

Orthotrichum pumilum and *O. schimperi* in Britain

Tom Blockeel disentangles the records of two rare British epiphytes

O*ρθotrichum pumilum* Sw. ex anon. has always been a rare moss in Britain since it was first reported by Richard Spruce near York in 1843 (Spruce, 1845). It belongs to a difficult complex of species in *Orthotrichum* that includes *O. pallens* Bruch ex Brid., *O. schimperi* Hammar and *O. philibertii* Venturi. The latter is not yet known in Britain but might occur here. These species share the following morphological characters:

1. plants small or very small; leaf margins recurved almost to the apex
2. seta short or very short; capsules immersed or emergent
3. calyptra lacking hairs (except *O. philibertii*)
4. stomata mostly positioned at or above the middle of the urn, immersed (cryptopore), but often only partly covered by the surrounding exothecial cells
5. outer peristome recurved when dry, often coloured orange; inner peristome with 8 or 16 segments.

British Floras have invariably treated *Orthotrichum pumilum* and *O. schimperi* as a single species. Dixon (1924) used the name *O.*

schimperi, but he was dismissive of the idea that *O. pumilum* could be maintained as a separate species. The name *O. schimperi* was retained by Smith (1978) in the first edition of his *Moss Flora*, but in his second edition he reverted to the name *O. pumilum*, and listed *O. schimperi* as a synonym (Smith, 2004).

Orthotrichum pumilum is the earlier name of the two, and it is the correct name if the two species are treated as synonymous. Although they have been united in some other recent publications, such as the German bryophyte atlas (Meinunger & Schröder, 2007), they are recognised as distinct species by Lara *et al.* (2009) in their key to European species, and by Lara & Garilleti (2014) in the Iberian Bryophyte Flora (*Flora Briofítica Ibérica*). It is now increasingly accepted that the two species are distinct, even though there is some overlap in the morphological characters. In the Mediterranean region, where *O. schimperi* is a rather common species, it is fairly stable in its morphology. There has been a slow increase in the number of British records of *O. pumilum* s.l. in recent years, and it has become clear that both of the segregates are



◁Fig. 1. Leaf of *Orthotrichum pallens* (Derbyshire, Blockeel 43/303).

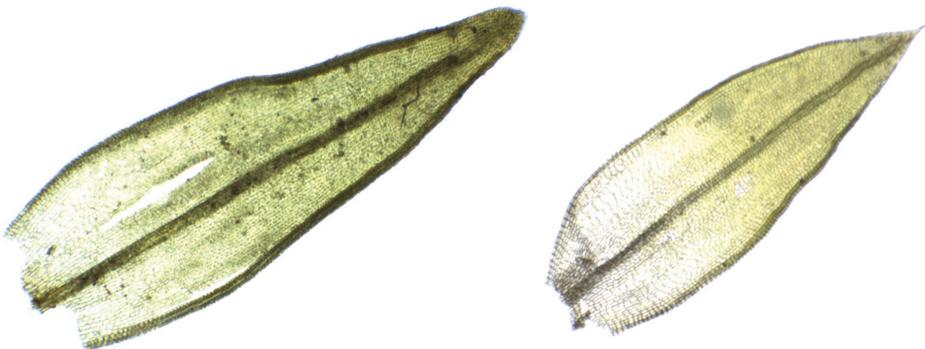
present here. However, there are no confirmed records for Ireland.

Detailed descriptions and figures of the European species of the group can be found in the Iberian Bryophyte Flora (Lara & Garilleti, 2014). *O. pallens* and *O. pumilum* are both widely distributed in the Holarctic region, whereas *O. schimperi* is almost confined to Europe and the wider Mediterranean region, with isolated occurrences in California and central Asia (Lara & Garilleti, 2014). *O. schimperi* is particularly common in the Mediterranean region and is absent from much of northern and eastern Europe, not reaching Russia. *O. pumilum* occurs more widely in Europe, reaching central Scandinavia, middle European Russia and the southern Urals, but is rare in the oceanic west.

Orthotrichum pallens

Identification of the species within the *O. pallens/pumilum* group can be difficult. Typical leaves of *O. pallens* have a distinctive shape,

▽Fig. 2. Leaves of *Orthotrichum schimperi* (Hertfordshire, Tipper, 2010; Spain, Blockeel 45/343).

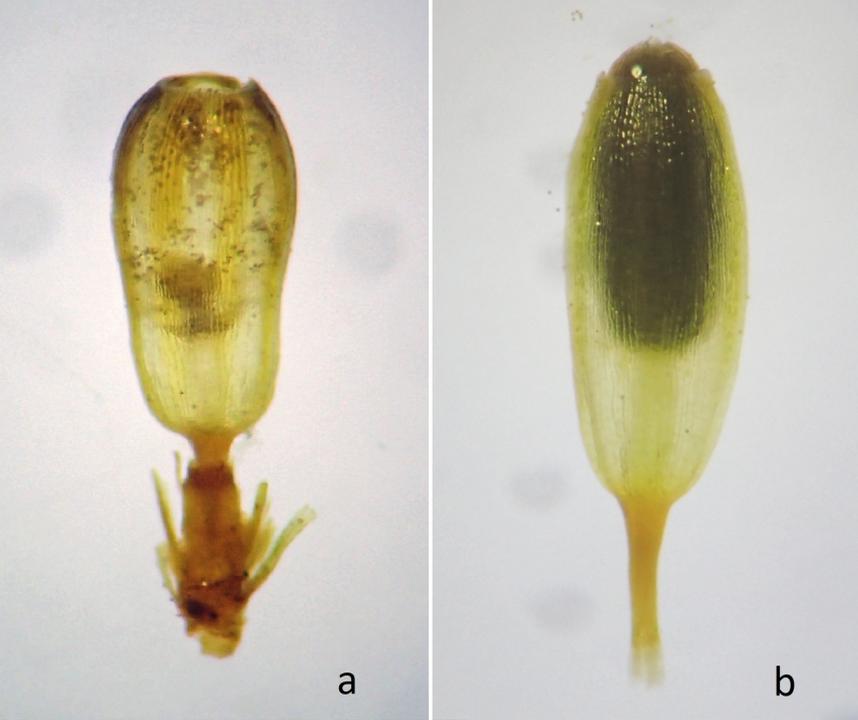


being contracted at the middle from an ovate base to a rather long and somewhat lingulate upper part (Fig. 1). The widest part of the leaf is below the middle, and the apex is broadly acute or obtuse. The capsules are emergent, and ellipsoid or cylindrical at maturity. The stomata of the capsules are almost exposed, covered only at the edges by the exothecial cells, and there are usually 16 inner peristome segments, although the intermediate segments are often reduced and sometimes absent.

Orthotrichum pumilum and *O. schimperi*

The leaves of *O. pumilum* and *O. schimperi* are ovate-lanceolate in shape without an obvious contraction at mid-leaf (Fig. 2). In *O. schimperi* they are often broadly acute or obtuse at the apex, whereas in *O. pumilum* the apices are typically acute. Often a minute hyaline apiculus is present at the leaf apex, and this is particularly characteristic of *O. schimperi*. The stomata of the capsules of both species are variably covered by the exothecial cells, often less than half covered, but completely so in some specimens. There are usually 8 inner peristome segments, but occasionally intermediate segments can be found in *O. pumilum*.

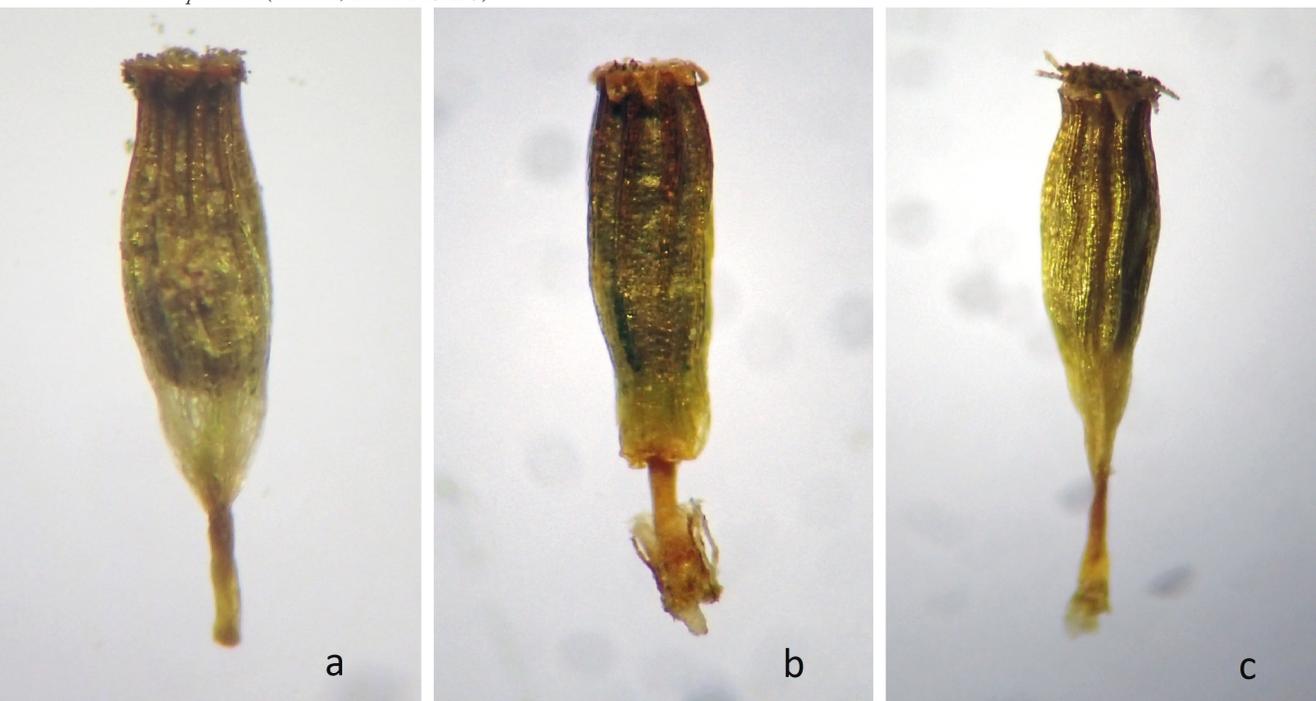
The most important difference between *O. pumilum* and *O. schimperi* is in the shape of the



△Fig. 3. Capsules in moist condition; (a) moist empty capsule of *Orthotrichum schimperi* (Hertfordshire, Tipper, 2010), (b) moist, recently dehiscent capsule of *O. pumilum* (Teesdale, Blockeel 45/295). The urn of capsule (a) is 1.3 mm long, and of capsule (b) 1.6 mm.

capsule. However, it is important to be aware that the shape changes during the various stages of development. At maturity (when the lid

▽Fig. 4. Recently dehiscent capsules in dry condition; (a) *Orthotrichum schimperi* (Spain, Blockeel 45/343), (b) *O. schimperi* (Abergavenny, Bosanquet, 2011), (c) *O. pumilum* (Teesdale, Blockeel 45/295).



separates) the capsules of *O. schimperi* are narrowly ovoid, wide at the middle and somewhat contracted below the mouth. With age they become urceolate when dry (narrowed between the mouth and the middle to lower part of the urn). The base of the capsule is abruptly contracted to the seta (Fig. 3a), and it appears rounded when moist. The

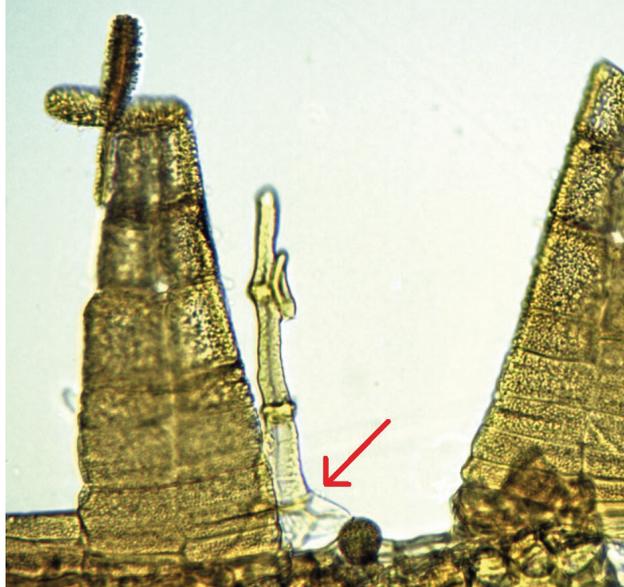
basal part of the capsule has a delicate texture, and when dry the base of mature capsules may become crumpled, and sometimes even sags over the top of the seta (Fig. 4b). The seta is very short.

On average, the capsules of *O. pumilum* have a slightly longer and narrower shape at maturity, and they are tapered at the base to the seta (Fig. 4c). As in *O. schimperi*, the capsules become urceolate with age, and old capsules of the two

species can appear very similar.

There are also differences in the detail of the peristome in the two species. In *O. schimperi* the endostome segments are typically shorter than the outer teeth, and distinctly widened at the base (Fig. 5). Rarely, however, the segments can be almost as long as the outer teeth. The outer teeth are strongly papillose throughout, rarely with a few lines also present towards the apex. In *O. pumilum* the segments are long and narrow, almost as tall as the outer teeth (Fig. 6), and only a little widened at the base. The outer teeth are more finely papillose, and the ornamentation of the apices of the teeth usually includes some lines as well as papillae (Fig. 7).

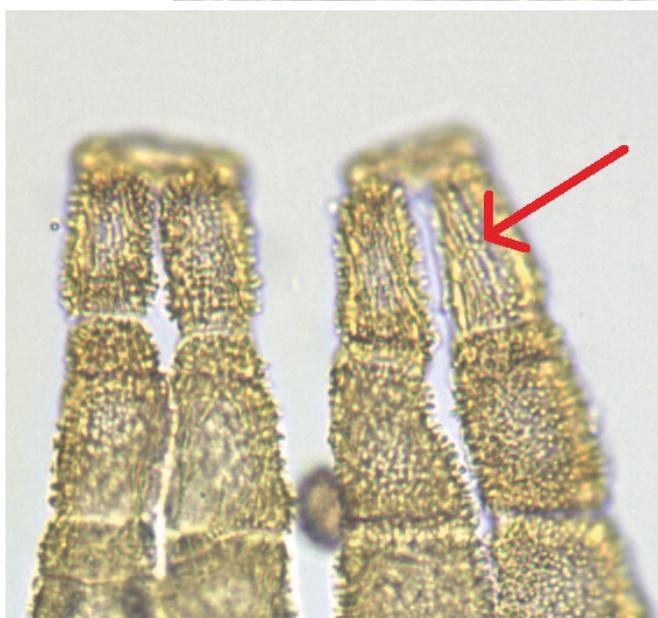
O. schimperi is a very small moss, fertile shoots typically being only 3–5 mm tall. It forms tiny tufts or scattered shoots on bark (Fig. 8), with the capsules immersed in the perichaetial leaves. The leaves are mostly obtuse at the apex with a small apiculus. The ribs of the capsule at and after the fall of the lid are usually more strongly coloured than the rest of the capsule wall, and the outer peristome teeth are orange. *O. pumilum* can appear very similar, but it is often a little larger. The leaves tend to be acute at the apex, with or without an apiculus. The capsules are often emergent, and a little less fattened at the middle than in *O. schimperi*. The colouring of both the capsule ribs and the peristome teeth is often less marked. Forms of *O. pumilum* can approach *O. pallens* on the one hand, and *O. schimperi* on the other, and it represents what is left over when the other two species have been taken out of the mix. There is clearly some morphological intergradation between the species. In spite of these difficulties in identification (especially



△Fig. 5. Peristome of *O. schimperi*, with broad-based endostome segment (arrowed) (Spain, Blockeel 45/343).



▷Fig. 6. Peristome of *Orthotrichum pumilum*, with tall endostome segments (arrowed) (Oxborough, Stevenson 2012).



▷Fig. 7. Outer peristome teeth of *Orthotrichum pumilum*, with some lines visible near the apex (arrowed) (Oxborough, Stevenson 2012).

when capsules are old or in poor condition), most specimens can be assigned to one or other species on the balance of morphological characters.

Orthotrichum philibertii

Although primarily a Mediterranean species, *O. philibertii* occurs in SW Norway, and it might well occur in Britain. Like *O. schimperi*, it is a very small moss and it is similar in size and appearance to that species. It is most easily recognised when the capsules are still maturing, because of the presence of stout, papillose hairs on the calyptra. In addition, the leaves are shortly acuminate rather than apiculate at the apex, and the stomata are more widely distributed over the capsule wall, sometimes extending to the neck (Lara & Garilleti, 2014).

The distribution of *O. pumilum* and *O. schimperi* in Britain

There are very few records of the two species in Britain. I have examined 17 packets from the herbaria at BBSUK, NMW, E and my own herbarium. Two of the specimens are duplicates, so there are 16 separate records. They are divided equally between *O. pumilum* and *O. schimperi*. I have not seen vouchers from East Norfolk (vc 27) and Northants (vc 32), which are listed under *O. pumilum* in the current Census Catalogue (Hill *et al.*, 2008). Many of the herbarium specimens consist of very sparse material, and in some cases only old capsules are present. Prof. Francisco Lara kindly checked several of the British specimens during the BBS *Orthotrichum* Workshop in 2014, as well as the more recent voucher of *O. pumilum* from vc 35.

***Orthotrichum pumilum*. West Suffolk, vc 26:** branch of oak tree, Lakenheath Warren, TL792799, R.J. Fisk, 12 February 2015 (BBSUK C.2016.005.106). **West Norfolk, vc**

28: epiphytic on Conference Pear, 6 m alt., Elm, Oxborough Hall Orchard, TF4790507859, C.R. Stevenson, 8 March 2012 (BBSUK). **Monmouthshire, vc 35:** 2 tufts on *Corylus* in hedge, 25m alt., Langstone Church lane, ST37068908, S.D.S. Bosanquet, 21 January 2017, conf. F. Lara (BBSUK). **Derbyshire, vc 57:** on branch of *Salix* near ground level in moist woodland, Sidings Wood, near Ironville, SK4450, T.L. Blockeel 34/240, 25 March 2005, det. F. Lara (BBSUK). **North-west Yorkshire, vc 65:** on *Salix* in wet woodland, 200 m alt., Foxglove Covert, Catterick Garrison, SE1697, T.L. Blockeel 41/283, 13 May 2012 (BBSUK C.2013.012.241); on sycamore below crag,

▽Fig. 8. *Orthotrichum schimperi* growing on bark in Greece



Holwick Scar, Teesdale, NY902269, M. Wilcox, T.L. Blockeel, *et al.* 45/295, 7 May 2016 (Herb. Blockeel). **Durham, vc 66:** trunk of *Fraxinus excelsior* on edge of riverside wood, 110 m alt., near footbridge over R Wear, Low Harperley, 45/117345, T.S. Wharton & J. Wharton, 13 May 2000 (BBSUK C.2003.006.335), det. F. Lara. **Peeblesshire, vc 78:** on *Acer*, 250 m alt., hillside above Dawyck House, Dawyck Botanic Garden, NT1735, E.M. Kungu, 25 July 2015 (E 00905651).

***Orthotrichum schimperi*. Hertfordshire, vc 20:** rain track on small twin-trunked ash, at edge of plantation, with *O. diaphanum* and *Cryphaea heteromalla*, 200 m alt., Kensworth Quarry, Kensworth, TL030194, C.T.W. Tipper, 13 April 2010 (BBSUK C.2011.018.148). **West Suffolk, vc 26:** on trees by the duck ponds, Palmers Heath, Brandon, TL78 (approx. TL7484), W.H. Burrell, July 1911 (BBSUK C2001.019.19647), det. F. Lara. **Cambridgeshire, vc 29:** on hawthorn in thin strip of woodland alongside railway, 10 m alt., S side of railway, Coldham's Common, Cambridge, TL472585, C.D. Preston, 5 March 2017 (BBSUK C.2018.01.001). **Monmouthshire, vc 35:** on trunk of 25 cm diameter of leaning Ash, 40 m alt., by ford across Afon Gavenny, Castle Meadows, Abergavenny, SO300136, S.D.S. Bosanquet, 24 February 2011 (BBSUK C.2012.014.253). **North-east Yorkshire, vc 62:** on Ash tree, near York, R. Spruce, April 1843 (NMW 22.187d.855), det. F. Lara. The locality is given more precisely in Spruce (1845) as Clifton Ings, near York, which is in hectad SE55. **Angus, vc 90:** bole of elm, grounds of Cortachy Castle, NO3959, Ursula Duncan, March 1966 (E 00905650; BBSUK C2001.019.19649), det. F. Lara. **Kincardineshire, vc 91:** on lower bole of *Juglans* in parkland, 70 m alt., The Burn, Edzell,

NO596716, B.J. Coppins & A.M. Coppins, 15 April 1996 (E 00905648); old trees, Gateside of Strachan, NO6792, W. Smith, May 1914 (E 00905649).

Acknowledgements

My thanks are due to Dr Francisco Lara for checking several of the specimens reported here. I'm also very grateful to the herbaria at the National Museum of Wales, Cardiff, and the Royal Botanic Garden, Edinburgh, for the loan of specimens.

References

- Dixon, H.N. (1924). *The student's handbook of British mosses*, ed. 3. V.V. Sumfield, Eastbourne.
- Hill, M.O., Blackstock, T.H., Long, D.G. & Rothero, G.P. (2008). *A checklist and census catalogue of British and Irish bryophytes: updated 2008*. British Bryological Society, Middlewich.
- Lara, F. & Garilleti, R. (2014). *Orthotrichum* Hedw., in J. Guerra, M.J. Cano & M. Brugués (eds), *Flora Briofítica Ibérica*, vol. V, pp. 50–135. Universidad de Murcia and Sociedad Española de Briología, Murcia.
- Lara, F., Garilleti, R., Medina, R. & Mazimpaka, V. (2009). A new key to the genus *Orthotrichum* Hedw. in Europe and the Mediterranean Region. *Cryptogamie, Bryologie* 30: 129–142.
- Meinunger, L. & Schröder, W. (2007). *Verbreitungsatlas der Moose Deutschlands*. 3 vols. Regensburgische Botanische Gesellschaft von 1790, Regensburg.
- Smith, A.J.E. (1978). *The moss flora of Britain and Ireland*. Cambridge University Press, Cambridge.
- Smith, A.J.E. (2004). *The moss flora of Britain and Ireland*, ed. 2. Cambridge University Press, Cambridge.
- Spruce, R. (1845). On several mosses, new to the British flora. *London Journal of Botany* 4: 169–195.

Tom L. Blockeel

e Tblockeel@aol.com