

# A revised list of nationally rare bryophytes

Chris Preston presents a revised list of nationally rare bryophytes.

The categories 'nationally rare' and 'nationally scarce' have been used for some years in Britain as a way of identifying the most uncommon plants. Nationally rare taxa are those present in 1–15 10-km grid squares and nationally scarce taxa those in 16–100 squares. These categories are distinct from measures of threat, such as Critically Endangered, Endangered, Vulnerable and Near Threatened, which are assessed using the internationally agreed IUCN criteria. Rare and scarce attributions are less important than these designations, but are nevertheless useful in selecting SSSIs, drawing up rare plant registers and highlighting the 'special species' in areas ranging from counties to small nature reserves. This paper, prepared at the request of the BBS Conservation and Recording

◀ *Timmia megapolitana*. Ron Porley

Committee, revises the list of nationally rare species. It is a companion to the earlier revision of scarce species (Preston, 2006) which provides more background to the use of these terms.

The starting point for this revision is the list of nationally rare bryophyte species and subspecies which can be extracted from the spreadsheet of Conservation Designations for UK taxa on the Joint Nature Conservation Committee's (JNCC) website ([www.jncc.gov.uk](http://www.jncc.gov.uk)). I have brought the taxonomy into line with that of the new *Census Catalogue* (Hill *et al.*, 2008), and updated the list to include newly discovered taxa and new 10-km square records. The 10-km square totals are based on records made from Britain (v.-cc. 1–112) from 1950 onwards.

The changes to the list are summarized below and a complete new list of nationally rare species then follows. Nomenclature follows Hill *et al.* (2008) with the name on the JNCC website (if it differs) given as a synonym in the list at the end of this paper. The 10-km square totals were taken from the BBS database at BRC in September 2009.

### Species to be excluded from the list

The largest group of deletions (Table 1) are species which are now recorded in more than 15 10-km squares, and these should therefore be transferred to the list of scarce species. The number of squares in which the species was mapped from 1950 onwards in the *Atlas of Bryophytes* (Hill *et al.*, 1991–94) and the current total give an indication of the extent to which the species was previously under-recorded.

The greatest increases reflect species where bryologists have made a special effort to get to know plants and systematically survey likely habitats. Sandy Payne has walked the coastlines of northern Scotland in search of *Sanionia orthothecioides* (Figs 1 & 2), showing that it is much

Table 1. Species now recorded in more than 15 10-km squares since 1950

H, hornwort; L, liverwort; M, moss.

	Atlas total	Current total	% of Atlas total
H <i>Phaeoceros carolinianus</i>	4	17	425
L <i>Barbilophozia kunzeana</i>	10	17	170
L <i>Fossombronia fimbriata</i>	10	17	170
L <i>Leiocolea fitzgeraldiae</i>	–	22	–
L <i>Leiocolea gillmanii</i>	13	18	138
L <i>Lophozia perssonii</i>	12	23	192
L <i>Nardia breidleri</i>	11	20	182
L <i>Scapania curta</i>	15	16	107
L <i>Scapania paludicola</i>	4	19	475
L <i>Scapania paludosa</i>	14	22	157
M <i>Bryum gemmilucens</i>	10	20	200
M <i>Bryum knowltonii</i>	13	19	146
M <i>Bryum kunzei</i>	8	16	200
M <i>Cynodontium strumiferum</i>	8	18	225
M <i>Cynodontium tenellum</i>	14	17	121
M <i>Ditrichum plumbicola</i>	12	20	167
M <i>Fissidens monguillonii</i>	10	17	170
M <i>Grimmia elongata</i>	6	16	267
M <i>Hedwigia ciliata</i>	–	22	–
M <i>Hypnum bambergeri</i>	14	16	114
M <i>Leptodontium gemmascens</i>	9	21	233
M <i>Oncophorus wahlenbergii</i>	12	17	142
M <i>Orthotrichum speciosum</i>	12	20	167
M <i>Philonotis tomentella</i>	13	19	146
M <i>Physcomitrium sphaericum</i>	14	21	150
M <i>Poblia andalusica</i>	12	16	133
M <i>Pseudoleskeella rupestris</i>	12	18	150
M <i>Racomitrium macounii</i>	10	21	210
M <i>Sanionia orthothecioides</i>	5	61	1220
M <i>Sciuro-hypnum glaciale</i>	14	16	114
M <i>Sciuro-hypnum reflexum</i>	14	20	143
M <i>Sphagnum majus</i>	3	21	700
M <i>Sphagnum riparium</i>	15	36	240
M <i>Tortula freibergii</i>	5	34	680

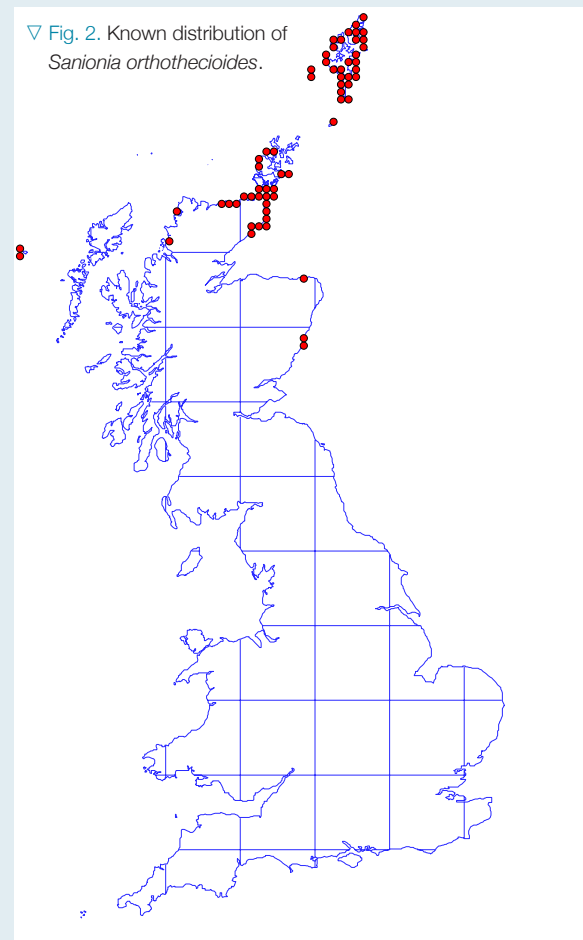


△ Fig. 1. *Sanionia orthothecioides*, a species now removed from the 'rare' list thanks to systematic survey work. Effy Everiss

more frequent (especially around the convoluted coast of Shetland) than was suspected when it was reported, new to Britain, in 1992. He is also primarily responsible for the 700% increase in records of *Sphagnum majus*. Similarly, *Tortula freibergii* has been systematically recorded along the canals of north-west England by Locksley (2007) and Callaghan (2008). These examples show how effective it can be to adopt and record 'pet' species.

Several of the other species have been discovered in Britain only recently. These include some added to the British list in the 1990s such as *Leiocolea fitzgeraldiae* (described in 1995), *Hedwigia ciliata* (not separated by British bryologists from the much more frequent *H. stellata* until 1995) and *Racomitrium macounii* (first recognized here in 1991). Others have been known rather longer but are small, very inconspicuous and genuinely very uncommon, including *Ditrichum plumbicola* (described in 1976), *Fossombronia fimbriata* (described in 1974) and *Lophozia perssonii* (reported new to Britain in 1968). *Phaeoceros carolinianus* is a much more conspicuous plant, but it has been confused with the very similar *P. laevis*, and *Bryum kunzei* was neglected until it was treated as a species rather than as var. *imbricatum* of *B. caespiticium*. Only *Orthotrichum speciosum* of the above species is genuinely increasing in frequency.

A few species have to be deleted as the result of taxonomic research (Table 2). Only species and



subspecies are listed as nationally rare, so those reduced to variety should be removed from the list.

This gives a total of 40 deletions.

Table 2. Species deleted as a result of taxonomic research

M	<i>Bryum archangelicum</i>	Now includes the much commoner <i>B. imbricatum</i>
M	<i>Bryum neodamense</i>	Now reduced to a synonym of <i>B. pseudotriquetrum</i> var. <i>pseudotriquetrum</i>
M	<i>Didymodon mamillosus</i>	Now reduced to a synonym of <i>D. rigidulus</i>
M	<i>Grimmia ungeri</i>	British material has been re-identified as <i>G. montana</i>
M	<i>Hymenostylium insigne</i>	Now reduced to a variety of <i>H. recurvirostrum</i> (and in any event now known from 19 squares)
M	<i>Pictus scoticus</i>	Now reduced to a synonym of <i>Hygrohypnum luridum</i>

Native species to add to the list

The native species in Table 3 have recently been added to the British list. They all seem likely to be genuinely rare, although as some of the above examples show, our initial impressions of the rarity of species sometimes have to be modified in the light of later experience.

Table 3. Native species to add to the list

M	<i>Arctoa anderssonii</i>
M	<i>Bruchia vogesiaca</i>
M	<i>Dialytrichia saxicola</i>
M	<i>Ephemerum hibernicum</i>
M	<i>Orthotrichum acuminatum</i>
M	<i>Orthotrichum consimile</i>
M	<i>Schistidium flaccidum</i>
M	<i>Seligeria oelandica</i>
M	<i>Timmia megapolitana</i>
M	<i>Tortula inermis</i>

Four of these, *Arctoa anderssonii* (Rothero, 2009), *Orthotrichum acuminatum* (Blockeel, 2009), *Seligeria oelandica* (Bosanquet, 2009) and *Tortula inermis* (Blockeel *et al.*, 2009) were published after the preparation of the new *Census Catalogue*. *Seligeria oelandica* has long been known from Ireland, and *Ephemerum hibernicum* was described from Ireland in 2005; both have recently been found in Wales by Sam Bosanquet. *Orthotrichum acuminatum* may be a 'native casual', a plant which arrived by natural means but has not persisted.

A few species have to be added because of taxonomic revision, or for miscellaneous other reasons (Table 4).

*Grimmia anodon*, once feared extinct, still survives in Edinburgh (Long, 2006). The recent history of *Grimmia alpestris* in Britain is a confusing story of changing determinations, but it is now regarded as genuinely British

Table 4. Species to be added as a result of taxonomic revision or other reasons

M	<i>Acaulon mediterraneum</i>	Upgraded from variety
L	<i>Fossombronia mittenii</i>	Extinct but with a post-1950 record
M	<i>Grimmia alpestris</i>	Reinstated on British list
M	<i>Grimmia anodon</i>	Formerly feared extinct
M	<i>Pterygoneurum lamellatum</i>	Extinct but with a post-1950 record
M	<i>Schistidium atrofusum</i>	Perhaps omitted in error
M	<i>Tortula schimperi</i>	Upgraded from variety and taxonomic concept refined

(Long, 2008). Like *G. sessitana*, it is retained on the list on the basis of different specimens from those which caused it to be added originally, as the latter were all misidentifications. It seems worth adding, for the sake of completeness, *Fossombronia mittenii* and *Pterygoneurum lamellatum*, two species which have post-1950 records but are feared extinct.

The total number of additional native species is 17.

Alien species

It is more difficult to identify introductions in bryophytes than flowering plants as they have much greater powers of long-distance dispersal. They are almost never deliberately spread by people, unlike (for example) vascular plants which are imported for horticultural reasons and which therefore have a clear introduction pathway. In general, bryophytes can only be recognized as aliens in Britain if they come from distant continents, and even then their status is likely to be doubtful unless their means of introduction is clear. The JNCC spreadsheet omits such recently established, alien species. While this is a perfectly reasonable course of action for a conservation organization to take, it seems worth adding them to the list (with an appropriate annotation) for those who would like to use the list of rare species

for other purposes. The following can be listed as rare aliens or putative aliens.

Table 5. Rare aliens or putative aliens

M	<i>Achrophyllum dentatum</i>
M	<i>Bryum apiculatum</i>
M	<i>Bryum valparaisense</i>
M	<i>Calypstrochaeta apiculata</i>
M	<i>Leptophascum leptophyllum</i>
L	<i>Lophocolea brookwoodiana</i>
L	<i>Riccia crystallina</i>
L	<i>Riccia rhenana</i>
L	<i>Telaranea murphyae</i>
L	<i>Telaranea tetradactyla</i>
M	<i>Thamnobryum maderense</i>
M	<i>Tortula amplexa</i>

Most of these are more or less obvious introductions even if (as with *Lophocolea brookwoodiana* and *Telaranea murphyae*) their native range is unknown. Two are more doubtful. *Bryum apiculatum* is a tropical/subtropical, weedy species recently found by David Holyoak (2009) in East Cornwall, new to Europe, where it appears to have been spread by motor vehicles. Its status as a native or alien may become clearer if further populations are discovered. *Thamnobryum maderense* is a particularly doubtful case as the taxonomy of the species requires clarification, and a final assessment is obviously impossible until we have a clearer idea of its British and European distribution.

There may well be other species of bryophyte which are listed amongst the native rare species but which were actually introduced, in some cases perhaps in ancient times. Obvious examples include those associated with heavy metal workings such as *Cephaloziella massalongi* and *Scopelophila cataractae*, as well as the puzzlingly rare and disjunct liverwort *Lophozia herzogiana*.

### Doubtful cases

British bryologists are still working out the distribution of the species of *Schistidium* defined by H.H. Blom in his monograph of the *S. apocarpum* complex and introduced to most British bryologists by Smith (2004). *S. atrofusum* is included amongst the additions to the JNCC list above (Table 4) as it has been known from Britain since 1957 and is clearly very uncommon. *S. flaccidum* has also been added to the list on the advice of Sam Bosanquet, who regards it as a very distinctive species which has only been found twice, and so is likely to be genuinely rare. Four other species are currently known from fewer than 16 squares, *S. dupretii*, *S. flexipile*, *S. papillosum* and the very recent addition to the British list *S. helveticum* (Blockeel *et al.*, 2009). It seems best to wait before adding these to the list of rare species until their distributions are clarified. *Grimmia muehlenbeckii*, reinstated on the British list in 1997, seems likely to be under-recorded rather than genuinely rare, as it is already known from six Scottish vice-counties (Hill *et al.*, 2008). *Dicranum flexicaule*, the recently upgraded *D. fuscescens* var. *congestum*, is even more likely to be under-recorded. We do not yet have a detailed account of the distribution in Britain of *Moerckia hibernica* (now separated from *M. flotoviana*) and of the two species which have until recently been included under *Seligeria trifaria*, *S. trifaria sens. str.* and *S. patula* (Fig. 3).

### Discussion

Records made from 1950 onwards are included in the above totals, and some may therefore be nearly 60 years old. Species such as *Bryum knowltonii* and *Tortula wilsonii* have declined since 1950 and are probably now present in fewer than 15 squares, even though they do not qualify for the nationally rare list on the basis of the total from 1950 onwards. However, for most species



△ Fig. 3. *Seligeria patula*. David Holyoak

under-recording is an even greater problem, and a long period is needed to ensure that we have adequate national coverage and that species are not included on the list simply because they are under-recorded. The BBS Conservation & Recording Committee has suggested that a more fundamental revision of the rare and scarce lists, with a later cut-off date, should await the publication of the proposed new *Atlas of Bryophytes* (see Preston *et al.*, 2009, for details of this). The IUCN threat criteria should identify species which are rapidly declining and ensure that they have the appropriate conservation designations.

*Leptodontium gemmascens* (Fig. 4) has been the subject of an exemplary study by Porley (2008), which highlights another aspect of this problem. Its known sites have been thoroughly surveyed in recent years and it is known from 15 10-km squares since 1990 and 10 since 2000. However, it is a species which clearly has a rather dynamic distribution, and although we can resurvey old

sites, new localities are only likely to be found by general recording and we are likely to become aware of extinctions more rapidly than colonizations.

A further question relates to the frequency with which these lists are reviewed. With the increasing flow of data electronically to the BBS, the totals on which our assessments are based are updated regularly, and it becomes feasible to revise lists such as those of rare and scarce species annually. However, if they are to be used for planning local rare plant registers or assessing the importance of sites, a degree of stability in these lists is essential. We need to decide on a compromise between the desire to be up-to-date and the need to avoid constantly tinkering with the list.

### The revised list

Once the changes outlined above are implemented, the revised list of nationally rare species is as presented in Table 6.

Table 6. Revised list of nationally rare bryophytes

Alien or probably alien species are indicated by an asterisk (\*) and species which have been recorded since 1950 but are now feared extinct by an obelus (†).

Liverworts (54)		
<i>Adelanthus lindenbergianus</i>	<i>Gymnomitrium corallioides</i>	<i>Odontoschisma macounii</i>
<i>Anastrophyllum alpinum</i>	<i>Herbertus delavayi</i> (H. borealis)	<i>Plagiochila norvegica</i>
<i>Anastrophyllum joergensenii</i>	<i>Jamesoniella undulifolia</i>	<i>Radula carringtonii</i>
<i>Anastrophyllum saxicola</i>	<i>Jungermannia polaris</i>	<i>Riccia bifurca</i>
<i>Athalamia hyalina</i>	<i>Leiocolea rutheana</i>	<i>Riccia canaliculata</i>
<i>Barbilophozia quadriloba</i>	<i>Lejeunea eckloniana</i> (L. holtii)	* <i>Riccia crystallina</i>
<i>Cephalozia ambigua</i>	<i>Lejeunea mandonii</i>	<i>Riccia nigrella</i>
<i>Cephaloziella baumgartneri</i>	<i>Liochlaena lanceolata</i>	* <i>Riccia rhenana</i>
<i>Cephaloziella calyculata</i>	( <i>Jungermannia leiantha</i> )	<i>Scapania gymnostomophila</i>
<i>Cephaloziella dentata</i>	* <i>Lophocolea brookwoodiana</i>	<i>Scapania parvifolia</i>
<i>Cephaloziella elachista</i>	<i>Lophozia herzogiana</i>	<i>Scapania praetervisa</i>
<i>Cephaloziella integerrima</i>	<i>Lophozia longiflora</i>	<i>Solenostoma caespitium</i>
<i>Cephaloziella massalongi</i>	<i>Lophozia wenzelii</i>	( <i>Jungermannia caespiticia</i> )
<i>Dumortiera hirsuta</i>	<i>Marsupella arctica</i>	<i>Southbya nigrella</i>
† <i>Fossombronina mittenii</i> (F. crozalsii)	<i>Marsupella boeckii</i>	<i>Southbya tophacea</i>
<i>Geocalyx graveolens</i>	<i>Marsupella condensata</i>	<i>Telaranea europaea</i> (T. nematodes)
<i>Gongylanthus ericetorum</i>	<i>Marsupella profunda</i>	* <i>Telaranea murphyae</i>
<i>Gymnocolea acutiloba</i>	<i>Marsupella sparsifolia</i>	* <i>Telaranea tetradactyla</i> (T. longii)
<i>Gymnomitrium apiculatum</i>	<i>Nardia insecta</i>	
Mosses (146)		
<i>Acaulon mediterraneum</i>	<i>Brachythecium cirrosium</i>	<i>Buxbaumia viridis</i>
<i>Acaulon triquetrum</i>	( <i>Cirriphyllum cirrosium</i> )	* <i>Calyptrochaeta apiculata</i>
* <i>Achrophyllum dentatum</i>	<i>Brachythecium erythrorrhizon</i>	<i>Campylophyllum halleri</i>
<i>Amblystegium radicale</i>	<i>Bruchia vogesiaca</i>	<i>Campylopus subporodictyon</i>
<i>Andreaea alpestris</i>	<i>Bryoerythrophyllum caledonicum</i>	( <i>Dicranum subporodictyon</i> )
<i>Andreaea blyttii</i>	* <i>Bryum apiculatum</i>	<i>Ceratodon conicus</i>
<i>Andreaea frigida</i>	<i>Bryum arcticum</i>	<i>Cheilotela chloropus</i>
<i>Andreaea sinuosa</i>	<i>Bryum calophyllum</i>	<i>Cinclidotus riparius</i>
<i>Anomodon attenuatus</i>	<i>Bryum cyclophyllum</i>	<i>Ctenidium procerrimum</i>
<i>Anomodon longifolius</i>	<i>Bryum dyffrynense</i>	<i>Cyclodictyon laetevirens</i>
<i>Aongstroemia longipes</i>	<i>Bryum gemmiparum</i>	<i>Cynodontium polycarpon</i>
<i>Aplodon wormskioldii</i> ('wormskjoldii')	<i>Bryum marratii</i>	<i>Daltonia splachnoides</i>
<i>Arctoa anderssonii</i>	<i>Bryum muehlenbeckii</i>	<i>Dendrocryphaea lamyana</i>
<i>Bartramia stricta</i>	<i>Bryum salinum</i>	( <i>Cryphaea lamyana</i> )
<i>Blindia caespiticia</i>	<i>Bryum schleicheri</i>	<i>Dialytrichia saxicola</i>
<i>Brachytheciastrum trachypodium</i>	<i>Bryum uliginosum</i>	<i>Dicranella grevilleana</i>
( <i>Brachythecium trachypodium</i> )	* <i>Bryum valparaisense</i>	<i>Dicranum elongatum</i>

<i>Dicranum leioneuron</i>	<i>Mnium spinosum</i>	<i>Scopelophila cataractae</i>
<i>Didymodon cordatus</i>	<i>Myurella tenerima</i>	<i>Seligeria brevifolia</i>
<i>Didymodon glaucus</i>	<i>Orthodontium gracile</i>	<i>Seligeria campylopoda</i>
<i>Didymodon icmadophilus</i>	† <i>Orthotrichum acuminatum</i>	<i>Seligeria carniolica</i>
<i>Ditrichum cornubicum</i>	<i>Orthotrichum consimile</i>	<i>Seligeria diversifolia</i>
<i>Ditrichum subulatum</i>	<i>Orthotrichum gymnostomum</i>	<i>Seligeria oelandica</i>
<i>Entosthodon pulchellus</i>	<i>Orthotrichum obtusifolium</i>	<i>Sematophyllum demissum</i>
( <i>Funaria pulchella</i> )	<i>Orthotrichum pallens</i>	<i>Sematophyllum substrumulosum</i>
<i>Ephemerum cohaerens</i>	<i>Orthotrichum pumilum</i>	<i>Sphagnum balticum</i>
<i>Ephemerum hibernicum</i>	<i>Palustriella decipiens</i>	<i>Sphagnum skyense</i>
<i>Eurhynchiastrum pulchellum</i>	<i>Paraleucobryum longifolium</i>	<i>Stegonia latifolia</i>
( <i>Eurhynchium pulchellum</i> )	<i>Philonotis cernua</i>	<i>Syntrichia norvegica</i>
<i>Fissidens curvatus</i>	<i>Philonotis marchica</i>	<i>Tayloria lingulata</i>
<i>Fissidens serrulatus</i>	<i>Physcomitrium eurystomum</i>	<i>Tayloria tenuis</i>
<i>Grimmia alpestris</i>	<i>Plagiobryum demissum</i>	<i>Tetradontium repandum</i>
<i>Grimmia anodon</i>	<i>Plagiomnium medium</i>	<i>Thamnobryum angustifolium</i>
<i>Grimmia arenaria</i>	<i>Plasteurhynchium meridionale</i>	<i>Thamnobryum cataractarum</i>
<i>Grimmia crinita</i>	( <i>Eurhynchium meridionale</i> )	* <i>Thamnobryum maderense</i>
<i>Grimmia elatior</i>	<i>Pohlia crudoides</i>	<i>Timmia austriaca</i>
<i>Grimmia sessitana</i>	<i>Pohlia obtusifolia</i>	<i>Timmia megapolitana</i>
<i>Grimmia tergestina</i>	<i>Pohlia scotica</i>	<i>Timmia norvegica</i>
<i>Grimmia unicolor</i>	<i>Pseudocalliergon turgescens</i>	<i>Tortella fragilis</i>
<i>Heterocladium dimorphum</i>	( <i>Scorpidium turgescens</i> )	* <i>Tortula amplexa</i>
<i>Homomallium incurvatum</i>	<i>Pseudoleskea incurvata</i>	( <i>Syntrichia amplexa</i> )
<i>Hygrohypnum molle</i>	<i>Pseudoleskeella nervosa</i>	<i>Tortula cernua</i>
<i>Hygrohypnum polare</i>	† <i>Pterygoneurum lamellatum</i>	<i>Tortula cuneifolia</i>
<i>Hygrohypnum smithii</i>	<i>Ptychodium plicatum</i>	<i>Tortula inermis</i>
<i>Hygrohypnum styriacum</i>	<i>Racomitrium himalayanum</i>	<i>Tortula leucostoma</i>
<i>Hypnum revolutum</i>	<i>Rhynchostegium rotundifolium</i>	<i>Tortula schimperii</i>
<i>Hypnum vaucheri</i>	<i>Rhytidiadelphus subpinnatus</i>	<i>Tortula solmsii</i>
* <i>Leptohasium leptophyllum</i>	<i>Saelania glaucescens</i>	<i>Tortula vahlbiana</i>
( <i>Chenia leptophylla</i> )	<i>Schistidium atrofusum</i>	<i>Weissia levieri</i>
<i>Micromitrium tenerum</i>	<i>Schistidium flaccidum</i>	<i>Weissia multcapsularis</i>
<i>Mielichhoferia elongata</i>	<i>Sciuro-hypnum starkei</i>	<i>Zygodon forsteri</i>
<i>Mielichhoferia mielichhoferiana</i>	( <i>Brachythecium starkei</i> )	<i>Zygodon gracilis</i>
<i>Mnium lycopodioides</i> (M. ambiguum)		

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△ Fig. 4. *Leptodontium gemmascens*. Ron Porley

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#### C.D. Preston

CEH Wallingford, Benson Lane, Crowmarsh  
Gifford, Wallingford, Oxfordshire OX10 8BB  
(e cdpr@ceh.ac.uk)

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