

BOOK REVIEW

England's Rare Mosses and Liverworts: Their History, Ecology and Conservation.

Ron D. Porley. New Jersey: Princeton University Press. 2013. 224 pp. ISBN 978 0 691 15871 6. £25, hardback.

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This book deserves a place in the office of every conservation biologist, bryologist and ecologist. I expect it to be heavily referenced in grant proposals and to act as a template for guides to other countries' rare bryophytes.

Porley's introduction covers what bryophytes are and their importance, bryophyte-specific issues of rarity, background information on UK conservation and a history of bryophyte collection and conservation, followed by an overview of threatened English bryophytes that includes some very nice Red List coincidence maps, revealing rarity hotspots on the Cornish mainland and the south Devon coast. The bulk of the book (pp. 44–198) comprises species profiles for 84 (of 87) threatened bryophytes, arranged alphabetically. Each profile gives the IUCN threat category, a brief description, illustrations of the plant and a short history of known collectors and sites. An accompanying map gives its distribution in 20 km squares. Possible conservation actions are mentioned where appropriate. Known English extinctions are covered as a list, while appendices discuss three Red List species recorded in Wales and Scotland, but apparently absent from England, and provide a status summary for the 87 English species on the British Red List. Finally a three-page glossary explains some bryological terminology.

My strongest gripe with this book is its assumption of familiarity with English geography. Either a county map somewhere in the introduction or linking the text to annotations on the distribution maps would have made things easier to follow. A few typos also stuck out – *Thamnobryum 'cataractarum'* for '*angustifolium*' on p. 177; the 'moss' *Dumortiera* on p. 102 is a liverwort; and both male and female plants of the dioecious *Lophozia herzogiana* (p. 125) are said to be unknown in Britain, leaving little to record.

Porley reports molecular information where it has been available. For *Thamnobryum angustifolium* I would query the report that it is genetically identical to *T. alopecurum* – this should be qualified by the markers that were used. In general, however, molecular data is absent (although Porley mentions that the Royal Botanic Garden Edinburgh's DNA barcoding project has material for several species, a timely reminder that this work is important and needs to get into the public sphere).

Reading through the habitat requirements and threats to these bryophytes, common themes emerge. Many rare species are recorded from ash woods, or on ash trees; *Orthotrichum pumilum* is found on two ash trees in Co. Durham and one in Bedfordshire. With the recent spread of ash dieback disease (*Chalara fraxinea*) in the UK, this clearly calls for close monitoring. Habitats for *Southbya nigrella* are threatened by invasive aliens *Buddleja* and *Rhododendron*, although in contrast another liverwort,

Telaranea europea, is reported to thrive in the damp shade below *Rhododendron*. The action of rabbits in keeping land open seems critical for many grassland species, including 'rabbit moss' *Cheilothela chloropus*, with population declines following myxomatosis outbreaks, while the demise of heavy metal mining and spoil heaps endangers many species, including *Cephaloziella massalongi*. Porley suggests providing fresh metal-rich substrates for them to colonise. This opens the question of where these metalliferous species were before human actions provided habitats for them, and whether we are obliged to carry on doing so.

Various gems appear in the species profiles. The beauty of *Cyclodictyon laetevirens* and *Fissidens serrulatus* may well have been their downfall: they have fallen victim to overcollection. *Cyclodictyon laetevirens* was first discovered in a Cornish sea-cave, from which it was subsequently eradicated by a well-meaning but seriously misguided vicar keen to stop anyone else finding it. Thankfully it turned up in another cave nearby, where it still appears to exist. A car park extension covers one known site of *Homomallium incurvatum*, while road maintenance seems to be responsible for the demise of populations of endangered British Isles endemic *Ditrichum cornubicum*. Tragically, a pond dug in a Site of Special Scientific Interest to help conserve natterjack toads eradicated what was the only known English population of the globally rare *Lophozia herzogiana*, which highlights a need for openness about rare plant locations.

Concepts of rarity and threat combine in interesting ways with habitat-level preservation. In general, keeping pollution low and invasives out is beneficial, but attempts to pretty up wasteland sites can devastate bryophyte populations. Localities for metalliferous liverworts like *Cephaloziella integerrima* are superficially wastelands, creating a disconnection between environmental amelioration and bryophyte conservation. Carrion and dung mosses in the Splachnales must provide conservationists with headaches at several levels. The habitats they colonise are highly ephemeral, making monitoring near impossible. Veterinary antiparasitic drugs deposited in dung may affect the flies that disperse the spores. Also, large carcasses are not left out to rot, removing an important moss habitat from the ecosystem. Porley intriguingly mentions an attempt to increase populations of *Aplodon wormskioldii* by seeding an area with carcasses; apparently this did not work.

The UK bryophyte flora is arguably the best known and mapped in the world, yet most of this knowledge is based on morphological data. At RBGE we are collating genetic information for UK liverworts, and the emerging picture has serious implications for the level at which we conserve. Numbers of genetically distinct liverwort species are seriously underestimated. For example, *Aneura pinguis* is found around the globe, from the tropics to the arctic. However, there are at least seven very distinct molecular lineages within this single species in the UK, and dozens more lineages around the world. Information about distribution, ecology and rarity is absent and without names there is currently no way to monitor their conservation. So, while Porley's book has claimed its well-earned spot on my shelf, I expect it to serve very much as a springboard for conservation of bryophytes in the UK rather than an endpoint.

Laura Forrest