Weissia squarrosa in Britain: a re-evaluation of its identification and ecology in the light of recent records

S.D.S. Bosanquet[1] & C.D. Preston[2]

[1] *Dingestow Court, Monmouth, Monmouthshire, NP25 4DY*
[2] *CEH Monks Wood, Abbots Ripton, Huntingdon, Cambridgeshire, PE28 2LS*

Background

According to Church *et al.* (1991), *Weissia squarrosa* is one of the most threatened members of its genus, assessed by IUCN criteria as Endangered in Britain. It is also a European endemic and is listed as rare in Europe (ECCB, 1995). However, despite its rarity it was only included on the long list of the UK Biodiversity Action Plan (BAP) and treated in a Species Statement (UK Biodiversity Group, 1999) because it had not been recorded in the UK for more than ten years and so survey was considered to be the only possible action (R.D. Porley, pers. comm.). This contrasts with *W. rostellata*, which is a BAP priority species even though it is merely listed as Near Threatened in Church *et al.* (1991). The map in Hill, Preston & Smith (1992) suggests that *W. squarrosa* has suffered a severe decline, as it shows ten 10-km squares with records from 1950 onwards but 39 with earlier records. The compilers of Church *et al.* (1991) were able to cite recent records (made from 1970 onwards) from only two of the 49 10-km squares from which the species was recorded.

Recent records

Set against this decline, the discovery of a thriving colony of *W. squarrosa* in Monmouthshire (v.-c. 35) in the winter of 2002/03 was very exciting. Initially, the short setae and semi-immersed capsules of the plant suggested that it was *W. rostellata*, but it was subsequently re-identified as *W. squarrosa.* It occupied 1.7 ha of an 8 ha set-aside field just north of Caewern Wood, Dingestow. In the following winter the *Weissia* was still abundant, and so SDSB invited CDP, D.T. Holyoak and J.D. Sleath to see the field. They documented the colony with a series of digital photographs, took soil samples and recorded ten quadrats to describe the vegetation.

A few months later, *W. squarrosa* was found in two fields surveyed for the Survey of the Bryophytes of Arable Land (SBAL) project during the 2004 BBS spring meeting in Worcestershire (v.-c. 37). One of the specimens was initially identified in the field as *W. rostellata*, prompting us to look at other recent specimens of *W. rostellata* from arable fields. Some of these also turned out to be *W. squarrosa*, notably four specimens from three different arable and set-aside fields in Cambridgeshire (v.-c. 29), a vice-county from which *W. squarrosa* had never previously been recorded (Preston & Hill, 2004). As the SBAL project has continued, further records of the species have been made. The net result of this activity is that 15 sites for *W. squarrosa* have now been recorded since 1990, including 11 hitherto unknown colonies of the plant discovered since 2001 (Table 1). These included a second Monmouthshire colony just 1 km west of the first, where *W. squarrosa* grew alone in one field and as scattered patches with

Table 1. Records of *Weissia squarrosa* in the British Isles since 1990.

Vice-county	Grid reference	Locality	Habitat	Soil[1]	Quantity of *W. squarrosa*	Recorder	Date
3	SX924781	Woodhouse Farm	Spring barley stubble managed for cirl buntings	Sandy clay, pH 8.0*	In scattered turfs	R.D. Porley	26 March 2002
16	TQ708346	Combwell Wood	Bank on W side of track leading down to wood	No details	Covering bank for *ca* 50 m	J.G. Duckett	1999
22	SU415659	Elm Farm	Organic oat stubble	Clay, pH 7.2*	Occasional, locally frequent	R.D. Porley	8 February 2005; first seen with immature capsules on 15 November 2004
29	TL354655	Boxworth	Set-aside	Clay, pH 6.3	One large and at least three small clumps	C.D. Preston	9 April 2004; known here since 1991/92 winter
29	TL348662	Between Boxworth and Fen Drayton	Set-aside	Clay	No details	M.O. Hill	June 1991
29	TL325667	Conington	Rape direct-drilled into cereal stubble	Clay	One detached tuft (perhaps dislodged by rape drilling)	M.O. Hill	10 November 2001
32	SP813371	Milton Keynes	Newly planted wood	No details	No details	F. Higgs	5 February 1994
33	SO946023	Casseywell Bottom, Sapperton	At interface of 3-4-year-old set-aside and cultivated area	Clayey loam, pH 7.1	One tuft	S.D.S. Bosanquet & R.V. Lansdown	27 November 2004
33	SP045058	Barnsley Wold, Cirencester	Set-aside in second winter	Clayey hollow (pH 5.7) in more base-rich field (pH 7.5)	Rare	S.D.S. Bosanquet & R.V. Lansdown	27 November 2004
33	SP188358	Aston Magna	Wheat stubble	pH 7.2*	-	R.D. Porley	15 February 2005
35	SO444091	N of Caewern Wood, Dingestow	Set-aside in third winter	Clay, pH 5.8	Frequent in bare areas	S.D.S. Bosanquet	26 January 2003; still present in 2005
35	SO435089	Coed-y-fedw, Dingestow	Fallow margin of barley stubble field; mixed with *W. rostellata*	Clayey loam, pH 6.4*	Occasional	S.D.S. Bosanquet	25 September 2004
37	SO942404	St Catherine's Farm, Eckington	Wheat stubble	Silty clay, pH 6.5*	Rare	R.D. Porley	4 April 2004
37	SO937538	Upton Snodsbury	Grass ley, perhaps 1 year old	Clay, pH 6.9*	Two patches seen	S.D.S. Bosanquet, J.J. Graham & C.D. Preston	5 April 2004
39	SJ835130	Wheaton	Wheat stubble	Loam, pH 6.6*	Rare	M. Lawley	10 November 2004

[1] Asterisked pH measurements refer to the entire field, not specifically to the microhabitat of *W. squarrosa*.

abundant *W. rostellata* in another immediately adjacent, allowing direct comparison between the two species.

It is clear that few active field bryologists know *W. squarrosa*: it has been confused with *W. rostellata* in recent years and there is little published information on its ecology. The aim of this note is to fill this gap. Our observations are based primarily on the Monmouthshire colonies, which SDSB has been able to study in some detail, supplemented by less detailed information about the plant at other sites.

Identification

The growth form of *W. squarrosa* is very distinctive once learnt, but is not illustrated in readily-available Floras. As described in Smith (2004), mature stems of *W. squarrosa* are decumbent and often partly buried in the substrate; they produce plentiful innovations (shoots with well-spaced, rather short leaves) below the perichaetium (Figures 1 and 2). Tufts of *W. squarrosa* are up to 5 cm in diameter and 1.5 cm deep and, in contrast to the familiar *W. controversa*, do not have sporophytes standing proud above the tuft but mixed in amongst it or slightly exserted. Commonly, two or three sporophytes are borne in each perichaetium.

The standard Floras (e.g. Nyholm, 1989; Smith, 1978, 2004) suggest that *W. brachycarpa* is the species that most closely resembles *W. squarrosa*. At the colonies we have seen, confusion with *W. rostellata* (Figure 3) is more likely, as the seta length in *W. squarrosa* is very variable, and its growth form means that capsules are often immersed among leaves, like those of *W. rostellata*, albeit in the case of *W. squarrosa* immersed mostly in the leaves of innovations. In their first autumn, tufts of *W. squarrosa* have usually not had time to produce decumbent stems and may then look more similar to *W. brachycarpa*. However, innovations were already present in all tufts in a Monmouthshire colony by October 2004, after germination following ploughing in early August. Innovations are not known to occur in either *W. brachycarpa* or *W. rostellata*.

Dixon & Jameson (1924), Crundwell & Nyholm (1972) and Nyholm (1989) all give the longer seta of *W. squarrosa* as a character that distinguishes it from *W. rostellata*, although neither these accounts nor those of Smith (1978, 2004) actually give any measurements for its seta length. Touw & Rubers (1989) suggest that there is no overlap in the seta length of the two species, citing measurements of (1.5-)2-3(-4) mm in *W. squarrosa* compared to 0.7-1.5 mm in *W. rostellata*; Smith's key also implies that the seta of *W. squarrosa* always exceeds 1.5 mm. At Dingestow the seta length of *W. squarrosa* varies between 0.6 mm and 2.2 mm, with most about 1.6 mm; this range overlaps completely with the 0.7-1.5 mm seta length usually quoted for *W. rostellata*. However, no patches in the main colony had all their setae shorter than 1.5 mm, whereas a nearby colony of *W. rostellata* had consistently very short setae (0.6-0.9 mm), much shorter than the perichaetial leaves, which were 2.0-2.6 mm long. The Dingestow *W. squarrosa* has perichaetial leaves 1.6-2.1 mm long and thus has a combination of perichaetial leaves that are usually shorter than those of *W. rostellata* and some setae on all plants that are longer than those of that species.

The mature sporophyte, rather than the seta length, gives better characters for distinguishing *W. squarrosa* and *W. rostellata*. In particular, *W. squarrosa* has a dehiscent operculum (lid), whereas the lid of *W. rostellata* remains until the sporophyte falls. When sporophytes of *W. squarrosa* are nearly ripe they contract below the mouth when they dry. This gives them a different profile to that of the ripe or nearly ripe sporophytes of *W. rostellata*, which are ovoid or fusiform when dry. Unfortunately, there is some overlap in exothecial cell structure between the two species and this can cause confusion. In both, two or three rows of cells near the top of the capsule are smaller than those on the rest of

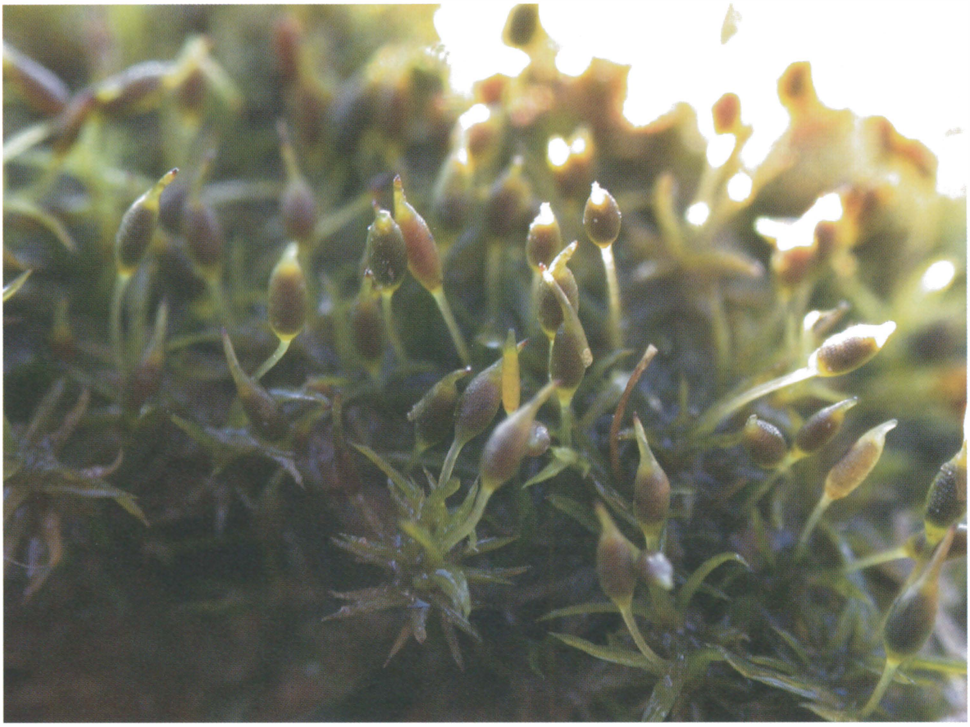

Figure 1. *Weissia squarrosa* at Dingestow (v.-c. 35) in January 2004. Photo: J.D. Sleath.

Figure 2. *Weissia squarrosa*, showing innovations, collected from Dingestow (v.-c. 35) in December 2002. Photo: S.D.S. Bosanquet.

Figure 3. *Weissia rostellata* at Coed-y-fedw (v.-c. 35) in October 2004. Photo: S.D.S. Bosanquet.

the capsule and on the operculum (Figure 4). Observations by SDSB suggest that the smaller cells in *W. rostellata* have walls of a similar structure to those of the rest of the exothecium, whereas the small cells of the capsule mouth of *W. squarrosa* have thicker walls and more rounded lumens than the rest of the exothecial cells. The operculum of the mature *W. squarrosa* capsule falls off, but a hymenium remains covering the mouth (Figure 5c). Spores are released by the rupturing of the capsule wall, and partly broken-down capsules can sometimes be found in the field (Figure 5d). Setae persist long after the breakdown of the capsule and by mid-winter most tufts have a mixture of unripe and mature sporophytes and bare setae. Crundwell & Nyholm (1972) mention this as a difference from *W. rostellata*, which drops its entire ripe sporophyte with the seta still attached to the capsule. Confusion is only really likely, therefore, in autumn and early winter, as later in the winter mature plants of *W. squarrosa* will show either dehiscent opercula or bare setae or both.

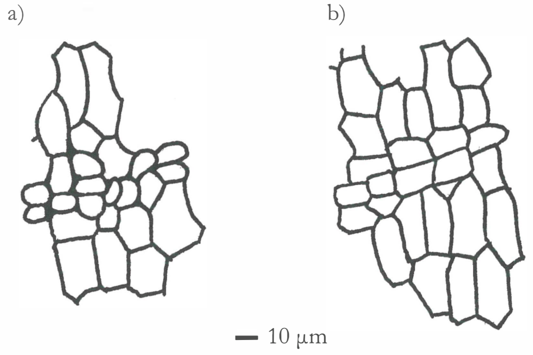

Figure 4. Cells of capsules of a) *Weissia squarrosa* and b) *Weissia rostellata* showing transition to operculum. Drawn by S.D.S. Bosanquet.

The capsules of *W. squarrosa* often look small and narrow in the field (Figures 5a and 5b) but vary a lot in size and shape: 0.80 x 0.25 mm is a typical size, compared with 1.10 x 0.35 mm for

W. brachycarpa var. *brachycarpa* (from Meidrim, v.-c. 44). *W. squarrosa* at Dingestow shows an enormous amount of variation in capsule size, even within a single tuft. Some capsules are spherical, whilst others are very narrow and almost cylindrical. A collection of *W. squarrosa* from Boxworth, v.-c. 29 (M.O. Hill, 1991), has unusually large capsules, but the presence of short-leaved innovations allows identification. The exothecial cells of the Boxworth plant, and those from Dingestow and Worcestershire, appear to be slightly more thin-walled than those of *W. brachycarpa* in direct comparison, but this is a subtle character and may be of less use than the literature suggests.

There are several specimens of *W. squarrosa* collected by W.E. Nicholson from fallow fields at Hamsey in East Sussex (v.-c. 14). Interestingly, in the context of the mixed colony at Dingestow, Nicholson also collected *W. rostellata* from a fallow field at Hamsey, and reported that 'in the Hamsey locality forms occur which seem to connect this species with *W. squarrosa*; on the other hand, in the Barcombe locality [where he also collected both species] the plants appear to be remarkably uniform and distinct' (Nicholson, 1908).

The characters distinguishing *W. rostellata* and *W. squarrosa* are summarised in Table 2.

The close similarity of *W. rostellata* and *W. squarrosa* has previously been mentioned mainly in the context of the classification of *Weissia*, rather than in comments on the identification of its component species. Crundwell & Nyholm (1972) place *W. rostellata* in Subgenus *Astomum* (comprising species with well-developed perichaetial leaves and immersed, cleistocarpous capsules) but they note that it is too closely related to *W. squarrosa* in Subgenus *Hymenostomum* for the subgenera to be treated as genera. Smith (1978) and Nyholm (1989) place both species in the *Hymenostomum* group, which Nyholm treats as a section rather than a subgenus; she notes that *W. rostellata* seems to be intermediate between the sections. Smith (2004) also recognises the groups as sections but reverts to including *W. rostellata* in *Astomum* and *W. squarrosa* in *Hymenostomum*. Dixon & Jameson (1924) had earlier commented on the difficulty of separating *W. brachycarpa*, *W. rostellata* and *W. squarrosa*, and Mark Hill has suggested to us that *W. squarrosa* may be a species of hybrid origin, a hypothesis perhaps supported by the great variation shown by its sporophytes.

Figure 5. Capsules of *Weissia squarrosa* collected from Dingestow (v.-c. 35) in January 2004: a) ripe capsule; b) dry ripe capsule; c) dehisced capsule; d) old and broken-down capsule. Photos: J.D. Sleath.

Table 2. Summary of the characters distinguishing *W. rostellata* and *W. squarrosa*.

	Weissia rostellata	***Weissia squarrosa***
Growth form	Low turfs with erect stems; without innovations	Low turfs with decumbent stems; abundant innovations
Seta length (mm)	0.6-0.9	(0.6-)1.5-2.2, some setae >1.5 mm always present
Perichaetial leaf length (mm)	2.0-2.6	1.6-2.1
Dry capsule	Ovoid or fusiform	Contracted below the mouth
Operculum	Indehiscent	Dehiscent
Exothecial cells	All thin-walled, including smaller cells near top of capsule	Cells around capsule mouth with thicker walls
Sporophyte breakdown	Capsule and seta are shed and break down together	Capsule breaks down *in situ* leaving a bare seta

Habitat

Almost all the recently-discovered colonies of *W. squarrosa* in arable fields are on clay or clayey soils. pH measurements taken at the specific sites where *W. squarrosa* grows indicate acidic soils (pH 5.7-7.2). Some mean pH values for fields containing *W. squarrosa* are higher than this, but it is possible that in these fields, as at Barnsley Wold (Table 1), the *Weissia* may be growing in acidic microhabitats. At Dingestow, the underlying geology is part of the Raglan Marl Group of the Old Red Sandstone over which are the typical red clay loams of the Monmouthshire lowlands. The main colony is restricted to one part of the field, from which the topsoil was stripped in the late 1970s and which is now the only area not dominated by the grasses that have taken over since the field was set-aside in 2000. Soil analysis by Natural Resource Management laboratories indicates that the soil in this stripped area is a silty clay rather than the clay loams elsewhere in the field. The Cambridgeshire colonies, at Boxworth and Conington, are on Ampthill Clay, an acidic Jurassic clay which contrasts with the calcareous boulder clays of glacial origin that are much more frequent in the area.

The main Dingestow colony is in an unusually open section of set-aside. Its ability to persist here is presumably due to previous removal of the topsoil, which has delayed or prevented the colonisation of the area by competitive perennials. Details of the vegetation here are given in Table 3. The nearby colony at Coed-y-fedw is centred on a one-year-old set-aside strip but also includes the cultivated parts of two barley fields. The main Cambridgeshire colony, at Boxworth, is in a set-aside field that has been cultivated only intermittently since 1991; a quadrat from this site is also included in Table 3.

Habitat details are not, of course, available for all historic records of *W. rostellata* and *W. squarrosa* but the details accompanying all the records we have traced (ancient and modern) are summarised in Table 4. There are more records of *W. squarrosa* from stubble and fallow/set-aside fields than from other habitats. There are a few records from a range of other habitats but none from established woodland, the only woodland record being from a newly planted site. There are quite a number of records, including all the 19th century records from Cheshire, for which we have not yet traced habitat details. *W. rostellata* grows in a similar range of habitats, differing in its much greater propensity to occur on mud at the edge of reservoirs and in its occasional presence on woodland rides. The waterside habitats perhaps suggest that it is more suited than *W. squarrosa* to completing its life-cycle rapidly in very short-lived habitats and then persisting as dormant spores. They must also help buffer its distribution against the adverse effects of agricultural intensification, to which arable specialists (both vascular plants and bryophytes) are potentially vulnerable.

Distribution

An updated distribution map of *W. squarrosa* in the British Isles is presented as Figure 6.

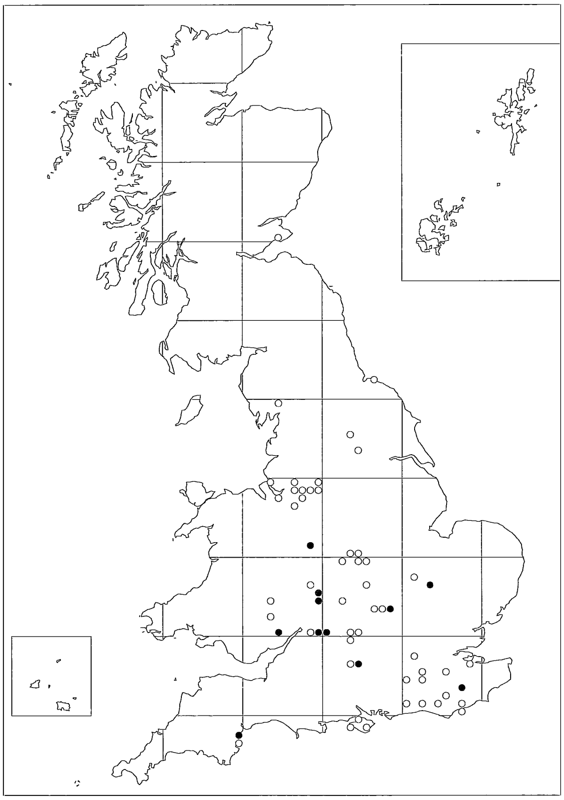

Figure 6. Distribution map of *Weissia squarrosa* in the British Isles. Solid circles indicate post-1990 records, hollow circles indicate pre-1990 records.

Relationship to agricultural management

W. squarrosa fruits in early winter, reproducing by sporophytes rather than by the rapidly-produced tubers that are favoured by many arable mosses. It has probably declined dramatically in recent decades because of changes in agriculture, and in particular populations in arable fields have probably suffered from the large-scale change from spring sowing to autumn sowing (Porley, 2000). The abundance of *W. squarrosa* in the set-aside at Dingestow, compared with its sparseness in both Worcestershire fields, is probably an indication that it takes a relatively long time to produce sporophytes, but once it does the species can establish rapidly. Indeed, there may have been a minor revival in recent years because of the introduction of the set-aside policy as a device to reduce cereal surpluses. It seems to thrive in the set-aside regime, as a fallow year allows almost continuous fruiting until early summer and subsequent establishment of numerous second-generation patches in addition to those that germinated in the first autumn. The vascular plant cover in set-aside usually becomes too dense by the second summer after harvest for many bryophytes to grow. However, the species has been regularly present since 1991 in a field at Boxworth where several years of set-aside have been interspersed with occasional ploughing, although it is usually restricted to small patches of barer vegetation amongst dense vascular plant cover. Thus, optimal management would appear to be short-term set-aside, ploughed and sown in April or May of its second winter.

The discovery of 11 new colonies of *W. squarrosa* since 2001, coupled with the re-identification of earlier specimens, makes it clear that the species is not as threatened as its Endangered status suggests. Further searches of set-aside fields in areas of acidic clay soils are likely to result in additional records. However, *W. squarrosa* is clearly uncommon nationally. It is a fairly conspicuous species which fruits early in the winter and is identifiable by December, so the usual reasons for the under-recording of arable mosses, inconspicuousness (as in *Didymodon tomaculosus*) or late fruiting (as in *Entosthodon fascicularis*), are not likely to apply to this species. Because of its scarcity, its historical decline and the small size of most of the known populations, *W. squarrosa* should still be regarded as threatened.

Table 3. Vegetation and soil characteristics of *Weissia squarrosa* habitats at Dingestow (v.-c. 35) (quadrats 1-10) and at Boxworth (v.-c. 29) (quadrat 11). Soil properties were determined by Natural Resource Management laboratories, apart from the pH for Boxworth (quadrat 11), which was measured by Mark Hill.

	Quadrat number										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Eastings	44482	44490	44505	44516	44554	44566	44592	44589	44636	44459	35504
Northings	09248	09245	09249	09232	09208	09204	09171	09166	09137	09186	65578
Slope (degrees)	2	2	2	10	20	20	20	20	10	5	0
Aspect	E	E	SE	S	W	W	S	SW	S	S	-
Total cover of major vegetation and habitat components (no of squares within a 40x40 cm 5-cm-gridded quadrat)											
Dicot	61	61	47	64	64	50	64	61	8	0	-
Monocot	46	60	64	48	52	54	49	63	64	64	-
Bryophyte	55	61	47	64	63	64	51	57	2	0	-
Bare soil	62	56	43	58	64	54	64	62	23	9	-
Stones	13	36	7	44	42	43	9	2	0	0	-
Vascular plants (Domin scale)											
Agrostis capillaris	1	6	7	2	3	2	5	6	5	9	
Agrostis stolonifera				1	3	4	1	1		3	
Anagallis arvensis	1		2		1	1	1				
Arrhenatherum elatius											5
Centaurium erythraea								1			
Epilobium sp.	3	4	5	3	6	4	5	2	1		1
Festuca rubra											1
Galium aparine				1							
Geranium sp.				2	1	1	1				1
Holcus lanatus						1		1			4
Picris echioides											2
Plantago major	1			3							
Poa annua	5										
Poa pratensis					1	1			9	1	2
Ranunculus repens									1		
Rumex sp.								2			
Senecio vulgaris	1		1	1		1		1			
Sonchus cf *asper*	3				2		3	3			
Stachys arvensis	1				1	1					
Taraxacum sp.				1							
Veronica cf *persica*							2				
Veronica serpyllifolia			1	1	3		2				
Vicia sativa agg.											2

	Quadrat number										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Bryophytes (Domin scale)											
Archidium alternifolium							3	2			
Barbula unguiculata	5	4	7	4			2				1
Brachythecium rutabulum											1
Bryum rubens	1			1	2	2		2			
Bryum sp.									1		
Didymodon insulanus								1			
Drepanocladus polygamus		5									
Entosthodon/Physcomitrium sp.								3			
Ephemerum minutissimum						1			1		
Fissidens incurvus											3
Fissidens taxifolius				2	1						4
Fossombronia sp.									1		
Hypnum cupressiforme					1						
Kindbergia praelonga				1							4
Leptodictyum riparium											2
Pleuridium subulatum				1	1		3	3			
Tortula truncata				2	2	3	1	2			
Weissia cf *controversa*							4	1			
Weissia longifolia var. *longifolia*											2
Weissia squarrosa	4	4	3	7	5	7	2	3			1
Other habitat components (Domin scale)											
Litter	3	4	5	4	5	4	4	4	7	6	5
Bare ground	8	8	5	5	5	5	8	6	4	3	0

Soil characteristics	**Q1-3**	**Q4-6**	**Q7-8**	**Q9-10**	**Q11**
pH	7.2	6.9	6.6	7.2	6.3
P (index)	1	2	2	2	-
K (index)	1	2+	2-	2-	-
Mg (index)	5	5	5	5	-
P (mg/l, available)	14.8	16.0	16.0	16.6	-
K (mg/l, available)	115	198	150	156	-
Mg (mg/l, available)	276	348	263	287	-
Conductivity (µS/cm)	2,019	2,046	2,028	2,038	-
Organic matter LOI (% w/w)	4.2	5.1	3.7	4.9	-
Stones >50 mm (% w/w)	0.0	0.0	0.0	0.0	-
Stones 20-50 mm (% w/w)	0.0	3.9	0.0	0.9	-
Stones 2-20 mm (% w/w)	0.0	12.2	0.0	0.9	-
Sand 2.00-0.063 mm (% w/w)	17	21	12	24	-
Silt 0.063-0.002 mm (% w/w)	54	45	50	45	-
Clay <0.002 mm (% w/w)	29	34	38	31	-
Total nitrogen (% w/w)	0.147	0.169	0.122	0.182	-
Textural class	Silty clay loam	Clay loam	Silty clay	Clay loam	-

Table 4. Number of recorded sites of *W. rostellata* and *W. squarrosa* in different habitat types. Each locality is only counted once, even if there are several records. The table is based on literature, herbarium and field records, including records in the Biological Records Centre database and the Threatened Bryophyte Database and specimens in BBSUK, CGE and NMW.

Habitat type	Detailed habitat	Number of *W. squarrosa* sites	Number of *W. rostellata* sites
Fields	Standing crop	1[1]	-
	Arable/stubble	8	6
	Fallow/set-aside	7	1
	Ley	1	1
	Pasture/grass/grass bank	2	3
	Bank in field	1	-
	No further details	1	1
	Total	*21*	*12*
Waterside	Lake	-	1
	Reservoir	2	14
	Pool/pond	1	1
	River	-	2
	Canal	1	-
	Ditch	1	1
	Total	*5*	*19*
Wood	Newly planted wood	1	-
	Ride	-	3
	Ditch in wood	-	1
	No further details	1	-
	Total	*2*	*4*
Others		6[2]	1[3]

[1] This is a specimen from a 'damp old mustard field'.
[2] These are records of *W. squarrosa* from habitats described as 'anthills in rough uplands', 'golf links', 'rail bank', 'bank with *Funaria hygrometrica*', 'bank on side of track' and '[sea] cliff'.
[3] This is a record of *W. rostellata* from 'mud on a [?pond] bank'.

Acknowledgements

Thanks are due to David Holyoak and Jonathan Sleath for visiting the Dingestow *W. squarrosa* colony; some of Jonathan's photographs illustrate this article. Sally Whyman sent SDSB specimens of *W. squarrosa* and *W. rostellata* from the National Museum and Gallery of Wales, and Gina Murrell facilitated CDP's access to CGE. Nick Hodgetts supplied information from the Threatened Bryophyte Database. Ron Porley recorded several new colonies of *W. squarrosa* and provided helpful comments on this paper. Natural Resource Management laboratories of Bracknell analysed soil samples from Dingestow.

References

Church JM, Hodgetts NG, Preston CD, Stewart NF. 2001. *British red data books: mosses and liverworts.* Peterborough: Joint Nature Conservation Committee.

Crundwell AC, Nyholm E. 1972. A revision of *Weissia*, subgenus *Astomum*. I. The European species. *Journal of Bryology* **7:** 7-19.

Dixon HN, Jameson HG. 1924. *The student's handbook of British mosses*, 3rd ed. Eastbourne: V. Sumfield.

ECCB. 1995. *Red Data Book of European bryophytes.* Trondheim: European Committee for the Conservation of Bryophytes.

Hill MO, Preston CD, Smith AJE. 1992. *Atlas of the bryophytes of Britain and Ireland. Volume 2. Mosses (except Diplolepideae).* Colchester: Harley Books.

Nicholson WE. 1908. The mosses of Sussex. *Hastings and East Sussex Naturalist* **1:** 79-110.

Nyholm E. 1989. *Illustrated flora of Nordic mosses. Fasc. 2. Pottiaceae-Splachnaceae-Schistostegaceae.* Copenhagen & Lund: Nordic Bryological Society.

Porley RD. 2000. Bryophytes of arable fields: current state of knowledge and conservation. In: Wilson P, King M, eds. *Fields of vision: a future for Britain's arable plants.* London: Plantlife, 8-19.

Preston CD, Hill MO. 2004. Bryophyte records. *Nature in Cambridgeshire* **46:** 90-93.

Smith AJE. 1978. *The moss flora of Britain and Ireland.* Cambridge: Cambridge University Press.

Smith AJE. 2004. *The moss flora of Britain and Ireland*, 2nd ed. Cambridge: Cambridge University Press.

Touw A, Rubers WV. 1989. *De Nederlandse bladmossen.* Utrecht: Stichting Uitgeverij Koninklijke Nederlandse Natuurhistorische Vereniging.

UK Biodiversity Group. 1999. *Tranche 2 Action Plans. Volume VI - terrestrial and freshwater species and habitats.* Peterborough: English Nature.

Pterigynandrum filiforme: an addition to the 'montane' bryoflora of Suffolk

Richard Fisk

35 Fair Close, Beccles, Suffolk, NR34 9QR

Locality and habitat of *Pterigynandrum filiforme* in Suffolk

At the end of January 2005 I was recording bryophytes in a previously unvisited tetrad in King's Forest Wordwell to the south of Brandon in West Suffolk (v.-c. 26). I had struggled to reach 30 species by lunchtime, and had more or less decided to move elsewhere. However, I thought that a few minutes in an area where there were some beech trees might be well spent. This did indeed add a few records but I then came to an open area with some silver birch and what at first I took to be ash trees (Figure 1). The first tree that I looked at had a small patch of a curious moss with curved, thread-like branches (Figure 2). Knowing that *Pterogonium gracile* had been recorded in the early 1900s from Icklingham, just three miles away, I at once assumed that I had refound that species, and it was only later that its true identity was revealed to be *Pterigynandrum filiforme*.

Smith (2004) describes the distribution of *Pterigynandrum* as boreal-montane, and states that it occurs in montane and northern Europe. Its appearance in the lowlands of Suffolk is therefore something of a mystery. The map in the *Atlas* (Hill, Preston & Smith, 2004) shows how far from home it is. The tree on which it was growing turned out to be a species of *Acer*, as yet to be identified. Forest Enterprise records only show that the area was planted with mixed broadleaf trees in 1955.

Whilst I was still under the impression that I had refound *Pterogonium*, I obtained permission from the Elveden estate to visit the site of the old record at Icklingham. It was reported as occurring on the base of a poplar. There are some very old black poplars still at the site and it was undoubtedly on one of them that the *Pterogonium* had been found. There is no sign of it now, and the bark of the trees is so dry, hard and deeply furrowed that I could find no moss of any sort.