized before MacVicar's *Student's Handbook of British Hepatics* appeared in 1912, Ley paid more attention to mosses than liverworts, but he did find *Metzgeria pubescens* on The Doward in 1884, *Riccia cavernosa* at Sellack (SO5627) in 1889, and *Sphaerocarpos texanus* at King's Caple (SO5628) in 1872.

Ley never joined the Moss Exchange Club (forerunner of the BBS) which formed in 1896, for he was in the autumn of his bryological career by then. But the Welsh border remained a region of bryological activity during the Club's early years, with several bryologists assuming the mantle of Brown, Williams, Crouch and Ley. One of these, Charles Herbert Binstead (1862–1941) succeeded Ley as Herefordshire's principal moss-cropper. Binstead spent most of his working life at various incumbencies in the

diocese of Hereford, and during these years he added to corporate knowledge of Herefordshire's bryoflora to an extent matched only by Ley before him. He published his paper (Binstead, 1940) on the county's mosses shortly before he died.

A founding member of the Moss Exchange Club in 1896, Binstead added many mosses to the county's list, including *Tortula atrovirens* near Mordiford (SO5737), and *T. cuneifolia* from sunny hedgebanks at Eardisley (SO3149) in 1897–98 and in other districts subsequently. He also found the rare aquatic moss *Cinclidotus riparius* in the River Teme at Whitbourne (SO7256).

Brown, Williams, Crouch, Ley, Binstead: all five were Anglican priests, comfortably placed, middle-class gentlemen with plentiful spare time in which to pursue bryology. After caring for their cures, they would have set off on horseback (or latterly by train) to explore countryside largely unpolluted by agrochemicals, industrial effluent and internal combustion engines.

Low-lying, base-rich and calcareous rock in the Marches

Calcareous localities such as The Doward in south Herefordshire, Nash Rocks in north-west Herefordshire, Aberedw Rocks in Radnorshire, and Llanymynech Rocks on the border of Montgomeryshire and Shropshire offer botanists uncommon assemblages of plants, including some species which are rare. Other small hills along the Welsh border are composed of base-rich, igneous rocks that also support unusual bryofloras, for example at Stanner, Roundton, and Breidden. Such places have attracted more bryological attention than elsewhere in the Marches, but are still offering up fresh discoveries in the 21st century.

Near Ross-on-Wye, the Doward's (SO5416)

white cliffs of Carboniferous Limestone rear up like ghosts from wooded slopes where the looping River Wye has cut a gorge, with sheltered, humid air at the bottom and drier, more exposed conditions above. Ley was one of the first to examine the Doward's bryophytes, finding *Bryum canariense*, *Dicranum scottianum*, *Entosthodon muhlenbergii*, *Grimmia orbicularis*, *Gymnostomum calcareum*, *Plasturhynchium striatulum*, *Pleurochaete squarrosa*, *Rhytidium rugosum*, *Scorpiurium circinatum*, *Seligeria acutifolia* and *S. pusilla*. And Binstead found *Cololejeunea calcarea* nearby in the Great Wood at Huntsham (SO5616).

Another prominent bryologist of Ross-on-Wye, Eleonora Armitage (1865–1961) also explored the Doward to good effect. She was the only female founding member of the Moss Exchange Club in 1896, a great-granddaughter on her mother's side of Spencer Perceval (the British Prime Minister who was shot in the lobby of the House of Commons in 1812), and the third daughter in a family of four sons and four daughters. As was usual in the 19th century, only the boys were formally educated for the professions, the girls being taught at home by their mother, and then the elder daughters taught the younger ones. Later, Miss Armitage earned a little money by helping to lay out friends' gardens, working with their men. In her spare time she used to set off by bicycle on her explorations of the countryside, and slept at farmhouses long before the modern habit of 'bed and breakfasting' came into fashion.

After Ley died in 1911, Miss Armitage was indisputably the botanical matriarch (with Binstead as patriarch) of her home county of Herefordshire, and enjoyed contacts with many of the leading botanists of the day. She made numerous notable bryological discoveries in Herefordshire, such as the rare

moss *Anomodon longifolius* near Huntsham Hill (SO5616). Stimulated by the publication of MacVicar's guide to liverworts in 1912, she found *Metzgeria pubescens* on Huntsham Hill, *Blepharostoma trichophyllum* and *Scapania gracilis* in Chase Wood (SO6021) near Ross, and elsewhere (all these species being rare in Herefordshire), *Cephaloziella turneri* in Haugh Wood (SO5836) and at Titley (SO3360), *Harpanthus scutatus* in Penyard Wood (SO6122) near Ross, *Scapania aspera* at the Great Doward (SO5416), *Cololejeunea rossettiana* on the Great Doward and at Backbury Hill (SO5838) near Mordiford, *Marchesinia mackaii* at the Great Doward, *Sphaerocarpos michelii* at Foy (SO5928) as well as *S. texanus* at Foy, Bridstow (SO5824), Walford (SO5820) and Weston-under-Penyard (SO6323), and *Anthoceros agrestis* and *Phaeoceros laevis* in fields near Ross (SO5924) and Bodenham (SO5351). She wrote a paper about the shire's liverworts in 1925. Henry Knight (Graham & Lawley, 2004) accompanied her on numerous botanical excursions after he came to live in the neighbouring county of Gloucestershire.

Between Ley's botanical début in the 1870s and the time when Binstead and Armitage retired from the field 60 or 70 years later, these three botanists not only found uncommon bryophytes new to Herefordshire, but also quartered their county to build a picture of the local distribution of each species, just as had been done earlier for vascular plants.

When members of the BBS visited the Doward in 1968, they 'were disappointed not to see a number of the species previously recorded there' by Ley, Armitage and Watkins, but did note the liverwort *Riccia subbifurca*, as well as the mosses *Rhytidium rugosum* and *Gymnostomum calcareum*. More recently, *Gymnostomum viridulum* has been distinguished from *G. calcareum*, and added to the Doward's known bryoflora.

Gymnostomum viridulum also grows on lime spoil at Nash Rocks (SO3062) in north-west Herefordshire, and shares the quarries at Nash and nearby Mocktree (SO4176) with Pale St John's-wort (*Hypericum montanum*), neither plant occurring elsewhere in the district. *Campyliadelphus chrysophyllus*, *Ditrichum flexicaule* s.l., *Ptychomitrium polyphyllum*, *Tortella nitida* and *T. tortuosa*, *Trichostomum crispulum* and *Weissia brachycarpa* var. *obliqua* have also been seen at Nash, and long ago at the close of the 19th century Binstead found *Didymodon acutus* (where it still grows), as well as *D. ferrugineus*, *Grimmia orbicularis* and *Thuidium assimile*. With its south-easterly aspect, lime in the rock, and freedom from shade and intense grazing, Nash outshines other, smaller, disused quarries in north Herefordshire for botanical diversity and scarce species – a place the botanist can return to repeatedly, and each time find new plants.

Stanner Rocks (SO2658) lie in east Radnorshire, just across the Welsh border from Kington, Herefordshire. Stanner's dark, sun-soaked and readily drying volcanic gabbro, dolerite and granite stare out into Wales over a long-abandoned railway line and halt, and provide uncommon conditions that favour scarce species. Binstead came to Stanner at the beginning of the 20th century, finding *Bartramia stricta*, *Bryum archangelicum*, *Grimmia decipiens* and *Tortula canescens*, and Miss Armitage added *Grimmia laevigata*. In 1965, the BBS recorded *Grimmia lisae*, *G. ovalis* and *G. trichophylla*, as well as *Syntrichia papillosa* on an elm tree. More recently, *Grimmia longirostris*, *G. montana*, *Schistidium pruinosum*, *Riccia beyrichiana* and *R. nigrella* have come to light.

Dolerite and shallow soil on Roundton Hill (SO2994) near Churchstoke on the Montgomeryshire border with Shropshire

hold *Bryum elegans*, *B. kunzei*, *Encalypta streptocarpa* and *E. vulgaris*, *Grimmia laevigata*, *Orthothecium intricatum*, *Philonotis arnellii*, *Plagiopus oederianus*, *Plagiothecium cavifolium*, *Pterogonium gracile*, *Rhodobryum roseum*, *Schistidium confertum*, *Tortula canescens*, *T. lanceola*, *Weissia brachycarpa*, *W. longifolia* var. *longifolia* and *W. sterilis*, as well as the liverworts *Barbilophozia barbata*, *Frullania fragilifolia* and *Lophozia bicrenata*. BBS members found many of these plants when they explored Roundton in 1975 and 1994.

Further north again, hard, resistant, much-quarried dolerite on Breidden Hill (SJ2914) south-east of Welshpool towers over the wide Severn valley below. Here *Buxbaumia aphylla* numbers (or has numbered) among the specialities. Littleton Brown, who held the living at nearby Kerry must have known the Breiddens; which bryophytes did he find here? BBS members visited twice in the 20th century, noting *Bartramia stricta*, *B. ithyphylla*, *Orthotrichum rupestre*, *Pterogonium gracile*, *Rhabdoweisia fugax*, *Scleropodium tourettii*, *Taxiphyllum wissgrillii* and the liverworts *Frullania fragilifolia*, *Riccia subbifurca* and *Targionia hypophylla*. And when Sam Bosanquet came here in 2009 he added *Grimmia longirostris*, *Schistidium helveticum* and *S. pruinosum* to the list of species known from the hill.

Llanymynech Rocks (SJ2621) south-west of Oswestry straddle the vice-county boundary between Montgomeryshire and Shropshire. They are Carboniferous Limestone like the Doward, and much quarried like the Breiddens. As with the Breiddens, the BBS visited twice in the 20th century, finding *Bryum canariense* var. *provinciale*, *Didymodon acutus*, *Entosthodon muhlenbergii*, *E. pulchella*, *Pleurochaete squarrosa*, *Seligeria calcarea*, *S. donniana*, *Thuidium assimile*, and the liverwort *Scapania cuspiduligera*.

Where rivers have cut deep gorges through rock, more shaded and humid conditions enable a greater suite of species to thrive. In north Herefordshire, the River Teme cuts through mildly calcareous shale and mudstone at Downton Gorge (SO4474), where the castle is renowned as the former seat of the Knight family, who made a fortune as ironmasters in the Industrial Revolution. Downton Castle is the spiritual home of the Romantic movement's appreciation of 'picturesque' nature; indeed, cynics remark that the wild and beautiful gorge could hardly be transformed into the kind of smooth parkscape favoured by Capability Brown.

However that may be, bryophytes abound in Downton Gorge, particularly in moist, shady places by the river. Binstead discovered *Bryum torquescens*, *Plagiopus oederianus*, *Platydictya jungermannioides* and *Seligeria donniana* early in the 20th century, and Miss Armitage added *Metzgeria conjugata*. In 1979, BBS members found *Bartramia ithyphylla*, *Dialytrichia mucronata*, *Mnium marginatum*, *Orthothecium intricatum*, *Pohlia cruda*, *Pterogonium gracile*, *Scleropodium cespitosum* and *Taxiphyllum wissgrillii*, as well as the liverworts *Anastrophyllum minutum*, *Lejeunea lamacerina*, *Microlejeunea ulicina*, *Reboulia hemisphaerica* and *Targionia hypophylla*. More recently *Cinclidotus riparius*, *Conardia compacta*, *Fissidens rufulus*, *Hennediella stanfordensis*, *Platygyrium repens* and the liverworts *Frullania fragilifolia*, *Plagiochila britannica* and *Cololejeunea rossettiana* have come to notice.

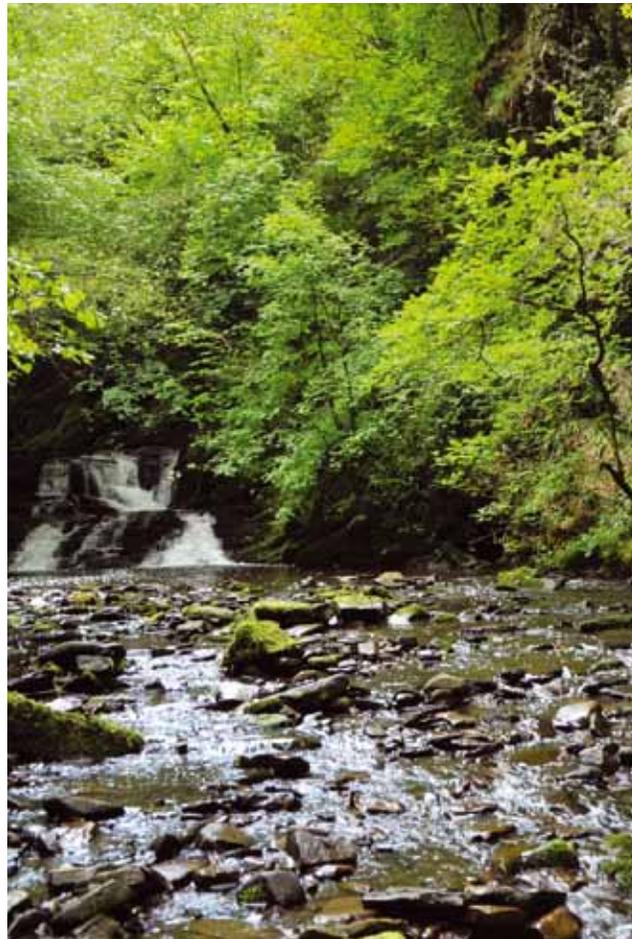
Further west, a deep gorge at Bach Howey (SO1143/1243) in south-west Radnorshire is much less well known bryologically (and in other respects too) than Downton. The BBS frolicked there in 1965, but cannot have ventured far into this ravine, with its humid air and very steep

flanks where scarce species reside, for they did not record *Hymenostylium recurvirostrum*, *Platydictya jungermannioides*, *Seligeria donniana*, *S. pusilla*, *Cololejeunea rossettiana*, *Jubula hutchinsiae* or *Lejeunea patens*. There must surely be more yet to find, deep in the recesses of this alluringly wild and sequestered gorge.

Just north of Bach Howey, base-rich sandstone at Aberedw (SO0746) supports *Oxyrrhynchium schleicheri*, *Scleropodium tourettii*, *Weissia rutilans*, and the liverworts *Lophozia bicrenata*, *Marchesinia mackaii*, *Plagiochila bifaria* and *Targionia hypophylla*.

Higher ground in the Marches

The hills of the Welsh Marches are more mound than mountain, neither spectacularly high



nor steep. They attract ramblers rather than mountaineers, and many tourists pass them by on their way to the coast or more eye-catching terrain. But the Marches' discreet charm entices discerning naturalists, with bryologists particularly attracted to rocky crags and scree, and flushes on hillsides and in hollows.

The Darens (SO2929/2930) of south-west Herefordshire and the Black Mountains (SO22) just across the Welsh border enjoy comparatively high rainfall and are made of Old Red Sandstone that is distinctly base-rich in some places, with a correspondingly rich bryoflora. Hard up against the border, the Olchon valley is a delightful vignette of old England, with hedges of Bird

▽ Deep in the bowels of Bach Howey Gorge. Xiaoqing Li



Cherry (*Prunus padus*) bounding small meadows beneath the rocky slopes above. These hills and the valleys between them attracted Ley, and he found *Bryum mildeanum* in the upper Grwyne valley (SO22/23) in 1903, *Encalypta ciliata* on the Black Mountain (SO22), *Plagiopus oederianus* on the Red Daren (SO2930) in the Olchon valley, and *Weissia squarrosa* at Cwm-y-oy (SO2923) in 1874. In various places and on different occasions during the 20th century, BBS members found *Brachydontium trichodes*, *Bryoerythrophyllum ferruginascens*, *Campylostelium saxicola*, *Encalypta ciliata*, *Hygrohypnum eugyrium*, *Isopterygiopsis pulchella*, *Orthothecium intricatum*, *Philonotis calcarea*, *Plagiobryum zieri*, *Seligeria trifaria s.l.*, *Tetrodontium brownianum* and the liverworts *Marchesinia mackaii*, *Riccia beyrichiana* and *Scapania uliginosa*. *S. aspera* and the moss *Tortella bambergeri* also occur.

At just over 500 metres, Titterstone Clee Hill (SO57/67) just east of Ludlow in south Shropshire has some of the highest ground in Shropshire, so its air and soil remain colder and wetter than elsewhere so far south-east in Britain. The persistent moisture attracts a suite of species uncommon or unknown elsewhere in the county, otherwise confined to districts further north and west.

The subdued green and brown hues of Grimmiads, Racomitriums, Marsupellas and Andreaeas on Clee's slopes attest acidity, whereas the brighter, terracotta tints of *Bryoerythrophyllum recurvirostrum* and *Schistidium* species, the yellows of Barbulas, Trichostomums, Tortellas and *Ctenidium*, and vivid green of Encalyptas or Gymnostomums are conspicuous only by their absence. *Grimmia incurva* abounds on the hard dolerite near the summit, even though on a national scale it is the rarest bryophyte known from Titterstone. *G. donniana* also grows on the hill, and indeed both these species have been

found on Brown Clee to the north. Of liverworts on Titterstone, *Gymnomitrium obtusum* is notable this far south and east in Britain, and *Barbilophozia hatcheri* also occurs sparingly.

Discoveries by the legends of yesteryear lure the inquisitive to Titterstone in the hope of refinding their plants. Augustin Ley came up from Herefordshire in May 1893 and found *Grimmia incurva* and *Tetraplodon mnioides*, and both mosses thrive there to this day. John Bishop Duncan (1869–1953) found *Poblia cruda* and *Rhabdoweisia crispata*, and they too still live among boulders in the scree. However, *Hygrohypnum eugyrium* has not been seen since Duncan found it in 1904; does it survive on the hill?

Another local bryologist, Arthur William Weyman (1860–1935) was a solicitor of Ludlow, a younger brother to Stanley Weyman (the popular and successful historical novelist), and of the 23 founding members of the Moss Exchange Club in 1896 was one of five who lived in the Welsh Marches. He found *Hamatocaulis vernicosus*, *Tetraplodon mnioides* and *Blindia acuta* on Titterstone Clee Hill (SO5977) late in the 19th century.

Weyman is remembered particularly for his discovery of the rare aquatic moss *Cinclidotus riparius*, new to Britain in the River Teme at Ludlow (SO57), where it grows to this day in some abundance. Weyman first found his moss in 1891, and described it in the *Journal of Botany* that year. *C. riparius* differs from *C. fontinaloides* in being tinged black, but is otherwise very similar to its congener – so similar, indeed, that for a long time *C. riparius* was reduced to varietal status. A note accompanying a specimen at Ludlow Museum indicates that H.N. Dixon was not convinced *C. riparius* was sufficiently distinct from *C. fontinaloides* to merit specific status. This view prevailed until 1998, when it was realized

that the two species can after all be distinguished by differences in thin sections of the leaf margins and a few other subtle differences, whereupon *C. riparius* was reinstated as a species, so enabling Weyman to rest easy in his grave. Weyman, though, was no one-moss wonder, for apart from his discovery of *C. riparius*, and other species on Titterstone Clee Hill, he is also credited with first discovering the scarce *Bryum weigelii* on the Long Mynd (SO49) in 1893.

Titterstone's bryological riches may not all have yet been discovered. *Scorpidium cossonii* betrays more base-rich conditions in flushes on lower slopes, *Nardia geoscyphus* came to notice in 1999, Jonathan Sleath found *Gymnomitrium obtusum* the following year, and exploration of the quarries on Magpie Hill (SO6177) in 2010 added *Fossombronia incurva*, *Campylopus subulatus* and *Dicranella crispa*, as well as restoring *Poblia cruda* to the county's bryoflora, so who can say what's still to come?

On Titterstone's eastern slopes, Catherton Common and Cramer Gutter (SO6177 to 6479) are nature reserves of the Shropshire Wildlife Trust. Although Cramer Gutter is only one field, it has many plants which are rare so far east. Bog-mosses (*Sphagnum* species) abound in the wettest part of the reserve, including *S. compactum* and *S. tenellum*. Water gradually flows through the mire down a slope at Cramer, as well as on nearby Catherton Common to the south of the stream, bringing minerals with it and also maintaining oxygen levels, enabling some plants to assimilate minerals which would be unobtainable in anaerobic or mineral-poor conditions. Perhaps this is why these flushes are rich in liverworts which weave across and between the stems of *Sphagnum*: *Mylia anomala*, *Cephalozia connivens*, *C. macrostachya* and *C. pleniceps*; also *Cladopodiella fluitans* and *Odontoschisma sphagni* and their gemmiferous

congeners *C. francisci* and *O. denudatum*. The tiny *Kurzia pauciflora* is present, and the rare, even more minute *Cephaloziella elachista* also occurs. Cramer is a wonderful place to botanize on fine summer days, with Cranberry (*Vaccinium oxycoccus*) and orchids in flower, or heather and the rare Marsh Gentian (*Gentiana pneumonanthe*) later in the season, and only the song of birds and hum of insects disturbing the peace. *Hyocomium armoricum* and *Sphagnum quinquefarium* grow under birch trees by the stream at the south-east end of the reserve, where the strange, white, thallose liverwort *Aneura mirabilis* lurks underground.

To the north of Titterstone, the Long Mynd (SO49) near Church Stretton also offers considerable bryological interest on rocks and in flushes. Relentless mowing by countless sheep and rabbits keeps tall plants in check, allowing many bryophytes to thrive. Weyman found *Bryum weigeli* in flushes on the Long Mynd, and John Duncan added *Grimmia montana* to the Mynd's known bryoflora.

Richard de Gylpyn Benson (1856–1904; Lawley, 2009b) knew the Long Mynd well. He had retired early because of poor health, and took up the study of mosses (and afterwards botany in general) to occupy himself after going to live with relatives at Church Pulverbatch, a few miles south of Shrewsbury at the northern end of the Long Mynd. His grandmother Frances was a daughter of the Reverend William Gilpin (1757–1848), a noted proponent of the Romantic movement, who extolled the beauty of the Wye valley at Tintern. Later Gilpin became rector at Pulverbatch for many years. Benson found many mosses new to the district around his home, and published a list of Shropshire's mosses (Benson, 1893) but did not notice liverworts, for he was bryologizing before MacVicar's handbook became available. He found *Grimmia montana*

on the Wrekin (SJ6208/6308), *Hamatocaulis vernicosus* and *Orthotrichum rupestre* on the Long Mynd (SO49), *Rhabdoweisia fugax* and *Splachnum ampullaceum* on the Stiperstones (SO39/SJ30), *Syntrichia princeps* on Pontesford Hill (SJ4005) and *Tortula wilsonii* at Pulverbatch (SJ4202/4302).

Leiocolea bantriensis was first found on the Long Mynd in the early years of the 20th century, but not until a century later was it realized that the Mynd's flushes (like those at Catherton and Cramer) possessed an unexpectedly rich trove of hepatic treasures, as *Barbilophozia kunzeana*, *Cephalozia pleniceps*, *Jamesoniella undulifolia* and *Scapania paludicola* came to notice for the first time. And many flushes on the Long Mynd still remain to be carefully examined, as do countless flushes and bogs in Radnorshire and Montgomeryshire.

Further north, straddling Montgomeryshire, Merioneth and Denbighshire, Silurian flags and shales on the Berwyn hills constitute the highest ground along the Welsh Marches but remain little known bryologically. The BBS explored Tre-rhiwarth (SJ0229) one morning during their Spring Meeting in 1992, finding *Bartramia ithyphylla*, *Brachydontium trichodes*, *Coscinodon cribrosus*, *Isopterygiopsis pulchellum*, *Plagiobryum zieri*, *Poblia camptotrachela*, *Ulota drummondii* and the liverworts *Anastrepta orcadensis*, *Frullania fragilifolia*, *Plagiochila spinulosa* and *Solenostoma paroicum*. During the 2008 Spring Meeting, despite poor weather, members found *Dicranoweisia crispula* and *Kiaeria blyttii* at Bwlch Maen Gwynedd (SJ0936), but there must still be a great deal more to find on the Berwyns and neighbouring hills.

Ruderal habitats

Ruderal places and habitats have also been much neglected in the Marches, and probably harbour

many weedy species known to be common in more thoroughly explored English counties to the east, but remain scarcely known west of the border. Disturbed ground is often referred to by the implicitly derogatory term 'brown-field', but some sites may boast very interesting suites of species.

Many bryophytes are annuals or short-lived perennials, so thrive on the variety of substrates available in towns and villages. For example, as I walked round Presteigne during the epidemic of foot-and-mouth disease in 2001 (when the countryside was closed to travellers), I added *Didymodon nicholsonii*, *D. sinuosus* and *D. vinealis* to Radnorshire's known bryoflora, as well as *D. luridus*, *Bryum radiculosum*, *Pseudocrossidium revolutum* and *Syntrichia papillosa*, all of which have rarely been recorded in the county.

Churches and churchyards can be as rewarding to the bryologist as lichenologist, and many lie beside quiet lanes: peaceful places in which to botanize. Where the local base-rich sandstone has been used to tile roofs in the southern Welsh Marches, it provides a suitable substrate for *Grimmia laevigata*, *G. ovalis* and *Hedwigia ciliata*. Weedy species such as *Bryum donianum*, *Ephemerum recurvifolium* and *Pottia davalliana* may turn up on soil, with *Weissia longifolia* var. *longifolia* on mounds of soil in graves, and *Syntrichia virescens* on paths of damp tarmac and gravestones.

Stubble in fields that have been left unploughed for several months is another neglected bryological habitat, where the bryologist may only have flocks of winter birds and occasionally a hare for company. A field at Wollaston (SJ3212) in west Shropshire that was examined in 2006 during the BBS's survey of arable bryophytes contained *Weissia rostellata* and *W. squarrosa*, and stubble elsewhere in the Marches has offered *Acaulon muticum*, *Leptophascum leptophyllum*,



Fossombronina caespitiformis, *Anthoceros agrestis* and *Phaeoceros carolinianus*.

Abandoned quarries and pits that were once hives of incessant noise and disruptive, industrial bustle can be startlingly good for ruderal bryophytes, depending on how much bare rock and soil remains exposed. Disused limestone quarries near Blakeway at the northern end of Wenlock Edge (SO6099) harbour *Ephemerum recurvifolium*, *Microbryum rectum* and *Weissia longifolia* var. *longifolia*. Nash Rocks (see above) is another rewarding locality, and in 2006 the rare *Tortula amplexa* came to notice in a working pit near Bridgnorth (SO79).

The draw-down zone of pools and reservoirs provides another rewarding ruderal habitat that is subtly different to the equally interesting flood-zone of medium-sized and large rivers. An hour on hands and knees by the Elan reservoirs near Rhayader (SN86) for a forthcoming bryoflora of mid-Wales turned up *Atrichum crispum*, *A. tenellum*, *Pohlia lescuriana* and *Fossombronina foveolata*. *Heterocladium wulfsbergii*, *Pohlia bulbifera*, *P. camptotrachelata* and *P. filum* grow there too. River banks may also reward the inquisitive bryologist (for example, *Cinclidotus riparius*, *Fissidens exiguus*, *F. rivularis*, *F. rufulus*, *Myrinia pulvinata*,



△ A *Sphagnum*-rich bog pool at Whixall Moss. *I. Atherton* (*Orthotrichum rivulare* and *O. sprucei*), but remain neglected, and there must be more to find beside still and running water in the Marches.

Bryological exploration lapsed and then resurged in the 20th century

William Phillips Hamilton (1840–1910) of Shrewsbury added numerous species to Shropshire's list. Like Ley, Hamilton probably acquired his interest in natural history from a maternal uncle, William Phillips (1822–1905), who was an accomplished mycologist. *Orthodontium gracile* from Hodnet (SJ6128) in 1892 and *Sphagnum magellanicum* from Whixall Moss (SJ4835/4935) in 1905 were two of his best discoveries in Shropshire, but worthy as he was as a field bryologist, Hamilton's most useful quality seems to have been his ability to coordinate the botanical efforts of his contemporaries in the county. An ultimately abortive attempt to publish a new flora of Shropshire (which would have included an account of the county's mosses) failed because of ill health and a paucity of pre-publication subscriptions.

Indeed, the early years of the 20th century saw convulsive changes in English middle-

class society, as the Great War claimed young men who might otherwise have inherited their fathers' herbaria and entomological cabinets, and the subsequent economic depression diverted attention from the intricate diversity of nature to more pressing concerns about employment, salaries and standards of living (Lawley, 2009a). The atrophy of interest in natural history in the Welsh Marches exactly mirrored the national picture, and with Ley, Hamilton and Benson dead by the outbreak of war in 1914, only Armitage, Binstead and John Duncan remained to regularly explore the Welsh border. But they were aging Victorians, and no younger bryologists succeeded them in the field.

It is noticeable, too, that all these bygone bryologists lived on the English side of the border. As William Condry (1966) commented about north Wales, '*In 1797 ... someone wrote "Scarcely a summer passes but the opulent or the curious from the most distant parts visit ... and volume upon volume is written to record its minutest beauties."* How I wish these words were true! Not until the middle years of the 20th century was the bryological imbalance on the Welsh side of the border corrected to some extent when Paul Westmacott Richards (1908–1995) was appointed to the chair of botany at Bangor in 1949, a post that he held until his retirement in 1976. During that time he developed around him a coterie of bryological expertise, whose cumulative explorations culminated in Mark Hill's article (1988) on the bryoflora of North Wales, a publication whose coverage extended as far south-east as north Radnorshire.

Otherwise, though, bryological explorations on both sides of the Welsh border during the 20th century depended upon occasional incursionists at BBS meetings: Brecon (1927 and 1984), Llangollen (1938 and 2008), Monmouth (1954), Oswestry (1960 and 1992), Llandrindod

Wells (1965), Newtown (1975), Ross-on-Wye (1968), Ludlow (1979) and Abergavenny (1999). Reports of the many species discovered new to districts during these meetings can be found online at <http://britishbryologicalsociety.org.uk>. Valuable though these meetings were for investigating where few or no bryologists had ventured before, in the very limited time available they could do no more than break an ice that still hides a vast pool of bryological ignorance regarding what grows where in the Marches.

Ray Woods has published bryofloras of Radnorshire (1993) and Breconshire (2006), Sam Bosanquet and others have done likewise for Carmarthenshire (2005) and Pembrokeshire (2010), and I have investigated Shropshire's bryoflora (see <http://britishbryologicalsociety.org.uk/>). However, no active, resident bryologist has ever lived in Montgomeryshire, or written and published a bespoke bryoflora for that county. What information exists regarding its mosses and liverworts lies scattered in obscure files and herbaria. Indeed, early in the 21st century, much of the Welsh side of the middle Marches remains largely *terra incognita*, and a bryologist need only to visit and look in order to find species new to counties as well as districts along the Welsh border.

The variety of species known from the localities mentioned above, and the scarcity of some of these species may seem impressive, as indeed they are, but no site ever gives up all its secrets easily, and more doubtless remains to be found at them all. Moreover, these localities merely happen to have been best explored. Scores, perhaps even hundreds of other sites may merit mention, if only their bryofloras were better known. This is probably particularly true of ground on the Welsh side of the border. What do the innumerable cliffs and rocky outcrops of the border hills still hold unnoticed and unremarked,

or the countless flushes on moors and valley-sides? As instance, my visit to the Radnorshire Wildlife Trust's new reserve at Tylcau (SO1476) in 2009 turned up *Dicranella crispa* on the soil bank of a stream (a second Welsh record, and the first for a century), with *Leiocolea bantriensis* and *L. collaris* growing together in a flush, as well as *Brachythecium mildeanum* and *Pohlia drummondii* on nearby tracks. All were new to Radnorshire's known bryoflora.

Numerous localities in the Welsh Marches will probably turn out to harbour scarce bryophytes when someone gets round to exploring them. The BBS visited such a place during their Spring Meeting in 1975: a valley above Mochdre (SO0788) near Newtown. There, in the lower part of the valley members found *Plagiothecium latebricola* new to Montgomeryshire, and damp calcareous shales supporting *Gymnostomum aeruginosum*, *Mnium stellare*, *Neckera crispa*, *Pohlia cruda*, *Rhynchostegiella teneriffae*, *Taxiphyllum wissgrillii*, *Porella arboris-vitae*, *P. cordaeana* and *P. platyphylla*. Near the top of the valley, a gorge at Craig Dugwm (SO0584) was also virgin ground for bryologists, and proved to be unexpectedly calcareous. Sheets of *Palustriella commutata* and *Ctenidium molluscum* accompanied *Hygrohypnum luridum*, as well as the smaller and less common *Anomobryum concinnum*, *Didymodon spadiceus*, *Orthothecium intricatum*, *Philonotis calcarea*, *Platydictya jungermannioides*, *Schistidium confertum*, *Blepharostoma trichophyllum*, *Cololejeunea calcarea*, *Leiocolea bantriensis*, *Plagiochila exigua*, *P. punctata* and *Scapania aspera*. Six of these species were first vouched records for Montgomeryshire.

What does the crystal ball suggest still awaits discovery?

Who can say what's still to find? What we do know – or can at least presume with confidence

– is that there's plenty more to come, and a significant proportion of these new discoveries will be unexpected. Shropshire has taken a pounding in the last few years, with the 21st century already seeing more than 100 species either added or restored to the list of species known to occur in the county, while Radnorshire's published bryoflora (Woods, 1993) is already badly out of date less than 20 years after publication, with numerous subsequent additions to the list of species known from the county. Montgomeryshire slums along in a state of protracted and undeserved neglect, and concerted efforts in Herefordshire would surely bring much more to notice.

Many people anthropocentrically presume that when a regional flora is published it becomes the definitive botanical statement about that district, with little or nothing more remaining to be found there or written about it. Nothing could be further from the truth, and thankfully a few folk do take up the challenge and find species that are supposedly 'missing, presumed absent'. Diligent and painstaking though a few bryologists' explorations have been, their endeavours only hint at what else may await discovery along and near the Welsh border. And perhaps we may also discover a little more about ourselves, obliquely reflected in nature's mirror as we strive to interpret (or fail to interpret) the little-known bryology of a neglected region.

Mark Lawley

e m.lawley@virgin.net

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