

Progress towards a new *Atlas of Bryophytes*

BBS Council has accepted a proposal that we should work towards a revision of the Atlas of Bryophytes. **Chris Preston, Mark Hill, Sam Bosanquet** and **Stephanie Ames** review the progress that has been made so far, and set out what still needs to be done.

The publication of the *Atlas of Bryophytes of Britain and Ireland* (Hill *et al.*, 1991–94) was the result of 30 years fieldwork by the BBS. After a sustained campaign of recording, led by a dozen or so stalwarts, the Society was able to produce meaningful maps of almost all the British and Irish species. Coverage was far from complete, but the extent of recording was impressive, particularly in the bryologically exciting but remote regions of western Scotland (Fig. 1). The *Atlas* was one of the first BRC atlases in which each map was accompanied by a detailed text, and it provided a model for some later atlases (including, in a pleasant reversal of the normal relationship, some atlases of flowering plants).

In recent years there has been something of a boom in bryological recording. Attendance at BBS field meetings has increased, revised *Census Catalogues* have appeared (Blockeel & Long, 1998; Hill *et al.*, 2008) and regional groups (almost unknown in the earlier period) have fostered recording at the county level. County Floras are produced as frequently as at any period

since the 1960s and now tend to have much more thorough coverage than they did then. Technological developments allow recorders to computerize their own records and to email them to the Recording Secretary. Updated distribution maps are available on the NBN Gateway, and the data underlying them can be examined.

Why do we need a new *Atlas*?

The reasons for producing a new *Atlas* are probably obvious to anyone actively involved in bryophyte recording. They include:

- ▷ updating the *Atlas* to take account of taxonomic changes and the discovery of new species in Britain and Ireland
- ▷ incorporating records from hitherto unrecorded or under-recorded areas
- ▷ documenting changes in the distribution of species
- ▷ updating records of threatened species in Britain and Ireland
- ▷ updating the species texts
- ▷ providing a focus for our recording activities.

These are discussed in turn below.

Taxonomic changes and the discovery of new species

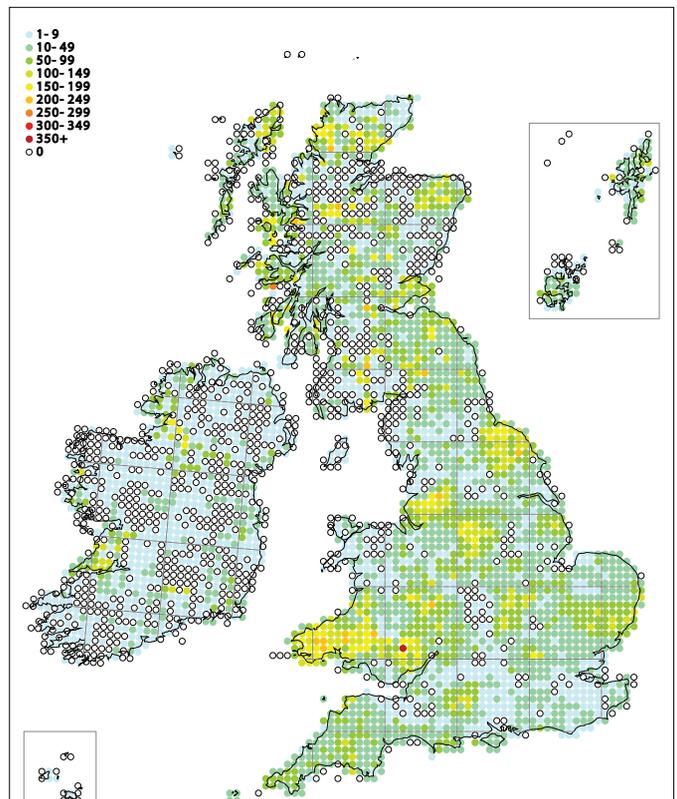
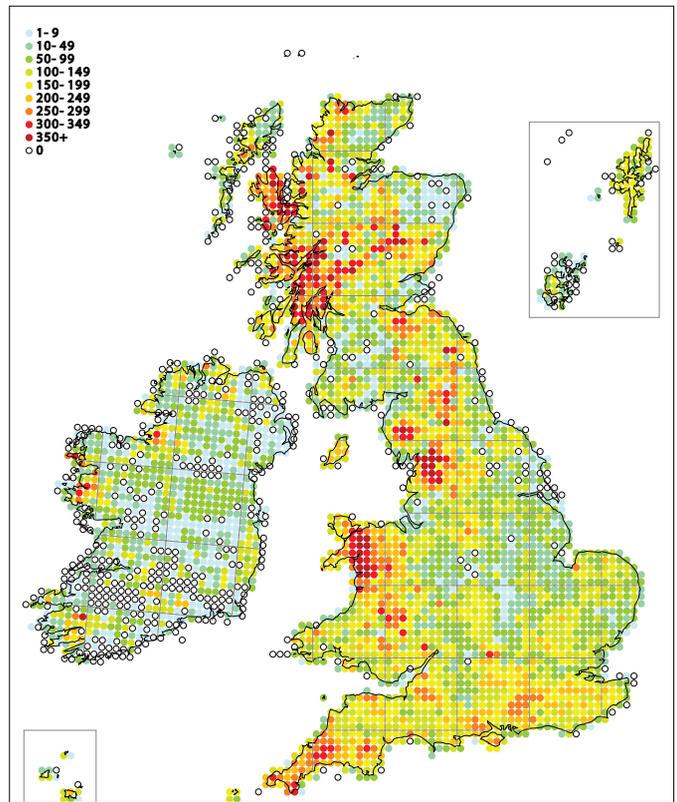
Recording always lags behind taxonomic innovation, as it takes time to document the distribution of recently discovered or described species. Much of the fieldwork for the 1991–94 *Atlas* had taken place by the time that species such as *Metzgeria consanguinea* (=temperata) (1977), *Plagiochila bifaria* (1977) and *Racomitrium elongatum* (1984) were added to the British and Irish lists, and the revision of the *R. heterostichum* aggregate in Britain (1991) took place just in time for the inclusion of the first records in the relevant *Atlas* volume. We have had another 20 years to record these, but meanwhile we have new splits to contend with (e.g. *Conocephalum salebrosum*, *Ditrichum flexicaule* s.s. and *Schistidium crassipilum*). Some taxa, such as *Barbula convoluta* var. *sardoa*, have even been lumped (Blockeel & Long, 1998) and split again (Hill *et al.*, 2008). Other non-critical or less critical species have been discovered in the British Isles and their initial range described, but further fieldwork has revealed additional localities for many of them (e.g. *Ephemerum hibernicum*, *Sematomyllum substrumulosum*, *Tortella bambergeri*). In all, 64 species and 62 subspecies and varieties in the recent *Census Catalogue* (Hill *et al.*, 2008) are not mapped in the 1991–94 *Atlas*.

Recording under-worked areas

Many of the areas of England and Wales which were under-recorded in the last *Atlas* have now been worked by resident (or near-resident) bryologists (Fig. 2). There is a noticeable trend

▷ Fig. 1 (top). The coverage obtained by the 1991–94 *Atlas of Bryophytes*, as shown by the number of bryophyte species recorded in British and Irish 10-km grid squares, 1950–89.

▷ Fig. 2 (bottom). The number of species recorded in British and Irish 10-km grid squares from 1990 onwards which were not recorded there between 1950 and 1989.



for areas which were well-worked by 1991–94 to have been neglected in favour of under-recorded areas, although the extent to which this represents the deliberate decision of bryologists to record in near-virgin terrain, as opposed to random fluctuations in the distribution of bryologists, is unclear. North Wales, for example, was very well recorded in the *Atlas* but has received little attention since; instead we have had bryophyte Floras for Carmarthenshire (Bosanquet *et al.*, 2005) and Brecon (Woods, 2006), with Pembrokeshire in preparation and Monmouthshire to come. In England, areas from which there were few records by 1990 but which have been well-recorded since include South Wiltshire, Suffolk, Northamptonshire, Shropshire, Derbyshire, South Lancashire and North-east Yorkshire. Conversely, counties such as North Somerset, Kent and (most notably) Warwickshire, which were well-recorded in earlier decades, have received relatively little attention. Few counties have been well-worked in both periods, exceptions being Cornwall and Cambridgeshire where bryologists are completing the fieldwork for ‘repeat’ county Floras.

As BBS Meetings Secretary, Mark Lawley has been particularly helpful in arranging meetings in under-recorded areas, both to help resident recorders as in Staffordshire (2006) and Northamptonshire (2007), and to visit areas where there are no resident bryologists. The area of north-east Scotland including Kincardineshire, Aberdeenshire and Banffshire, described by Hill *et al.* (1991) as ‘*undoubtedly the worst-recorded area on the mainland of Great Britain*’, has received special attention, with

BBS meetings in North Aberdeenshire in 2004 followed by return visits by smaller parties in 2006 and 2008. There are still some under-recorded squares in this area, but no longer a gaping hole in the coverage map. Other BBS meetings, to East Sutherland (2006) and Lewis in the Outer Hebrides (2007), recorded ground further north. In lowland Scotland, David Chamberlain and Liz Kungu have done much recording in Fife, another area from which there were few post-1950 records, and the Spring Meeting 2009 was held in Ayrshire.

A feature of visits to supposedly dull areas of eastern Scotland has been the discovery of species well outside their known British range, including *Grimmia elatior* (previously thought to be extinct) and *Lophozia herzogiana* (only hitherto known from a single British and European locality). In the course of ‘routine’ recording to improve coverage in Fife and Stirlingshire, David, Liz and Gordon Rothero found two species new to Scotland in 2007–08 (*Rhytidiadelphus subpinnatus* and *Tortula freibergii*) and additional sites for several others that are rare there (e.g. *Conardia compacta*, *Fissidens rivularis*, *Schistostega pennata*). In Ireland, the scope for fieldwork was illustrated in Co. Monaghan when a party truanting from the Derrygonnelly meeting in 2005 produced 74 new vice-county records in a single day. It has certainly not been our experience that recording under-worked areas is ‘*a frequently unrewarding recreation ... resulting in poor lists in bryologically depleted terrain and lots of wasted petrol*’ (Fox *et al.*, 2001)¹.

¹This gloomy view followed a poorly attended BBS meeting in south-east Ireland. It may be that this area is best visited in winter. Two members ‘*searched diligently*’ at the J.F. Kennedy Arboretum in Wexford on 18 August 1999 and found only 18 species, which they regarded as ‘*a pathetic total ... perhaps indicative of this part of the country*’. On a rapid visit to the same site towards dusk on 3 March 2009 SDSB and CDP recorded 60 species, and did not cover anything like the entire site.

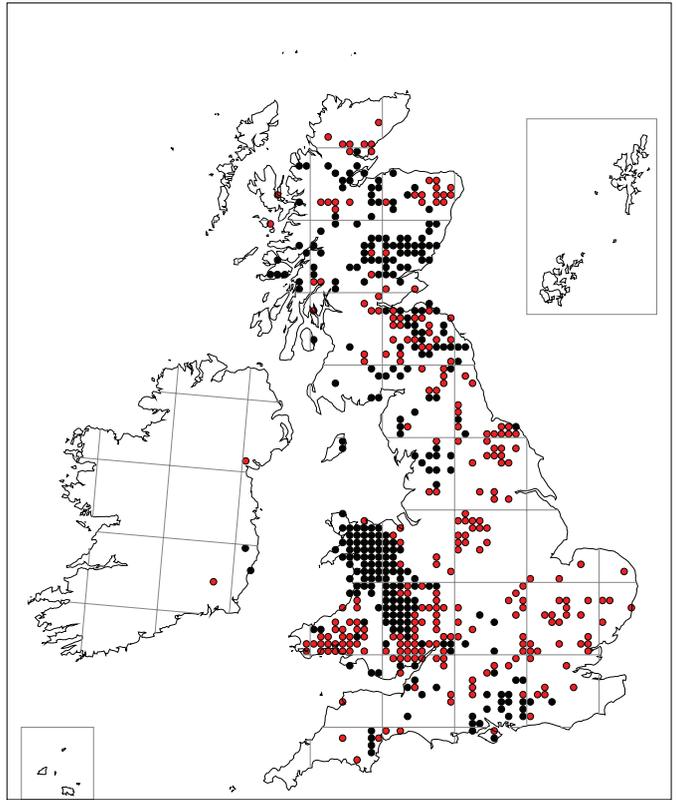
Documenting changes in the distribution of species

One feature of the period since 1990 has been the marked changes in the distribution of some well-known species. Our ability to detect these changes is enhanced now that we have documented their known ranges in Census Catalogues and 10-km dot maps. Expansions are more obvious than contractions, and are easier to document. The spread of epiphytes such as *Orthotrichum stramineum* into hitherto polluted areas is the most obvious example (Fig. 3). The first signs of the increase, or recovery, of these species were noted in the 1980s, and are therefore referred to in the 1991–94 *Atlas*. A few species of other habitats, such as *Didymodon nicholsonii*, have increased markedly, for less obvious reasons. One or two alien bryophytes have also spread, most notably *Lophocolea semiteres* which was only known from the Isles of Scilly and from Benmore Gardens in 1991. Declining species are less easy to detect except by a complete resurvey at national or local level – the ‘repeat’ county Floras should be useful in documenting these.

One consequence of taxonomic changes, and of changes in the distribution of well-understood species, is that areas which were well-recorded in the earlier *Atlas* require bringing up-to-date. The absence of *O. stramineum* from the most south-easterly parts of England, for example, probably reflects the scarcity of active recorders in this area. At the moment we have to accept the fact that the bryological community is, even in boom times, unable to cover all the English and Welsh counties (let alone those in Scotland and Ireland) in a single recording generation.

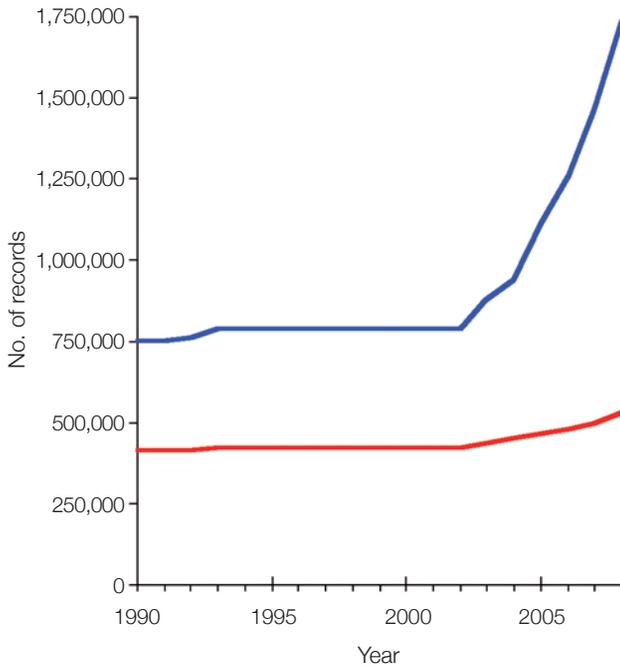
Updating records of threatened species in Britain and Ireland

In Britain the Threatened Bryophyte Database (TBDB), managed by Nick Hodgetts and financed by the conservation agencies, has



△ Fig. 3. The eastwards expansion of *Orthotrichum stramineum*. Black dots indicate squares where the species was recorded before 1990; red dots, squares in which it was first recorded since then. The increase of records in both hitherto under-recorded areas in the west and in areas east of its previous distribution limit are both apparent on the map.

focused on keeping up-to-date records of rare and declining species (Hodgetts, 2009). This is one group where we may be able to demonstrate losses as well as gains, as Ron Porley (2008) has done so well for *Leptodontium gemmascens*. In Ireland, the conservation agencies north and south have collaborated on a major project to produce a *Red Data Book*, involving the revision of old records of rarer species and much fieldwork by David Holyoak and Nick Hodgetts to revisit



△ Fig. 4. The number of records in the BBS database at BRC, 1990–2009. Both the number of individual records (blue line) and the number of records of species in 10-km squares (red line) are shown.

old sites. The timetable for the new *Atlas* has been arranged so that this work will be published before ours, and on that understanding the Irish authorities have generously agreed to make all the records available to us.

Updating the species texts

In addition to the distribution maps, the *Atlas* is also useful as a basic reference work about the habitat, altitudinal range and reproductive biology of species, and their wider ranges. We now have better data on altitudes and world ranges. Some of the original species accounts were thin, and a few might even be characterized as exiguous. The new *Atlas* will provide a chance to update this aspect of the publication, taking

into account advances in knowledge since the early 1990s.

A focus for our recording activities

Although we can encourage recording, and set up systems for data exchange, nothing stimulates activity as much as a project with a deadline! The new *Atlas* project has encouraged us to set up a programme for visiting under-recorded areas, which might otherwise have been dismissed as too dull to merit a BBS meeting, and to organize, send in and computerize our records now (rather than next year, or the year after that...). Towards the end of the project we will have to check all maps for errors, a useful exercise even though we try to validate all incoming records. The end result should be a tangible product which will summarize the recent recording activities of the BBS, and which will interest other naturalists, scientists and conservationists.

Summary of progress so far

The 1991–94 *Atlas* was based on 0.78 million records. The total in the BBS database at BRC is now over 1.8 million, and currently increasing rapidly (Fig. 4). In part this increase represents the computerization of all (rather than 10-km summary) records, and the start of tetrad recording. The first county tetrad atlas was that of Warwickshire (Laffin, 1971) but it took a long time for bryologists to take up tetrad recording with any enthusiasm; the next tetrad maps were those for Co. Durham (Graham, 1988). However, over 90% of the records added to the BBS database in the last 5 years have been localized to a tetrad or to a more precise area than that. The growth of 10-km square records has obviously been less marked, but we still have nearly 120,000 more dots on the 10-km square distribution maps than we did in 1990.

A summary of total coverage since 1950 is provided in Fig. 5. Inevitably, this is not quite up-to-date, as there are always records awaiting input into the database, but the vast majority of available records are included. Several counties were identified as seriously under-recorded by Hill & Dominguez Lozano (1994, p. 16) in the final volume of the 1991–94 *Atlas*, on the basis of an analysis of liverwort records. As we have seen, Shropshire and Suffolk are now very well-recorded, Fife has been brought up to par, and much has been done in Staffordshire and Aberdeenshire. Nottinghamshire is the only county listed in 1994 which is critically in need of attention. South-east Yorkshire also appears species-poor, but Colin Wall is currently working in this area and has already been rewarded by the discovery here of *Orthotrichum consimile* (Blockeel & Wall, 2008). In Ireland, however, progress has been slow and although visitors can contribute a great deal, there is a desperate need to develop a corps of resident bryologists. The Dublin Naturalists' Field Club (DNFC) are trying this year to promote bryology in Ireland, and with luck the 2009 Summer meeting in Cork and Kerry will contribute towards a revival of Irish bryology.

Timetable for the completion of the new *Atlas*

The agreed timetable is as follows:

- 2008 New *Census Catalogue* published (Hill *et al.*, 2008), providing the taxonomy and nomenclature for the new *Atlas*.
- 2010 Irish *Red Data Book* due to be published.
- 2011 Last year for field recording.
- 2012 Complete work on maps and text and submit new *Atlas* for publication.

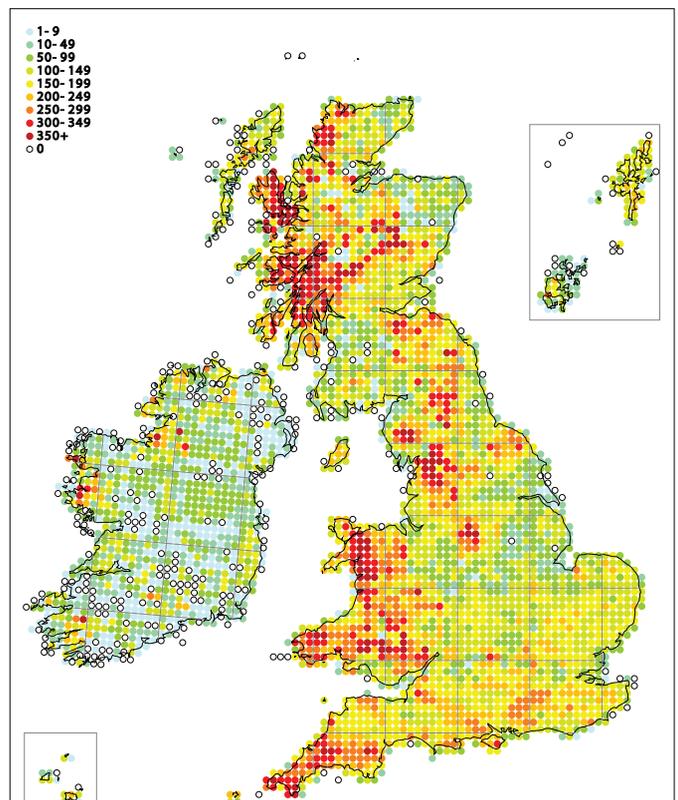
A Steering Group (Tom Blockeel, Sam Bosanquet, David Chamberlain, Mark Hill, Neil Lockhart, Chris Preston & Richard Weyl)

oversees the project. Mark Hill has been checking and assembling data in the BBS database, Sam Bosanquet (liverworts) and Tom Blockeel (mosses) have agreed to take charge of the editing of species captions, with Chris Preston taking responsibility for the introductory chapters. The form of the publication, and many of the details of the format, remain to be decided.

What can you do to help?

There are a number of ways of helping. All BBS members can contribute, although the exact ways in which you can help will depend on where you live and how expert a bryologist

▽ Fig. 5. The number of species recorded in British and Irish 10-km grid squares from 1950 onwards.



you are, or can become. You can:

- ▷ record in your local area, by yourself or with a local group (if there is one)
- ▷ come to BBS meetings, especially those held to record in under-worked areas – members of all levels of ability can help on these, and you'll learn rapidly!
- ▷ travel to record in under-worked areas in Britain – obviously some degree of expertise is needed here, but even as a beginner you may find that you can team up with a more experienced bryologist
- ▷ record in Ireland, where there is huge scope for recording (and for joining in with DNFC activities)
- ▷ send your records to the relevant vice-county recorder, if there is one, or to the Recording Secretary, Mark Hill, if there isn't or if you are one.

The BBS is keen to ensure that recorders who are able to travel to record under-worked areas are not prevented from doing so for financial reasons. A sum has been set aside for travel costs and out-of-pocket expenses for recorders working outside their home areas. If you think you can help with such recording, contact Chris Preston. For more general queries about BBS recording, contact Mark Hill.

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