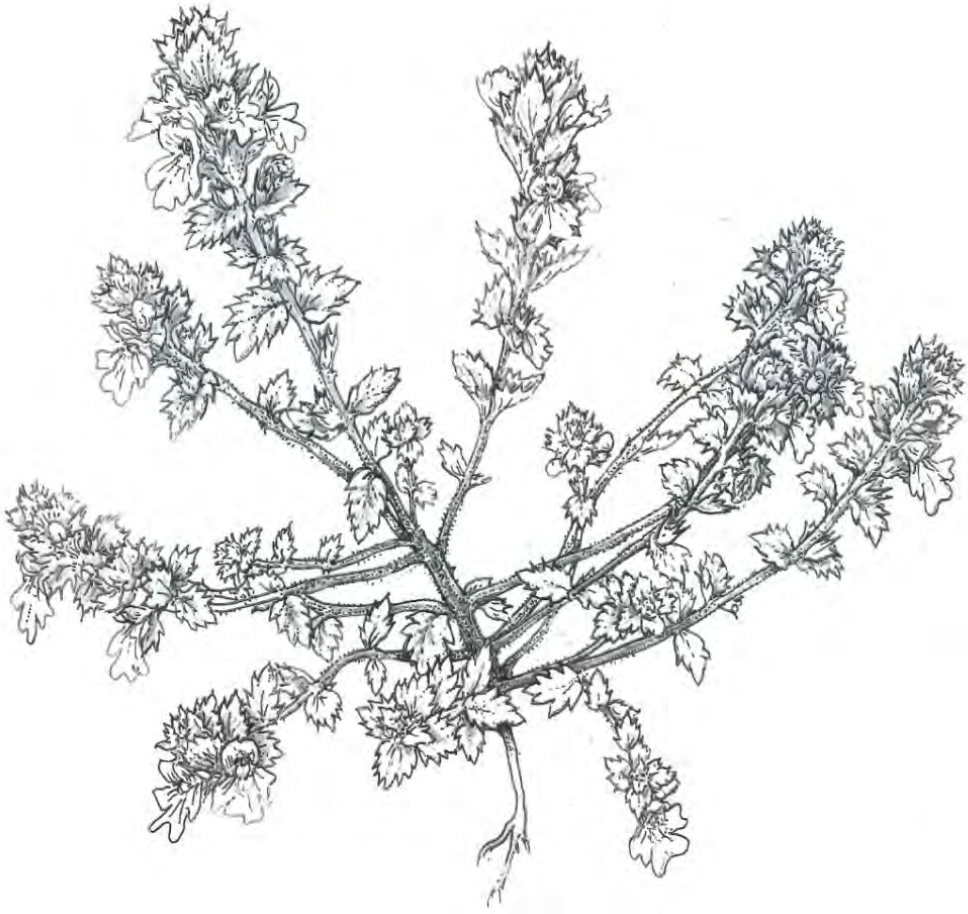
BSBI Atlas 2020

Notes on identification works and difficult and under-recorded taxa



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Contents

Introduction	2
Identification works	3
Recording species, subspecies and hybrids for Atlas 2020	6
Notes on individual taxa	7
List of taxa	7
Widespread but under-recorded hybrids	31
Summary of recent name changes	33
Definition of Aggregates	39

Introduction

The first edition of this guide (Preston, 1997) was based around the then newly published second edition of Stace (1997). Since then, a third edition (Stace, 2010) has been issued containing numerous taxonomic and nomenclatural changes as well as additions and exclusions to taxa listed in the second edition. Consequently, although the objective of this revised guide hasn't altered and much of the original text has been retained with only minor amendments, many new taxa have been included and there have been substantial alterations to the references listed.

We are grateful to A.O. Chater and C.D. Preston for their comments on an earlier draft of these notes, and to the Biological Records Centre at the Centre for Ecology and Hydrology for organising and funding the printing of this booklet.

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June 2015

Suggested citation:
Stroh, P.A., Pearman, D.P., Rumsey, F.J & Walker, K.J. 2015. *Notes on identification works and some difficult and under-recorded taxa*. Botanical Society of Britain and Ireland, Bristol.

Front cover: *Euphrasia pseudokerneri* © F.J. Rumsey.

Identification works

The standard flora for the Atlas 2020 project is edition 3 of C.A. Stace's *New Flora of the British Isles* (Cambridge University Press, 2010), from now on simply referred to in this guide as 'Stace'; all recorders are urged to obtain a copy of this, although we suspect that many will already have a well-thumbed volume.

We are keenly aware that some recorders will also refer to the published volumes of Sell & Murrell, within which there are instances of conflicting taxonomy with Stace as well as the addition of many new infraspecific taxa. Records using these volumes are very welcome and can be accommodated in the BSBIs main distribution database (DDb), and will have long term value beyond the Atlas. Differences in taxonomy encountered in BSBI Handbooks can also be accommodated, many of which are covered in the notes on individual taxa below. However, for the purposes of Atlas 2020, not least because of the accessibility of Stace to field recorders and the relative expense of purchasing all published volumes of Sell & Murrell, we have taken a pragmatic decision to use Stace as the default list of taxa to be recorded.

Details of many difficult pairs or groups of plants are provided in *Plant Crib*, compiled by T.C.G. Rich & A.C. Jermy (1998, BSBI, London), which should be used in conjunction with Stace. *Plant Crib* is currently being updated by T.C.G. Rich, with fresh accounts uploaded on completion at http://www.bsbi.org.uk/plant_crib.html. *The Vegetative Key to the British Flora* by J. Poland & E.J. Clement (2009, BSBI, London) is also a very useful accompaniment to Stace, particularly in cases where only floral characters are used in the keys of the latter. Fuller descriptions can be found in A. R. Clapham, T. G. Tutin & D. M. Moore, *Flora of the British Isles* ed. 3 (1989) and the volumes of P. D. Sell & G. Murrell, *Flora of Great Britain and Ireland* (1996-) .

Detailed treatments of some genera or families are provided in the BSBI Handbook series (all published by BSBI, London):

No. 1. *Sedges of the British Isles*, ed. 3. A.C. Jermy, D.A. Simpson, M.J.Y. Foley & M.S. Porter, 2007.
No. 2. *Umbellifers of the British Isles*. T.G. Tutin, 1980.
No. 3. *Docks and knotweeds of the British Isles*, ed. 2. J.R. Akeroyd, 2014.
No. 4. *Willows and Poplars of Great Britain and Ireland*. R.D. Meikle, 1984.
No. 6. *Crucifers of Great Britain and Ireland.* T.C.G. Rich, 1991.
No. 7. *Roses of Great Britain and Ireland.* G.G. Graham & A.L. Primavesi, 1993.
No. 8. *Pondweeds of Great Britain and Ireland.* C.D. Preston, 1995.

No. 9. *Dandelions of Great Britain and Ireland*. A.A. Dudman & A.J. Richards, 1997.
No. 11. *Water-starworts of Europe*. R.V. Lansdown, 2008.
No. 12. *Fumitories of Britain and Ireland*. R.J. Murphy, 2009.
No. 13. *Grasses of the British Isles*. T. Cope & A. Gray, 2009.
No. 14. *Whitebeams, Rowans and Service Trees of Britain and Ireland*. T.C.G. Rich, L. Houston, A. Robertson & M.C.F. Proctor, 2010.
No. 15. *British Northern Hawkweeds*. T.C.G. Rich & W. Scott, 2011.

The following publications provide a detailed treatment of ferns:

The ferns of Britain and Ireland. ed. 2. C.N. Page, 1997. Cambridge University Press, Cambridge.
The illustrated field guide to ferns and allied plants of the British Isles. C. Jermy & A. Camus, 1991. Natural History Museum Publications, London.
The Fern Guide: a field guide to the ferns, clubmosses, quillworts and horsetails of the British Isles (AIDGAP). J. Merryweather & A. Hill, 1995.

Notes on the distribution and identification of all hybrids are given in:

Hybrid Flora of the British Isles. C.A. Stace, C.D. Preston & D.A. Pearman, 2015.

Supplementary information on 'alien' plants can be found in:

Alien plants of the British Isles. E.J. Clement & M.C. Foster, 1994
Alien grasses of the British Isles. T.B. Ryves, E.J. Clement & M.C. Foster, 1996.*Illustrations of alien plants of the British Isles*. E.J. Clement, D.P.J. Smith & I.R. Thirwell, 2005.
A catalogue of alien plants in Ireland. S.C.P. Reynolds, 2002. National Botanic Gardens, Glasnevin, Dublin

Three further publications are worth mentioning here. *The Colour Identification Guide to the Grasses, Sedges, Rushes and Ferns of the British Isles and North Western Europe* by F. Rose (1989) has excellent descriptions and illustrations (although the taxonomy is not up to date in some cases), and *Conifers of the World – The Complete Reference* by J.E. Eckenwalder (2009) provides descriptions of all conifers likely to be encountered in the

British Isles, and for trees in general, especially aliens, *Collins Tree Guide* by O. Johnson & D. More (2004) is very helpful.

The list of books above is far from comprehensive, but we hope we have covered the key identification works that a recorder would find useful. Detailed accounts of many taxa are provided in *Watsonia, New Journal of Botany* and *BSBI News;* references to some of these are provided in the notes on individual taxa below. Other important works are expected during the course of the Atlas 2020 project: these include BSBI Handbooks for *Euphrasia*, *Oenothera* and *Viola*, and a *Fern Crib* to complement an ongoing revision of *Plant Crib*.

All of the botanical books in print listed above are available from Summerfield Books, http://www.summerfieldbooks.com

Recording species, subspecies and hybrids for Atlas 2020

Records will be collected for *the species and subspecies treated in full* by Stace, and for *all hybrids.* There is no harm, and potentially great benefit, in recording to as much taxonomic detail as you can – we can easily lump for the Atlas, but we cannot split what you record, and records of segregates and infraspecific taxa will be useful to someone in the long run even if not to us!

The BSBI field cards indicate aggregates and species with more than one subspecies in our area by an asterisk: consider whether a more detailed identification is possible when recording these asterisked taxa. Subspecies and segregate species differ greatly in the ease with which they can be identified: some are fairly straightforward whereas others may need expert determination. You will need to decide which you can tackle yourself and which you cannot deal with. Even if you cannot identify plants in particular critical groups you may nevertheless be able to collect good voucher specimens which can be identified later by others. This is particularly important in regions where there are few other botanists or where access is difficult, and where it is therefore unlikely that anyone else will be recording.

It is essential to confirm the identity of the common subspecies even if it is the only one present in an area if we are to obtain satisfactory distribution maps. Thus, *Potentilla erecta* subsp. *erecta* should be recorded even in lowland areas where subsp. *strictissima* would not be expected.

All those recording for Atlas 2020 should feel free to consult other BSBI members about groups that they cannot identify themselves. In this way the expertise in the society will be shared and the general standard of recording increased. BSBI field meetings provide an opportunity for more informal tuition and exchange of information. There may well be someone in your region with knowledge of particular difficult groups: the vice-county recorder or the national referee for the group may be able to suggest suitable contacts. If there is no local expert the national referees will examine material. They are listed in the BSBI Year Book: please note the general instructions and check if individual referees have particular requirements before sending material. If you have large quantities of specimens (say, over 30) please contact the referee first to check that they will be able to cope with them.

Notes on individual taxa

The following notes highlight particular taxa where many people have had recording problems. The aim is to draw attention to sources of taxonomic information, not to provide the information itself which is usually available in fairly accessible publications. The list is selective: an exhaustive list would include so many species that its impact would be lost. The aim has been to draw attention to groups where there has been taxonomic revision in recent years. These include many garden plants, as in many genera the naturalised species traditionally included in Floras have been joined by, or even replaced by, additional taxa which have become commercially available in recent years. Some native and naturalised subspecies have also been included, as have major nomenclatural changes which may help recorders to find taxa 'disguised' under new names on the cards. The abbreviations given on the BSBI recording cards are sometimes cited in brackets. References are given to the accounts in Stace (with page numbers) and often to other literature including the books cited here in the 'Identification works' section,

LIST OF TAXA

Acaena. Plants which have not been identified to species should be recorded as *Acaena* agg., not *A. novae-zaelandiae* which is simply the most frequent of several naturalised species. See Rich & Jermy, pp.154-155, Yeo (1973) in P.S. Green (ed.), *Plants: wild and cultivated* (BSBI Conference Report no. 13), pp.193-221, Yeo (1982) in *The Garden* no.107, pp.326-328, and Stace, pp.262-263.

Aconitum. Take care to identify the naturalised plants correctly rather than recording them automatically as *A. napellus*. See Stace, pp.105-106 and Rich & Jermy, pp.44-45.

Aethusa cynapium subsp. agrestis. This subspecies is distinct and appears to be common in cereal crops on calcareous soils in southern Britain. Stace, p.816.

Agrostis. Recorders should attempt to separate *A. canina* from *A. vinealis* (Stace, p.1028, couplet 5). If these are not separated, record as *A. canina* agg. (Agros *can). *A. gigantea* and the widely planted and frequently naturalised alien species *A. castellana* (now often sown as a substitute for *A. capillaris*) are often overlooked, other aliens occur, and hybrids are under-recorded.

Alopecurus magellanicus/ovatus/borealis. Although straightforward to identify, keeping up with nomenclature is sometimes more taxing. Stace introduces *A. magellanicus* in the main text (but note *A. borealis* in the index); Cope & Gray (pp.392-394) suggest that the

correct name may be *A. magellanicus* but that until this is proven *A. ovatus* should be used. We suggest using the name *A. magellanicus* in line with Stace ed. 3.

Amaranthus. These are becoming more visible with the increasing planting of game crops. See Stace, pp.496-500, with illustrations, and also Watsonia, 6: 261-280 (1961) for fuller keys and descriptions.

Anthyllis vulneraria subsp. lapponica/subsp. corbieri. Stace, pp.152-153, includes five subspecies but suggests that these probably represent only two subspecies. You should always record the status with the species/subspecies and id the subspecies if you can. Native populations should be recorded just as the species, but introduced ones as the relevant subspecies.

Aphanes. Differentiating between *A. arvensis* and *A. australis* ideally requires examination of stipules and ripe fruit. If a determination is not possible, *Aphanes* agg. should be recorded. See Rich & Jermy, p.159, Stace, p.267, and Sell & Murrell 2, pp.351-352.

Arctium/Arctium nemorosum. Stace, pp.689-690. Plants which have not been identified to species should be recorded as *Arctium* agg., although it should be possible to identify them as *A. minus* sens. lat. (Arcti *min) or *A. lappa*. *A. minus* sens. lat. includes subsp. *minus*, subsp. *pubens* and *A. nemorosum* which should be recorded if possible. Note that Sell & Murrell 4, p.71, treat *A. minus* and *A. nemorosum* as subspecies of *A. lappa*.

Arenaria leptoclados. Formerly regarded as a subspecies of *A. serpyllifolia*. See Stace, p.456, and also the account in *Flora Nordica*, volume 2, Jonsell, B. (ed.), 2001, pp.103-104.

Arenaria serpyllifolia subsp. lloydii is now thought to be a robust coastal ecotype of *A. serpyllifolia* and will not be treated separately in Atlas 2020**.**

Asperula cynanchica subsp. occidentalis is now thought to be a variety (var. *densiflora*) of subsp*. cynanchica* and will not be treated separately in Atlas 2020.

Asplenium trichomanes. It is unsafe to assume subspecies identity on the basis of rock type. The common plant is subsp. *quadrivalens*. The calcifuge diploid, subsp. *trichomanes* has most spores <35µm, medifixed roundish pinnules and long persistent red-brown rachises. Subsp*. pachyrachis* is not always as illustrated in Stace, p.24. It has imbricate, rather triangular, hyaline-edged, medifixed pinnae and is usually a more glaucous colour - some forms of *quadrivalens* mimic its starfish-like appressed habit. If in doubt send specimens to the referee. Where subspecies meet, hybrids may occur. These are

intermediate in pinna shape, usually conspicuous through their greater size and vigour and produce sterile misshapen spores.

Aster. Michaelmas Daisies which are not identified to species or hybrid level should be recorded as *Aster* agg. There are helpful keys available for many of the European taxa in Rich & Jermy, pp.303-304, and in Stace, pp.740-741. In addition, a comprehensive examination of the *Aster* genera can be found in Semple, Heard & Brouillet (2002), *Cultivated and Native Asters of Ontario*, which can be ordered from the University of Waterloo, Ontario by going to https://uwaterloo.ca/astereae-lab/biology-series. The account by P. F. Yeo in *The European garden flora* 5: 470-479 (2011) is also useful, as is Sell & Murrell 4, pp.443-452.

Atriplex. The key in Stace, pp.487-490, is complemented by illustrations of bracteole characters (p.491). For detailed accounts of the British and Irish taxa, see *Watsonia* 5: 183-219 (1985) for the species and *Watsonia* 16: 153-162 (1986) and 17: 247-264 (1989) for the hybrids. Field tips for separating *A. prostrata*/*patula* and *A. prostrata*/*glabruiscula* are given in *BSBI News* 114: 3-11 (2010), and Poland & Clement, p.417.

Baldellia ranunculoides. A summary of the differences separating subsp. *ranunculoides* and subsp*. repens* can be found at http://www.bsbi.org.uk/Baldellia_ranunculoides_subspecies.pdf. See also Stace, p.836.

Betula. *B. pendula* and *B. pubescens* are often difficult to separate and the hybrid *B*. x *aurata* appears to be frequent in some areas. These difficulties may in part be due to the presence of an overlooked third native species, *B. celtiberica*, which appears to be as common as *B. pubescens* in parts of Wales. See *BSBI Welsh Bulletin* 85: 17-19 (2010). Further research is required to establish the degree of hybridisation between these and the increasing number of alien birches which are being planted for ornament.

Betula pubescens subsp. pubescens, subsp. tortuosa. Subsp. *tortuosa* is a distinctive small tree/shrub that is confined to upland areas. It is worth recording as distinct from the widespread subsp. *pubescens* because of its differing habitat and morphology. Stace, p.294.

Bolboschoenus maritimus /B. laticarpus. Plants in non-saline environments with long pedicellate inflorescences are likely to be *B. laticarpus*. However, *B. maritimus* can have long pedicels and occasionally occurs inland - a section of the ripe fruit is necessary to confirm ID. See *Ann. Bot Fennici* 44: 81-102.

Brachypodium rupestre/pinnatum are difficult to separate, as the diagnostic character (prickle hairs) are microscopic and apparently unreliable. The recording of *B. pinnatum* agg. will therefore be needed until better discriminating characters are found.

Brassica. *B. juncea* may be overlooked as *Sinapis arvensis*. *B. napus*, *B. oleracea* and *B. rapa* are often confused and existing records are often unreliable. See Rich & Jermy, p.129, and Stace, pp.412-413 and corresponding figures on p.398.

Bromus is divided into 4 Sections in Stace: *Anisantha*, *Bromopsis*, *Bromus* and *Ceratachloa*. Note that Cope & Gray (2009) prefer different Section names; *Genea*, *Pnigma*, *Bromus*, and *Ceratochloa*.

Bromus commutatus/racemosus. See Stace, p. 1040, couplet 12 for differences between these two species. However, as Cope & Gray, p.470, note, the limits between these two species are in some cases 'little short of fanciful' and therefore include *B. commutatus* within *B. racemosus*. Record the two species if possible, but if uncertain, record as *B. racemosus* agg.

Bromus hordeaceus agg. (Bromu *hor) includes *B. hordeaceus* (with 4 subspecies), *B. lepidus* and their hybrid *B*. x *pseudothominei*. The hybrid is often confused with *B. hordeaceus* ssp. *thominei*, so that the hybrid is under-recorded and the subspecies over-recorded. Due to extreme variability it may be better to treat all these subspecies and the hybrid as widespread ecotypes of *B. hordeaceus* (see Cope & Gray, p.475-478).

Bromus hordeaceus subsp. longipedicellata. As noted above this subspecies is probably best treated as an ecotype and recorded under *B. hordeaceus* agg.

Calamagrostis. *C. purpurea* and *C. stricta* may both be under-recorded, with the former only recognised as a separate taxon in Britain in 1980, and the latter similar to *C. scotica* and also introgressing with *C. canescens*. See Cope & Gray, pp.351-352 and pp.360-362, Rich & Jermy, p.363, and Stace, pp.1030-1031.

Callitriche. Unidentified *Callitriche* plants should be recorded as *Callitriche* agg. and not as *C. stagnalis*. We are fortunate that the identification of *Callitriche* in Britain and Ireland has been greatly aided by the publication of Lansdown (2008). Note especially the separation of the two subspecies of *C. hermaphroditica* (subsp. *hermaphroditica* and subsp. *macrocarpum*); records are badly needed and will hopefully lead to a better understanding of the species' distribution. See also Stace, p. 601.

Calystegium sepium subspecies. The typical subspecies in the British Isles is subsp. *sepium*. The lovely subsp. *roseata* is under-recorded, as is the naturalised subsp.

spectabilis and the hybrid between *C. sepium* and *C. silvatica* (*C* x *lucana*). See Stace, p.567, Rich & Jermy, p. 231, and Watsonia 23: 161-165 (2000).

Cardamine corymbosa is a small prostrate nursery weed which is spreading, but is easily overlooked as *C. hirsuta*. For those fluent in Dutch or Flemish, see *Dumortiera* 93: 15-24 (2008). Alternatively, use Stace, p.401, Sell & Murrell 2, p.24, and for information about non-flowering plants, BSBI News 92: 14-16 (2003).

Cardamine pratensis subsp. paludosa, subsp. polemonioides, subsp. pratensis. *Cardamine pratensis* is a highly variable taxon in Britain and it is not yet clear how British material relates to the Continental subspecies given in Stace, pp.400-401. Nevertheless it is worth trying to record them.

Carex. See BSBI Handbook no. 1 (ed. 3), in addition to Stace, p.951-974 and Rich & Jermy, pp.341-351. Note that, as well as name changes from Stace ed. 2 to ed. 3 (listed in a separate section below), *C. viridula* has been split into three species - again!

Carex cespitosa has recently been found in Hertfordshire, and it is just possible that other populations await discovery. See *New Journal of Botany* 2: 20-25 (2012).

Centaurea nigra group. The distinction between *Centaurea nigra* and *C. debeauxii* has still to be satisfactorily resolved and so both are best treated as *C. nigra* agg. for the Atlas. However, it is still worth attempting to identify and record them if you feel you can!

Cerastium arcticum/nigrescens. The former *C. arcticum* is now subsumed within *C. nigrescens*. The Shetland taxon, *C. nigrescens* subsp. *edmonstonii*, is now treated as a variety of the widespread *C. nigresecens*. Stace, p.462.

Chenopodium album. Plants in the *C. album* aggregate (species 17-23; Stace, p.486) are sometimes difficult to separate; leaf shape characters can be unreliable. In cases of difficulty, record the aggregate. See also Rich & Jermy, pp.81-82.

Cochlearia. *Cochlearia alpina* and *C. scotica* are worth recording and are recognised as subspecies of *C. pyrenaica* and *C. officinalis* respectively by Stace (p.424) and as species by Sell & Murrell 2, p.35-36.

Cochlearia micacea is probably under-recorded in upland areas of northern and central Scotland. Stace, p.424.

Coniferous trees. We should record trees planted as a forest crop as 'planted'. In order to count as naturalised, plants must be regenerating from seed into saplings or mature

trees; the mere presence of short lived seedlings does not constitute naturalisation; these should be marked as casuals.

Conyza. Stace, pp.745-746, recognises four distinct species, *C. canadensis*, *C. floribunda*, *C. sumatrensis* and *C. bonariensis*. Note that in Stace ed.2, *C. floribunda* was listed as a synonym of *C. sumatrenisis*, but is now used as the correct name for a taxon which includes the former *C. bilbaoana*. Sell & Murrell 4, pp.456-459, added a fifth taxon, *C. daveauiana*, but this is treated by Stace as part of *C. sumatrensis* - see also BSBI News 108: 40-43 (2008). We recommend that recorders follow Stace until further progress is made with this difficult genus. Note also that *C. canadensis*, *C. sumatrensis* and *C. floribunda* hybridise with *Erigeron acris*.

Cornus sericea is a frequent alien but it is difficult to distinguish from *C. alba*; if in doubt, record *C. sericea* agg. Stace, p. 510, Sell & Murrell 3: pp.143-146.

Cotoneaster. There are now so many species in Stace that it is difficult to know where to start! A good approach might be to concentrate on the more common species - better to have some done well than none at all. The more common species are covered by Rich & Jermy, pp. 177-179. Poland & Clement, pp. 418-423 has excellent notes with a useful introductory key. Stace, pp. 216-237, has some good notes on what is over/under recorded and illustrations of all. Fryer & Hylmö, *Cotoneasters* (2009) has full keys and descriptions and many illustrations.

Cotula alpina is not listed in Stace, but has become well-established and spreading on grouse moors in northern England. Some early records attributed to *C. squalida* are errors for this. See *BSBI News* 113: 52-54 (2010) and 113: 54-55 (2010).

Crocosmia. Note that not all naturalised plants are *C*. x *crocosmiiflora*. *C. paniculata* is frequently recorded instead of the hybrid *C. paniculata* x *C. pottsii*. See Chater, A.O., Flora of Cardiganshire (2010) and the new *Hybrid Flora*, Stace et al. 2015, p.362. See also the illustrations in Stace, p.893, and Goldblatt, P., Manning, J. & Dunlop, G. (2004). *Crocosmia and Chasmanthe*. Timber Press, Portland & Cambridge.

Crocus. Naturalised populations are very under-recorded. Do not assume that all are *C. flavus* or *C. vernus*! See Stace pp.887-891, *BSBI News* 60: 36-38 (1992), and for comprehensive treatment of the genus, Matthew (1982), *The Crocus: A Revision of the Genus* Crocus (Iridaceae) (B.T. Batsford, London), and Rukšāns (2010) *Crocuses: A Complete Guide to the Genus* (Timber Press, London).

Dactylorhiza. Material which is not obviously identifiable using Stace, pp.870-877 should be submitted to local experts or the national referees. Photographs of whole plants and

key features, supported by notes on locality, size, habitat, etc., are accepted. Note that southern populations of subsp. *traunsteinerioides* are now recognised as a subsp. of *praetermissa* (*New Journal of Botany* 2:37-55).

Dryopteris affinis. Illustrated guidance and keys e.g. Trewren (2014), *Some Taxa within the Dryopteris affinis complex - A field Guide*, BPS publications; *Fern Gazette* 18:1-26, are summarised in BSBI News 108:19-22, but *D. pseudodisjuncta* is missing from the accounts. Attempts should be made to get plants to species level (*D. affinis*/*D. borreri*/*D. cambrensis*/*D. pseudodisjuncta*) but otherwise record as *D. affinis* agg.

Eleocharis spp. are now included in ed. 3 of BSBI Handbook no. 1. The drawings in Rose (1999), *Colour identification guide to the grasses, sedges, rushes and ferns* (Viking, London) are also highly recommended. The subspecies of *E. palustris*, especially the rarer subsp. *palustris*, are still under-recorded; they are not difficult to separate if ripe fruit and/or glumes are measured accurately. *E. austriaca* (*mamillata*) should be examined with care - see *Watsonia* 26: 317-325 (2007). *E. mitracarpa* is now discounted. The website by Jeremy Roberts is extremely useful (http://www.edencroft2.demon.co.uk).

Elodea. *E. nuttallii* is more frequent than *E. canadensis* in many areas of England and might turn up anywhere; *E. callitrichoides* is much rarer. Stace, p.839-840, *Watsonia* 15: 1-9 (1984), 16: 1-14 (1986) and 18: 173-177 (1990).

Epilobium. Hybrids should be looked for wherever two or more species are gathered together. Examples of under-recorded hybrids are listed below, and detailed accounts are found in the *Hybrid Flora* (Stace et al. 2015).

Erodium cicutarium. *E. cicutarium* agg. (Erodi *cic) includes both *E. cicutarium* and *E. lebelii* (formerly *E. glutinosum*). For their separation, see Stace, p.350, couplet 4. The hybrid between the two (*E*. x *anaristatum*) is not infrequent in mixed populations and is described in the *Hybrid Flora*.

Erophila. Record as *E. verna* agg. (Eroph *ver) unless identified to one of the three segregates recognised by Stace (*E. glabrescens*, *E. majuscula* and *E. verna*), pp.409-411. See also BSBI Handbook no.6 (Rich 1991), pp.256-259 and for a detailed commentary, Rich & Jermy, pp.126-128.

Escallonia. Note the presence of the hybrid, *E*. x *langleyensis*, increasingly sold by garden centres. Key features of the hybrid are shorter petal claw length and absence of tube. See Stace, p.782 and the *Hybrid Flora*, p.314.

Euphorbia oblongata is thought to be spreading, seeds prolifically and is probably under-recorded. Stace, p.308.

Euphrasia. Stace, pp.642-655. Hybridisation is frequent and hybrids may occur in the absence of one or both parents. The notes provided by Silverside in Rich & Jermy, pp.269-272, are still very helpful. Plants which cannot be named should be recorded as *Euphrasia* agg. and not as *E. officinalis* agg. An active programme of research and regional ID workshops are underway and a study group has been established. Material can be submitted to the referee (following consultation) for determination. A BSBI handbook is due for release in 2016.

Festuca. See Stace, pp.999-1006, and Cope & Gray, pp.116-153, although note that the latter volume differs in its treatment of this genus. *F. rubra* and *F. ovina* segregates are extremely critical and far from straightforward (e.g. see *Festuca ovina* text below). In the first instance, the ability to reliably identify plants to aggregate level is crucial, alongside the recording of *F. filiformis*.

Festuca arenaria subsp. arenaria, subsp. oraria. The two subspecies of *F. arenaria* have long been recognised as distinct taxa under a variety of names. Stace, p.1001, brought these together as subspecies under *F. arenaria* and they should be recorded as such. Cope & Gray, p.133, prefer to treat them as subspecies of *F. rubra*. Regardless of treatment, both subspecies are drastically under-recorded.

Festuca longifolia. Recent discoveries suggest that *Festuca longifolia* may be overlooked for other pruinose fescues in coastal areas.

Festuca ovina subsp. ovina, subsp. hirtula, subsp. ophioliticola. British populations of *Festuca ovina* traditionally comprise three subspecies: the diploid subsp. *ovina* on acid soils, mainly in the north and west, and the tetraploid subsps. *ophioliticola* of calcareous or serpentine soils and *hirtula* of acid soils throughout the range of the species (Stace, p.1005). However, doubt has been cast on ecological and geographic separation of these subspecies, with two or even three subspecies found occurring in the same habitat, and ultimately whether botanists can practically identify them in the field (Cope & Gray, p.149). Record using Stace if possible, but otherwise as Festu *ovi.

Ficaria verna. The native subspecies *fertilis* and *verna* are easily identified in late spring and populations should be checked then, although small bulbils can usually be found in leaf axils in subsp. *verna* as soon as the plants are in flower. Stace, pp.118-119 and *Watsonia* 20: 41-50 (1994) provide details of the native subspecies and an account of the large-flowered introduced taxa (subsp. *ficariiformis*, subps. *chrysocephala*).

Fumaria. For all your *Fumaria* needs, see BSBI Handbook no.12 (Murphy, 2009).

Galanthus. Don't assume all plants are *G. nivalis*. *G. elwesii*, *G. plicatus* and their hybrids are increasingly to be found, as is the glossy green-leaved *G. woronowii*. Mick Crawley's illustrated guide accessed through the BSBI website (snowdrop_identification[1].pdf) provides useful guidance.

Galeopsis. *G. tetrahit* agg. (Galeo *tet) includes *G. tetrahit* and the closely related *G. bifida*. For the distinguishing characters see Stace, p.620 and Rich & Jermy, p.242.

Galium album. Stace (pp.541-542) casts considerable doubt on the recognition of subspecies for British and Irish plants using the former name *G. mollugo*, a name which is upheld by Sell & Murrell 4, p.24. For the purposes of the Atlas, we follow Stace's interpretation.

Galium verum subsp. maritimum. Dwarf, procumbent plants with short internodes on sand-dunes, sea-cliffs and sandy heaths inland are recognised as subsp. *maritimum* (Sell & Murrell 4, p.24) although Stace, p.540, suspects that they should just be of varietal status. Although common in coastal habitats it is very poorly recorded.

Geranium ibericum, G. x magnificum and G. platypetalum are all increasingly naturalised and should be identified with care. The hybrid is totally sterile.

Geranium robertianum subsp. celticum, subsp. maritimum. *Geranium robertianum* is a very variable taxon which has been divided into a number of subspecies although Stace suggests that the characters of many overlap and probably do not define meaningful taxa. Susbsp. *maritimum* and subsp. *celticum* are most often segregated (Stace, p.348). Subsp. *celticum* grows on sunny limestone rocks, and subsp. *maritimum* appears to grow on shingle all around the coasts of Britain and Ireland, but neither are recorded consistently and they may be much more widespread than current distribution data suggests.

Gymnadenia. Our three species are *G. borealis*, *G. conopsea* and *G. densiflora*. All are under-recorded - see http://www.bsbi.org.uk/Gymnedenia_Crib_3.pdf for useful characters separating the three species, and Stace, pp.868-869.

Hedera colchica is an under-recorded naturalised Ivy. See Rich & Jermy, pp.216-217, and Stace, pp.798-799.

Hedera helix. The former *H. helix* subsp. *hibernica* is now *H. hibernica*. Differences between this and *H. helix* s.s. can be found in Rich & Jermy, pp.216-217, and Stace,

pp.798-800. Be sure to make it clear whether you are recording *H. helix* s.l. or s.s., and remember to record the cultivar Irish Ivy separately as cultivar 'Hibernica'.

Heracleum. After the gloves are on, check for the data deficient *H. sphondylium* subsp. *flavescens* (formerly subsp. *sibiricum*), currently thought to be native to east Norfolk, but perhaps overlooked elsewhere. Recent work has postulated that *H. mantegazzianum* is not the sole naturalised Giant Hogweed in Britain. See *New Journal of Botany* 3: 183-196 (2013) for information on *H. lehmannianum.* The accounts for *Heracleum* in Sell & Murrell differ substantially from Stace. Please record as per Stace for the Atlas project.

Hieracium. Identification of microspecies is greatly assisted by the recent publication of BSBI Handbook no. 15 (for northern Hawkweeds), the *Atlas of British and Irish Hawkweeds* (McCosh & Rich 2011) and Sell & Murrell (volume 4). We encourage the recording of *Hieracium* microspecies, but appreciate that most field recorders will not be able to identify plants to this level. If in doubt, record as Hiera*agg. Identification of collected material should be confirmed by a local expert or national referee. Indiscriminate collection of potentially rare taxa (e.g. members of *Hieracium* sect. *Alpina*) is strongly discouraged.

Huperzia selago subsp. selago, subsp. arctica are both under-recorded. Subsp. *selago* is assumed to be the commoner taxon occurring throughout the range of the species. Subsp. *arctica* appears to be much rarer with confirmed records from only three sites in the Outer Hebrides and one site in County Clare. See Stace, p.5.

Hyacinthoides. *H. hispanica* is much over-recorded - the default should be *H*. x *massartiana*. Polyploid wide-leaved (>25mm) non-native plants with lower fertility but spreading vegetatively are of horticultural origin and should probably be distinguished as a Cv but can be recorded as *H. hispanica* s.l. Typical diploid *H. hispanica* s.s. is rarely established but does persist in some sites. Stace, p.920-921.

Hypochaeris radicata subsp. ericetorum, with prostrate or decumbent stems, would appear to be common by the coast but there are very few records, and it is clearly grossly under-recorded. Stace, p.703.

Inula helenium resembles *Telekia speciosa* and is sometimes confused with it. Stace, p.737.

Isoetes echinospora/I. lacustris can often be distinguished morphologically on the colour and shape of the leaves but it is best to confirm ID from the megaspores - white,spiny and small (<550µm) in *echinospora*; greyer, larger (mostly 650µm+) and with anastomosed tubercles in *lacustris*. Where the two grow together the hybrid *I.* x *hickeyii* may be

expected - it is intermediate in appearance, its megaspores misshapen and irregular in size. Stace, pp.7-8.

Isolepis setacea/cernua. The overtopping bract character often used to distinguish these is a good indication but not totally reliable. Seeds should always be examined to confirm ID: *setacea* - shiny and ridged; *cernua* - matt and smooth.

Juncus bufonius. Material which has not been identified to species should be recorded as *Juncus bufonius* agg. (Juncu *buf). Where possible, however, plants should be identified to one of the three segregate species; *J. bufonius*, *J. foliosus*, *J. ranarius* (previously *J. ambiguus*). Rich & Jermy, p.327; Stace, p.936.

Juncus compressus/gerardii. Assumption about identification based on habitat can be misleading, as *J. compressus* may occur in brackish sites, and *J. gerardii* in non-saline sites inland (notably as a roadside halophyte). Stace, p.936 and *BSBI News* 114: 3-11 (2010).

Juncus conglomeratus is still over-recorded for *J. effusus* var. *subglomeratus*. See Stace, pp.937-938; Rich & Jermy, p.333. *J.* x *kern-reichgeltii* is very under-recorded.

Lamiastrum galeobdolon. Three subspecies are recognised: subsp. *montanum* is the widespread native taxon; subsp. *galeobdolon* is apparently very rare; subsp. *argentatum* is a frequent and increasingly naturalised escape from cultivation. Rich & Jermy, pp.239-210 has excellent notes on separating the two native subspecies. See also Stace, p.618.

Larix. Don't assume that all larches are *L. decidua*! *L.* x *marschlinsii* and *L. kaempferi* are frequent, the hybrid being the taxon which is now most frequently planted by foresters. Stace, p.47; *BSBI News* 71: 12-16 (1996).

Lemna. *L. minuta* is now frequent in many areas, but is sometimes mistaken for *L. minor* or for the small form of *L. gibba*. Small *L. gibba* can also be mistaken for *L. minor*, and note the recent spread of *L. turionifera* and the potential for new records for *L. valdiviana*. *British Wildlife* 23: 326-334 (2012) provides an excellent field guide to the Duckweeds of the British Isles. See also Stace, pp.833-834 and Rich & Jermy, pp.325-326.

Leucanthemum vulgare subsp. cantabricum, subsp. crassifolium. Although not recognised by Stace, these two subspecies are thought to be distinct (Sell & Murrell volume 4, p.481). Subsp. *crassifolium* is a southwest European subspecies that has been recorded on serpentine rocks at Mullion and Cadgwith in Cornwall, whereas subsp. *cantabricum* is known from only two sites, one in County Mayo and one in Glamorganshire. Both may be under-recorded.

Leucojum aestivum. The two subspecies are under-recorded. In addition to the differences in Stace, p.905, the edges of the scape are denticulate in subsp. *aestivum* but entire in subsp. *pulchellum*.

Limonium. See Stace, pp.427-434. The named infraspecific taxa within the *L. binervosum* agg. generally have very local geographic ranges and this is a strong indication of what to expect. Some taxa however are now starting to spread as roadside halophytes which may confuse the picture. Further distinct local variants are equally worthy of recognition - many additional taxa have been described in the as yet unpublished account by Sell & Murrell. *L. hyblaeum* is an increasing garden escape which superficially may resemble *L. humile* in its lax inflorescence but has obovate-spathulate leaves.

Lonicera caprifolium/L. x italica. The hybrid is commoner than *L. caprifolium* in gardens and may now be the most common naturalised Honeysuckle. Check plants which appear to be *L. caprifolium* to ensure that they are really this and not the hybrid. Stace, p.790.

Lotus. *L. corniculatus* var. *sativus*, sometimes introduced with wildflower seed mixes, may have hollow rather than solid stems, so the hollow stems of *L. pedunculatus* will not always separate it from *L. corniculatus*. The appearance of the calyx teeth in bud provides an easily observed and more reliable distinction. Stace, p.153.

Lupinus polyphyllus. Lupins should not be automatically recorded as *L. polyphyllus*; *L*. x *regalis* is much the commoner naturalised species in England and Wales, and may account for most modern records outside of Scotland. Stace, pp.179-180.

Lycium. It is difficult to separate the two species, but see Stace, p.572 for differences in corolla and leaf shape. Bushes which are not identified to species should be recorded as *Lycium* agg.

Lycopodium clavatum/lagopus. For distinguishing characters see Stace, p.6. Intermediate plants with mostly but not exclusively single strobili on 2.5cm+ peduncles on Scottish mountains may be hybrids/introgressants and should be sent to the referee.

Mahonia. Check naturalised populations to see if they are *M. aquifolium*, *M*. x *decumbens* or even *M. repens*. Stace, pp.100-101, also notes the possible presence of *M*. x *wagneri*.

Melampyrum pratense subsp. commutatum, subsp. pratense. See *BSBI News* 125: 38-39. Subsp. *commutatum* occurs on calcareous soils, is a taller plant and has proportionately broader leaves and shorter calyces. The small, golden-flowered taxon var. *hians* is sometimes mistaken for *M. sylvaticum* and is worth recording.

Mentha. It is always prudent to check for hybrids when encountering *Mentha*. The accounts in the *Hybrid Flora* are excellent, and complement Stace, pp.629-634.

Mimulus. Plants which are not identified to species should be recorded as *Mimulus* agg., not *M. guttatus* (*M*. x *robertsii* is commoner than this species in many areas). *M. peregrinus* has recently been described new to Britain (Vallejo-Marin 2012). For comprehensive accounts of the British and Irish taxa, see Rich & Jermy, pp.258-260, Stace, pp.637-639, Silverside, A.J. (1981). *Mimulus* L., in Wigginton, M. J. & Graham, G. G., (eds). *Guide to the identification of some of the more difficult vascular plant species*. Nature Conservancy Council England Field Unit Occasional Paper No. 1: pp.81-84, and Silverside, A.J. (2000). *Mimulus* L., in Cullen, J., et al., (eds.), *European Garden Flora* 6: 275-280.

Molinia caerulea subspp. In recent years two subspecies (*arundinacea* and *caerulea*) have been recognised (Stace, 1056-1057), but detailed examination of specimens have shown that they overlap in terms of morphology, ecology and habitat, often with tall plants of subsp. *arundinacea* occurring amongst larger populations of subsp. *caerulea* (Cope & Gray, p.522-524). It is very doubtful that the current division into two subspecies should be maintained given the difficulties of recording them accurately in the field, and we suggest not attempting to do so.

Montia fontana. There are four subspecies in the British Isles; susbp. *fontana*, subsp. *chondrosperma*, subsp. *variabilis*, subsp. *amporitana*. The latter two are probably under-recorded, although subsp. *amporitana* may be genuinely rare. Stace, pp.507-508.

Muscari. *M. neglectum* and the common garden plant *M. armeniacum* are often confused. Stace, pp.921-922.

Myosotis scorpioides/M. secunda. These should be separated by the floral characters; stem pubescence is unreliable and reliance on this character results in records of *M. secunda* outside its range. *M. laxa* may also be confused with these species

Myriophyllum. Vegetative distinctions between *M. alterniflorum* and *M. verticillatum* are not always reliable, and records of the latter outside its known range should be based on floral characters or plants with turions (only produced by *M. verticillatum*). Stace, pp.142-143.

Narcissus. Unidentified daffodils should be recorded as *Narcissus* agg., not *N. pseudonarcissus*. If possible, plants should be identified to species or hybrids rather than the 'Divisions' of the International Daffodil Checklist. Crawley (2009) has set up a website

(http://www.thedaffodilsite.co.uk/) to help identification of cultivars, and see also Stace, pp.908-914.

Nasturtium microphyllum/officinale. Record when pods are ripe to make identification straightforward. Descriptions and photographs of seeds are in Stace, pp.397-399.

Nuphar pumila. Care should be taken to separate this species from *N*. x *spenneriana*, its hybrid with *N. lutea*. Stace, p.81.

Oenanthe. Key differences separating *O. pimpinelloides*, *O. silaifolia*, *O. lachenalii* and *O. fistulosa* can be found in Rich & Jermy, p.222-223. See also Stace, p.813 and pp.815-816.

Oenothera. A critical genus which needs to be approached with care. Plants which cannot be identified as a particular species/hybrid should be recorded as *Oenothera* agg. There are small differences in the treatment of this genus between Stace, pp.362-365, and the forthcoming handbook from Rose Murphy. Record as Stace, but with the recognition of *O. cambrica*, and be aware of the frequency of hybrids.

Ononis repens/spinosa. Stace (pp.163-164) holds with the view that *O. repens* and *O. spinosa* are separate species, whereas Sell & Murrell (volume 3; p.60) treat them as a single species, *O. spinosa*, with four subspecies. For the purposes of the Atlas, we suggest using Stace's treatment, but for clarification, the description by Sell & Murrell of *O. spinosa* subsp. *maritima* and *O. spinosa* subsp. *procurrens* are synonymous with *O. repens* subsp. *maritima* and *O. repens* subsp. *repens* of Stace. Similarly their description of *O. spinosa* subsp. *spinosa* is synonymous with *O. spinosa* (sensu Stace), and *O. spinosa* subsp. *intermedia* with the hybrid between *O. repens* subsp. *repens* and *O. spinosa* subsp. *spinosa* (*O*. x *pseuohircina*).

Ophioglossum azoricum. Dwarfed forms of *O. vulgatum* in exposed sites can be mistaken for *O. azoricum* as they have more reflexed, smaller fronds. *O. azoricum* usually has paired sterile fronds and <14 pairs of sporangia on the fertile spike. *O. vulgatum* fronds are always single and usually with >14 sporangia pairs.

Oxalis corniculata/exilis/dillenii/stricta. Poland & Clement, pp.337-338, Stace, pp.302-305, and Rich & Jermy, p.207 all help in separating *Oxalis corniculata* and its allies. The cautionary note in *BSBI News* 101: 40-42 (2006) is also useful.

Pedicularis sylvatica. Subsp. *hibernica* with a uniformly hairy calyx is easily distinguished but perhaps not always looked for. Intermediate plants with hairs on the ridges only may represent hybridisation/introgression with subsp. *sylvatica* - their relationship to subsp.

lusitanica requires clarification. Note that *P. palustris* has a hairy calyx but with two sets of lateral teeth, not one.

Philadelphus. The hybrids *P.* x *virginalis* and *P*. x *lemoinei* are now more frequently encountered in gardens than *P. coronarius*. Take care to identify plants in the wild correctly. Stace, pp.510-511.

Phleum pratense/bertolonii are morphologically very similar, but *P. bertolonii* tends to be smaller and more slender than *P. pratense*, typically occurring in less productive grassland, although *P. pratense* is very variable and characters often overlap. Cope & Gray recommend separation using a combination of features (p.406). See also Stace, p.1037.

Pilosella officinarum subspecies. Seven subspecies have been recognised in the British Isles based on differences in hairs on the involucral bracts (Sell & Murrell, volume 4, pp.214-215). However, Stace (p.721) suggests that these probably just represent forms, a sentiment echoed by Chater (2010). With the possible exception of subsp. *trichoscapa*, which may be genuinely rare, all have been recorded unevenly and are significantly under-recorded. Although they will not be mapped for the Atlas project, they are nevertheless worth attempting.

Pilosella peleteriana subsp. peleteriana, subsp. subpeleteriana, subsp. tenuiscapa. *Pilosella peleteriana* is now thought to include three subspecies with disjunct distributions (Sell & Murrell, volume 4, p.218); subsp. *peleteriana*, subsp. *subpeleteriana* and subsp. *tenuiscapa.* Although Stace (p.721) recognises subsp*. subpeleteriana* from a single site in Montgomeryshire (Craig Breidden), records are also known from Portland, Alderney, Jersey and Guernsey.

Planted trees and shrubs. Many of the 'native' trees and shrubs recently planted are in fact sourced from abroad, and may be different subspecies or races or even different species. Reference should be made to the article by Peter Sell in *BSBI News* 105: 24-30 (2007) on introduced 'look-alikes', and Johnson & More, *Collins Tree Guide* (2004) is very useful.

Poa infirma is spreading but possibly still under-recorded. Best searched for in spring when the grass's lemon-yellow colour stands out. Stace, p.1012; Cope & Gray, pp.201-203.

Poa pratensis agg. Poa *pra includes *P. angustifolia*, *P. humilis* and *P. pratensis*. *P. pratensis* s.s. itself is now rare in some areas (it has been suggested that it is our most

over-recorded plant!) and is almost always less common than *P. humilis*. Cope & Gray, pp.222-229, treat these taxa as subspecies of *P. pratensis*.

Polygonatum. The commonest garden plant is *P*. x *hybridum*, which is widely naturalised. The native species are much less frequent as naturalised plants: make certain of the identification before recording them, particularly outside the native range of either parent. Stace, pp. 929-930.

Polygonum. See BSBI Handbook no. 3 (Akeroyd, 2103). Sell & Murrell's as yet unpublished account recognises many segregates within *P. aviculare/ P. arenastrum* and these have been taken up and briefly described by Chater (2010) in his *Flora of Cardiganshire*. Karlsson (2000) in *Flora Nordica* volume 1 treats *P. arenastrum*, *P.boreale* and *P. rurivagum* as subspecies of *P. aviculare*. Further work is clearly needed on this group, but for the purposes of the Atlas project records are accepted following Stace, pp.440-442.

Polypodium. The three species are now generally well known and usually well recorded. Hybrids, of which *P*. × *mantoniae* (*P*. *interjectum* × *P*. *vulgare*) is the most frequent, have been less well characterised in descriptive texts (but see the new *Hybrid Flora*), and are still under-recorded, but they generally show hybrid vigour. The illustrations and descriptive comments in Page (1997), *The ferns of Britain and Ireland, Cambridge University Press*, 2nd ed., are helpful to an extent. The hybrids show abortive spores but care must be taken as sporangial abortion may occur in climatically stressed fertile taxa. Material suspected to be of hybrids should be sent to the referee for confirmation.

Polystichum × bicknellii (P.aculeatum × P. setiferum) is under-recorded and can be expected wherever the parents meet. It is intermediate in frond form, tapering more to the base and with a shorter rachis than *setiferum* and more leathery/evergreen than that plant. It shows hybrid vigour and is best discriminated by its abortive spores.

Populus. In addition to Stace, pp.312-318 and BSBI Handbook no. 4 (Meikle, 1984), see J. Jobling, 1990, *Poplars for wood production and amenity* (Forestry Commission Booklet 92), HMSO London, for the cultivars of *P*. x *canadensis* and other alien poplars.

Potamogeton. BSBI handbook no. 8 (Preston, 1995) provides a detailed account and hybrids discovered since are described in the *Hybrid Flora*. Note remarks on the need for voucher specimens (pp.114-116) and criteria for the acceptance of records (pp.136-137). Linear-leaved taxa should be identified using stipule characters. Recorders with little experience of this genus are advised to consult more experienced colleagues for help with the more difficult taxa.

Potentilla erecta. The subspecies of *P. erecta* should be recorded; subsp. *strictissima* is almost certainly under-recorded in upland areas. Stace, p.256 and *Watsonia* 9: 301-317 (1973).

Prunus cerasifera is possibly still being under-recorded. It flowers earlier than P*. spinosa*/*P.domestica*. See Stace, p.196. The purple-leaved var. *pissardii* is very widely planted and may be self-sowing more frequently - its offspring are more variable and less strongly pigmented, and the characteristic green colour of the first-year shoots less easy to discern though they are, however, still shiny and glabrous.

Pteridium. The taxonomy of *Pteridium* is still contentious; clonal variation occurs and some British forms have been given recognition at specific, subspecific and varietal ranks. Genetic studies suggest such recognition is generally unwarranted. However, two discrete taxa can be recognised and should be recorded. Shorter boreal plants with +/- horizontal, rather triangular tripinnate, more winter-green fronds, hairy only on the main veins below and with very sparsely ciliate false-indusia (cf. densely ciliate in subsp*. aquilinum*) have previously been called subsp*. latiusculum* (Stace, p.19). Molecular studies suggest that extensive hybridisation and introgression with local more southern taxa have created distinct genetic entities in N. America, Asia and Europe which have therefore been given different names - the European now recognised as subsp. *pinetorum*. This occurs in Scotland as scattered clonal patches possibly relict but as likely colonists from Scandinavia. It is probably under-recorded. Hybridisation is believed to continue with subsp. *aquilinum* where the taxa meet. Plants showing intermediacy in the characters given above should be recorded as possible hybrids and material sent to the general Pteridophyte referee (FJR).

Pteris. Several species are to be regularly found as fairly persistent self-sown plants of sheltered walls - see *Pteridologist* 5: 31-35. Variegated forms of *P. cretica* are cultivated but the variegated plant often sold as var. *albo-lineata* and which has established in several sites is *P. nipponica*. *P. multifida* is at least as hardy as *P. cretica* and almost as frequently established. It differs in its narrower pinnae (<8mm) all of which are decurrent. *P. umbrosa* is similar in its pronounced pinna decurrence but is a much larger plant, only the lowest pinnae pair branching - it is frequent in some botanic garden glasshouses but very rarely established outside. *P. vittata* is the only simply pinnate species established. *P. tremula* is similar to young *Pteridium* but lacks that species' dense pubescence on the unfurling fronds. It is rather frost sensitive and rarely persists.

Puccinellia distans. For details of subsp. *borealis*, currently only known in the British Isles along the coastline of Scotland, see Cope & Gray, p.190, and *Watsonia* 20: 391-396 (1995).

Pyrola media/minor. See Poland & Clement, p.232, for foliage characters distinguishing non-flowering plants.

Ranunculus subgenus Batrachium. This is a difficult group to record with accuracy, and even with the assistance of Stace, plants can be easily mis-identified. For example, many plants that resemble *R. tripartitus* in the New Forest appear to be *R*. x *novae-forestae*, and in fact, hybridisation is probably the norm, rather than being unusual. Lansdown (2015) sets out the issues facing identification of members of the subgenus in his subgeneric introduction to the account in the new *Hybrid Flora*, and also in his 2007 report to the Environment Agency (Southern Region) '*The identity of* Ranunculus *subgenus* Batrachium *in the River Itchen*'. The report is available from the author on request. If there is doubt about an identification, it is best to confer with a local expert or the national referee. Otherwise, we suggest that plants are recorded to the subgenus aggregate.

Rhinanthus minor subsp. minor, subsp. stenophyllus. The subspecies as noted by Stace, pp.657-659, do not consistently work and perhaps accordingly have been poorly recorded. They do however make some ecological and geographic sense and recorders are encouraged to overcome their reluctance and make an effort.

Ribes rubrum/spicatum. Flowering plants can be separated using Stace, p.124, couplet 7. See also the BSBI species account written by A.J. Richards and available to download at http://www.bsbi.org.uk/Ribes_spicatum_species_account.pdf.

Rorippa islandica/R. palustris. *R. islandica* has been found in quantity in Wales and there are recent first records for England, so it might therefore be more widespread than thought. Check fruiting plants to separate these closely related taxa. Stace, pp.396-397; BSBI Handbook no. 6 (Rich, 1991).

Rosa. Recorders who wish to look at roses critically are encouraged to contact a local botanist with experience of the group when they start to record, or (failing that) a national referee. Although a complex group, it is normally possible to make useful progress in a single season. The current taxonomy is set out in BSBI Handbook no. 7 (Graham & Primavesi, 1993) and summarised to species level in Stace, pp.267-277. It relies on the identification of fruiting material. The taxa on the cards include Rosa *cae (the two subspecies of *R. caesia*), Rosa *can (*R. canina* agg., i.e. *R. caesia*, *R. canina* and *R.*

obtusifolia), Rosa *mol (*R. mollis* agg., i.e. *R. mollis*, *R. sherardii* and *R. tomentosa*) and Rosa *rub (*R. rubiginosa* agg., i.e. *R. agrestis*, *R. micrantha* and *R. rubiginosa*). A few hybrids are commoner than at least one of their parents in particular areas.

Rubus. Most recorders will not be able to identify the microspecies and should record *R. fruticosus* agg. However, it is also important for Atlas 2020 to record the native and alien species which do not belong to this critical aggregate: these are the native *R. arcticus* (if anyone finds it!), *R. chamaemorus*, *R. idaeus* and *R. saxatilis* and the aliens *R. cockburnianus*, *R. loganobaccus*, *R. odoratus*, *R. parviflorus*, *R. phoenicolasius*, *R. spectabilis* and *R. tricolor*. Stace, 241-246; Rich & Jermy, p.143-146; Edees & Newton (1988). *Brambles of the British Isles* (Ray Society, London).

Rumex acetosa subsp. biformis. A succulent leaved coastal taxon that has been recorded from sea-cliffs in Cornwall, Cardiganshire and County Clare. It is probably overlooked and could occur elsewhere on the Atlantic coasts of the British Isles. Stace, p.447.

Salicornia. Molecular studies suggest that our current taxonomic treatment is untenable, with the morphologically recognised taxa representing multiple parallel evolutions. Kadereit et al, 2012 (*Taxon* 61: 1227-1239) recommend the recognition of 3 species in the British flora - the tetraploid low salt-marsh *S. procumbens* subsp. *procumbens* (incl. *S. dolichostachya* , *S. fragilis* and *S. emerici*) and two diploid upper saltmarsh species *S. europaea* and *S. perennans*. The single-flowered *S. pusilla* is regarded as a subsp. of the former (*S. europaea* subsp. *disarticulata*). Unfortunately there are no clear morphological characters by which *europaea* and *perennans* can be told apart (!), and they do not correspond completely with existing named taxa, e.g. *S. europaea, S. obscura*, *S. ramosissima*, etc. *S. perennans* has a predominantly eastern European distribution and is currently only known from the Norfolk coast. Recorders who feel confident can continue to record as per Stace, pp.492-495 and may also refer to C. Lahondère, *Les Salicornes s. l.* (Salicornia *L.* Sarcocornia *A. J. Scott et* Arthrocnemum *Moq.) sur les côtes Francaises* (2004), a very helpful, well-illustrated handbook. Otherwise a sensible level would be to differentiate and record the tetraploid (*S. procumbens* agg.) and the diploids (*S. europaea* agg.) - noting the morphologically distinctive *S. europaea* subsp. *disarticulata* (and its hybrid - nothosubsp. *marshallii*).

Salix euxina, Salix x fragilis. Notes on taxonomic changes to what was once known as *S. fragilis* can be found in *BSBI News* 118: 8-9 and *BSBI News* 120: 37.

Scleranthus annuus subspecies have not been well recorded - the sepal divergence character is not always apparent but the two taxa can be reliably discriminated on achene length: >3.2mm in *annuus*, usually <3.0mm in *polycarpos* (Stace, p.465).

Sedum. Do not assume that all Sedums on walls are either *S. acre* or *S. album*!

Sedum telephium subsp. fabaria, subsp. telephium. The distinction between the two subspecies is often not clear, and the extent to which subsp. *telephium* occurs, at least as a native plant, is uncertain. Both are inconsistently recorded by British and Irish botanists and consequently their relative distributions are not clear, but one should try. Its occurrence as a frequent escape from gardens has further obscured these distributions. Stace, p.140.

Senecio aquaticus subsp. ornatus, subsp. erracticus. *Senecio aquaticus* subsp. *ornatus* is a very distinctive subspecies with more compact inflorescences but larger flowers than subsp. *aquaticus* (Sell & Murrell 4, p.495). It is thought to occur throughout the Hebrides and the Orkney and Shetland Islands. Subsp. *erracticus* resembles a taller but much smaller flowered subsp. *aquaticus*. It has been recorded from Guernsey in the past and there are also a few specimens from southern England which may be referable to it.

Senecio vulgaris subsp. denticulatus. Hairy plants on sand-dunes with small ligules, simple stems, few flowers and less deeply-lobed leaves than subsp. *vulgaris* have been named as subsp. *denticulatus* (Stace, p.764). It has a westerly distribution but is clearly under-recorded and requires further work and recording.

Solanum physalifolium/S. sarachoides. *S. sarachoides* is over-recorded for *S. physalifolium* subsp. *nitidibaccatum*. See Stace, p.578. *S. nigrum* subsp. *schultesii* may, like the former taxa, also have greenish fruits, but its obtuse-toothed calyx does not enlarge in fruit and the fruits lack stone cells.

Solidago virgaurea subsp. minuta. Dwarf, unbranched, early flowering mountain plants in northern England, Wales and Scotland are sometimes segregated as subsp. *minuta*. It is clearly under-recorded and requires further study and recording. Stace, pp.739-740.

Sonchus arvensis subsp. arvensis, subsp. uliginosus. Subsp. *arvensis* is the common taxon throughout the range of the species but is unevenly recorded. Glabrous plants of *Sonchus arvensis* with short phyllaries have a different chromosome number to subsp. *arvensis* and have been called subsp. *uliginosus,* but their status requires further investigation (Stace, p.708).

Sonchus asper subsp. asper, subsp. glaucescens. Subsp. *asper* is the common taxon throughout the range of the species but it has been recorded very unevenly by British botanists. Although the taxonomic status of subsp. *glaucescens* requires further investigation, it is certainly under-recorded, probably in part due to the difficulties in measuring the diagnostic spicules on the achenes.

Sorbus. For a detailed account of this group, see BSBI Handbook no. 14 (Rich et al., 2010), and also *New Journal of Botany* 4: 2-12 (2014).

Sparganium erectum subspp. For the subspecies see Stace, 925-926; Rich & Jermy, p.371. Subsp. *microcarpum* and subsp. *neglectum* appear to be the most widespread of the four subsp., but all are almost certainly under-recorded, partly due to ripe brown fruit being required for identification, as the subspp. cannot be separated vegetatively.

Sparganium natans. Dwarf plants of *S. angustifolium* are often misidentified as *S. natans*, although *S. natans*, once known, is a distinctive plant. An additional character to those in Stace, p.926, lies in the lowest peduncle, which arises directly out of the axil of the bract in *S. natans* but is fused with the stem for a short distance above the axil in *S. angustifolium*. All records of *S. natans* should be based on flowering or fruiting plants, as vegetative plants resemble immature individuals of the other *Sparganium* species.

Spartina. *S. anglica* should be distinguished from *S*. x *townsendii*, which is still being over-recorded. See the new *Hybrid Flora*, pp.425-427. Record as *Spartina* agg. if in doubt.

Spiraea. Four species (*S. alba*, *S. douglasii*, *S. salicifolia*, *S. tomentosa*) and their hybrids (*S*. x *billardii*, *S*. x *pseudosalicifolia*, *S*. x *rosalba*) form a critical group. If they are have not been identified to species/hybrid level they should be recorded as *Spiraea* agg. (not *S. salicifolia*, which is greatly over-recorded). The *Spiraea* agg. category should not be used for the other taxa in Stace, which are quite distinct. Stace, pp.191-194; Rich & Jermy, pp.140-142.

Stellaria neglecta/media. *S. media* s.s. is a variable species and some of its variants can approach *S. neglecta* in general appearance. Stamen number and seed size are good characters to separate the two. See Stace, p.459. *Nature in Cambridgeshire* 35: 61-63 (1993) is also useful, noting that alongside these two characters, petals should at least equal the sepals for *S. neglecta* .

Symphytum. In addition to Stace, pp.555-558, see Rich & Jermy, pp.235-236 and Sell & Murrell, volume 3, pp.358-363, which briefly describes some of the *S*. x *hidcotense* cultivars.

Symphytum officinale subsp. officinale, subsp. bohemicum. Subsp. *officinale* is less common than and over-recorded for *S*. × *uplandicum,* which itself is fertile and backcrosses to subsp. *officinale* forming intermediates. Subsp. *bohemicum* has only recently been discovered by British botanists and requires further study. Stace, p.557.

Taraxacum. Most recorders will not be able to identify the microspecies and should record *Taraxacum* agg. Those that attempt to record microspecies should consult their local expert and/or the BSBI referee, Professor John Richards, for advice.

Thalictrum minus subsp. arenarium. Coastal plants with glaucous leaves with dense stalked glands on the lowerside of the leaf have been named subsp. *arenarium* but recent work suggests all our plants of *T. minus* occur within subsp. *saxatile* (Stace, p.121). However, subsp. *arenarium* is a very distinctive taxon, has been well recorded by British and Irish botanists, and is worth noting pending any future revision.

Trichomanes speciosum. The gametophyte generation is still very under-recorded and overlooked. It is very distinctive in both habit and habitat but growing in situations rarely explored by vascular plant recorders. See *Watsonia* 22: 1-19.

Trichophorum. Make sure that you make it clear whether you are recording *T. cespitosum* s.l. or s.s. Both segregate species and the hybrid *T*. x *foersteri* is still under-recorded. See Jeremy Roberts' excellent illustrated account of the deergrasses and how to distinguish them at http://www.edencroft2.demon.co.uk/deergrasses.html

Trifolium fragiferum subsp. bonannii. Plants of *Trifolium fragiferum* in southern England with small calyces, exserted corollas and slightly elongated racemes have been named subsp. *bonannii,* but its status seems very doubtful (Stace, p.174) and it is probably under-recorded.

Tripleurospermum. Recorders should separate *T. inodorum* from *T. maritimum* and record the subspecies of the latter, and be aware of the hybrid, which could be widespread in coastal areas. Stace, p.759.

Ulmus. Stace (p.279) gives useful information on the collection of material for identification. Sucker shoots cannot be reliably identified and so should be recorded as *Ulmus* agg. *U. glabra* is normally distinctive, although it hybridises freely. Material identified by the recorder as not belonging to *U. glabra* should be verified with the VCR and/or sent to the specialist referee. If the latter course is taken, fruits should be collected between April and May, mature shoots after June, and a description of habit should also be supplied.

Ulmus glabra subsp. glabra, subsp. montana. In Britain two rather ill-defined subspecies have been described based on the width of leaves: subsp. *glabra*, with broadly obovate leaves, occurs mainly in the south and subsp. *montana*, with narrowly obovate leaves occurs in the north and west (Stace, p.281).

Urtica dioica subsp galeopsifolia does not always differ in morphology with subsp. *dioca*, and a range of intermediates occur. Record this subsp. following Stace, p.285, and the usual one as subsp. *dioica*, but if in doubt, name as *Urtica dioica* agg.

Utricularia australis/vulgaris. *U. australis* cannot (yet) be reliably morphologically distinguished from *U. vulgaris* when not in flower – and flowers are rarely produced. Non-flowering plants should be recorded as *U. vulgaris* agg. The two may co-exist. Stace, pp.665-667.

Utricularia intermedia agg. The commonest taxon in this agg. is *U. stygia*. *U. intermedia* - a plant of more nutrient-rich and basic environments - is apparently very rare. The taxa can be distinguished by the quadrifid hairs in the traps - this requires caution, common-sense and a consistent approach. Always look c. mid-trap and take a consensus view as there will be variation. *U. minor*, which can sometimes show the shoot dimorphism of the *intermedia* agg., consistently differs in its much smaller (<2.5 mm) traps. British plants identified as *U. bremii* may be forms of *U. minor*- any material believed to be this taxon should be sent for critical determination.

Vacciunium uliginosum subsp. microphyllum. Some small plants from Shetland resemble the diploid subsp. *microphyllum* from northern Europe but require further study (Stace, p.534).

Valeriana officinalis subsp. collina, subsp. sambucifolia. Both subspecies have been virtually ignored by British and Irish botanists but attempts should be made to distinguish them. Subsp. *collina* occurs in southern and central Britain, mainly in boulder clay woods, whereas subsp. *sambucifolia* occurs on much damper soils throughout the range of the species. Sell & Murrell, volume 4, p.52; Stace, p.793.

Valerianella locusta subsp. dunensis. Very dwarf, stemless plants which are common and sometimes abundant on dunes in western Britain have been recognised as subsp. *dunensis* (Sell & Murrell, volume 4, p.49), are probably best treated as a variety (Stace, p.791), but should still be recorded.

Veronica serpyllifolia subsp. humifusa is probably still under-recorded in the Scottish Highlands. Stace, p.589, and Rich & Jermy, pp.262-263, both note the presence of montane forms of subsp. *serpyllifolia* that share some characters with subsp. *humifusa*,

particularly in montane areas outside of the Highlands, and in such instances suspected subsp. *humifusa* should be examined with care, and the normal plant recorded as subsp. *serpyllifolia*.

Vicia sativa. The large subsp. *sativa* is only rarely found as a relic of cultivation or of commercial products such as chicken feed; subsp. *nigra* and *segetalis* are much commoner. The annual *V. lathyroides*, a close relative of *V. sativa* s.l., can be most readily separated by its simple (not branched) tendrils and a tuberculate seed coat, although other characters (flower and pod size) listed in Stace, pp.159-160 and Rich & Jermy, pp.184-185, should be examined for determination.

Vicia sativa subspecies. Subsp. *nigra* is mainly a coastal species of sandy habitats throughout the British Isles but often introduced inland; subsp. *segetalis* is an archaeophyte formerly grown for fodder and is the commonest taxon throughout the range of the species; subsp. *sativa* is a casual alien of rough ground (formerly cultivated for fodder) which is often over-recorded for subsp. *segetalis*. Two additional subspecies recognised by Sell & Murrell (volume 3, p.80) - subsp. *bobartii* and subsp. *uncinata* - are included as synonyms of subsp. *nigra* in Stace (p.159).

Zannichellia palustris subsp. palustris, subsp. pedicellata. Subsp *palustris*, with peltate stigmas, appears to be more common than subsp. *pedicellata* (with strap-shaped stigmas), but both are under-recorded and require further investigation.

Zostera angustifolia. Narrow-leaved plants formerly recognised as *Z. angustifolia* are now considered to be either a variety (var. *stenophylla*) or growth form of *Z. marina*. Stace, p.842.

Widespread but under-recorded hybrids

Below is a list of the 50 commoner hybrids which seem, from inspection of the Maps and species accounts in the new *Hybrid Flora*, to be widespread yet under-recorded in many areas. The hybrid book includes comprehensive identification notes including diagnoses from the parents, enabling naming and recording of hybrids to a degree not available previously. Many of us shy away from recording hybrids, but almost all on this short list might be recorded with a little care, looking especially for examples of sterility and very vigorous growth.

Taxon	**Hybrid Atlas**
Atriplex prostrata x *longipes (A.* x *gustafssoniana)*	p. 218
Calystegia sepium x *silvatica (C.* x *lucana)*	p. 238
Carex hostiana x *viridula (C.* x *fulva)*	p. 391
Carex otrubae x *remota (C.* x *pseudoaxillaris)*	p. 382
Carex paniculata x *remota (C.* x *boenninghausiana)*	p. 381
Cirsium dissectum x *palustre (C.* x *forsteri)*	p. 292
Colutea arborescens x *orientalis (C.* x *media)*	p. 46
Drosera anglica x *rotundifolia (D.* x *obovata)*	p. 209
Dryopteris carthusiana x *dilatata (D.* x *deweveri)*	p. 27
Elytrigia repens x *juncea (E.* x *laxa)*	p. 422
Epilobium ciliatum x *montanum (E.* x *interjectum)*	p. 165
Epilobium ciliatum x *parviflorum (E.* x *floridulum)*	p. 162
Epilobium montanum x *obscurum (E.* x *aggregatum)*	p. 164
Equisetum arvense x *fluviatile (E.* x *litorale)*	p. 9
Euphorbia waldsteinii x *esula (E.* x *pseudovirgata)*	p. 102
Fallopia japonica x *sachalinensis (F.* x *bohemica)*	p. 191
Festuca pratensis x *Lolium perenne (*x *Festulolium loliaceum)*	p. 400
Galium mollugo x *verum (G.* x *pomeranicum)*	p. 229
Glyceria fluitans x *notata (G.* x *pedicellata)*	p. 420
Hyacinthoides hispanica x *non-scripta (H.* x *massartiana)*	p. 368
Hypericum maculatum x *perforatum (H.* x *desetangsii)*	p. 150

Ilex aquifolium x *perado (I.* x *altaclerensis)* p. 288
Juncus acutiflorus x *articulatus (J.* x *surrejanus)* p. 372
Juncus conglomeratus x *effusus (J.* x *kern-reichgeltii)* p. 375
Juncus effusus x *inflexus (J.* x *diffusus)* p. 374
Leucanthemum lacustre x *maximum (L.* x *superbum)* p. 305
Lolium multiflorum x *perenne (L.* x *boucheanum)* p. 404
Persicaria hydropiper x *maculosa (P.* x *intercedens)* p. 189
Polypodium interjectum x *vulgare (P.* x *mantoniae)* p. 28
Prunus domestica x *spinosa (P.* x *fruticans)* p. 53
Quercus petraea x *robur (Q.* x *rosacea)* p. 97
Rorippa amphibia x *sylvestris (R.* x *anceps)* p. 182
Nasturtium officinale x *microphyllum (N.* x *sterile)* p. 184
Rumex crispus x *obtusifolius (R.* x *pratensis)* p. 202
Rumex longifolius x *obtusifolius (R.* x *hybridus)* p. 196
Rumex obtusifolius x *sanguineus (R.* x *dufftii)* p. 207
Salix alba x *babylonica (S.* x *sepulcralis)* p. 111
Salix aurita x *cinerea (S.* x *multinervis)* p. 124
Salix aurita x *repens (S.* x *ambigua)* p. 128
Salix babylonica x *fragilis (S.* x *pendulina)* p. 110
Salix caprea x *cinerea (S.* x *reichardtii)* p. 120
Salix caprea x *viminalis (S.* x *sericans)* p. 115
Salix cinerea x *viminalis (S.* x *holosericea)* p. 117
Senecio aquaticus x *jacobaea (S.* x *ostenfeldii)* p. 307
Senecio squalidus x *viscosus (S.* x *subnebrodensis)* p. 310
Spiraea douglasii x *salicifolia (S.* x *pseudosalicifolia)* p. 51
Stachys sylvatica x *palustris (S.* x *ambigua)* p. 251
Typha angustifolia x *latifolia (T.* x *glauca)* p. 370
Ulex europaeus x *gallii (U.* x *breoganii)* p. 49
Veronica anagallis-aquatica x *catenata (V.* x *lackschewitzii)* p. 241

Summary of recent name changes

Although changes from Stace ed. 2 to ed. 3 have been widely publicised, we felt it pertinent to include them again in this Booklet for ease of reference. Nomenclatural changes relating to hybrid taxa can be found at http://www.bsbi.org.uk/resources.html, scrolling down to 'New Names in Stace 3', Part 2 (hybrids). There are also some nomenclatural changes in the *reprint* of edition 3; see *BSBI News* 118: 8-9 (2011).

Stace ed.2 Taxon	**Stace ed.3 Taxon**
Aceras anthropophorum	*Orchis anthropophora*
Aethusa cynapium subsp. *cynapioides*	*Aethusa cynapium* subsp. *elata*
Alopecurus borealis	*Alopecurus magellanicus*
Althaea hirsuta	*Malva setigera*
Alyssum saxatile	*Aurinia saxatilis*
Anagallis minima	*Centunculus minimus*
Arabis arenosa	*Arabidopsis arenosa*
Arabis glabra	*Turritis glabra*
Arabis petraea	*Arabidopsis petraea*
Arabis turrita	*Pseudoturritis turrita*
Arenaria serpyllifolia subsp. *leptoclados*	*Arenaria leptoclados*
Asparagus officinalis subsp. *prostratus*	*Asparagus prostratus*
Astilbe rivularis	*Astilbe chinensis*
Bromus hordeaceus subsp. *divaricatus*	*Bromus hordeaceus* subsp. *molliformis*
Callitriche hamulata	*Callitriche brutia* subsp. *hamulata*
Carex curta	*Carex canescens*
Carex muricata subsp. *lamprocarpa*	*Carex muricata* subsp. *pairae*
Carex ovalis	*Carex leporina*
Carex viridula subsp. *brachyrrhyncha*	*Carex lepidocarpa*
Carex viridula subsp. *oedocarpa*	*Carex demissa*
Carex viridula subsp. *viridula*	*Carex oederi*
Cerastium arcticum	*Cerastium nigrescens*

Ceterach officinarum	*Asplenium ceterach*
Chamaecyparis nootkatensis	*Xanthocyparis nootkatensis*
Chenopodium ambrosioides	*Dysphania ambrosioides*
Chenopodium carinatum	*Dysphania carinata*
Chenopodium cristatum	*Dysphania cristata*
Chenopodium desiccatum	*Chenopodium pratericola*
Chenopodium multifidum	*Dysphania multifida*
Chenopodium pumilio	*Dysphania pumilio*
Chionodoxa forbesii	*Scilla forbesii*
Chionodoxa luciliae	*Scilla luciliae*
Chionodoxa sardensis	*Scilla sardensis*
Chrysanthemum coronarium	*Glebionis coronaria*
Chrysanthemum segetum	*Glebionis segetum*
Corispermum leptopterum	*Corispermum intermedium*
Coronopus didymus	*Lepidium didymum*
Coronopus squamatus	*Lepidium coronopus*
Cotoneaster linearifolius	*Cotoneaster thymifolius*
Cotoneaster nitidus	*Cotoneaster rotundifolius*
Cotoneaster rotundifolius	*Cotoneaster uva-ursi*
Crataegus pedicellata	*Crataegus coccinea*
Cucubalus baccifer	*Silene baccifera*
*Dactylorhiza majalis (*excl. subsp. *cambrensis)*	*Dactylorhiza kerryensis*
Dactylorhiza traunsteineri	*Dactylorhiza traunsteinerioides*
Dryopteris affinis subsp. *borreri*	*Dryopteris borreri*
Dryopteris affinis subsp. *cambrensis*	*Dryopteris cambrensis*
Duchesnea indica	*Potentilla indica*
Eleocharis austriaca	*Eleocharis mamillata* subsp. *austriaca*
Elytrigia repens subsp. *arenosa*	*Elytrigia campestris*
Epipactis leptochila var. *dunensis*	*Epipactis dunensis*

Erica mackaiana	*Erica mackayana*
Erigeron acer	*Erigeron acris*
Erodium malachoides	*Erodium malacoides*
Escallonia macrantha	*Escallonia rubra* var. *macrantha*
Euphorbia characias subsp. *wulfenii*	*Euphorbia characias* subsp. *veneta*
Euphorbia serrulata	*Euphorbia stricta*
Euphrasia anglica	*Euphrasia officinalis* subsp. *anglica*
Euphrasia rostkoviana	*Euphrasia officinalis*
Euphrasia rostkoviana subsp. *montana*	*Euphrasia officinalis* subsp. *monticola*
Euphrasia rostkoviana subsp. *rostkoviana*	*Euphrasia officinalis* subsp. *pratensis*
Festuca arundinacea	*Schedonorus arundinaceus*
Festuca gigantea	*Schedonorus giganteus*
Festuca pratensis	*Schedonorus pratensis*
Filipendula kamtschatica	*Filipendula camtschatica*
Fragaria × ananassa	*Fragaria ananassa*
Galanthus ikariae	*Galanthus woronowii*
Galium mollugo	*Galium album*
Gentiana clusii	*Gentiana acaulis*
Gentianella ciliata	*Gentianopsis ciliata*
Geranium rubescens	*Geranium yeoi*
Geranium submolle	*Geranium herrerae*
Gymnadenia conopsea subsp. *borealis*	*Gymnadenia borealis*
Gymnadenia conopsea subsp. *densiflora*	*Gymnadenia densiflora*
Hebe barkeri	*Veronica barkeri*
Hebe brachysiphon	*Veronica brachysiphon*
Hebe dieffenbachii	*Veronica dieffenbachii*
Hebe salicifolia	*Veronica salicifolia*
Hedera helix subsp. *hibernica*	*Hedera hibernica*
Helictotrichon neesii	*Amphibromus neesii*

Helictotrichon pratense	*Avenula pratensis*
Helictotrichon pubescens	*Avenula pubescens*
Heracleum sphondylium subsp. *sibiricum*	*Heracleum sphondylium* subsp. *flavescens*
Jonopsidium acaule	*Cochlearia acaulis*
Juncus ambiguus	*Juncus ranarius*
Lavatera arborea	*Malva arborea*
Lavatera cretica	*Malva pseudolavatera*
Lavatera plebeia	*Malva preissiana*
Lavatera trimestris	*Malva trimestris*
Ledum palustre subsp. *groenlandicum*	*Rhododendron groenlandicum*
Leontodon autumnalis	*Scorzoneroides autumnalis*
Limonium latifolium	*Limonium platyphyllum*
Listera cordata	*Neottia cordata*
Listera ovata	*Neottia ovata*
Lloydia serotina	*Gagea serotina*
Loiseleuria procumbens	*Kalmia procumbens*
Lotus glaber	*Lotus tenuis*
Luzula pallidula	*Luzula pallescens*
Lychnis alpina	*Silene suecica*
Lychnis chalcedonica	*Silene chalcedonica*
Lychnis coronaria	*Silene coronaria*
Lychnis flos-cuculi	*Silene flos-cuculi*
Lychnis viscaria	*Silene viscaria*
Lycopersicon esculentum	*Solanum lycopersicum*
Lythrum hyssopifolium	*Lythrum hyssopifolia*
Malus domestica	*Malus pumila*
Matricaria recutita	*Matricaria chamomilla*
Medicago sativa subsp. *varia*	*Medicago sativa* nothosubsp. *varia*
Monotropa hypopitys	*Hypopitys monotropa*

Monotropa hypopitys subsp. *hypophegea*	*Hypopitys monotropa* subsp. *hypophegea*
Monotropa hypopitys subsp. *hypopitys*	*Hypopitys monotropa* subsp. *monotropa*
Narcissus poeticus subsp. *radiiflorus*	*Narcissus radiiflorus*
Narcissus pseudonarcissus subsp. *major*	*Narcissus hispanicus*
Narcissus pseudonarcissus subsp. *obvallaris*	*Narcissus obvallaris*
Nothofagus nervosa	*Nothofagus alpina*
Orchis laxiflora	*Anacamptis laxiflora*
Orchis morio	*Anacamptis morio*
Orchis ustulata	*Neotinea ustulata*
Ornithogalum angustifolium	*Ornithogalum umbellatum* subsp. *campestre*
Orobanche artemisiae-campestris	*Orobanche picridis*
Orobanche minor var. *maritima*	*Orobanche minor* subsp. *maritima*
Orobanche minor var. *minor*	*Orobanche minor* subsp. *minor*
Otanthus maritimus	*Achillea maritima*
Papaver dubium subsp. *dubium*	*Papaver dubium*
Papaver dubium subsp. *lecoqii*	*Papaver lecoqii*
Peucedanum ostruthium	*Imperatoria ostruthium*
Peucedanum palustre	*Thyselium palustre*
Photinia davidiana	*Stranvaesia davidiana*
Phyllitis scolopendrium	*Asplenium scolopendrium*
Picris echioides	*Helminthotheca echioides*
Potentilla neumanniana	*Potentilla tabernaemontani*
Potentilla palustris	*Comarum palustre*
Psoralea americana	*Cullen americanum*
Ranunculus ficaria	*Ficaria verna*
Ranunculus ficaria subsp. *bulbilifer*	*Ficaria verna* subsp. *verna*
Ranunculus ficaria subsp. *chrysocephalus*	*Ficaria verna* subsp. *chrysocephala*
Ranunculus ficaria subsp. *ficaria*	*Ficaria verna* subsp. *fertilis*
Ranunculus ficaria subsp. *ficariiformis*	*Ficaria verna* subsp. *ficariiformis*

Rorippa microphylla	*Nasturtium microphyllum*
Rorippa nasturtium-aquaticum	*Nasturtium officinale*
Rosa caesia subsp. *glauca*	*Rosa caesia* subsp. *vosagiaca*
Rosa pimpinellifolia	*Rosa spinosissima*
Rumex pseudoalpinus	*Rumex alpinus*
Sagina apetala subsp. *erecta*	*Sagina filicaulis*
Salicornia nitens	*Salicornia emerici*
Salix fragilis var. *decipiens*	*Salix euxina*
Salsola kali subsp. *ruthenica*	*Salsola kali* subsp. *tragus*
Sanguisorba minor	*Poterium sanguisorba*
Sanguisorba minor subsp. *minor*	*Poterium sanguisorba* subsp. *sanguisorba*
Sanguisorba minor subsp. *muricata*	*Poterium sanguisorba* subsp. *balearicum*
Senecio fluviatilis	*Senecio sarracenicus*
Seriphidium maritimum	*Artemisia maritima*
Silene quadrifida	*Silene alpestris*
Simethis planifolia	*Simethis mattiazzii*
Stachys officinalis	*Betonica officinalis*
Stellaria uliginosa	*Stellaria alsine*
Stipa neesiana	*Nassella neesiana*
Thlaspi caerulescens	*Noccaea caerulescens*
Thlaspi macrophyllum	*Pachyphragma macrophyllum*
Thlaspi perfoliatum	*Microthlaspi perfoliatum*
Tragopogon hybridus	*Geropogon glaber*
Trichophorum cespitosum subsp. *cespitosum*	*Trichophorum cespitosum*
Trichophorum cespitosum subsp. *germanicum*	*Trichophorum germanicum*
Triglochin maritimum	*Triglochin maritima*
Triglochin palustre	*Triglochin palustris*
Yucca recurvifolia	*Yucca gloriosa (*var. *recurvifolia)*

Definition of Aggregates

Aconitum napellus s.l. includes *A. napellus* s.s., *A. napellus* subsp. *napellus* and subsp. *vulgare*, and *A. napellus* x *variegatum* (*A*. x *cammarum*)

Agrostis canina s.l. includes *A. canina* s.s. and *A. vinealis*.

Alchemilla vulgaris agg. is defined in Stace to include *A. acutiloba*, *A. filicaulis*, *A. glabra*, *A. glaucescens*, *A. glomerulans*, *A. micans*, *A. minima*, *A. mollis*, *A. monticola*, *A. subcrenata*, *A. tytthantha*, *A. vulgaris*, *A. wichurae*, and *A. xanthochlora.*

Aphanes arvensis agg. includes *A. arvensis* s.s., *A. australis*, and *A. arvensis-australis* intermediates.

Aster agg. includes all of the introduced 'Michaelmas-daisies', i.e. *A. ascendens*, *A. ageratoides*, *A*. *amellus*, *A. concinnus*, *A. cordifolius*, *A. dumosus*, *A. ericoides*, *A. foliaceus*, *A. junceus*, *A. laevis*, *A*. *lanceolatus*, *A. lateriflorus*, *A. macrophyllus*, *A. novae-angliae*, *A. novi-belgii* s.s., *A. pilosus*, *A. praealtus*, *A. prenanthoides*, *A. puniceus*, *A. schreberi*, *A. sedifolius*, *A. spectabilis*, *A. subulatus*, *A. umbellatus*, *A. vimineus*, *A. laevis* x *novi-belgii* (*A*. x *versicolor*), *A. novi-belgii* x *lanceolatus* (*A*. x *salignus*)

Atriplex prostrata agg. includes *A. prostrata* s.s., *A. glabriuscula*, *A. longipes*, *A. praecox*, *A. glabriuscula* x *longipes* (*A*. x *taschereaui*), *A. glabriuscula* x *praecox*, *A. glabriuscula* x *prostrata*, *A. longipes* x *prostrata* (*A.* x *gustafssoniana*)

Brachypodium pinnatum s.l. includes *B. pinnatum* s.s., *B. rupestre*, and *B. pinnatum* x *sylvaticum* (*B.* x *cugnacii*)

Bromus racemosus agg. includes *B. commutatus* and *B. racemosus*.

Callitriche agg. includes all *Callitriche* species

Carex flava agg. includes the very rare *C. flava* s.s. and the three former *C. viridula* subspecies *C. demissa*, *C. lepidocarpa*, and *C. oederi*.

Chenopodium album agg. is defined by Stace as including *C. album* s.s., *C. album* var. *album* and var. *reticulatum*, *C. bushianum*, *C. giganteum*, *C. opulifolium*, *C. probstii*, *C. suecicum*, *C. strictum*, *C.* x *variabile* (*C. album* x *berlandieri)*, and *C. album* x *suecicum* (*C.* x *fursajewii*).

Cochlearia officinalis s.l. includes *C. micacea*, *C. officinalis* s.s., *C. pyrenaica* and subspecies.

Cornus sericea agg. includes *C. alba* and *C. sericea*.

Cotoneaster horizontalis agg. includes *C. adpressus*, *C. apiculatus*, *C. ascendens*, *C. atropurpureus*, *C. nanshan*, *C. perpusillus*, *C. horizontalis*, *C. hjelmqvistii*.

Cotoneaster microphyllus agg. includes *C. microphyllus* s.s., *C. cashmiriensis*, *C. congetstus*, *C. conspicuus*, *C. integrifolius*, *C. linearifolius*, *C. astrophorous*, *C. marginatus*, *C. cochleatus*, *C. thymifolius*, *C. microphyllus*, *C. prostratus*, *C. rotundifolius*, *C. sherriffii*.

Dipsacus fullonum s.l. includes *D. fullonum*, *D. sativus* and *D. fullonum* x *sativus*.

Dryopteris affinis agg. includes *D. affinis*, *D. borreri*, *D. cambrensis, D. pseudodisjuncta* and their subspecies.

Epipactis leptochila agg. includes *E. dunensis*, *E. leptochila*, *E. muelleri, and E. sancta*.

Erodium cicutarium agg. includes *E. cicutarium* s.s., *E. cicutarium* s.l., *E. lebelii*, and *E. cicutarium* x *lebelii* (*E.* x *anaristatum*).

Erophila verna s.l. includes *E. glabrescens*, *E. majuscula*, and *E. verna* s.s.

Euphorbia esula agg. includes *E. cyparissias*, *E. esula*, *E. waldsteinii* and their hybrids: *E. cyparissias* x *esula* (*E.* x *pseudoesula*), *E. cyparissias* x *waldsteinii* (*E*. x *gayer*i), and *Euphorbia esula* x *waldsteinii* (*E*. x *pseudovirgata*).

Euphrasia agg. includes all *Euphrasia* taxa. Note that it is not acceptable to use *E. officinalis* agg.

Festuca ovina agg. is defined in Stace to include *F. armoricana*, *F. brevipila, F*. *filiformis*, *F. huonii*, *F. lemanii*, *F. longifolia*, *F. ovina* s.l., *F. ovina* s.s., *F. vivipara*.

Festuca rubra agg. includes *F. arenaria*, *F. heterophylla*, and *F. rubra*.

Galeopsis tetrahit agg. includes *G. bifida*, *G. tetrahit* s.s., and their hybrid *G. bifida* x *tetrahit* (*G.* x *ludwigii*).

Hieracium agg. includes all *Hieracium* species.

Hordeum distichon s.l. includes *H. distichon* s.s., and *H. vulgare*.

Juncus bufonius s.l. includes *J. bufonius*, *J. foliosus*, and *J. ranarius* (previously *J. ambiguus*).

Limonium binervosum agg. is defined in Stace to include *L. binervosum* s.s., *L. britannicum*, *L. dodartiforme*, *L. loganicum*, *L. paradoxum, L. parvum*, *L. procerum*, *L. recurvum*, *L. transwallianum*.

Malus sylvestris s.l. includes *M. pumila* and *M. sylvestris* s.s.

Mimulus agg. includes all *Mimulus* species and hybrids.

Narcissus agg. includes all *Narcissus* species and hybrids.

Nasturtium officinale agg. includes *N. microphyllum*, *N. officinale* s.s., and their hybrid *N. officinale* x *N. microphyllum* (*N*. x *sterilis*).

Phleum pratense s.l. includes *P. bertolonii* and *P. pratense* s.s.

Poa pratensis s.l. includes *P. angustifolia*, *P. humilis*, and *P. pratensis* s.s.

Polygonatum multiflorum agg. includes *Polygonatum multiflorum* and the hybrid *P. multiflorum* x *odoratum* (*P.* x *hybridum*)

Polygonum aviculare agg. includes *P. arenastrum*, *P. aviculare* s.s., *P. boreale*, and *P. rurivagum*.

Polypodium vulgare s.l. includes *P. cambricum*, *P. interjectum*, *P. vulgare* s.s., and their hybrids: *P. interjectum* x *vulgare* (*P.* x *mantoniae*), *P. cambricum* x *vulgare* (*P*. x *font-queri*), *P. cambricum* x *interjectum* (*P*. x *shivasiae*).

Populus nigra includes all fastigate cultivars of *P. nigra* except *P. nigra* subsp. *betulifolia* s.s.

Potentilla x mixta s.l. includes *Potentilla* x *mixta* s.s. (*P. anglica* x *repens*) and *P. erecta* x *reptans* (*P.* x *italica*)

Pyrus communis s.l. includes *P. communis* s.s., *P. pyraster* s.s., and *P. pyraster* s.l., unless *P. cordata* is a possibility.

Ranunculus subgenus Batrachium agg. should only be used when identification is in doubt and material cannot be collected and sent to the referee or local expert for determination.

Rosa canina agg. includes the dog-roses (*R. caesia*, *R. canina* s.s. and *R. obtusifolia*) and the hybrids between these species.

Rosa mollis agg. includes the downy-roses (*R. mollis* s.s., *R. sherardii* and *R. tomentosa*) and the hybrids between these species

Rosa rubiginosa agg. includes the sweet-briars (*R. agrestis*, *R. micrantha* and *R. rubiginosa* s.s.) and the hybrids between these species.

Rubus fruticosus agg. is defined in Stace (p.241) to include all taxa in *Rubus* subgenus *Rubus* except *R. caesius*.

Salicornia agg. includes all *Salicornia* species and hybrids.

Salicornia europaea agg. includes *Salicornia europaea* s.s., *S. obscura*, *S. perennans*, and *S. ramosissima*.

Salicornia procumbens agg. includes *S. emerici*, *S. fragilis*, and *S. dolichostachya*

Sorbus aria agg. is defined in Stace to include *S. aria*, *S. cambrensis, S. cheddarensis*, *S. eminens* s.s., *S. eminentiformis*, *S. eminentoides*, *S. hibernica*, *S. leptophylla*, *S. lancastriensis*, *S. leighensis*, *S. margaretae*, *S. parviloba*, *S. porrigentiformis*, *S. rupicola*, *S. rupicoloides*, *S. saxicola*, *S. stenophylla, S. stirtoniana, S. whiteana,* and *S. wilmottiana.*

Sorbus intermedia agg. is defined in Stace to include *S. anglica, S. arranensis, S. cuneifolia, S. intermedia* s.s., *S. leyana, S. minima*, *S. mougeotii*, and *S. scannelliana*.

Sorbus latifolia agg. includes *S. admonitor*, *S. bristoliensis*, *S. croceocarpa*, *S. decipiens*, *S. devoniensis*, *S. latifolia* s.s., *S. subcuneata*, and *S. aria* x *torminalis* (*S*. x *tomentella*).

Spiraea agg. Four species (*S. alba*, *S. douglasii*, *S. salicifolia*, *S. tomentosa*) and their hybrids (*S*. x *billardii*, *S*. x *pseudosalicifolia*, *S.* x *rosalba*) form a critical group.

Taraxacum agg. includes all *Taraxacum* species.

Tricophorum cespitosum s.l. includes *T. cespitosum* s.s., *T. germanicum*, and their hybrid *T. cespitosum* x *germanicum* (T. x *foersteri*).

Tripleurospermum maritimum s.l. includes *T. inodorum*, *T. maritimum* s.s., and their hybrid.

Utricularia intermedia s.l. includes *U. intermedia* s.s., *U. ochroleuca*, and *U. stygia*.

Utricularia vulgaris s.l. includes *U. australis* and *U. vulgaris* s.s.