

# Vagrant epiphytic mosses in England and Wales

**Sam Bosanquet**

examines some of the reasons why certain epiphytic species are spreading into England and Wales and becoming established. In addition, he lists a number of potential 'spreaders' that we should all keep our eyes open for

To the non-bryologist, bryophytes seem remarkably static compared with birds, butterflies or moths. Bryologists know that distributions of species change, and that losses of species to habitat destruction or pollution are countered by increasing taxa and spreaders (e.g. Jones, 1991), although it is often possible to revisit a historic locality for a moss or liverwort and find it in just the same place where our forefathers noted it decades before. Acidophiles were increasing when E.W. Jones looked at Oxfordshire's changing flora, but changing pollution and climate have led to a subsequent shift from acid substrates to more base-rich, but also often very nutrient-rich, conditions (Bates & Preston, 2011).

Changing conditions are exploited particularly rapidly by epiphytes, which have evolved effective dispersal mechanisms to cope with sudden host death and to allow colonization of bark with suitable pH and nutrient status, which may not be present nearby. It seems highly likely that epiphytes have been appearing as casual, non-persistent colonies for many years, and that some regionally extinct species or current conservation priorities may be no more than occasional colonists. Some bryophytes are already being found in significant quantity outside the range in which they occurred in the early 20th century, for example the liverworts *Cololejeunea minutissima* and *Colura calyptrifolia*, and the moss *Ulota phyllantha* (Bates & Preston, 2011). They are effectively internal spreaders, expanding from ecologically suitable ground within the British Isles. This article covers species that appear to be arriving in England and Wales from outside these two countries, and summarizes records of vagrant epiphytic mosses as well as discussing their likely origins.

Spores arriving from outside England and Wales may establish relatively persistent colonies,

as with *Orthotrichum obtusifolium* on a street tree in Cardiganshire or in a Cambridgeshire orchard, or may form single tufts that do not spread, as is the case for *Antitrichia curtispindula* at Bristol Zoo or in another Cambridgeshire orchard, or Britain's only known *Orthotrichum acuminatum*. The exact distinction between a casual colony and a persistent one – and potentially between a species deserving conservation efforts and one that is less deserving – is arbitrary, but the 10 year cut-off proposed for persisting introductions (Blockeel, 2010) could perhaps be used.

An illustration of the extent to which epiphytes have spread during the last few years in England and Wales is given by the BBS epiphyte survey in the mid-1990s (Bates *et al.*, 1997). No rare epiphytes were recorded during the survey, despite competent bryologists recording epiphytes in 107 tetrads between Devon/Glamorgan and Norfolk/Suffolk. The counties making up this transect of Britain have produced records of at least six vagrants from continental Europe since 2000, as have Derbyshire, Yorkshire and Co. Durham to the north, all found during general recording rather than a targeted survey. At the same time, *Orthotrichum lyellii*, *O. pulchellum*, *O. stramineum* and *O. striatum* have become frequent in south Wales in contrast to their near, or complete, absence during the survey. It certainly appears as though conditions in Britain in the 1990s were not suitable for spreading epiphytes, other than acidophilous species. Past pollution may have left a 'clean slate' for colonization, which has been coupled with planting of new amenity trees with base-rich bark in nutrient-rich suburban habitats to provide excellent conditions for new colonists. (Re)-colonization has been shown to be relatively haphazard in both bryophytes and lichens, with some supposedly very sensitive taxa appearing in areas that were formerly highly polluted (e.g. Richardson, 1992). It has also been



△ The author searching for epiphytes. Ian Atherton

suggested that acidified bark can take a long time to lose its acidity, so recently planted trees often provide the best conditions for epiphytes such as *Orthotrichum* species.

The British are somewhat behind the game when it comes to locating vagrant epiphytes compared with the Dutch, although our more north-western location goes some way to explaining the relative paucity of British records of southern species. The BLWG *Verspreidingsatlas Mossen* online ([www.verspreidingsatlas.nl](http://www.verspreidingsatlas.nl)) is an extremely useful internet resource, presenting maps, photographs and text (in Dutch) that help to put British records into context. Almost all of the epiphytic vagrants to England and Wales have been noted as spreading into The Netherlands since the 1990s, and there are several additional *Orthotrichum* species that we might expect to appear in Britain in the near future (van der

Pluijm, 2004). Some Dutch bryologists have been focussing on epiphyte recording for the last 20 years. It is quite clear from recent British records that vagrant *Orthotrichum* species turn up in areas where active recorders are concentrating on seeking epiphytes, rather than areas closest to Mediterranean Europe – it is hard to explain otherwise why Bedfordshire, Cambridgeshire, Derbyshire, Co. Durham, Norfolk and Suffolk should be the prime epiphyte counties, rather than Kent, Sussex, Hampshire and Dorset. It appears that the same may have been true in the past, with most historic records of *O. consimile*, *O. pumilum* and *O. obtusifolium* coming from areas worked by bryologists such as H.H. Knight, H.N. Dixon and W. Mitten.

Two saxicolous species of *Grimmia* can also be considered as vagrants to Britain. *G. crinita* was recorded from Hatton, Warwickshire (v.-c. 38) in the 1870s and 1880s and from Treviscoe, West Cornwall (v.-c. 1) for a few years from 1999. As discussed by Greven (2011), this species seems to arrive in northern Europe from the Mediterranean, grow for a few years and then die out. A patch of *G. tergestina* was noted on a breeze-block wall on Fetlar, Shetland (v.-c. 112) by SDSB and Dave Genney during the 2008 BBS summer meeting. Records of *G. tergestina* from further south in Britain seem likely to represent the northern edge of an expanding European population, coupled with a relict population in Mull and the adjacent mainland, but the Shetland record is on an artificial substrate so far north of the species' range that establishment on Shetland seems implausible. Fetlar is a well-known site for rare birds and is clearly well situated for attracting vagrants. Other species that may have been spore casuals include the single British record of *Trematodon ambiguus*, as this species is increasing in the Netherlands, with 21 records since 1992 following a single

collection in 1855 ([www.verspreidingsatlas.nl](http://www.verspreidingsatlas.nl)), and the single British record of *Neckera pennata*, whilst the liverwort *Ptilidium pulcherrimum* has long been considered a regular casual in eastern Britain originating from Scandinavia.

There are five keys to finding vagrant epiphytes: (1) familiarity with the common British species; (2) familiarity with non-British species abroad; (3) having a search image in your head; (4) persistence; and (5) a lot of luck. One has to check a great many trees before finding a rarity, but this process can produce useful lists of common and less common species on different host trees and also aids that all important familiarity with the extraordinarily variable *Orthotrichum affine* and the other, slightly more consistent *Orthotrichum* species.

Most epiphytes that arrive for the first time in Britain probably do so as spores or gemmae that have come from far away, although the slow eastward spread of the non-fertile, non-gemmiferous *Microlejeunea ulicina* suggests that some species probably spread as fragments. A few Mediterranean mosses get a helping hand from man – Fred Rumsey (*in litt.*) has seen abundant *Syntrichia pagorum* on an old olive tree in his local garden centre – but it seems unlikely that many, if any, colonies of rare mosses in Britain arise from propagules originating from plants on an imported tree. The sole British record of *Orthotrichum shawii*, from Kilkerran Castle in Ayrshire, might have resulted from importation with the non-native *Fraxinus ornus* on which it grew, although trees are usually imported as seedlings or saplings and importation thus seems rather far-fetched. Chance clearly plays a significant role in epiphyte spread, although it remains unknown whether southern European *Orthotrichum* spores are common in British airspace and only germinate when they find a suitable niche, or whether such spores are themselves rare.



### Species

All information on records comes from the BBS Database housed by the Biological Records Centre and accessed through the NBN Gateway ([www.searchnbn.net](http://www.searchnbn.net)).

▷ *Antitrichia curtispindula* declined dramatically in Britain during the 19th and 20th centuries and its population is now largely restricted to upland areas of western Britain from Devon and Cornwall to Cumbria, with a relatively large proportion of sites in Scotland. Only one colony remains in south Wales, on upland sandstone, and many of the colonies in north Wales are on rock, whilst those in south-west England are mostly on tors. In contrast, it is locally abundant in parts of continental Europe, for example the Pyrenees (R.V. Lansdown, pers. comm.), forming deep cushions on tree branches. It is likely that this was the case in Britain before industrial pollution, although herbarium specimens suggest that much English *Antitrichia* grew on rocks or walls in the 18th and 19th centuries. The only recent records from England away from the far south-west and north-west are from a wood near Holcombe, North Somerset (v.-c. 6) in 1969; Ditchling and Heyshott, West Sussex (v.-c. 13) in 1961 & 1968; *Prunus spinosa* scrub at Dungeness, East Kent (v.-c. 15) from 1968 to 2000 at least; *Malus* in a commercial orchard near Wisbech, Cambridgeshire (v.-c. 29) in 2006; *Pauwlonia* at Bristol Zoo, East Gloucestershire (v.-c. 33) in 2010; a horizontal ash branch in a hedge at Ashorne, Warwickshire (v.-c. 38) in 1969; and an elder by the River Went at Kirk Smeaton, West Yorkshire (v.-c. 63). The Cambridgeshire, Gloucestershire and West Yorkshire patches, at least, are clearly recent colonists, and seem more likely to be spore vagrants from continental Europe than scraps somehow transported from north-western

Britain, where sporophytes are rare, whilst most of the remainder may have been vagrants rather than remnant native populations and only the one at Dungeness remains extant so far as is known. Loose, glossy patches of *Antitrichia* are reasonably distinctive, but could easily be passed over as a scrappy *Brachythecium*, so odd-looking pleurocarpous epiphytes need to be checked.

▷ *Cynodontium* sp. was reported from a pear tree at Walsoken, West Norfolk (v.-c. 28) by Robin Stevenson (Hill, 2006). There are five recent Dutch records of *Cynodontium polycarpon* and one of *C. strumiferum* from trees with acidified bark, but no other members of the genus have been recorded from The Netherlands ([www.verspreidingsatlas.nl](http://www.verspreidingsatlas.nl)).

▷ *Daltonia splachnoides* was recorded new to Wales from a conifer plantation in Carmarthenshire (v.-c. 44), and has not yet been found in England. Traditionally, it has been considered an extremely rare moss of humid areas of western Ireland and western Scotland, but recent records indicate that it is spreading in Irish conifer plantations in a similar way to *Colura calyptrifolia* (Bosanquet *et al.*, 2010). The Welsh colony, comprising a single, fruiting tuft and one or two non-fertile scraps, clearly originated from a spore that travelled eastwards from Ireland.

▷ *Hypnum cupressiforme* var. *hesseleri* was added to the British list when it was collected from an apple tree in the Royal Orchards at Fritcham, West Norfolk (v.-c. 28) and has subsequently been recorded in another orchard in Cambridgeshire (v.-c. 29). This distinctive pleurocarp, with imbricate, nerveless leaves has a range centred on western Germany, eastern France and The Netherlands, and is considered to be a recently evolved taxon.

▷ *Orthotrichum acuminatum* was discovered new to Britain by Tom Blockeel in the Erewash Valley south of Ironville in Derbyshire (v.-c. 57) in December 2004 and persisted there for just 3 years: a relatively rapid death reminiscent of vagrant *Grimmia crinita* (Greven, 2011). This close relative of *O. striatum* was overlooked in the Mediterranean until recently, but is now known to be widespread and reasonably common there. There have been records from 19 sites in The Netherlands in the last 20 years ([www.verspreidingsatlas.nl](http://www.verspreidingsatlas.nl)), suggesting that it is highly likely that further tufts will be found in Britain. As its name suggests, *O. acuminatum* has acuminate leaves, but so too does *O. striatum* and the key character lies in the peristome: *O. acuminatum* has almost no exostome teeth, whereas the exostome teeth of *O. striatum* are long and beautifully curled back from the mouth. British bryologists need to get into the habit of checking the peristome teeth of all *O. 'striatum'* that they find.

▷ *Orthotrichum consimile* first occurred in Britain in the Hurstpierpoint area of West Sussex (v.-c. 13). An extensive revision of specimens of *O. pulchellum* by Ron Porley revealed no more recent occurrences, so Tom Blockeel's discovery of *O. consimile* on elder at Ashover, Derbyshire (v.-c. 57) was the first modern record. The second came from Sledmere Park, South-east Yorkshire (v.-c. 61) in 2008, the third from Crowle Moor, on the Thorne Moors, South-west Yorkshire (v.-c. 63) in 2009,

and the fourth on an ash trunk in woodland at Flat Isley, Buckinghamshire (v.-c. 24) in 2010. This pattern seems to reflect the distribution of bryologists who are keen on *Orthotrichum*, rather than the most likely pattern of arrival from Europe, especially given the lack of Nordic records. Surprisingly, there have only been seven records of this species from The Netherlands ([www.verspreidingsatlas.nl](http://www.verspreidingsatlas.nl)). *O. consimile* has exerted capsules and flexuose leaves when dry, like *O. pulchellum*, and differs in having 8 off-white exostome teeth rather than the 16 red exostome teeth of its commoner relative. Perhaps unexpectedly, epiphytic *O. anomalum* is a significant confusion problem, not least because epiphytic plants of this saxicolous species are often atypically small.

▷ *Orthotrichum obtusifolium* was widespread but uncommon in the English Midlands until the early 20th century, with records from 20

▽ *Orthotrichum consimile*. Michael Lüth



hectads, but then disappeared, and was only known from Scotland at the time of the *Atlas* apart from a single record of a casual tuft on elder in West Norfolk (v.-c. 28) in 1989. Recent records have been: on willow in carr, Gunpowder Park, Waltham Abbey, South Essex (v.-c. 18) in 2006; in Warboys Wood, Huntingdonshire (v.-c. 31) in 2011; on apple in an orchard at Elm, Cambridgeshire (v.-c. 29) in 2007; on ash by the Severn, north of Gloucester, West Gloucestershire (v.-c. 34) in 2011; and on a street tree maple in Aberystwyth, Cardiganshire (v.-c. 46) in 2008. This species is remarkably common as an epiphyte on street trees in parts of north-eastern France (SDSB, pers. obs.), and [www.verspreidingsatlas.nl](http://www.verspreidingsatlas.nl) shows 94 records from The Netherlands, mostly from the south. The concentration of historic records in the English Midlands is peculiar, and may reflect the activities of a small number of bryologists, for example J.E. Bagnall (8 sites), H.N. Dixon (8 sites) and H.H. Knight (4 sites), who knew

▽ *Orthotrichum obtusifolium*. Andy Amphlett



how to find what were very scattered, if well established, colonies of *O. obtusifolium*. Ash was the most popular host tree (*Atlas*), and SO<sub>2</sub> pollution probably rendered England unsuitable for *O. obtusifolium* by the 1900s. British plants of *O. obtusifolium* are often extremely small, and might be confused with a *Zygodon* when dry, but the acute leaf apex of all *Zygodon* except for *Z. conoideus* var. *lingulatus* provides a quick distinction.

▷ *Orthotrichum pallens* is rather an anonymous species and is easy to overlook, so the paucity of British records may in part reflect confusion over its identification. It has a short, hairless, pale calyptra with an orange tip and perhaps most closely resembles a small *O. stramineum*, although it would be simple to dismiss a tuft as an odd form of *O. affine* or *O. tenellum*. All five historic English records come from the north of the country, and there are recent records from Addingham, Wharfedale, Mid-west Yorkshire (v.-c. 62) in 2005, and from Weardale, Co. Durham (v.-c. 66) from 1999 onwards, and *O. pallens* is clearly well established in Weardale (Hodgetts, 2003). It is hard to tell whether some other historic records were of casual plants derived from Scandinavian spores. The only southern British records were made by Chris Tipper on willow at Cassiobury Park, Watford, Hertfordshire (v.-c. 20) in 2007, and by Sam Bosanquet on field maple in a hedge near Dingestow, Monmouthshire (v.-c. 35) in 2011, both of which are likely to have been vagrants.

▷ *Orthotrichum pumilum* is the most diminutive British *Orthotrichum*, and looks much more squat than *O. tenellum*, with short, hairless calyptrae that only partly cover the capsules, rather than the long, slightly hairy calyptrae of

*O. tenellum*. Three historic records from England – from West Suffolk (v.-c. 26), East Norfolk (v.-c. 27), Northamptonshire (v.-c. 32) and North-east Yorkshire (v.-c. 62) – have the feel of casual colonies rather than lost natives. There have been two recent southern British records, on an ash trunk at Kensall Quarry, Hertfordshire (v.-c. 20 in 2010, on an ash trunk at Abergavenny in Monmouthshire (v.-c. 35) in 2011, and one from northern England on ash by the River Wear near Low Harperley, Co. Durham (v.-c. 66) in 2000. Many authors split *O. pumilum* into two European species: the slightly taller, more northern/montane *O. pumilum* s.s. and the extremely squat, lowland Mediterranean *O. schimperi*. Dixon (1924) reports the historic British records as *O. schimperi*, and both of the recent southern records are of that taxon. The five east Scottish and Co. Durham records are more likely to be *O. pumilum* s.s. given its range in Scandinavia, but more work is needed on this species pair in Britain.

▽ *Orthotrichum pumilum*. Graham Motley



▷ *Orthotrichum rupestre* is widespread on rocks in north-western Britain, especially eastern Scotland, but it not particularly common, and also grows on Sarsen Stones at a few sites in southern England. It is a frequent epiphyte in much of Europe, and was found on apple at The Royal Orchards, Flitcham, West Norfolk (v.-c. 28) in 2005. There is also a record from Spurn, South-east Yorkshire (v.-c. 62), a prime site for vagrant birds, in 1968, and an extraordinary one from a churchyard wall top in Paddington Green, Middlesex (v.-c. 21) in 2004. All three of these colonies seem likely to have originated from the continent, rather than from British colonies, although it is impossible to be sure. This species has a very hairy calyptra and its eight exostome teeth are upright when dry.

▷ *Orthotrichum shawii* has only been recorded from one British site, Kilkerran Castle in Ayrshire (v.-c. 75) in 1860. This colony may have been the result of a vagrant spore, but as it was recorded on the non-native *Fraxinus ornus* it could conceivably have been an importation. There seems

a reasonable chance that *O. shawii* could reappear in Britain, perhaps in upland areas of England because of its predominantly upland distribution in southern Europe. There are recent records from two sites in The Netherlands. It looks rather like *O. striatum*, with a more or less smooth capsule and recurved exostome teeth, but its endostome is rudi-



mentary. R.V. Lansdown (pers. comm.) has twice found *O. striatum* with a damaged/rudimentary endostome in Gloucestershire: the specimens' 30 µm wide spores confirmed the identification.

▷ *Orthotrichum speciosum* appears to have retreated from England to Scotland since the 20th century, as befits a species that is commoner than *O. affine* in all but the southern parts of Scandinavia and is also frequent in the mountains of Europe. It is quite possible that the four historic English records – from Hurstpierpoint and Henfield, West Sussex (v.-c. 13), Tilgate Forest, East Sussex (v.-c. 14) and Stockton Forest, North-east Yorkshire (v.-c. 62) – were of casual colonies, and they have been followed by a 1999 record from *Salix alba* near Wolsingham, Co. Durham (v.-c. 66) and three 20th century records, from willow at Wigginton, near Tring, Hertfordshire (v.-c. 20) in 2008, ash at Balsham Wood, Cambridgeshire (v.-c. 29) in 2008 and apple in an orchard at Wisbech, Cambridgeshire (v.-c. 29) in 2009. *O. affine* can be a more of a confusion problem than the Floras suggest, as some populations have relatively exerted capsules and hairy calyptrae, for example at sites in Gloucestershire (R.V. Lansdown, pers. comm.) and West Sussex (SDSB, pers. obs.). True *O. speciosum* is quite striking, and the ill-defined capsule striae provide a useful identification feature in addition to the exerted capsule and acuminate leaves.

▷ *Pterigynandrum filiforme* has occurred recently as a vagrant to Wordwell, West Suffolk (v.-c. 25) and an orchard at Elm, Cambridgeshire (v.-c. 29), and was also reported south-east of its upland British range at Ashford, Derbyshire (v.-c. 57) in 1840 and on a tree in a hedge near Sennybridge, Breconshire (v.-c. 42) in 1907, although the Derbyshire specimen is in the private Chatsworth House herbarium and may



△ Map showing known records of vagrant *Orthotrichum* species in England and Wales. ●, post-2000 record of at least one 'vagrant' *Orthotrichum* or *Ulotia coarctata*; +, pre-2000 records of these species.

not have been checked critically (T. Blockeel, pers. comm.). There have been 24 recent records from The Netherlands (www.verspreidingsatlas.nl), probably deriving from gemmae transported from upland area of Europe. This species resembles a diminutive *Pterogonium gracile* and has down-curved branches.

▷ *Ulotia calvescens* has a similar range to *Daltonia splachmoides* and, like that species, appears from recent records to be spreading eastwards in Ireland. It is now frequent on willows in conifer plantations in Co. Tipperary (v.-c. H7 & H10) (SDSB, pers. obs.) as well as further south-west. There are two historic records from north Wales, but the only recent record was of a single tuft on a willow in southern Pembrokeshire (v.-c. 45), which was clearly a spore vagrant from the west. It is highly likely that two West Cornish (v.-c. 1) records on willow, the only ones for *U. calvescens* from England, also derive from spores of Irish origin.

▷ *Ulotia coarctata* is relatively easy to spot, because of its unique club-shaped capsule with a small mouth; it also has straighter leaves than dry than the common *U. bruchii* and *U. crispata*.

Its conspicuousness may explain why this species has been found relatively regularly in southern England, despite being uncommon and mostly montane in Europe. Records are: Combe St Nicholas, South Somerset (v.-c. 5) before 1926; Winters Down, South Hampshire (v.-c. 11) in 1958; a willow in North Hampshire (v.-c. 12) in 2008; Danny, West Sussex (v.-c. 13) in the 19th century; willow at Slindon, West Sussex (v.-c. 13) in 2000 and still present in 2011; willow at Brandy Hole Copse, West Sussex (v.-c. 13) in 2011; willow at Ham Street, East Kent (v.-c. 15) in 2004; Glover's Wood, Surrey (v.-c. 17) in 2006; Pitstone Common, Buckinghamshire (v.-c. 24) in 2010; a chestnut at Aylmerton, East Norfolk (v.-c. 27) in 1907; and a poplar at Nineveh, Worcestershire (v.-c. 37) in 1992. Recent records of this species are much more concentrated in south-east England than those of most vagrant *Orthotrichum*.

Potential additions to the British list

Predicting additions to the British list is a game that many birders play, and the same can be done for bryophytes. *Birding World* often features identification articles on gulls or warblers that have yet to be recorded in Britain, and within a few months a first for Britain is found, in part because people have been armed with a search image. Alan Crundwell's list of 10 liverworts and 17 mosses present in Europe but not Britain (Crundwell, 1992) does not include any northward-spreading species or epiphytes, probably because he was writing at the end of a long period of epiphyte decline, and is made up of various subtle, mostly northern species that could have been overlooked in Britain. Only *Nardia insecta* and *Cinclidotus riparius* have been confirmed in the subsequent 19 years, whilst *Dicranella howei* is probably present (Smith, 2004; Bosanquet, 2010) but remains unconfirmed.

There have been numerous additions (Lawley, 2010), many of them just as subtle as those on Crundwell's list. *Orthotrichum acuminatum* is the only southern spreader recorded new to Britain in this time, but *O. consimile*, *Grimmia tergestina* and *Sematophyllum substrumulosum* have all arrived in England following previous records of outlying northern populations, in West Sussex (v.-c. 13), Argyll/Mull (v.-c. 98/103) and West Sussex (v.-c. 13) respectively. At least 10 other epiphytes might appear in Britain judging by their European distribution or recent arrival in Belgium or the Netherlands. Having a search image for these species will give British bryologists a better chance of detecting any that arrive. Data on records from The Netherlands come from www.verspreidingsatlas.nl.

▷ *Orthotrichum alpestre* has been found at a single Dutch site on a sycamore bole in young, planted woodland at sea level. It is frequent on rocks in the Scandinavian mountains, as well as further south in Europe, and also occurs occa-



△ *Orthotrichum alpestre*. Michael Lüth



sionally as an epiphyte. Its calyptra has a dark tip and abundant, thick, strongly papillose hairs.

▷ *Orthotrichum casasianum* is a bit of a long shot, recorded only from riparian woodland in northern Spain (Blockeel, 2006), but could conceivably appear in south-western Britain. It resembles *O. pallens*, with a hairless calyptra, but typically has a hooded leaf tip and a seta that is the same brown colour as the ripe capsule, whereas the seta of *O. pallens* is contrastingly light brown.

▷ *Orthotrichum hispanicum* has been recorded once from The Netherlands, and is otherwise known from the Mediterranean between Spain and Turkey, with an outlying colony in Kashmir. Its conspicuous, emergent, wide-mouthed, yellow capsules should draw attention.

▷ *Orthotrichum ibericum* has been collected once in Belgium but is otherwise restricted to the Iberian Peninsula (Blockeel, 2006) and Cyprus. It has an even more rudimentary peristome than *O. acuminatum*, with both the endostome and exostome short or absent. The upper sixth of the capsule is sulcate, but the remainder is smooth. Along with *O. acuminatum* and *O. shawii*, this species highlights the need to routinely check the peristome of any *O. striatum* seen in Britain, although the long seta and very exerted capsule of *O. ibericum* make it look more like *O. speciosum*.

▷ *Orthotrichum macrocephalum* resembles *O. sprucei* because of its rounded leaf tips, but has smaller cells and is not associated with rivers. It has not yet been recorded north of the Mediterranean.

▷ *Orthotrichum patens* has been claimed before in Britain (Smith, 1978), but all specimens



△ From top to bottom: *Orthotrichum hispanicum*, *O. ibericum* and *O. macrocephalum*. Ricardo Gariletti (*O. hispanicum*) & Michael Lüth

△ *Orthotrichum patens*. Michael Lüth

checked have proved to be *O. affine*. It is increasing in The Netherlands (van der Pluijm, 2004), with 37 records since 1990, and is widespread in Europe and common in parts of Germany (e.g. Nebel & Philippi, 2001). This species shares the dark calyptra tip and hairy vaginula of *O. stramineum* with the slightly hairy calyptra and loosely tufted appearance of *O. affine*, so plants that appear somewhat intermediate between these two common species should be checked carefully, with a focus on the width of the bands of thick-walled cells on the capsule.

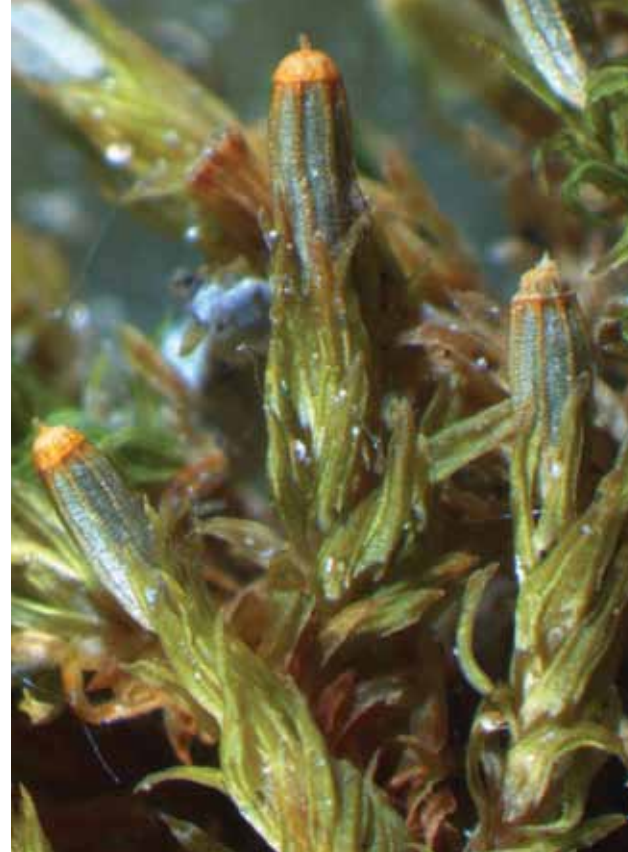
▷ *Orthotrichum philibertii* looks similar to *O. pumilum*, with a short, more or less non-plicate calyptra, but has papillose calyptra hairs and parallel-sided leaves that taper suddenly at the tip. There are a few records from base-rich bark in south-western Norway but none from The Netherlands.

▷ *Orthotrichum rogeri* is almost endemic to Europe, with outlying populations in north-east Turkey, is on the Red List of many European countries and is included on Annex 2 of the Habitats and Species Directive. However, it seems to be rather like *Hamatocaulis vernicosus* (Bosanquet *et al.*, 2006), with several countries claiming to be the centre of its distribution. It is similar in appearance to *O. tenellum*, with a relatively long, slightly dark-tipped calyptra,



△ *Orthotrichum rogeri* (top) and *O. philibertii* (bottom). Michael Lüth





△ *Orthotrichum scanicum*. Michael Lüth (left), Ricardo Gariletti (right)

but differs in having straight endostome teeth (incurved in *O. tenellum*) and male branches with conspicuously broader leaves than female branches. It has been seen recently at 17 sites in the Netherlands, where it is particularly frequent on *Salix alba* in young woodland, and also grows on base-rich bark in south-western Norway.

▷ *Orthotrichum scanicum* is spreading in the southern half of the Netherlands (van der Pluijm, 2004) and has been recorded at 26 sites since the first record in 1987. It has slightly flexuose leaves, a moderately exerted capsule with pale exostome teeth, 16 endostome teeth, and a very pale, almost white calyptra with a pale yellowish tip. The capsule lid is taller and more domed than that of related species and does not have a contrasting reddish margin, unlike *O. pulchellum* and *O. tenellum*. Checking that the peristome teeth of apparent *O. pulchellum* are red is essential to avoid overlooking both this species and *O. consimile*. Most leaves have a few teeth at the apex.

*Table 1* overleaf summarizes the main identification features of all the *Orthotrichum* species listed above.

▷ *Zygodon dentatus* is an Alpine epiphyte that was recorded once in 1895 in southern Norway but has been found five times in The Netherlands since 2001. Its leaves have conspicuous teeth near the apex and are somewhat crisped when dry, making loose patches of this plant resemble a *Uloa*. British bryologists regularly check the gemmae of *Zygodon* species, but need to examine specimens' leaf tips as well.

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**Note added in proof**

This article was written before the record of *O. scanicum* from Derbyshire was published. It backs up many of the feelings expressed in the article. See *Field Notes* on p. 26.



△ *Zygodon dentatus*. Michael Lüth

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Table 1. Summary of main identification features of *Orthotrichum* species

Species	Epi./ sax.*	GB freq.†	Seta‡	Dry capsule	Peristome		Calyptra	
					Exostome	Endostome	Hairs	
<i>acuminatum</i>	E	R	Short	Almost smooth	Absent	8 incurved	Abdt/sparse	
<i>affine</i>	E/S	A	Short	Strongly furrowed	8 brown reflexed	8 incurved	Sparse	
<i>alpestre</i>	S/E		Mid	Strongly furrowed	8 brown reflexed	8/16 incurved	Abdt papillose	
<i>anomalum</i>	S(E)	A	Long	Strongly furrowed	16 orange erect	None	Sparse/Abdt	
<i>casasianum</i>	E		Mid	Strongly furrowed	8 brown reflexed	16 incurved	Absent	
<i>consimile</i>	E	R	Long	Strongly furrowed	8 whitish reflexed	8 incurved	Absent	
<i>cupulatum</i>	S	F	Short	Strongly furrowed	16 pale erect	None	Sparse/Abdt	
<i>diaphanum</i>	S/E	A	Short	Smooth or wrinkled	16 pale reflexed	16 incurved	Sparse/None	
<i>gymnostomum</i>	E	R	Short	Almost smooth	Absent	Absent	None/Sparse	
<i>hispanicum</i>	E		Mid	Yellow, furrowed upper half	8/16 pale reflexed	16 incurved	None/Sparse	
<i>ibericum</i>	E		Long	Furrowed upper sixth	Absent	Absent	Abundant	
<i>lyellii</i>	E(S)	F	Mid	Furrowed	16 pale recurved	16 incurved	Abundant	
<i>macrocephalum</i>	E		Short	Strongly furrowed	8 orange reflexed	8 incurved	None	
<i>obtusifolium</i>	E	O	Short	Strongly furrowed	8 red reflexed	8 incurved	None/Sparse	
<i>pallens</i>	E	R	Mid	Strongly furrowed	8 pale reflexed	16 incurved	None	
<i>patens</i>	E		Mid	Narrow ribs upper half	8 pale reflexed	8 incurved	Sparse papillose	
<i>philibertii</i>	E		Mid	Strongly furrowed	8 yellow reflexed	8 incurved	Sparse papillose	
<i>pulchellum</i>	E(S)	F	Long	Strongly furrowed	16 red reflexed	16 incurved	None	
<i>pumilum</i>	E	R	Mid	Strongly furrowed	8 orange reflexed	8 incurved	None	
<i>rivulare</i>	E/S	F	Short	Strongly furrowed	8 brown reflexed	16 incurved	None	
<i>rogeri</i>	E		Mid	Strongly furrowed	8 brown reflexed	8/16 straight	None	
<i>rupestre</i>	S/E	O	Short	Weakly furrowed	8 pale erect	0/8 incurved	Abdt papillose	
<i>scanicum</i>	E		Short	Narrow ribs upper half	16 pale reflexed	16 incurved	Sparse/None	
<i>shawii</i>	E	R	Short	Almost smooth	16 pale recurved	Absent	Abdt/Sparse	
<i>speciosum</i>	E	O	Long	Furrowed upper half	8 brown recurved	8 incurved	Abundant	
<i>sprucei</i>	E	O	Mid	Strongly furrowed	8 pale reflexed	8 incurved	None	
<i>stramineum</i>	E	F	Mid	Strongly furrowed	8 orange reflexed	8 incurved	Sparse/None	
<i>striatum</i>	E	F	Short	Smooth	16 pale recurved	16 straight	Abundant	
<i>tenellum</i>	E(S)	F	Mid	Strongly furrowed	8 brown reflexed	8 incurved	Sparse	

\*E, Epiphytic; S, saxicolous.

†A, Abundant; F, frequent; o, occasional; r, rare.

‡Short, immersed-emergent; Mid, emergent; Long, exserted.

§Exposed, phaneropore; ± exposed, cryptopore with short surrounding cells; ± hidden, cryptopore with medium-long surrounding cells; V hidden, cryptopore with surrounding cells meeting.

Vaginula length	Leaf					Species
	Tip	Stomata§	Hairs	Margins	Apex	
Mid	Brown	Exposed	No	Recurved	Acuminate	<i>acuminatum</i>
Mid	Brown	Exposed	No	Recurved	Acute	<i>affine</i>
Short	Purple	± hidden	Yes	Recurved	Acuminate	<i>alpestre</i>
Short	Brown	V hidden	No	Recurved	Acute	<i>anomalum</i>
Long	Brown	± hidden	No	Recurved	Obtuse, hooded	<i>casasianum</i>
Long	Brown	V hidden	No	Recurved	Acute	<i>consimile</i>
Short	Brown	± hidden	Yes	Recurved	Obtuse/Acute	<i>cupulatum</i>
Mid	Brown	± hidden	No	Recurved	Hyaline	<i>diaphanum</i>
Mid	Orange	Exposed	No	Incurved	Obtuse	<i>gymnostomum</i>
Mid	Brown	± hidden	No	Recurved	Acute	<i>hispanicum</i>
Long	Brown	Exposed	No	Recurved	Acuminate	<i>ibericum</i>
Mid	Brown	Exposed	No	Plane	Acuminate	<i>lyellii</i>
Short	Brown	V hidden	No	Recurved	Rounded	<i>macrocephalum</i>
Mid	Brown	Exposed	No	Plane	Obtuse	<i>obtusifolium</i>
Short	Orange	± exposed	No	Recurved	Obtuse apiculate	<i>pallens</i>
Mid	Brown	V hidden	Yes	Recurved	Acuminate	<i>patens</i>
Short	Brown	± hidden	No	Recurved	Obtuse	<i>philibertii</i>
Short	Brown	V hidden	No	Recurved	Acuminate	<i>pulchellum</i>
Short	Orange	± hidden	No	Recurved	Obtuse apiculate	<i>pumilum</i>
Mid	Green	V hidden	No	Recurved	Toothed	<i>rivulare</i>
Short	Brown	± hidden	No	Recurved	Obtuse/Acute	<i>rogeri</i>
Mid	Brown	Exposed	No	Recurved	Acute	<i>rupestre</i>
Mid	Yellow	V hidden	No	Recurved	Obtuse, toothed	<i>scanicum</i>
Mid	Brown	Exposed	No	Recurved	Acuminate	<i>shawii</i>
Mid	Brown	Exposed	No	Recurved	Acuminate	<i>speciosum</i>
Mid	Orange	V hidden	No	Recurved	Rounded	<i>sprucei</i>
Mid	Purple	V hidden	Yes	Recurved	Acuminate	<i>stramineum</i>
Mid	Brown	Exposed	No	Recurved	Acuminate	<i>striatum</i>
Long	Brown	V hidden	No	Recurved	Obtuse	<i>tenellum</i>