It hardly seems like 3 years since I took over as Editor of *Field Bryology*, this unbelievably being my 9th issue in charge. I have of course introduced some new features to the magazine since I started, but I have also stated in previous issues that the magazine will continue to evolve, and with that in mind, I'm pleased to introduce in this issue a new column that I hope will become a regular feature of the magazine – *Beginner's Corner*.

Several members have voiced their opinion that one section of the readership that is rarely catered for explicitly is the absolute beginner. In an effort to address this, I am very grateful to Sharon Pilkington who has agreed to take on the challenge of writing this new feature for novice bryologists. Sharon begins her column on p. 52 with an article that will hopefully answer a frequently asked question posed by those who are about to embark on studying bryophytes – which is the best book to start with?

On the subject of books, I am very pleased to report that the BBS *Field Guide* is selling very well – over 3,400 copies have been sold worldwide to date, and it is already in its first reprint. As one of the editors of the guide, I am of course justifiably proud of the success of the book and the positive reviews it has received. (I am pleased to see that Sharon has included the guide as one of her suggestions in her new column alongside some of the long-standing and well-respected older texts!) Of course, this is not to say that the book is without fault. Jeff Bates, BBS Vice-president, has cast his critical eye over the guide, and offers his view of its merits and shortcomings in this issue on p. 54. If you have any comments on the guide, don't forget to let us know via the 'Feedback' feature on the *Field Guide* website at **www.hosting.sleath.co.uk/bbs/index.htm**

Ian Atherton, Editor

Ditrichum plumbicola Crundw. (lead-moss) in the Mendips

Ditrichum plumbicola was described by Alan Crundwell in 1976 from lead-mine spoil at Allenheads in Northumberland (Crundwell, 1976), but the species was also known to occur on similar substrates on the Isle of Man and in the Gwydyr Forest in Caernarvon (where first collected in 1972). Initially considered to be endemic, subsequently the moss has also been shown to occur in Westphalia and Rheinland-Pfalz in Germany (Düll & Meinunger, 1989) where seven localities are now known (Frahm *et al.*, 2008). More recently it has also been detected in Ireland where four sites have been found since 2008 (Holyoak & Lockhart, 2009). Because of its global rarity and evidence of continuing decline in Britain, *D. plumbicola* was made a UK Biodiversity Action Plan species in the second tranche (Anon., 1999). Its specific status has since been brought into question by molecular studies (Frahm *et al.*, 2008), which suggest it is an extreme morphological variant of

◁ Fig. 1. *D. plumbicola* – East Harptree (ST 5538 5483), January 2009. *Fred Rumsey*

Known only from a handful of sites in the UK and Germany, *Ditrichum plumbicola* is an uncommon moss of land contaminated by heavy metals. **Fred Rumsey** and **Helena Crouch** have been monitoring the species in the Mendips to improve our knowledge of this poorly understood plant.

D. lineare (Sw.) Lindb., and further research is necessary.

Apparently restricted to lead-mine spoil on more acidic substrates, this diminutive species is reliant on an open, heavily toxic substrate, a habitat which, in the absence of an active mining industry, is not now being freshly exposed or created; existing habitats are particularly vulnerable to inevitable natural succession and unsympathetic management.

Within the British Isles, *D. plumbicola* is now known from about 30 localities, the vast majority of which are in north and central Wales (Rumsey, 2006). Its presence nationally in 20 hectads has resulted in its removal from the recently revised list of nationally rare bryophytes (Preston, 2010). In England the species is only known in three areas: the original locality at Allenheads, where the species was refound in very small quantity in 2001 by Ron Porley; Chyverton in Cornwall, where first found by David Holyoak in 1998, again in very small quantity; and in the Mendips.

D. plumbicola was first found in the Mendips on a BBS field meeting in September 1980 (Appleyard, 1981). The group briefly visited Priddy Pools SSSI, examining some lead-mine waste (but not the main mine and smelting site), before crossing the road into the Forestry Commission's Stockhill Plantation. There, guided by Dr Dennis Brown, the party looked at an area (at around ST 548 514) so high in

lead (31,000–51,000 p.p.m. lead in dry soil) that the pines planted there were failing to thrive. On this bare ground several members of the group (David Long, Royce Longton, Ted Wallace and others) collected *D. plumbicola*. The species was recorded again from elsewhere in the plantation (ST 550 513) by Ron Porley in January 1990, and at a third site (ST 547 515) close to the original find by David Holyoak in May 1997 [records courtesy N. Hodgetts, Threatened Bryophyte Database (TBDB)]. All of the Mendip sites then known to the TBDB and Biological Records Centre (BRC) were from the Forestry Commission area at Stockhill which anecdotal evidence suggested was potentially the best English site for *D. plumbicola*. Firm evidence was, however, lacking as the species' true distribution, abundance and population dynamics were not known. As this species is possibly the most globally threatened but probably least-considered of the high conservation status organisms at the site and potentially vulnerable to management activities (or their absence), this lack of knowledge needed to be addressed; listing in the BAP process provided the necessary impetus. Accordingly, the authors have been compiling records in the Stockhill area since 2003 with the intention of setting up more formal monitoring programmes in collaboration with the many interested parties in this well-visited area, mindful of the already conflicting demands that the known priority species present.

The richest sources of lead in the Mendips were secondary ores, derived from narrow primary seams found lying close to the surface. Initial extraction was thus relatively easy and could be accomplished without great mechanical difficulty. This has left a legacy of old shallow pits, spoil heaps and shafts creating areas of pock-marked, 'gruffy' ground. Roman and early medieval processing techniques were relatively inefficient, leaving much lead and other metals in the spoil. Refinements in extraction and processing during the 19th century rapidly revealed that deeper mineral resources were not extensive or economically recoverable, but the spoil from earlier workings gave good yields when re-processed. This resource was a finite one and fairly rapidly exhausted; as a consequence, many speculative mining companies quickly failed. Extensive areas of this processed slag can be found at several Mendip locations, including Charterhouse, Velvet Bottom and Ubley Warren, and at the Priddy Mineries site adjacent to Stockhill. These slag heaps support a much greater diversity of vascular plants, including the metallophytes *Noccaea caerulescens* (alpine pennycress) and *Minuartia verna* (spring sandwort), but do not support *D. plumbicola*. This species is restricted to fine substrates in more acidic areas of lead-rich spoil from earlier workings, or lead-rich soils which have never been commercially exploited.

Metallophyte – a plant that can tolerate high levels of heavy metals.

Having gained a good search image for areas suitable for *D. plumbicola*, the authors have made extensive searches in adjacent metalliferous sites in the Mendip hills to establish whether they too contain this species.

D. plumbicola at Stockhill (2003–present)

Stockhill was acquired by the Forestry Commission in 1937 and planting was completed by the end of the 1940s. In the 1960s many trees were felled and replaced with varieties more tolerant of the toxic soils present over much of the site. Lead mining has occurred here since Roman times and evidence of mining activities is still to be found within the plantation, although not always easily visible now because

of the recent forestation. The area is primarily coniferous woodland, with older plantations of Beech on the margins and by major tracks. The original heathland vegetation is being allowed to regenerate from felled woodland to provide a mosaic of habitats suitable for creatures such as nightjars, for which the site is well known. The area is intersected by a network of walking trails, paths and animal tracks, several of which cross, or in some cases appear to follow the line of the more apparently toxic soils. The bare soil surfaces, which from their colour and continuing absence of vegetation we assume to be the most lead-rich and toxic, occur at scattered locations within the plantation area, but are concentrated to the north-west of the site where the majority of the past mining activity has been localized. Our survey has shown that *D. plumbicola* is restricted to these areas.

We have records from at least 16 discrete locations, extending over an area of about 510 × 830 m from ST 5515 5115 in the south, to ST 5479 5198 in the north. Populations of the moss are generally small and restricted within these features, and are far more apparent during the wetter months of the year. Care also has to be taken as some sites support an alga which produces superficially very similar narrowly pointed clustered 'peaks'. Where we have managed to relocate sites accurately over several years, the data show persistence in the majority of sites (Fig. 2).

Many sites, however, have declined in apparent quality as a consequence of successional processes over this period. These areas are generally very restricted in extent, so that eventually tolerant grasses encroach or, more damagingly, litter from adjacent and overhanging trees builds

▽ Fig. 2. Stockhill plantation (ST 5499 5181). Limited succession on an early spoil tump. Left, October 2003; right, January 2009. *Fred Rumsey*

▷ Fig. 3. Stockhill Plantation (ST 5504 5162) in October 2003. The site was lost by 2008 through deposition of leaf litter and overgrowth by beech and spruce. *Fred Rumsey*

up, shading out and ameliorating the surface (Fig. 3). The more extensive (and permanent) sites are apparent as glades within otherwise dense woodland where tree growth has obviously failed. These presumably represent larger areas of still lead-rich soils, sufficiently toxic to repress growth. The effects of toxicity are, however, so localized that, for smaller sites, large trees growing close by can, over time, create enough shade and litter that sites become unsuitable for *Ditrichum*.

Tracksides (such as ST 5515 5115 to ST 5516 5115) allow the maintenance of permanently open habitat through physical processes, but the area suitable for *Ditrichum* growth is usually limited, with plants restricted to thin crusts in somewhat sheltered spots at the margins of the bare areas.

Creation of fresh bare surfaces, with newly exposed toxic soils suitable for colonization or perhaps regeneration from buried vegetative propagules, is possible through tree felling and timber removal, new path creation, or at a smaller scale through the activity of rabbits. The effects of the latter, however, are not all positive as defecation on the bare areas adds humus and creates a less toxic soil in which other bryophyte species have a competitive advantage.

D. plumbicola at Priddy Pools SSSI

The adjacent Priddy Mineries (Priddy Pools SSSI) were at one time a Somerset Wildlife Trust (SWT) reserve. The area was surveyed for the Trust by the late Joan Appleyard, then BBS vice-county recorder, in 1985. However, we have not seen her unpublished data, which are not held by SWT, but it was apparent by implication from information previously available on the SWT website that *D. plumbicola* was found near Fair Lady's Well, just within the reserve's southern boundary. *D. plumbicola* is included in the SSSI citation for the site, which was last revised in 1986.

Examination of the remains of the minery buildings, processing areas and adjacent spoil heaps failed to reveal the moss, but low on the north-west-facing banks, east of the stream near St Cuthbert's Swallet and near the southern boundary of the SSSI, three small bare patches of toxic soil (the largest about 60 × 70 cm) were found in March 2009 to support small colonies of *D. plumbicola* (Fig. 4).

Bare areas of toxic soil were also found at the northern limits of the site, approaching the road which separates it from Stockhill Plantation. These were at the edges of low tumps bordering a flat area dominated by *Molinia* (purple moor-grass) and *Juncus* (rushes). At three of these sites (ST 5456 5180, ST 5457 5181, ST 5458 5181) small quantities of *D. plumbicola* were found. These represent the first finds in this part of the SSSI, but are adjacent to the original areas in which the species was found in Stockhill (perhaps now lost through the development of the car parks and forestry activities) (Fig. 5).

△ Fig. 4. Priddy Pools SSSI, near Fair Lady's Well. Top, site at ST 5437 5055; bottom, site at ST 5436 5052. *Fred Rumsey*

◁ Fig. 5. Priddy Pools SSSI (ST 5456 5180) looking towards Stockhill Plantation, with recently discovered site of *D. plumbicola*. *Fred Rumsey*

D. plumbicola at East Harptree Woods

As at nearby Priddy, just under 3 km to the south, the Harptree area was important for lead and zinc mining. Lead ore was mined from veins in the Carboniferous Limestone around Gibbets Brow and Lamb Leer, and manganese and zinc from veins in the Dolomitic Conglomerate around Harptree Combe. Much of the ore was processed and smelted on Smitham Hill, where ore dressing and smelting works were built by the

East Harptree Lead Works Company in 1867. This business proved short-lived, the smelting activity ceasing in this area by 1875. It has, however, left its legacy on the vegetation as well as features of archaeological interest.

During the course of vascular plant recording in the area surrounding Smitham's Chimney, a local landmark and the only surviving example of a lead-smelting chimney in the Mendips, *D. plumbicola* was found in some abundance in eight more or less parallel, linear, bare soil features on gruffy ground. On part of this area, rows of small stunted yellowed pines could be seen; it is likely that mechanical disturbance of the soil in preparation for the planting of trees has created the linear features and exposed toxic soil, causing the trees to fail and creating an opportunity for *D. plumbicola* to colonize, or appear from a soil propagule bank (Figs 6 and 7).

Repeated searches of the extensive lead-mining and processing areas near Charterhouse (Blackdown Reserve, Ubley Warren and Velvet Bottom), 6 km further west-north-west, have not revealed *D. plumbicola* or any apparently suitable sites for it. Our experience at Priddy Pools SSSI, where several searches had been made prior to eventual success suggests some caution should be exercised before declaring it categorically not present.

Several other metalliferous sites exist locally and further afield in North Somerset; we have investigated two so far. At Rowberrow Bottom (ST 45 57), a site known more for its zinc rather than lead production, and also now largely under rather unsympathetic forestry plantation, a few suitable looking areas were identified on and by tracks, but no *Ditrichum* was seen. The SWT reserve GB Gruffy (ST 47 56) is named after a cave (GB Cave) and for the conspicuous terrain, once again the legacy of lead mining.

▷ Fig. 6. North-west of Smitham's Chimney (ST 553 547), looking north towards Chew Valley Lake. Gruffy ground surrounded by plantation woodlands. *D. plumbicola* is frequent in parallel, bare, furrow-like features on the north-north-west-facing hillside. *Fred Rumsey*

▷ Fig. 7. Typical *D. plumbicola* habitat (ST 5531 5477). The area of land on which these occupied features are found covers about 90 x 70 m, from ST 5531 5477 to ST 5539 5483. *Fred Rumsey*

Two searches have been made here, but no *D. plumbicola* has been found.

While the discovery of additional sites for *D. plumbicola* in its major English area of occupancy is encouraging, the small quantities present, the potential threats to sites and our continuing lack of knowledge of the dynamics and tolerances of this species, suggest that we cannot afford to be complacent about its future. Over time, leaching of lead from the soil surface might be expected to result in amelioration of the substrate, allowing other species to colonize and out-compete *D. plumbicola*. With mining operations long finished, only disturbance by other activities such as forestry operations will bring fresh toxic material to the surface, creating new opportunities for *D. plumbicola*. Continued monitoring is seen as important, as is collaboration with the organizations whose activities will determine the survival of this species in the Mendips and elsewhere.

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