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Tiny form of *Conyza canadensis* (*c.*20 cm high) with atypical inflorescence structure and simple lower stem leaves. Wroxham, Norfolk (v.c.27). Photo Bob Leaney © 2006 (p. 7)

Carex oederi in Devil's Hole, Sefton Coast (v.c.59). Photo P.H. Smith © 2016 (p. 22)

Small form of *Conyza floribunda* with corymbose inflorescence and near simple main stem leaves. Sprowston, Norfolk (v.c.27). Photo Bob Leaney © 2012 (p. 7)

Platanthera ×*hybrida*, Ard Dorch, Skye (v.c.104). Photo T. Swainbank © 2016 (p. 51)

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Cover picture: – *Taxus baccata* (Yew) at 490m growing on open fell in acidic grassland, Cumberland (v.c.**70**). Photo taken from north of the tree, looking southerly to Middle Fell. The Yew shows flagging on its western side due to the south westerly prevailing wind. Photo R.A. Dalton © 2016 (p. 18)

Coordinator's Corner

PETER STROH, *c/o Cambridge University Botanic Garden, 1 Brookside, Cambridge, CB2 1JE*; (peter.stroh@bsbi.org)

I recently had the pleasure of reading through the many accounts sent in by VCRs describing some of the highlights of botanical recording in each vice-county across Britain and Ireland in 2016. In total, you (the botanical community) contributed another million records to our database, including an impressive 719 new vice-county records (NCRs) across 83 vice-counties. This wealth of information will greatly enhance our understanding of how our flora is changing in the twenty-first century, so thank you, and keep up the good work!

Spring and summer field meetings

One of the real highlights of being involved in an Atlas project is the pleasure of recording and learning in the company of others, and those with a wide range of skills. Please don't be put off by thinking everybody else on these trips will be an expert – that is almost never the case, and my experience is that those who do know more than you are incredibly patient and very good company. Glancing at the *Yearbook* there are many exciting meetings you might attend, all of several days length, in the Dingle Peninsula (June 1st -5th); N. Roscommon (June 16th-18th); West Cowal, Argyll (June 17th-24th); Wester Ross (June 23rd-26th & July 9th-16th); Merioneth (July 21st-24th). And of course there are many other shorter meetings too. Get in touch with your VCR and give one or more a try!

On the lookout for hybrids

It struck me that in 2016 there were, overall, a significant number of notable records for hybrids, and in particular, to my eye, hybrid sedges, that were either a first county record or had not been seen for many decades. To give a few examples, *Carex acuta* × *C. nigra* (*Carex* ×*elytroides*) was found in South Hampshire, the first record for over 100 years, and there were new county records for *Carex elata* × *C. acuta* (*Carex* ×*prolixa*) and *Carex acutiformis* × *C. acuta* (*Carex* ×*subgracilis*) in Kent, and a first for *Carex hostiana* × *C. demissa* (*Carex* ×*fulva*) in Stirlingshire, a hybrid that should always be looked for when both parents are in close proximity, with a squeeze of the empty 'pineapple' heads when found very satisfying indeed. There were also many new hybrid *Euphrasia* records for vice-counties, no doubt in large part a result of the series of workshops organised by Chris Metherell over the past couple of years as he and Fred Rumsey move a stage closer to finishing their eagerly-awaited *Euphrasia* Handbook. With the recent publication of the Violet Handbook, I look forward to seeing a boost in the number of hybrid *Viola* records in 2017!

It cannot, I think, be entirely coincidental that the publication of the *Hybrid Flora* (Stace *et al*., 2015) seems to have corresponded with an increase in hybrid records. In 2016 there were 243 new county records (and counting, as some data will still be 'in transit') for hybrid taxa, compared with an average of about 150 NCRs per year over the period 2006-2015. The availability of books that help with 'groups' that are widely regarded as 'difficult' is enormously helpful, both in terms of the

knowledge they impart, but also for the confidence-boost that they bring to recorders when out in the field or examining specimens at home, leading ultimately to a better understanding of a taxon's distribution and ecology. I am probably not alone in being previously unaware of the hybrid between *Luzula multiflora* subsp. *multiflora* and subsp. *congesta* (*Luzula* × *danica*) before I read the account of it in the *Hybrid Flora*, but having seen some odd-looking *Luzula* in a nearby reserve that contains both subspecies, I now know to look more closely at the Wood-rushes in the woodland, rather than just (rather lazily, I'm ashamed to admit) passing them off as strange, robust *multiflora* plants and leaving it at that. It also gives me a great excuse to get outdoors and try to find what would be a new county record – and I will certainly send off a specimen to the BSBI referee for confirmation!

Detailed recording at finer scales

I have in recent years, and rather belatedly, switched from tetrad (2km) to monad (1km) recording, and I find it very rewarding and much easier to fit in to a busy week. This is not to say that tetrad records are not valuable – they most certainly are – but if you are a bit short of free time then 'adopting' a few monads might be the way to go, and it could be that the monads surrounding your house, or where you walk regularly, have no or very few records. Recording near to your house presents an opportunity to know better your local flora and almost certainly discover new plants and in areas you might not have explored otherwise. I find it's also a good way of getting to know local landowners and farmers, whether it's asking for permission to access land or concerning plants that you have found on your wanderings. Please do ask your local VCR (or me) if you'd like to know more about monads in your local patch that require records for the Atlas.

Under-recorded/overlooked species

I thought it only right to focus on a few Violet hybrids that you may encounter this spring, giving you an excuse to use your brand-new copy of the *Viola Handbook* (which, at the time of writing, I've not received, so I'm relying on Stace *et al*., (2015) for the text below!). *Viola riviniana* × *V. reichenbachiana* (*Viola* ×*bavarica*) is widely scattered across England but is almost certainly still under-recorded, partly because it can be tricky to identify due to the similarity of the parents. Look for plants with either the characters of *V. riviniana* but with a dark delicate spur, or plants with the characters of *V. reichenbachiana* but with a spur that is notched and furrowed like *V. riviniana*. *Viola odorata* × *V. hirta* (*Viola* ×*scabra*) is confined to base-rich soils, has slightly fragrant flowers, and intermediate petiole pubescence. Lastly, *Viola riviniana* × *V. canina* (*Viola* ×*intersita*) can be present in open, well-lit habitats where both parents occur (e.g. heaths, coastal dunes). Like *V. canina* its flowers are almost clear blue, but spur colour is usually paler than *V. canina*, and, most notably, plants of the hybrid retain for a considerable time their withered brown petals around undeveloped ovaries, whereas the petals of both parents fall quickly as the ovaries swell.

Finally, and not a hybrid or a Violet, keep your eyes open for the continued spread of *Senecio inaequidens* (Narrow-leaved Ragwort). This had only a handful of records for the last Atlas across 12 vice-counties, but post-1999 it has 'exploded' in its distribution and can now be found from Kent to Orkney to Co. Cork, with records for 86 vice-counties. However, it has yet to be recorded in several vice-counties, including Breconshire, Radnorshire, Herefordshire, Huntingdonshire, Merioneth, North West Yorkshire, North Northumberland, Pembrokeshire and numerous vice-counties in Scotland and Ireland. The species is quite distinctive, having long golden ray florets and very narrow, dark green, willow-like leaves that are entire and sparsely-toothed rather than lobed (Crawley, 2005).

References:

CRAWLEY, M.J. (2005). *The flora of Berkshire*. Brambleby Books, Hertfordshire.

STACE, C.A., PRESTON, C.D. & PEARMAN, D.A. (2015). *Hybrid flora of the British Isles*. BSBI, Bristol.

IMPORTANT NOTICES

From The President

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"In those far-off days, one read botany, geology and zoology in equal parts; as the professors – though very distinguished – were laboratory rather than field men, I found the course not quite what I had been hoping for." Those are the words of the revered naturalist-scholar, Frank Mitchell, writing of his student days in Dublin in the early 1930s. So when BSBI members deplore the lack of field studies in modern university courses, and the supposed ignorance of some biology students about anything larger than a cell, it seems they are giving voice to a complaint that has been around for a long time! Fortunately for us, Mitchell did find some mentors, notably a Danish paleoecologist, Professor Knud Jessen, and an Irish naturalist who had originally trained as an architect, Arthur Stelfox.

It is just as well that we do not depend entirely on universities (or schools, museums or governments) to protect and foster field natural history. They may help from time to time, but fashions change, and field botanists in particular are now a rarity in all of these four types of institution. BSBI and its counterparts, however, continue to thrive. By welcoming within their compass the full range from expert to beginner, it is societies such as ours that keep the flag flying.

Since the last issue of *BSBI News* was published, the Review Group's Report (*A Society like no other*) has been issued and was discussed by Council on February 22nd. By the time you read this, it will have been on the website for several weeks, along with the minutes of the Council meeting at which it was broadly approved. It will also have been considered by the Board of Trustees. There are 44 recommendations, some of them modest, and some of them more radical.

One I would like to highlight is about BSBI's role in education: '*Learning about the flora of Britain and Ireland should have equal status in the Society with science and recording*'. Interestingly, this recommendation, depending on your point of view, suggests either a radical new departure, or a statement of the *status quo*. Some of those making submissions to the Review spoke of the Society's database of over 40 million records as its chief asset. If your main interest is in data gathering and interpretation, you may see the need to learn from and teach others as, at best, a means to an end and not a primary purpose of the Society. Others regarded BSBI members and their expertise as its most precious resource. If you see our purpose as one of creating a body of people with knowledge and understanding of plants, then the data we produce may seem as much a consequence as an end in themselves. Both are valid viewpoints. But the Review Group clearly felt it important that BSBI should be unambiguous in its adoption of an ethos in which botanists and plants have equal billing. In other words, providing mentors for the Frank Mitchells of tomorrow is as much part of the Society's role as identifying Fumitories or tracking the spread of the invasive species of Fleabane.

There are of course many other recommendations, and they are too varied even to summarise here. Some will not have obvious consequences unless you are deeply involved in the running of the Society. The proposal to reduce the number of standing committees from four to three may come into this category. In combination, however, the recommendations should make the Society more appealing to outsiders, less exposed to avoidable risks, and more able to fulfil its aims.

A few however are likely to become highly visible to all members. The most obvious of these is the proposal to merge most of BSBI's regular printed publications (including *BSBI*

News) into a single well-designed periodical. So far, we have only an outline proposal, but detailed investigations are underway to look into the feasibility and costs. If you'd like to find out more about the Review, take a look at the Report. One or two members have told me they actually enjoyed reading it. Even if you do not get round to reading it, do please join me in being grateful to all those who have worked so hard on your behalf: members who submitted their views and suggestions, the Review Group team who waded through the submissions and gave up an entire weekend (and more) to thrash out their recommendations, and all the officers and staff of BSBI who are now beavering away to implement it.

Meanwhile, learning about and recording the flora of these islands carries on apace. We are now into the third-last year before the deadline for Atlas 2020 recording. Now that the days are longer, the temperature warmer, and flowers are beginning to appear, I am looking forward to getting out and about more, using the Atlas project as an excuse to explore some new places.

New Journal of Botany

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Members who follow *New Journal of Botany* will be aware that the timing of its appearance has recently become erratic and has not complied with the planned schedule of three issues per year. This primarily reflects the disappointing rate at which new manuscripts are being submitted, a problem that has been apparent for some time but has become especially acute over the last two years. The reasons for this are manifold. An on-going decline in whole-organism botanical research in academia has limited the number of professional authors, and those still active are understandably drawn towards journals with a more established bibliometric rating. Attempts to attract more contributions from amateur botanists have been partly successful, but many such authors have found dealing with the online procedures for submission, review, proofing and production to be an intimidating and/or frustrating experience, with a few vowing never to repeat the process. In short, there is a growing mismatch between the placement of the journal and the ambitions of its publisher on the one hand, and the expectations of authors it needs to attract on the other.

Following advice from BSBI's Council and Publications Committee, BSBI's Board of Trustees has concluded that the journal in its current form is no longer sustainable. Nor does it appear to have much support from the membership as a whole. Comments from members about the usefulness and value of NJB expressed during the recent review of BSBI's structure and strategy were mainly negative, despite nearly 400 members subscribing to receive hard-copy of NJB in 2016 at extra cost. This negative perception is alarming given the proportion of the membership fee committed to producing NJB and providing on-line access to all. Consequently, we intend to terminate the current publication agreement with Taylor & Francis with effect from the end of 2017. All papers published in NJB since its inception in 2011 will remain on the T&F archive and be downloadable by BSBI members and accessible to other readers.

This development should not be interpreted as BSBI reneging on its commitment to support and disseminate research relevant to the systematics, ecology and conservation of the British and Irish flora. Nothing could be further from the truth! However, the society needs as a matter of urgency to explore options for developing an alternative platform for publication consistent with the needs and expectations of authors, members and the external readership. It is not the purpose of this article to speculate on the outcome of these discussions; this will be announced following careful consideration of the options, informed by the comprehensive consultations with

members that have recently taken place. In the meantime, there is a last chance to contribute an article for issues remaining to be published in 2017. Please email njb@bsbi.org to enquire about submitting a paper or to express a view about the journal.

BSBI is indebted to Richard Gornall for his role in the inception of *New Journal of Botany* and for steering it through its first five years as editor-in-chief, to Louise Marsh who as editorial assistant has provided the skills, diplomacy and discipline to guide authors through the non-trivial technical processes from initial submission to publication, and to our talented panels of editors and reviewers who have strived to support authors and ensure adherence to standards of scientific excellence.

Notes from the Editors

TREVOR JAMES (Receiving Editor), *56 Back Street, Ashwell, Baldock, Herts., SG7 5PE*; (Tel.: 01462 742684) (trevorjjames@btinternet.com)
GWYNN ELLIS (General Editor), *41 Marlborough Road, Roath, Cardiff, Wales, CF23 5BU*; (Tel.: 02920 332338) (gwynn.ellis@bsbi.org)

It is a truism that "you don't know what you've got until you lose it" and so it was when I had to edit this issue of *BSBI News* from scratch.

In the past I received edited Word documents from Trevor which I could cut-and-paste into my DTP programme with much of the hard work having already been done; what a revelation this time. I had not appreciated how almost every author interpreted the issued guide-lines in different subtle ways. The best advice I can give to any future contributor is just to look at how things have been done in recent issues. In particular, all taxa should have a scientific and vernacular name in that order with the latter in brackets and in the list of References, please follow this general plan – Ellis, R.G. (2015). Instructions to contributors. *BSBI News*, **135**: 6. [Don't put the authors in capitals, leave that to the Editors!]

It was quite a shock to see how many variations there were in the original texts but please don't let this put you off sending something, we are happy to receive contributions of all sorts!!

Trevor is now out of hospital but 'still very much under par', so copy for *BSBI News* **136** should continue to be sent to Gwynn Ellis with Trevor copied in.

David Pearman and Pete Stroh very kindly volunteered to assist with the editing of this issue and I am very grateful to them for all their help which has proved invaluable.

Another bumper issue this time, probably much larger than it would have been had Trevor been in charge; I can not resist late entries. When I started editing, it appeared that we had sufficient photos to fill the colour plates but as this proved not to be the case, we can again showcase some of the other entries in the 2016 BSBI Photographic Competition. The two shown on the back cover were the 'winners' in a vote taken at the Annual Exhibition Meeting at Wallingford. Colour Plates 2 & 3 have further photos, one of which on Plate 3 is by one of our junior members which unfortunately arrived too late to be judged.

The magnificent *Viola* handbook has now been published and all pre-publication orders have been posted. Anyone who has not received their copy should contact the Membership Secretary. One wrongly paginated copy has been reported; as there may be more, please check your copy and let the Membership Secretary know if a replacement is needed

A bumper issue of *Irish Botanical News* has just been published and should be available on the BSBI website http://bsbi.org/ireland. The editor Paul Green informs me that because of increased postage costs from Ireland to the UK, the price of printed copies has had to be increased to £4 an issue for any member living outside Ireland.

Members should note that Gwynn Ellis's answer-phone and fax number – 02920 496042 – is no longer operational. His other number – 02920 332338 does however have an answer-phone function.

NOTES

Common problems with identification in *Conyza*: Norfolk experience

BOB LEANEY, *122 Norwich Road, Wroxham, Norfolk, NR12 8SA*

Much has been written in these pages, and in *Watsonia*, on the arrival and spread of the various alien fleabanes over the last thirty years (Wurzell, 1988; McClintock & Marshall, 1988; Wurzell, 1994; Crawley, 1995; Stanley, 1996; Mundell, 2001; Rand, 2008). Many of these accounts give detailed descriptions of the plants found, on the assumption that the various characters found would help botanists to recognise these plants as they spread across the country.

Unfortunately, the great majority of the characters chosen in these articles, as well as those in standard descriptions, (Sell & Murrell, 2006; Stace, 2010), are so extremely variable, so difficult to interpret, or, in the case of floral characters, so transient, that the majority of botanists not taking a special interest in the genus seem stuck on *Conyza canadensis* (Canadian Fleabane)! Some are getting to grips with *C. sumatrensis* (Guernsey Fleabane), now quite abundant for a decade or two in south and central England, but few seem to be distinguishing *C. floribunda* (Many-flowered Fleabane), also becoming fairly frequent, from *canadensis*. *Conyza bonariensis* (Argentine Fleabane) remains only a very occasional casual, and is probably not so seriously under-recorded.

Problems with nomenclature

The particular confusion over *C. floribunda* is compounded by the fact that the two standard treatments differ fundamentally in their nomenclature, Sell recognising two taxa (*C. floribunda* and *C. bilbaoana* (Bilbao's Fleabane)), and Stace only one (*C. floribunda*). In the second edition of his flora, Stace only described *bilbaoana* under *canadensis*, but in his third edition he has now given it a taxon number under the name of *C. floribunda*. Most of the 12 or so examples of *floribunda/bilbaoana* found in Norfolk by the Norfolk Flora Group have fitted with *C. bilbaoana sensu* Sell, showing purple tips to some of the mature outer flowers and strikingly broad phyllaries with obtuse tips. The populations without purple in the outer flowers, in this way resembling Sell's *C. floribunda,* did not have obviously narrower or more acutely tipped phyllaries.

Sell also recognised a fifth species, *C. daveauiana* (Small-headed Fleabane), which is said to very closely resemble *C. sumatrensis* but with straight inflorescence branches from near ground level, and smaller capitula. Martin Rand has found and photographed *sumatrensis*-like plants with '*daveauiana* habit' but reported that these plants did not have regularly smaller capitula or different phyllary measurements to separate them from *C. sumatrensis* (Rand, 2008). Sell's assertion that *C. daveauiana* was common round Santon in West Norfolk (v.c.**28**) has never been confirmed and to date we have not seen any *sumatrensis*-like fleabanes with smaller capitula, or distinctly different inflorescences, to suggest a different taxon.

Thermophilous annuals of ruderal or urban habitats near the north of their range can, of course, be very transient in appearance and Sell's *C. daveauiana* may just have disappeared in Norfolk, at least for now. However, as will be discussed below, when *sumatrensis* is well grown it always produces potential inflorescence branches down to near ground level in the form of axillary leaf bundles, and the level at which these potential branches actually develop is associated with vigour of growth – the tallest plants tend to have inflorescence branches starting nearer the ground. Sell's description of *daveauiana* mentions a maximum height of 300cms, as opposed to

200cms for *sumatrensis*, and it seems likely that his '*daveauiana*' were just unusually well grown *sumatrensis* plants.

Previous accounts

Tony Mundell attempted to clear up the *Conyza* problem using his field experience in Hampshire, and by examining specimens of all four generally recognised British taxa at Kew, including a new type specimen of *C. sumatrensis*, producing a useful table of characters for *canadensis*, *bilbaoana* and *sumatrensis* (Mundell, 2001).

The problem is that herbarium specimens show virtually none of the important 'floral' characters except for phyllary hairiness, although even here the phyllary hairs, best observed in silhouette, are difficult to see and tend to be obscured by spiral twisting of the phyllaries as they dry. In order to identify fleabanes, they have to be seen in the field, or kept only for a matter of hours in an airtight polythene bag, preferably in the fridge. They show little change kept overnight in this way, but as soon as they are exposed to the air for examination the capitula divaricate and lose most of their diagnostic features within a few hours. Rapid pressing does not prevent this process.

Martin Rand, again in Hampshire, did examine fresh material ("roughly 100 plants on the bench", as well as tens of thousands of plants in the field (Rand, 2008)). He produced a "draft for a working key" to identify *canadensis*, *bonariensis* and what he called the *C. bilbaoana* and *sumatrensis* groups. However, this still to my mind relies overmuch on inflorescence outline, leaf shape and leaf colour, all very variable characters.

Experience in Norfolk

Over the last 10 years I have examined in the field hundreds of specimens of *C. canadensis* and *C. sumatrensis*, six solitary plants and two populations of *C. floribunda* and one solitary plant of *C. bonariensis*, in the field and in **NWH**. I have also looked at specimens of *C. bonariensis* from Düsseldorf, Germany, and from Faienza, Modena and Ravenna in Italy. Hundreds of drawings have been made, mainly of inflorescence shape and, intact, fresh capitula, but also of lower stem leaves, dissected out florets, and stem and leaf indumentum. A few photographs and scans have also been taken of fresh material.

As will be described later, and as shown in the drawings (see pp. 14-15), I have found five different inflorescence types in only eight populations of *floribunda*, five inflorescence types in *sumatrensis*, two in *bonariensis* and five in *canadensis*. These arbitrarily defined inflorescence types grade into each other, and inflorescence shape seems almost infinitely variable. In all these plants the important 'floral' characters of capitulum size, capitulum shape, phyllary shape and hairiness, and flower/pappus colour remained unvarying and showed no atypical or intermediate features to suggest any extra taxa or hybrids.

My main conclusion must be that inflorescence outline is misleading as a key character except in the case of *canadensis*, where the long, narrowly cylindrical shape, with very short inflorescence branches, is diagnostic. If the scarcer fleabanes are to be recognised, any plants with a non-*canadensis* inflorescence shape need to be examined in the field for the characteristic capitulum characters, which are actually very distinct but not to be found in standard descriptions, herbarium specimens or drawings. The main purpose of this article is to describe and illustrate these capitulum characters.

Capitulum characters

In practice I have found that inflorescence type is only useful as a spotting character to identify a fleabane that needs a closer look. Any fleabane that does not have the typical, densely flowered, very narrowly cylindrical inflorescence of *canadensis* should be examined carefully for the following capitulum characters, using *canadensis* as comparator:

Capitulum size: this character is thoroughly confusing if one attempts to use the measurements given in standard descriptions (see Rand, 2008). I would suggest a rough comparison with *canadensis*. *Sumatrensis* and *floribunda* (2.5–5mm max. diameter) are both much the same size, and *bonariensis* very noticeably larger, approaching twice the width, though

comparatively short (6–8(11)mm maximum diameter).

Capitulum shape: the descriptive terminology here is difficult and another source of confusion. I would again suggest a comparison with *canadensis*, where the capitulum can be described as narrowly flask shaped, with a pronounced bulge in the lower half and a long, well defined, and narrow 'neck'. The *sumatrensis* capitulum is less distinctly flask shaped and tending towards cylindrical, with less of a bulge at the base, and a shorter, poorly defined and broader neck. In *floribunda* the capitulum is distinctly flask shaped as in *canadensis* but more broadly so and often with a more distinct bulge in the lower half, again with a well-defined, fairly long and narrow neck. In *bonariensis* the capitulum is very broadly flask shaped to cylindrical (hardly longer than wide) with a poorly defined and short neck.

In all species the capitulum becomes transiently more bulging and flask-shaped just before divarification of the phyllaries and fruit dispersal. This stage, presumably due to sideways swelling of the achenes, is usually, miraculously brief and seems to be coordinated across the whole inflorescence, with all capitula then quickly divaricating and releasing their achenes – a process somehow accelerated by picking, though here divarification occurs without achene detachment.

Phyllary (or involucral bract) shape: here it is *floribunda* that is most distinctive. In the other three taxa the phyllaries are very narrowly triangular, attenuating steadily from the base to a narrowly acute tip (i.e. awl-shaped or subulate). In *floribunda* the phyllaries are strikingly broad and strap shaped, far fewer in number and much more parallel sided, with very little attenuation until a very blunt tip (obtuse to rounded, occasionally subacute). (See drawings (pp. 14-15) and colour photographs (inside front cover); also photos in Mundell, 2001; Rand, 2008).

Phyllary number: this again defines *floribunda*, which has only 5–6(7) very broad phyllaries countable across the widest part of the capitulum – the other three taxa have (6)8–12(14). Phyllary number and phyllary shape are the best diagnostic features for *floribunda* (again see drawings and colour photographs, plus photos in Mundell, 2001; Rand, 2008).

Phyllary colour and red tipping: descriptions of colour, especially if they attempt to be too exact, can be positively misleading, mostly of course because different botanists use different descriptive terms for the same colour. In *canadensis* and *floribunda* the phyllaries are a shiny pale to mid green, whereas in *sumatrensis* they are a dull mid green, and in *bonariensis* a dull grey green. More helpful in identification is the presence or absence of dark red/purple tips to the phyllaries, and at what level these are to be found. *C. canadensis* never has red tips to the phyllaries at all, and *sumatrensis* virtually never (I have seen one otherwise typical plant with occasional deep red tips to the upper / inner phyllaries). Both *floribunda* and *bonariensis* frequently have red tipped phyllaries, but at different levels. In *floribunda* the red tips are on the lower and middle phyllaries, and are often frequent on the capitulum "buds" before formation of the neck. However, they are never on all capitula in any one plant, and can be absent from a whole plant or population. In *bonariensis* red tips can again be totally absent, but if present they are in my experience virtually confined to the upper/inner phyllaries, sometimes forming a conspicuous red ring just below the exposed brilliant white floral parts (*not* as shown in *Illustrations of Alien Plants*, Clement Smith & Thirlwell, 2005).

Phyllary hairiness: the phyllary indumentum character in the two 'subglabrous' taxa can be made semi-quantitative by counting the number of bristly hairs visible on each side of the capitulum viewed in silhouette. Whereas in *sumatrensis* and *bonariensis* there are uncountable numbers of long hairs nearly to the phyllary tips, in the two subglabrous species the hairs are shorter, more bristly and in countable numbers, mainly restricted to the basal half of the phyllaries. In *canadensis* there are (0)2–8(10) moderately long translucent bristles on each side, easily visible at ×10. In *floribunda* the capitulum looks glabrous at ×10, but at ×20–30 one can sometimes see an

occasional extremely short bristle. On the underside of the capitulum, beneath the origin of the phyllaries, there can be a good number of bristles in both these 'subglabrous' taxa, as there are on the peduncle.

Ligule length and flower exposure: there has been some dispute as to whether species other than *canadensis* have a ligule, but in practice only *canadensis* has a ligule worthy of the name. All four species have zygomorphic corollas on the outer flowers (as opposed to actinomorphic corollas on the disc florets) and in all four cases there is one shorter, rounded corolla lobe from behind which the bifid stigma protrudes, and a longer limb, nearly always with two lobes at its tip (occasionally unlobed). This bifid, longer limb is the 'ligule', but only in *canadensis* is it really long enough to see without dissection under a microscope. In *canadensis* it is only the shiny very pale lavender or white ligules that are above the phyllary tips, whereas in the other taxa it is the upper part of the corolla *tubes* that one is looking at, sometimes mixed with the pappus. Some authorities insist that *bonariensis* has actinomorphic outer florets without any ligule, but my drawings of the Düsseldorf and Ravenna specimens show an extremely short ligule with two pointed lobes.

Flower/pappus protrusion: the floral parts project beyond the involucre in the mature capitulum to a variable degree, usually most in *canadensis*, *bonariensis* and *floribunda*, least in *sumatrensis*. However, the degree of protrusion of the flowers and pappus is very variable and some capitula can often be found with incompletely lengthened phyllaries resulting in more protrusion of the flowers than is usual for the taxon.

Flower and pappus colour: Also helpful is the colour of the protruding flower tips and pappus. In *canadensis* one sees only the broad, bluntly bifid 'true ligules', often said to be very pale lavender in colour but shiny white to my eye. In *sumatrensis* the protruding floral parts are pale buff and in *bonariensis* brilliant white. The colour of the protruding flower parts in *floribunda* is much more variable. Early in maturation only the tiny, pointedly bifid ligules may protrude above the phyllary tips, and these are sometimes dark purple in colour. Later the outer flowers elongate and their exposed corolla tubes are either a pale cream or pale purple colour – these pale purple, exposed outer flowers are especially characteristic of *floribunda* (see photographs inside front cover and in Mundell, 2001), but are not present in a good number of populations. On occasions the protruding corolla tubes of *floribunda* go a very dark purple when fully mature, but these conspicuous dark purple flowers usually occur only in a minority of capitula and again may be absent altogether. After picking, more or less every capitulum in any one plant can show these dark purple flower tips within a few hours, and this seems to be diagnostic when present.

A key for field identification of the British *Conyza* using 'floral' characters

The capitula of the four taxa generally recognised are actually extremely different and quite easy to distinguish, but the differences are difficult to describe and the descriptive terminology confusing. Few good drawings exist even of *canadensis*. I have attempted to remedy this situation by illustrating mature capitula and the 'bud stage' for all four taxa. Using these illustrations and the descriptions for each floral character, the following key can be used without being misled by inflorescence outline, leaf shape, colour or other highly variable vegetative characters.

The key uses *C. canadensis* as comparator and should be used whenever a fleabane is encountered without the typical inflorescence, leaf shape or colour of that species – but note that many plants will still turn out to be *canadensis*! The main key characters are illustrated in the drawings (Figs. 1a, b (p. 14) & Figs. 2a, b (p. 15).

1. Phyllaries (involucral bracts) near glabrous to subglabrous, with (0)2–8(10) very short to medium long bristly hairs countable @ ×10 magnification on each side of the capitulum, viewed in silhouette..... 2
1. Phyllaries densely hairy, with uncountable numbers of long soft hairs visible @ ×10 magnification on each side of the capitulum, viewed in silhouette 3
2. Capitula narrowly flask shaped with a long, well-defined neck; phyllaries a shiny pale-mid green, never with red-purple tips, very narrowly triangular with very acute tips, (7)8–10(12) countable across the widest part of the capitulum; (0)2–8(10) medium long bristles visible @ ×10 on each side in silhouette, confined to lower half or so of the phyllaries; ligules bright white or a very pale lavender, bluntly bifid, petal like and the only floral parts exposed above the phyllary tips..... *C. canadensis*
2. Capitula more broadly flask shaped, around the same size as *canadensis*, with a well defined and fairly long neck; phyllaries a shiny pale-mid green, sometimes with dark red tips to some lower and mid zone phyllaries on a few capitula, broadly strap shaped, with almost parallel sides and very blunt (subacute) obtuse –rounded tips; only 5-6(7) phyllaries countable across the widest part of the capitulum; phyllaries completely glabrous @ ×10, but sometimes with a very few extremely short bristles visible on each side, usually near the base, @ ×20 – 30; exposed corolla tubes cream to pale purple, on occasion turning to a dark purple when fully mature; (all of the exposed corollas may turn a very deep purple after picking)..... *C. floribunda*
3. Capitula flask shaped to cylindrical, with little bulge in the lower part and only a slight constriction into a poorly defined and short neck, slightly larger than in *canadensis*; phyllaries mid green, narrowly triangular with very acute tips much as in *canadensis*; (6)7-10(12) phyllaries countable across at the widest point, with uncountable number of short hairs visible in silhouette over their whole length; exposed corolla tubes pale buff and often only slightly protuberant..... *C. sumatrensis*
3. Capitulum noticeably short and broadly flask shaped to cylindrical, hardly longer than wide, with an almost flat ± subcordate base and a fairly short, poorly defined neck, much larger and getting on for twice the width of the capitulum of *canadensis*; phyllaries mid grey-green, usually with pale pink to deep red-purple tips to some of the inner/upper phyllaries when mature; phyllaries narrowly triangular much as in *canadensis*; 10–12(14) across at the widest point and with uncountable numbers of short hairs visible in silhouette over their whole length. Floral parts broadly exposed and brilliant white in colour ..... *C. bonariensis*

In late flowering plants (October – December) capitula are smaller and the number of phyllaries countable across the capitulum will be less, giving some overlap, as shown. However, this character remains very useful for separating *floribunda*, from *canadensis* even late in the year.

Counting the lobes on the disc florets *more or less* separates *canadensis* (4) from *floribunda* (5), but *canadensis* can on occasion show 5 lobes, and the lobes are in any case very difficult to count – one seldom sees all of them at once even under a microscope!

Vegetative characters

Leaf edge and stem indumentum are the most diagnostic vegetative characters. Leaf shape can also be useful, but it is important to realise that well lobed lower stem leaves, resembling rosette leaves, tend to occur only on tall and vigorously growing plants and may not be found at all on depauperate or late growing individuals. The lower stem leaves in such plants are frequently simple and oblanceolate in shape and this type of leaf can occur in all 4 taxa. An example in *canadensis* is shown in the colour section – it can be seen that the

leaves in this plant also lack the usual long narrow petiole section found in *canadensis*.

Colour is also helpful, but again can be misleading. Stressed plants of *floribunda*, or plants going over, may take on a pale yellow-green colour much like *canadensis*, and *canadensis* may show a darker, slightly grey hue when growing late in the year.

Long ciliate hairs at the base of the leaf are not diagnostic of *canadensis*, and occur frequently in all the other three taxa.

The following descriptions relate mainly to well grown plants early in the season:-

C. canadensis is usually strikingly pale yellow-green in colour; the lower stem leaves are oblanceolate, usually with an extremely long, narrow, winged petiole bearing numerous regularly spaced ciliate hairs without short hairs in between; the edge indumentum of the lamina is of antrorse hairs that are spreading rather than appressed; most distinctively there are usually only 1-2 triangular forwardly directed lobes on each side, but on occasions the lobes are narrower, more acutely pointed, and up to 5 per side; the stem indumentum is of sparse, long, narrow bristles without bulbous bases.

C. floribunda is usually grey-green in colour and the leaves can be a very strikingly dark, shiny grey-green colour; the rosette leaves and lower stem leaves are normally strap shaped or oblanceolate, without much of a parallel sided petiole section; usually 1–5 forward pointed mammiform lobes, but sometimes the lobes are longer narrower and ± hooked inwards; the leaf edge indumentum is mostly bulbous based, with a separate low domed cell at the base of the hair, antrorse and strongly appressed except near the base of the leaf: there are usually at least 1 or 2 long ciliate hairs also at the leaf base, but with short dense hairs in between; the stem indumentum is of thickish bristles, here with an elongate separate cell at the base.

C. sumatrensis is usually a rich mid green colour; the rosette leaves are especially striking, much broader and often with more lobes than in the other species, broadly oblanceolate – elliptic, obovate or even suborbicular, without much of a petiole section; lobes (0)3–6(12) on each side, crenate-serrate or serrate, or sometimes with long forwardly directed lobes which are round tipped; the lower stem leaves are similar but rarely quite so broad and usually with 3-6 lobes; the edge indumentum is of antrorse appressed hairs without bulbous bases, except at the base where the hairs are not so appressed and may be mixed with long ciliate hairs; the stem is characteristically covered with dense, soft fine hairs rather than bristles.

C. bonariensis is a grey-green colour; overwintering rosette leaves do not seem to occur in the British Isles; the lower stem leaves in the Norwich specimen (**NWH**) are simple and narrowly oblanceolate and those in the Düsseldorf plant simple and linear; in contrast the 3 populations found in Italy had very distinctive narrowly strap shaped lower stem leaves with extremely long, spreading, parallel sided lobes with mammiform tips; the indumentum in the Norwich, Düsseldorf and Italian specimens was very similar and would seem also to be very distinctive: on the leaf edge antrorse and spreading rather than appressed, mixed with one or two sometimes many long ciliate hairs near the base; on the main stem a mixture of antrorse and strictly appressed hairs (not present in the other 3 taxa) mixed with sparse, long patent bristles.

Inflorescence outline

It is customary to try and define various inflorescence shapes for identification purposes but to my mind this is a rather unprofitable endeavour. Only the narrowly cylindrical inflorescence of *canadensis* and the broad kite shaped inflorescence of *C. sumatrensis*, increasingly scarce in our region, are diagnostic. The other inflorescence shapes grade into each other, but I would define 8 very artificial shapes in all (see Fig. 3, p. 17):

1 **Narrowly cylindrical**: parallel sided and densely flowered, with very short, even length near patent inflorescence branches from upper third to two-thirds of the stem: *C. canadensi*s.

2 **Long and broadly elliptic** – obovate: fairly long, ascending inflorescence branches from upper third to two thirds of the stem:

C. canadensis, *C. sumatrensis*, *C. floribunda*, *C. bonariensis*.
This inflorescence is now the main inflorescence shape found in *sumatrensis* in our region, having become more common than the kite shape. It is also becoming more frequent in *canadensis*, and plants with this shape are usually taller than the typical forms.

3 **Short and narrowly elliptic–obovate**: short, ascending, sparsely flowered inflorescence branches from only the top third or less of the stem:
C. canadensis, *C. sumatrensis*, *C. floribunda*.
This shape is usually in shorter plants, but not always.

4 **Kite shaped**: many closely spaced and extremely long, ascending inflorescence branches arising from roughly half way up, sometimes much below half way up, the tips of the lowest and longest branches being overtopped by the shorter ones produced from the end of the main stem :
C. sumatrensis.
This shape only occurs in tall or very tall plants, often 200 – 250 cms high.

5 **Corymbose**: like 4 but with curved branches and a flat top, not so tall:
C. floribunda, *C. bonariensis*.

6 **Open, no main stem**: with very few, long, sparsely flowered branches arising from near the base:
C. floribunda, (occasionally *C. canadensis* and *C. sumatrensis,* especially late in year).

7 **Regenerative inflorescences**: several large inflorescence branches diverging from more or less the same point just above ground level (the main stem sometimes having been obviously cut off just above, with an identifiable stump, sometimes not). The inflorescence shape produced on each regrowth branch is usually elliptic or obovate in shape:
C. canadensis, *C. sumatrensis*, *C. floribunda*.

8 **Leafy pompom**: an extraordinarily leafy form, usually with completely obscured capitula; taller than typical *canadensis* with unbranched stem bearing closely spaced long leaves and even longer inflorescence leaves (bracts) forming a dense pompon within which are hidden the capitula:
C. canadensis

An example of the open, few flowered inflorescence shape without a main stem, occurring in *canadensis* is illustrated on the inside front cover. I have found very similarly structured and shaped forms in *sumatrensis*, again only c.20cms high. Both these forms had simple oblanceolate leaves on the lowermost stem. It is forms such as this that often cause uncertainty in identification, but, if the capitulum characters remain typical and show no intermediacy, I see no reason to suspect a new taxon or hybrid.

Hybridisation

Since its arrival in Norwich about 10 years back *C. sumatrensis* has become at least as common in the city as *C. canadensis*, a situation mirrored in other urban areas in Norfolk. At the same time what seems to be just a tall form of *canadensis* with a broadly obovate (rather than narrowly cylindrical) inflorescence shape has become increasingly frequent. This form might, on inflorescence shape, be suspected of being a *sumatrensis*/*canadensis* hybrid, but I have been unable to find any convincing intermediacy in capitulum or floral characters to support this notion. These plants have the usual 1mm long ligule and phyllary indumentum of *canadensis*. Moreover, I have never found in these or any other atypical fleabanes, the abortive capitula or barren ultimate inflorescence branches described for the *bonariensis/canadensis* hybrid in the *Hybrid Flora* (Stace, Preston & Pearman, 2015; Wurzell, 1994)

In May 2016, I found a fleabane with convincing intermediacy between *sumatrensis* and *floribunda*, with a kite shaped inflorescence and profusely hairy capitula much like *sumatrensis*, but with few, rather broad, strap shaped and blunt phyllaries, and purple tips to the outer flowers. I sent it to the referee who agreed that it showed good intermediacy for these two taxa, but was not necessarily a hybrid (M. Rand, pers. comm.).

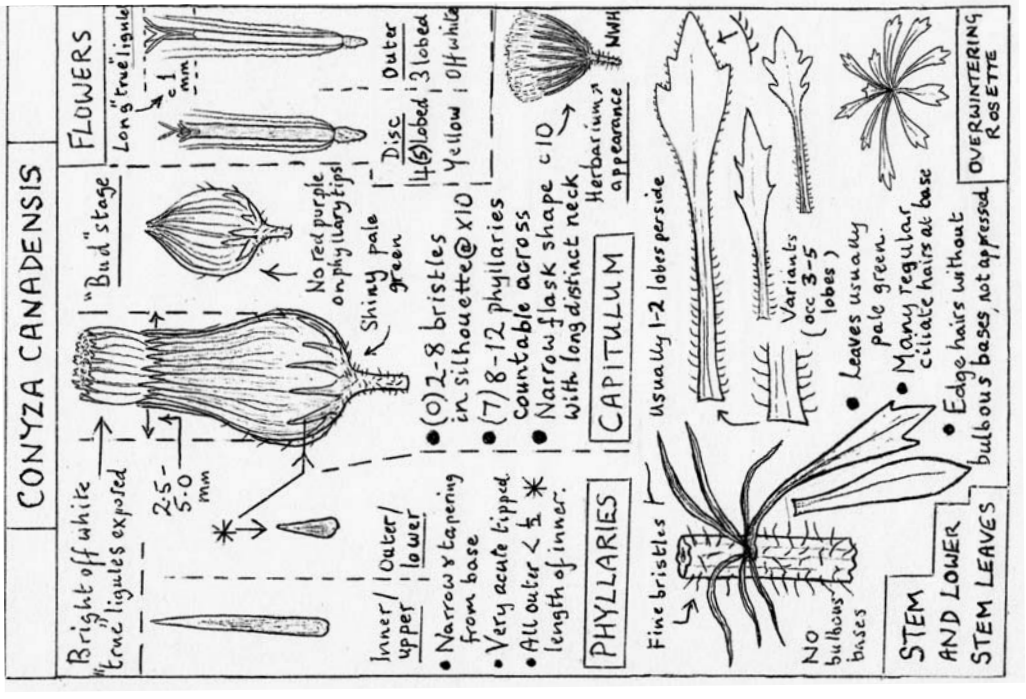
CONYZA CANADENSIS
FLOWERS
Bright off white true ligules exposed
2·5-5·0 mm
"Bud" stage
Long "true" ligule c1 mm
No red purple on phyllary tips
Shiny pale green
Disc
Outer
Inner/ upper
Outer/ lower
• Narrow & tapering from base
• Very acute tipped.
• All outer < ½ length of inner.
• (0) 2-8 bristles in silhouette @ x10
• (7) 8-12 phyllaries Countable across
• Narrow flask shape c10 with long distinct neck
4(5) lobed
3 lobed
Yellow
Off white
PHYLLARIES
CAPITULUM
Herbarium appearance
NWH
Fine bristles
Usually 1-2 lobes per side
Variants (occ 3-5 lobes)
• Leaves usually pale green.
• Many regular ciliate hairs at base
• Edge hairs without bulbous bases, not appressed
No bulbous bases
STEM AND LOWER STEM LEAVES
OVERWINTERING ROSETTE

Fig 1a

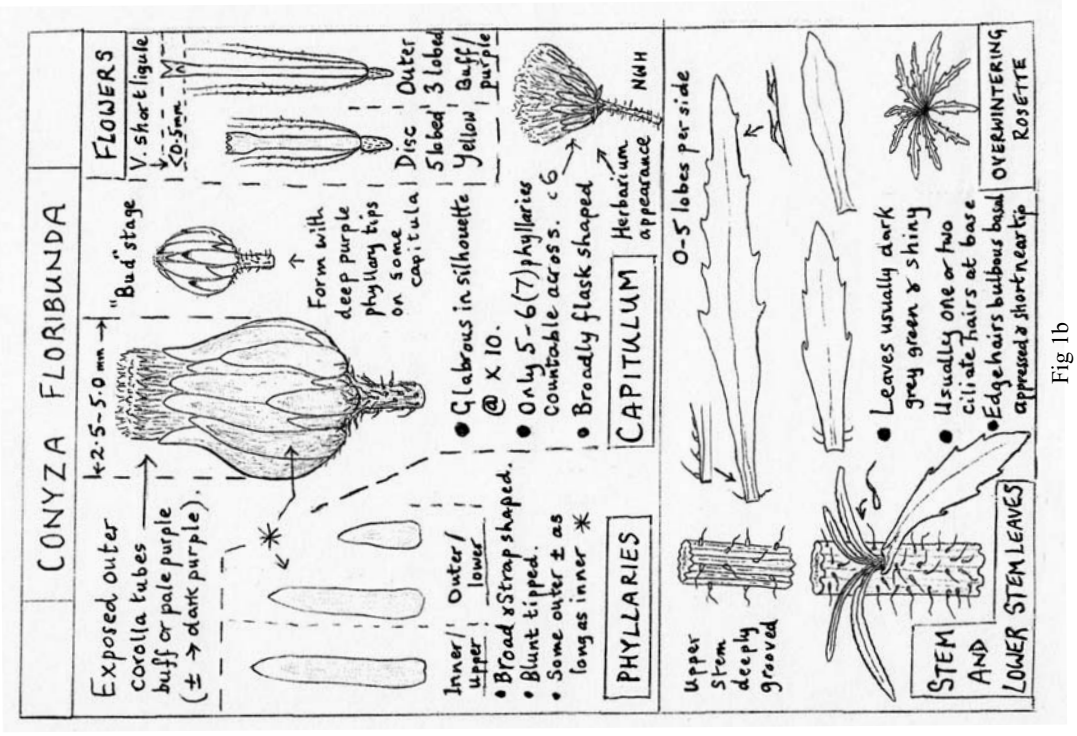
CONYZA FLORIBUNDA
FLOWERS
Exposed outer corolla tubes buff or pale purple (± → dark purple).
2·5-5·0 mm
"Bud" stage
V. short ligule <0·5mm
Form with deep purple phyllary tips on some capitula
Disc
Outer
Slobed
3 lobed
Inner/ upper
Outer/ lower
• Broad & Strap shaped.
• Blunt tipped.
• Some outer ± as long as inner
• Glabrous in silhouette @ x 10.
• Only 5-6(7) phyllaries Countable across. c6
• Broadly flask shaped
Yellow
Buff/ purple
PHYLLARIES
CAPITULUM
Herbarium appearance
NWH
Upper stem deeply grooved
0-5 lobes per side
• Leaves usually dark grey green & shiny
• Usually one or two ciliate hairs at base
• Edge hairs bulbous based appressed & short near tip
STEM AND LOWER STEM LEAVES
OVERWINTERING ROSETTE

Fig 1b

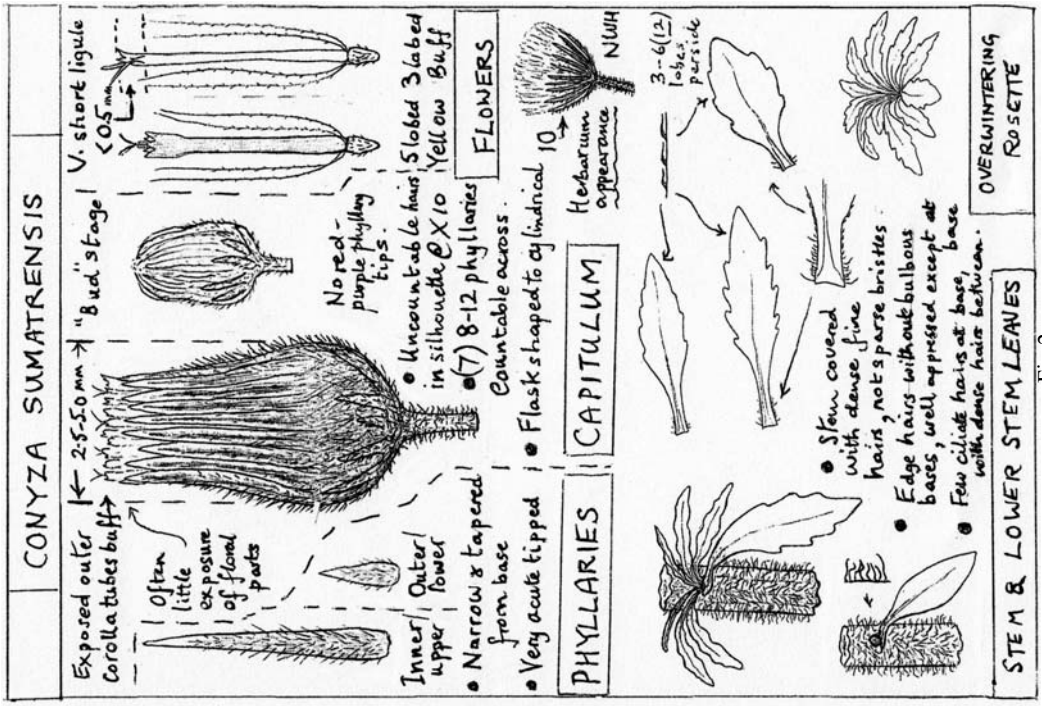

Fig 2a

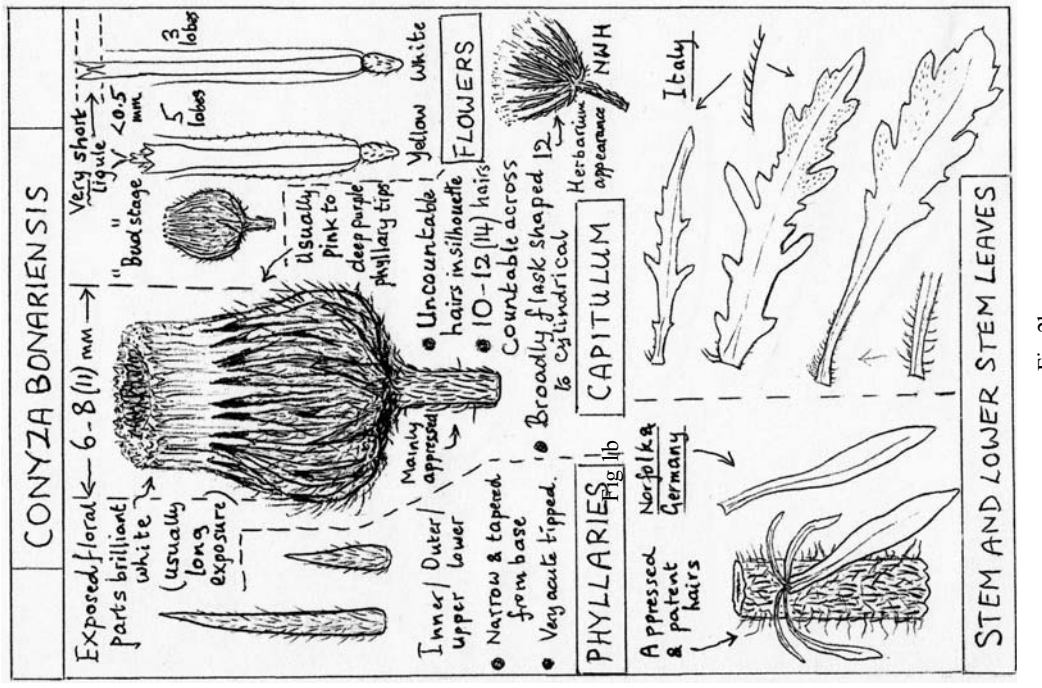

Fig 2b

Fig 1b

Conclusion

As can be seen, variations in inflorescence shape are far too frequent to be of much use in identification, and the same goes for characters such as leaf shape and colour. Using these vegetative characters tends to distract botanists from recognizing possible *C. sumatrensis, C. floribunda* or *C. bonariensis* in the field. A better approach is to examine the capitulum with a lens on any fleabane that does not have the typical narrowly cylindrical *canadensis* inflorescence.

With a ×10 lens it is quite easy to distinguish between the two fleabanes with subglabrous phyllaries using the number of bristly hairs visible on each side of the capitulum (in silhouette but against a dark background), the shape of the phyllaries, and the number of phyllaries countable across the capitulum. The two taxa with profusely hairy phyllaries can be separated by capitulum size (about twice the size of *canadensis* in *bonariensis*, not much bigger in *sumatrensis*), capitulum shape, and the degree of protrusion and colour of the flowers and pappus above the phyllaries. A field key and drawings using these characters are presented above.

Having said this, with experience, vegetative characters can be of use, especially the indumentum of stem and leaf edge. The bulbous based hairs in *floribunda*, with a separate basal cell, and the appressed as well as patent stem hairs in *bonariensis*, seem to be diagnostic, at least as regards the usual 4 taxa. The degree to which the hairs on the distal leaf edge are appressed is also helpful.

Forms with grossly atypical inflorescence structures which are typical in all other respects, do not, I feel, warrant more than varietal status, if that. Any one of the 4 usual taxa can show between 2 and 6 inflorescence shapes (see illustration) and still show absolutely typical capitulum, indumentum and leaf shape characters. Even tiny plants with simple oblanceolate lower stem leaves and with an inflorescence showing no main stem, have entirely typical capitulum and indumentum characters. Such a form, around 20cm high is illustrated on the inside front cover for *canadensis*, but also occurs in *sumatrensis* – in the latter case I have found such plants on wall tops only around 5cm high!

The main findings from my study relate to *floribunda*. The dozen or so examples of this taxon in Norfolk have all had very few, very broad, blunt tipped and strap shaped phyllaries, with only 5–6(7) countable across the capitulum (8–14 in the other taxa except in small, late developing capitula). These characters are found in all photographs previously published in these pages and are shown in the present inside front cover. They are preserved in pressed material, as shown in the drawings of specimens from **NWH**, and correspond to Sell's description for *C. bilbaoana*. However, these features are *not* shown in the illustrations from the original description of *C. bilbaoana* in the British Isles (Stanley, 1996). The drawings here are more like Sell's *floribunda* description, showing very narrow, awl-shaped acute tipped inner and upper phyllaries, with 9–10 countable across the capitulum.

Although we have found no evidence of 'new taxa' in Norfolk, Martin Rand feels that there may be another taxon close to, but separable from, Stace's *C. floribunda* (Sell's *C. bilbaoana*), though not with the characters of Sell's '*floribunda*' (pers. comm.). On the assumption that differences in inflorescence and leaf shape are not enough to designate a different taxon, at specific or subspecific level, without associated differences in indumentum and capitulum characters, this has not been our experience in Norfolk. It is true that all recent finds of *C. floribunda* have lacked purple in the outer flowers or on the phyllary tips, and this may show that another genotype has been arriving of late. However, these features, though present in nearly all our earlier finds, did not occur on all capitula, and not even on all plants within the population. I'm not sure that this single character, the expression of which seems to depend on growth conditions, merits even varietal status.

I hope that these descriptions and illustrations will help botanists recognise *sumatrensis, floribunda*, or *bonariensis*, either newly arrived in their vice-county, or previously overlooked. They might also help botanists

already familiar with these fleabanes to recognise possible new taxa.

In reporting finds to the referee adhere of course to the instructions in the *Yearbook*, but in *Conyza* good colour close-up photos of mature, intact capitula are especially important.

Acknowledgements:
I would like to thank Martin Rand, *Conyza* referee, for his opinion on some Norfolk specimens; members of the Norfolk Flora Group for showing me recent finds of *C. floribunda*; David Waterhouse, Senior Curator of Natural History, Norwich Castle Museum for use of the herbarium.

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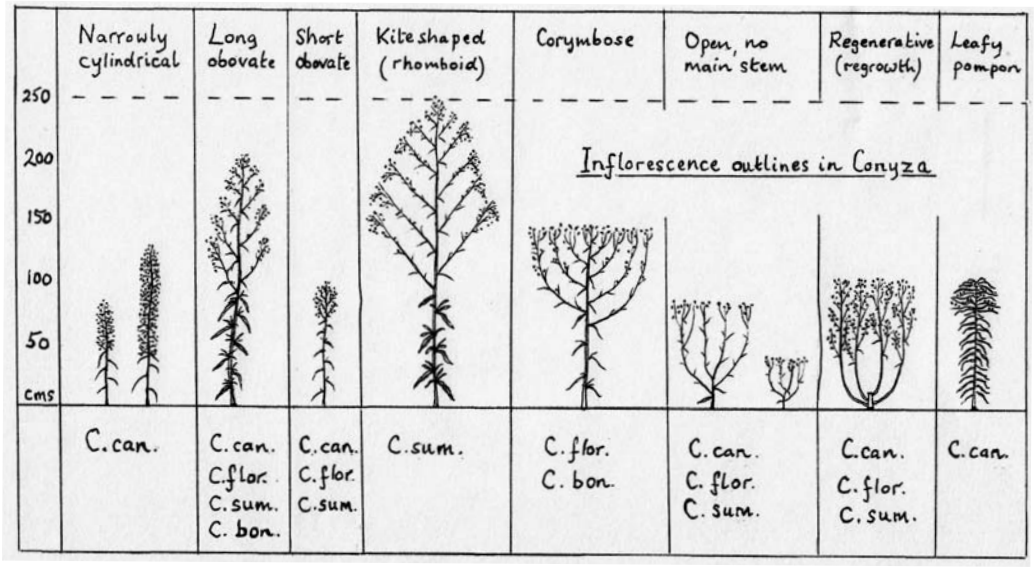

Fig. 3

New Altitudinal Limit for *Taxus baccata* (Yew)

R. ANDREW DALTON, *15 Victoria Parade, Morecambe, Lancashire, LA4 5NX.*

On Tuesday, 8th September 2015, whilst on my way to Scoat Tarn, Wasdale, I noticed an isolated tree of *Taxus baccata* (Yew) (Front cover). It grew about 50 metres off, and to the west of, the footpath to Scoat Tarn on the right hand bank of Nether Beck, approximately 500 metres downstream of its outfall from Scoat Tarn. I estimated its altitude and grid reference, from the OS 1:25000 map (OS 2011), to be between 460-480 metres at GR NY15581008.

I sent this information to Dr R.W.M. Corner, who replied that the previously highest recorded altitude for yews in Cumbria was at 300 metres in Helbeck Wood, Brough (NY7816) and above Barras (NY8408), (Halliday. 1997). He also informed me that a yew had recently been recorded at 465 metres at Swinnergill, Upper Swaledale (v.c.**65**) in 2009. The highest recorded yew in the British Isles is at 470 metres at Purple Mountain, South Kerry (v.c.**H1**), in Ireland (Wilson, 1956, Pearman & Corner, 2004). He suggested that it would be useful if the alleged altitude could be verified by GPS. On the 4th October 2016 I returned to the site 'armed' with a Garmin eTrex 30× GPS. This instrument recorded the grid reference of the yew as NY1541010069 at an altitude of 490 metres.

On the 21st October, Dr John Dalton also visited the site and confirmed my recordings using the same GPS instrument. The yew occurs in Cumberland (v.c.**70)** (NY1510).

I estimate the height of the yew to be between 4 and 5 metres and it consists of several trunks. The yew grows up from boulders amongst which *Vaccinium myrtillus* (Bilberry) grows, but which is not found to any great extent in the adjacent habitat, a boulder-strewn U5a *Nardus stricta-Galium saxatile* grassland, Species-poor sub-community. This grassland was being grazed by Herdwick sheep and black cattle.

Acknowledgement:
I thank Dr R.W.M. Corner for his help and suggestions.

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Hieracium sowadeense (Sowadee Hawkweed) re-discovered in Orkney (v.c.111)

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Hieracium sowadeense P.D. Sell is known from a single site, by the Burn of Sowadee in the parish of Sandwick in the West Mainland of Orkney. McCosh & Rich (2011) regarded it as IUCN (2001) Threat Status 'Data Deficient' as it had not been recorded recently, but oddly it is still listed as 'Vulnerable' by JNCC (2016).

The hawkweeds of Orkney have received little attention from field botanists since the early and middle part of the last century, when Henry Halcro Johnston and James Sinclair were active in the county. The considerable volume of herbarium material from Orkney, mainly Johnston's, was the subject of a special study by Peter Sell and Cyril West (1962), who

re-named many specimens. These included several *H. scoticum* F. Hanb. (which they did not re-name) from Burn of Sowadee, Sandwick, collected between 1912 and 1954. Subsequently Peter Sell described these as the new species *H. sowadeense* (Sell & Murrell 2006).

On becoming VC Recorder, I soon noticed in the BSBI database this intriguingly named hawkweed and went to look for it. The Burn of Sowadee winds between moorland-covered hills for about two kilometres before descending into lowland farmland. It is typical Old Red Sandstone country, with low, rounded hills and rock exposures confined to burn gullies. My quest was initially unsuccessful; I found no hawkweeds at all, but I tried again in 2015 and this time found a small, steep, grassy and heathery crag, about two metres high, a solitary intrusion of the basal granite, tucked into a twist in the upper part of the burn's course. On it, among a moderately rich flora including *Galium verum* (Lady's-bedstraw), *Primula vulgaris* (Primrose), *Thymus polytrichus* (Wild Thyme) and *Hypochaeris radicata* (Cat's-ear), were eight hawkweed rosettes, some of them about to flower. I returned later to examine them in flower (finding only seven this time), hoping also to collect seeds. To my untrained eye they appeared to fit the description of *H. sowadeense*. I collected seeds and searched up and down the burn for more plants but found none.

I sowed some seeds in pots and sent others to Walter Scott in Shetland and to Tim Rich. By the summer of 2016 we all had plants in flower. Tim was convinced they were *H. sowadeense* but noted short glandular hairs were present on the bracts, a feature not described by Sell. On inspecting the holotype and accompanying specimens in **CGE**, he found glandular hairs were also present on these, though sparse and difficult to see, and regarded this as a rare example of accidental omission from Sell's otherwise excellent descriptions.

It appears that a handful of plants on one crag comprise the entire population of this species, so it should now be regarded as IUCN (2001) Threat Status: 'Critically Endangered'. However, it seems likely that the population was always small, and it survived the somewhat ruthless (judging by the number by the number of specimens in various herbaria) attention of Johnston. The site is well protected within the Stromness Heaths and Coasts SSSI and SAC; if there is any grazing by livestock it is only by the odd stray sheep.

I harvested seed-heads from my plants in 2016 and sent them to Kew for preservation in the Millennium Seed Bank; I was later informed that 1044 healthy seeds had been processed.

Acknowledgement:
My thanks to Tim Rich for examining herbarium specimens in Cambridge and for greatly improving this account.

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Unusual feature of *Carex lepidocarpa* (Long-stalked Yellow-sedge) found in specimens from Shropshire (v.c.40) and East Perthshire (v.c.89)

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During 2016 we independently found an unusual form of *Carex lepidocarpa* Tausch (*C. viridula* ssp. *brachyrrhyncha* B. Schmid) (Long-stalked Yellow-sedge) bearing a lingulate apex to the sheath opposite the ligule. Other species of *Carex* including *C. binervis* (Green-ribbed Sedge), *C. distans* (Distant Sedge), *C. hostiana* (Tawny Sedge) and *C. laevigata* (Smooth-stalked Sedge) all have this feature but neither of us had seen this in relation to *C. lepidocarpa.*

The length of the lingulate projection has been measured and ranges from 1.6–2.9mm long by 1.1–13mm wide (measurements taken from voucher specimens).

The specimens were found in two distant locations, exhibiting typical reproductive characters with the utricles being gradually shouldered to the beak. The beak lengths ranged from 1.5–1.9mm and were mostly deflexed, helping to separate it from others in the *Carex flava* group. The inflorescence far exceeded any of the vegetative growth by more than a half, and all other features fitted with the descriptions in Jermy *et al.* (2007), Poland (2009) and Stace (2010).

Care was taken to ensure that material observed was fertile to rule out the possibility of *Carex* ×*fulva* Gooden. (*C. viridula* group × *C. hostiana*). A useful table in Jermy *et al.* summarises the differences between these two species and the hybrid. The form of the male spikes was comparable with *C. lepidocarpa* and in all other characters they agreed with the table. Opening of several utricles revealed a fully mature nut inside, again leading us away from *C.* ×*fulva* and towards *C. lepidocarpa.*

The key in Jermy *et al.* separate *C. hostiana* from *C. punctata* (Dotted Sedge) and the *C. flava* group on the presence/absence on the female glumes of a 'prominent, wide, silvery scarious margin', as well as the presence of a lingulate apex. If one considered the vegetative feature more dependable over the reproductive feature then identification would not have been possible, or erroneous.

Stace (2010) separates *C. flava* group and *C. hostiana* differently, relying on the length of the bract exceeding the inflorescence, and some of the female spikes being in proximity to the terminal male spikes (in *C. flava* group). In this case it was more reliable to rely on the features provided by Stace to make a determination. No mention is made of any lingulate apex to the sheath for any of the *C. flava* group.

Again Poland & Clement (2009) do not recognise any lingulate apex in *C. lepidocarpa*. They separate *Carex hostiana* from the *C. viridula* group by 'Sheaths with convex apex' versus 'Sheaths with concave (to ± straight) apex'. The sizes of ligules overlap so would not have helped in this case either.

Mark Duffell found the first specimen on the 22nd of June during the field test of a BSBI Field Identification Skills Certificate (FISC) held on Sweeny Fen (SJ274250), a SSSI managed by the Shropshire Wildlife Trust and located near Oswestry in Shropshire (v.c.**40**). The site is partly notified for its base-rich marsh and fen habitats, some areas being dominated by a rich suite of rushes including the locally uncommon *Juncus subnodulosus* (Blunt-flowered Rush). It was in this mire habitat adjacent to a shallow ditch running approximately west to east that the specimen was found alongside a couple of other examples. Associated species included *Carex nigra* (Common Sedge), *C. panicea* (Carnation Sedge), *Juncus acutiflorus* (Sharp-flowered Rush), *J. articulatus* (Jointed Rush),

J. subnodulosus (Blunt-flowered Rush), *Mentha aquatica* (Water Mint), *Silene flos-cuculi* (Ragged-Robin), *Succisa pratensis* (Devil's-bit Scabious) and patches of *Molinia caerulea* (Purple Moor-grass).

As it was not thought that *Carex lepidocarpa* had been recorded here previously a specimen was collected and only checking later on did the unusual lingulate projection become apparent. A check of the other examples during a later FISC revealed this feature to be common to all of the specimens observed. A second specimen was collected to be preserved after the first specimen was eaten by the vice-county recorders cat!

The record from Sweeney Fen in Shropshire was indeed a first for that site, although it has been previously recorded from nearby at Dolgoch Quarry (SJ2724), Llynclys Hill (SJ2723) and Trefonen Marshes (SJ2426) (BSBI 2016). All of these Shropshire sites feature base-rich habitats typical of *Carex lepidocarpa*.

Debs Wallace found her specimen only four days later on the 26th, growing with *Carex rostrata* (Bottle Sedge) on a river bank near Kindrogan Bridge, Enochdhu, in East Perthshire (v.c.**89**), GR NO06246252. Both were growing at the edge of the water, and silt deposited on both species indicated that they had recently been inundated. *Carex lepidocarpa* has only been recorded once before from this site (Enochdhu) by Franklyn Perring in July 1972 (BSBI 2016).

Photographs of the material (collected by DW) were shown to Mike Porter who agreed with the identification and had also not seen *C. lepidocarpa* exhibiting this feature before. He recommended examining more specimens to see if this feature occurs elsewhere. Early in July, Mike looked at a population of *C. lepidocarpa* which was growing with both *C. hostiana* and their hybrid but he found no sign of the lingulate projection in the *C. lepidocarpa* which he examined.

Is this feature anomalous, have other recorders come across it, or is it just another feature of the fascinating *Carex flava* group? We would be interested to hear if other similar specimens have been found.

Acknowledgements:
Thanks to Dr Sarah Whild for confirming the Shropshire specimen and to Mike Porter and Nigel Blackstock for confirming the Perthshire specimen and for their thoughts on our joint finds.

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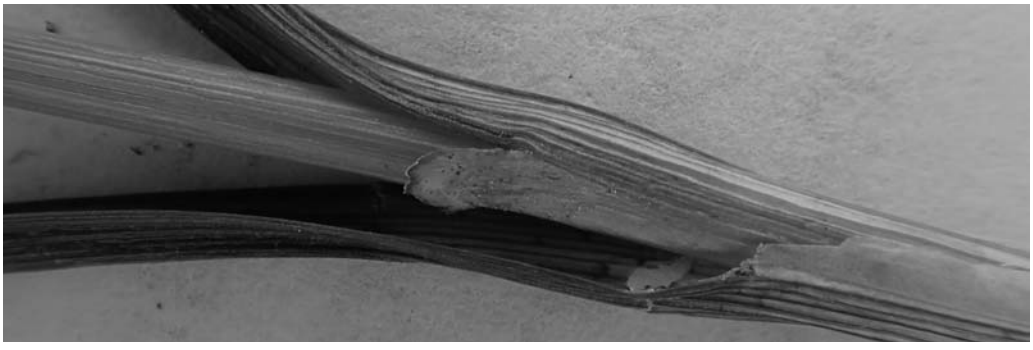

Lingulate projection opposite ligule found on *Carex lepidocarpa*, in Shropshire (v.c.**40**) & Perthshire (v.c.**89**). Photo (of v.c.**89** specimen) Debs Wallace © 2016

Occurrence and ecology of *Carex oederi* (Small-fruited Yellow-sedge) on the Sefton Coast, Merseyside (v.c.59, South Lancashire)

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Introduction

Carex oederi (Small-fruited Yellow-sedge) is an easily overlooked perennial herb of open damp or wet habitats on base-rich or flushed acid soils in dune slacks, the upper edges of salt-marshes, margins of stony lakes or ponds and in open fens and marshes (inside front cover). It may also be found on maritime heath and grassland. It is particularly associated with dynamic habitats kept open by a fluctuating water regime (Jermy *et al*., 2007; Porter & Foley, 2002; Stace, 2010). Ellenberg Indicator values show that this species is light-loving (L = 8), occurs in constantly moist or damp but not wet habitats (F = 7), is associated with weakly acid to weakly basic soils (R = 7) that are more or less infertile (N = 3) and is slightly salt-tolerant (S = 1) (Hill *et al*., 2004). *C. oederi* has a circum-boreal distribution and is a fairly widespread taxon in Britain; BSBI Maps show occurrence in 621 hectads, on mostly northern and western coasts with relatively few inland.

The Great Britain and England vascular plant Red Lists (Cheffings & Farrell, 2005; Stroh *et al*., 2014) give the conservation status of *C. oederi* as 'Least Concern' but this taxon is listed as a 'Species of Conservation Importance in North West England' by the Regional Biodiversity Steering Group (1999).

Blackstock (2007) sheds doubt on the validity of the species name, pointing out that the type of *C. oederi* is actually a specimen of *C. pilulifera*. He argues that the valid name for this taxon is *C. viridula*. It was also previously known as *C. serotina*. Blackstock further identifies three subspecies: *C. viridula* ssp. *viridula* is the most widespread of these, occurring on sparsely vegetated base-rich to base-poor substrates, including in dune-slacks. *C. viridula* ssp. *pulchella* is found as isolated tufts on upper salt-marshes on lake margins on the Atlantic seaboard, especially in northern Scotland, while *C. viridula* ssp. *bergrothii* is a taller plant of base-rich fens and lake shores in Fennoscandia. The latter had not been recognised in Britain until 2016 when a stand was found in Shropshire (v.c.**40**) (N. Blackstock, pers. comm.). Alternatively, Blackstock & Jermy (2001) argue that all yellow-sedges, other than *C. flava*, are subspecies of *C. viridula* and treat the three subspecies listed above as varieties. All the plants examined during the current study were referable to *C. viridula* ssp. *viridula* (*sensu* Blackstock, 2007) but it is proposed to adopt the nomenclature used by Stace (2010) for the purposes of this article.

Status in Northwest England

According to the Cheshire (v.c.**58**) Rare Plant Register (BSBI, 2015) *C. oederi* has probably only ever occurred in damp sandy hollows on the coast and lingers in only one such place at Moreton, Wirral, though E.F. Greenwood (pers. comm.) doubts it is still there. Greenwood (2012) describes the species as very rare in West Lancashire (v.c.**60**) with occurrences in only four tetrads. It was still present at Lytham St. Anne's Old Links golf course in 2008. Skelcher (2009) found plants at Lytham St. Anne's Local Nature Reserve in 2008 but a repeat survey in 2016 failed to locate *C. oederi* (G. Skelcher *in litt*., 2016). For Cumbria (mainly v.cc.**69** & **70**), Halliday (1997) gives fourteen tetrad records, mainly coastal, especially in dune slacks on the Duddon Estuary and at Ravenglass and on the upper salt-marsh at Anthorn. A few inland sightings were recorded on calcareous ground and in wet gravel at Coniston.

The *New flora of South Lancashire* (v.c.**59**) database (2015 archive version) lists 79 records for *C. oederi*, the first being in 1851. All are on or near what is now the Sefton Coast in north Merseyside. The plant is described as locally frequent between Hall Road and Birkdale in dune slacks and damp sandy ground near the sea (D.P. Earl *in litt.*, 2015).

Sefton Coast studies

During many botanical surveys on the Sefton Coast over the last two decades, I invariably recorded *C. oederi* when encountered. The sedge was usually associated with young seasonally-flooded dune-slacks or shallow 'scrapes' dug in the floors of existing slacks to provide breeding sites for the Natterjack Toad (*Bufo calamita*). Such early-stage successional slack vegetation is relatively rare on the Sefton Coast because, as in much of Western Europe, this dune system has become much more stable in recent decades, with a low rate of new slack formation by wind erosion (Houston, 2008; Smith, 2009a). It was therefore decided that a study of *C. oederi* could provide insights into an uncommon vegetation type as well as adding to knowledge of the species' ecology. The fact that the age of most sites could be determined added further interest. Accordingly, all known and likely locations for the plant in the Sefton dunes were visited during summer 2016. For each population found, the number of individuals was counted and a grid reference obtained using a Garmin Etrex GPS device. Notes were made on habitat type, evidence of Rabbit (*Oryctolagus cuniculus*) grazing and human disturbance. Quadrat samples were recorded for larger populations using UK National Vegetation Classification (NVC) methodology (Rodwell, 2000). A MAVIS programme (designed by Simon Smart at the Centre for Ecology & Hydrology) was used to determine the degree of fit to known NVC communities and sub-communities. One surface soil sample was taken for each quadrat, pH being determined with a Lutron PH-212 soil pH meter buffered at pH 7. The distance of these locations from the coastline was determined by reference to aerial photographs and the measure & drawing tool on www. gridreferencefinder.com. The age of each site was obtained from personal photographs, a Sefton Coast dune wetlands database (Sefton Council, 2015) or from aerial photographs.

Results

Forty-four discrete colonies of *C. oederi* were recorded, extending from Hightown dunes in the south to the Queen's Jubilee Nature Trail, Southport, in the north, a linear distance of about 15km (Fig. 1).

Fig. 1. Distribution of *Carex oederi* colonies on the Sefton Coast

Occurrences were in nine tetrads within three hectads. A grand total of 7303 plants was counted, colony size ranging from only two to 4400 plants (mean 166), the largest being at the Devil's Hole blowout in Ravenmeols Hills Local Nature Reserve. Another sizeable population (1300 plants) was found in a Natterjack Toad scrape at Queen's Jubilee Nature Trail. The main habitat types for the 44 colonies were as follows:

- Natterjack scrapes (20)
- wet-slacks disturbed by vehicles (12)
- wet-slacks (7)
- informal footpaths in wet-slacks (5)

Although the areas of vegetation supporting the target species were not accurately measured, the extent of its habitat was estimated to be less than 2ha. Evidence of rabbit-grazing, mainly droppings, was recorded at 48% of the sites; two colonies around ponds at Range Lane, Formby, had also been grazed by cattle, causing some damage to *C. oederi* leaves. Plants of *C. oederi* in scrapes and wet-slacks were usually found in a zone of intermediate wetness around the fringes of the sites, avoiding the central semi-aquatic habitat (*sensu* Ranwell, 1972). Sites damaged by vehicles were found in two groups: the Altcar Rifle Range training area and a series of slacks in the Birkdale frontal dunes, the latter having

been subject to illegal off-road vehicle driving in the 2013/14 winter. Colonies on informal footpaths across slacks were found in various parts of the dune system.

A frequency distribution of estimated age of vegetation supporting *C. oederi* is shown in Fig. 2. The distribution is strongly skewed towards younger ages, especially the 1-4 and 9-12 year categories, only one site being much older at about 30 years.

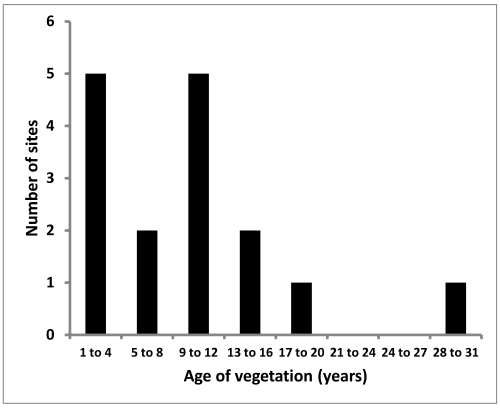

Fig. 2. Frequency distribution of vegetation ages at *Carex oederi* sites

A total of 31 2×2m quadrats was recorded, supporting 82 vascular associates of *C. oederi.* The most frequent of these were: *Salix repens* (Creeping Willow) (presence in 31 quadrats), *Agrostis stolonifera* (Creeping Bent) (30), *Juncus articulatus* (Jointed Rush) (30), *Carex flacca* (Glaucous Sedge) (19), *Hydrocotyle vulgaris* (Marsh Pennywort) (19), *Mentha aquatica* (Water Mint) (19), *Carex arenaria* (Sand Sedge) (18) and *Leontodon saxatilis* (Lesser Hawkbit) (16), all being typical dune-slack plants on the Sefton Coast (Smith, 2009a). Eighteen (22%) of the associates are regionally or nationally notable, including *Dactylorhiza incarnata* (Early Marsh-orchid) (11 quadrats), *Eleocharis quinqueflora* (Few-flowered Spike-rush) (6), *Epipactis palustris* (Marsh Helleborine) (10), *Parnassia palustris* (Grass-of-Parnassus) (13) and *Samolus valerandi* (Brookweed) (11).

Species-richness in the quadrats was quite high, the mean being 17.2 vascular taxa per quadrat, with a range of 10 to 29. Vegetation height ranged from 5 to 25cm, with a mean of 9.9cm. Percentage bare ground in the quadrats was extremely variable, having a range of 0 to 75% while the mean was 18.3%.

Table 1. Summary of MAVIS analysis of quadrat samples

NVC code	Community	Sub-community	No. of samples	% fit	Match
SD16d	*Salix repens- Holcus lanatus* dune slack	*Agrostis stolonifera*	20	39-56	Very poor-poor
SD14b	*Salix repens-Campylium stellatum* dune slack	*Rubus caesius-Galium palustre*	5	46-62	Very poor-fair
SD14a	*Salix repens-Campylium stellatum* dune slack	*Carex serotina* (= *oederi*)*-Drepanocladus sendtneri*	3	42-55	Very poor-poor
SD13b	*Sagina nodosa-Bryum pseudotriquetrum* dune slack	*Holcus lanatus-Festuca rubra*	3	47-51	Very poor-poor

MAVIS analysis of 31 quadrat samples is summarised in Table 1.

A majority of samples (20) have accordance with SD16d: *Salix repens-Holcus lanatus* dune slack, *Agrostis stolonifera* sub-community, though the level of fit is 'poor' to 'very poor'. SD16 is the most widespread slack vegetation on British coastal dunes, usually found in older, drier calcareous slacks. The *Agrostis* sub-community occupies the wetter end of the spectrum, though winter-flooding is typically rare and brief. Grazing by rabbits or livestock

often plays some part in keeping the vegetation open and more diverse, while lower grazing pressure renders the community susceptible to scrub invasion (Rodwell, 2000). Five samples most closely resemble SD14b: *Salix repens-Campylium stellatum* dune-slack, *Rubus caesius-Galium palustre* sub-community, though, again, most have very poor statistical fits, only one having a 'fair' level of agreement with SD14b. Nationally, this is a scarce vegetation type found locally around English and Welsh coasts and associated with slacks of young to moderate age kept moist by fluctuating base-rich ground-water. There is usually some winter-flooding (Rodwell, 2000). The *Carex-Drepanocladus* sub-community (SD14a) (three samples with very poor to poor matches) seems to be associated with slightly wetter sites. Finally, three quadrats have very poor to poor fits to SD13b: *Sagina nodosa-Bryum pseudotriquetrum* dune-slack, *Holcus lanatus-Festuca rubra* sub-community. This is a pioneer vegetation of calcicolous damp-slacks, flooded rather briefly to a shallow depth in winter. The *Holcus-Festuca* sub-community is characteristic of drier locations in slacks that are usually less than 20 years old. It is dependent for its open character on grazing or trampling (Rodwell, 2000).

Soil pH lies within the relatively narrow range of 7.13 to 7.67 (mean 7.43). Fig. 3 shows the relationship between soil pH and distance from the shore.

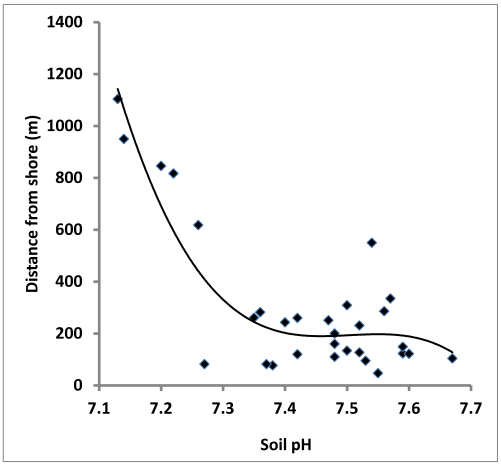

Fig. 3. Relationship between soil pH in quadrats and distance from shore

At distances of more than about 400m from the shore, there is a declining linear relationship between the two variables. Nearer to the shore the trend is less clear. Nevertheless, a third-order polynomial gives a highly significant correlation coefficient ($r = 0.7822$, $p = 0.001$).

Discussion

The target species occupied an area of less than 2ha. This is a small proportion of the potentially available habitat, the Sefton Coast having over 114ha of slacks and freshwater wetland, amounting to more than a third of the dune-slack resource in England (Edmondson, 2010; Radley, 1994). It is known that *C. oederi* favours open, damp, often basiphilous habitats as represented in pioneer dune-slack communities (Blackstock, 2007; Jermy *et al*., 2007; Porter & Foley, 2002). The findings of this study confirm those preferences, the sedge being found in damp calcicolous slacks with short, open vegetation that had mainly developed over a period of 1–12 years. There was also a strong association with disturbed sites, such as Natterjack Toad scrapes, recently-formed slacks and older slack floors damaged by off-road vehicles or human trampling. Vegetation on tracks is often suppressed by mechanical damage and, possibly, by enhanced rabbit-grazing, leading to more open communities with shorter vegetation. This will tend to favour slack plants, such as *C. oederi*, that are intolerant of competition, as was also shown for *Blysmus compressus* (Flat-sedge) (Smith 2009b) and *Juncus balticus* (Baltic Rush) (Smith 2006a) in earlier Sefton Coast studies. The implication is that these species are also tolerant of trampling damage, some of the trackways occupied by *C. oederi* being relatively heavily used for informal recreation or by vehicles.

Almost half of the sites supporting *C. oederi* showed evidence of rabbit-grazing. This herbivore is known to play an important role in modifying sand-dune vegetation. Thus, in a study of 48 British sand-dune sites, Boorman (1989) found that rabbits were the dominant grazer, all but two sites being rabbit-grazed to some extent. Potter & Hosie (2001) pointed to

the pervasive influence of rabbits in many British dune habitats, describing this mammal as a 'keystone species' influencing plant population dynamics. Rabbit grazing produces short, open swards, inhibits scrub encroachment and is likely to favour species of early stage successional vegetation, such as *C. oederi*. However, due to the impact of myxomatosis, rabbits are now patchily distributed on the Sefton dunes; a few areas retain sizeable populations, while many others have none (Smith, 2009a).

The largest population of *C. oederi* was located in a secondary dune-slack over 1ha in area that has formed by wind-erosion in the floor of the Devil's Hole blowout at Ravenmeols. Separate studies showed that vegetation first appeared in this slack in 2003, *C. oederi* being recorded the following year. The blowout is still growing, producing new pioneer habitat with abundant *C. oederi* around the fringes of the maturing central slack area (Smith & Lockwood, 2016). Another large population was recorded at Queen's Jubilee Nature Trail in a shallow Natterjack scrape excavated in 2007 but re-profiled in the 2015/16 winter. Therefore, the vegetation was in its first growing season during the current study. Most of the other scrapes in which the plant occurred were excavated within the last decade. Studies in the Netherlands found that *C. oederi* had a high frequency (80%) in pioneer slack vegetation five years old but then declined as successional changes took place reaching a low frequency (≤10%) by 39 years (Bekker *et al*., 1999). Similarly, Lammerts *et al*., (1999) recorded *C. oederi* in 2-year and 6-year dune-slack communities but not in vegetation that was 37 and 80 years old. The latter study also showed that 'sod-cutting', i.e. the removal of the organically enriched surface soil layer in slacks, could restore and maintain pioneer vegetation provided that the soil pH was not below 6. The excavation of Natterjack scrapes in existing Sefton Coast slacks has similarities to sod-cutting, providing a habitat for early successional vegetation with a soil pH above 7.

Over 80% of *C. oederi* colonies were situated within about 400m of the shore where the soil retains a high calcium content derived from intertidal mollusc shells incorporated into the blown sand (Millington *et al.*, 2010). A statistically significant declining trend of pH with distance from the shore accords with classical studies by Salisbury (1925) who demonstrated that, as time passes, calcium is gradually leached out of the sand by rainfall thereby creating more acidic conditions in the older dunes further from the sea. James (1993) stated that this reduction of pH over time also applies to slacks. The fact that this trend is less clear nearer the shore may be because, in many cases, the soil profile has been disturbed by the digging of scrapes or churning by vehicles, bringing fresh sand to the surface.

In the Sefton dunes, sites occupied by *C. oederi* are often hundreds of metres apart and are susceptible to vegetation maturation which eventually out-competes the sedge. Yet this plant appears in scrapes and other disturbed sites within a year or two of their creation. How *C. oederi* is dispersed is not known, though in the genus *Carex* the utricle is often inflated and contains air, thereby increasing buoyancy and the possibility of dispersal by water. Utricles of some species may be moved short distances by ants or other invertebrates (Jermy *et al*., 2007). Propagules may also be dispersed on vehicle tyres, on footwear or by livestock. Perhaps more significant is the finding of Bekker *et al*. (1999) that *C. oederi* has a long-term persistent seed-bank that peaks at about 20 years but is still present in 10% of samples in 80-year old slack soil. Therefore, the speedy appearance of this species in disturbed sites is likely to involve a seed-bank that originated soon after the slack was formed, perhaps decades earlier.

The high number of 82 vascular associates of *C. oederi*, 22% of which are regionally or nationally notable, emphasises the high conservation value of early stage dune-slacks (Smith, 2009a). Indeed, Sykora *et al*. (2004) describe young slacks as 'hotspots for botanical diversity', their poorly productive, basiphilous, pioneer communities harbouring many Red Listed species.

Analysis of quadrat samples gave accordance with a range of UK NVC slack communities,

the majority being SD16: *Salix repens-Holcus lanatus* dune-slack. That was unexpected as this vegetation is usually associated with older slacks, while the younger slack communities of SD13 and SD14 were represented in only 11 out of 31 quadrats. However, almost all the samples had poor to very poor statistical fits to these community types. Natural England (2014) suggested that sand-dune vegetation is not well suited to classification; first, because variation in dune vegetation in underpinned by a complex of environmental gradients that often operate independently of each other; secondly, NVC methodology recommends selection of 'typical' stands but, in the mosaic of dune landscapes, distinct stands of vegetation are often the exception rather than the rule; thirdly, the data used to derive dune NVC communities were based on a limited number of quadrats and may not be particularly representative. They further claim that poor statistical fits have been found in many recent sand-dune studies. Therefore, in some cases, allocation of a particular stand or set of quadrats to an NVC community may not be possible.

The increasingly vegetated condition of the Sefton dunes and the low rate of new slack formation (Smith, 2009a) suggest that *C. oederi* may have been more frequent here in the past. Thus, Savidge *et al*. (1963) described this sedge as 'locally common' in dune-slacks and 'plentiful at Ainsdale' after 1954. In the first half of the 20th century, the Sefton dunes were relatively dynamic with plenty of bare sand and young slacks, ideal for pioneer plants such as *C. oederi* (Smith, 2009a). Smith (2006b) studied changes in the floristics of 26 slacks in the Birkdale frontal dunes between 1983 and 2003. He reported that 15 of the slacks were 'incipient' (i.e. newly formed) in 1983, only one being in that state 20 years later. Furthermore, *C. oederi* was found in 11 of these slacks in 1983 but only six in 2003 and four in 2016. Evidently, *C. oederi* is adversely affected by successional change and, like other pioneer slack plants in Sefton, is vulnerable to vegetation maturation and is increasingly dependent on active management to create new slack habitat.

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Adiantum capillus-veneris (Maidenhair Fern) along the Vale of Glamorgan Coastline, South Wales, UK: a comparison of surveys over 30 years

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Introduction

Adiantum capillus-veneris (Maidenhair Fern), occurs on all continents except the Antarctic, and is considered stable worldwide (Lansdown & Bilz, 2013). In the UK the vascular plants red data list reports the status of *A. capillus-veneris* as of 'least concern' (Cheffings *et al*., 2005). Native populations occur mainly in crevices or on tufa deposits, limited to a few scattered coastal localities (Stewart *et al.*, 1994). Wales is home to about 25% of the UK's native population (Dines, 2008) mainly concentrated along the Vale of Glamorgan Coastline and to a lesser extent in Pembrokeshire and Carmarthenshire. The earliest record (Llwyd, 1698), at Jacksons Bay, Barry Island suggest populations have been persistent for at least 300 years. Historical records for *A. capillus- veneris* can also be found for Porthkerry; 1838, Dunraven Bay; 1849, Aberthaw; 1862 and Font-y-Gary, 1927 and *A. capillus-veneris* is still present at all of the aforementioned sites. *A. capillus-veneris's* natural habitat in South Wales is primarily restricted to active post glacial tufaceous cliff face seepages which are frequently, but not entirely, associated with the Jurassic Lias bedrock that defines the Vale of Glamorgan 'Heritage Coast'. The interbedded nature of the Jurassic Lias rocks, with relatively impermeable, thinly interbedded limestones and calcareous mudstones (Wilson *et al.*, 1990), favours the slow diffuse seepage of groundwater across large areas of cliff face supporting the formation of tufa. Tufa forms when groundwater, supersaturated with calcium carbonate dissolved from the bedrock aquifer, re-deposits the material on contact with the atmosphere.

Three surveys across the Vale of Glamorgan coastline have been undertaken, the first by Peter S. Jones (1983-4) then Kate Pryor 1996 (reported in Pryor, 2001) and again in 2015 by the authors. Molecular studies of several populations along the coast (Pryor, 2001 & Pryor *et al.*, 2001) provide insight into the genetics of satellite populations, however further discussion of this is outside of the scope of this note. The aim of this survey was to collate and compare the locations of populations recorded over the last 30 years. It is hoped that this will serve as a useful baseline for repeat surveys in the future.

Methods

The 2015 survey incorporated the entire Vale of Glamorgan coastline from Penarth to Ogmore (~ 45 km). This area was larger than the 1983 (P.S Jones) and 1996 (K. Pryor) surveys. For each site a 10 Figure Grid Reference (+/-10m accuracy) was recorded using a hand held GPS. When it was not safe to approach the cliff the grid references were corrected using aerial photography and 1:10,000 Ordnance Survey Maps. There was no defined methodology applied to characterising population sizes during the 2015 survey, thus any comparison with earlier surveys (P.S Jones, 1983 and Pryor, 1996) was not possible. Estimates of the elevation and accessibility of the populations were made although no direct measurements of elevation were made. Areas of tufa without populations of *A. capillus veneris* were also recorded, although they are not detailed in this report. Identification using binoculars was often the only safe method of survey due to cliff instability, estimates of the population sizes were made and sites were described as small, medium or large based on relative population sizes. Locations were numbered west to east from 1 to 54 with individual numbers assigned to each separate

population regardless of size (Fig. 1 (p. 33); Table 1 (p. 31)). Thus small dispersed populations received individual numbers, as did contiguous large populations. Each population was assigned to a lithology based on the British Geological Surveys 1:50,000 bedrock geology map.

Results

Adiantum capillus-veneris can occur from the base to the top of the cliffs, and in all locations it was associated with groundwater seepages and tufa formation. Only ten of the recorded populations were safely accessible from ground level (Sites 19, 37, 38, 41, 48, 50-54), the remaining populations were only possible to identify via binoculars. In areas where sea spray can reach the cliff face the fern appears to grow higher, possibly out of the potential spray zone for salt water. Where cliff faces did not have an obvious seepage area, *A. capillus-veneris* was absent, suggesting the location of the fern is influenced by local hydrogeological conditions. The largest populations of the fern can be found at: Porthkerry (Site 44–51); East Aberthaw/Font-y-Gary (Site 37); Stout Point (22-23); W of Aberthaw (Sites 24-36); St Donat's (Site 19) and Nash Point (Site 10) (Fig. 1 p. 33).

Three new sites were located (Sites 18, 40 & 54) each being very small (<1m^2) suggesting the fern has not colonised any significant new locations over the last 30 years. Two of the three sites were within the original extent of the 1983 survey (Sites 18 & 40) suggesting they may have formed after 1983 or overlooked. The small population of just four plants in rock crevasses on the Penarth Beach (Site 54) was outside of the 1983 and 1996 survey and may be a relic of a once larger population known to have been present in the area. The loss of the fern in the Penarth area may have resulted from coastal erosion or due to its easy accessibility for enthusiastic Victorian fern collectors. The Penarth population is considered to be at risk due to its small size.

Eight sites (Sites 3, 12, 13, 14, 16, 17, 20 & 21) from the original 1983 survey could not be relocated during the 2015 survey. The loss of these sites is attributed to natural coastal erosion, evidenced by fresh looking cliff faces. Natural cliff face instability is considered to be putting a further 9 sites at risk (4-9, 22 & 23) and it is at these sites where the loss of populations is most likely in the future.

Adiantum capillus-veneris occurs only in areas with water seepage and active tufa formation; however there are numerous areas of actively forming tufa that do not currently support *A. capillus-veneris,* and large areas that only have a few small populations. There were at least 28 additional areas of actively forming tufa (not shown on map) ranging in size from <1m to 10's of square meters without any evidence of *A. capillus-veneris*. It is not known why some areas of tufa appear to be favoured by *A. capillus-veneris* and others not, or indeed if these areas represent potential habitat for future expansion.

Discussion

Adiantum capillus-veneris is most commonly, but not exclusively, found on the Jurassic Lias cliffs in the Vale of Glamorgan. Pryor (2001) notes its absence from other coastal areas in South Wales (e.g. the Carboniferous Limestone of Gower) and suggests that both moisture (groundwater seepage) and low winter temperatures may be important ecological controls for its distribution. The ability of the local bedrock and hydrogeology to support localised tufa formation is also considered a key factor and populations have been recorded on lithologies including: Triassic Blue Anchor Formation and Mercia Mudstone Group at Barry Island, Jacksons Bay (Sites 52-53); Triassic Blue Anchor Formation at Penarth (Site 54), and Carboniferous Avon Group at Craig Ddu, Carmarthenshire (BSBI, 2000), where they are associated with localised active tufa formation. This suggests that *A. capillus-veneris* is not restricted to the Jurassic Lias, and that it can, when conditions are suitable, occur on other geological formations. New surveys along the South Wales coast, especially where tufa is known to form, even in the smallest of areas, may have the potential to identify previously unknown populations.

Conclusions

Adiantum capillus-veneris favours areas where groundwater seepage and tufa formation

occurs. There has been little change in the main locations of *A. capillus-veneris* populations along the Vale of Glamorgan coastline over the last 30 years. We report the loss of 8 sites between 1983 and 2015. The driver for this loss has been attributed to natural coastal erosion, evidenced by fresh cliff faces resulting from rock falls. Only three new populations were identified and all were considered small, i.e. <1m^2. The fourth 'new' site at Penarth is outside of the 1983 and 1996 survey areas and may be the last remaining relic of a once much larger population. Populations outside of the Jurasssic Lias coastline in Wales, namely Barry Island, Carmarthen, Pembrokeshire and Penarth, suggest there is potential for the fern to occur across a range of lithologies where groundwater seepage and active tufa formation occur.

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Table 1. Summary of surveys for *A. capillus-veneris* from 1983, 1996 and 2015 (1983 and 2015 data registered with SEWBReC and BSBI and 1996 data from Pryor, 2001)

Site	Site Name	Easting	Northing	1983 Survey	1996 Survey	2015 Survey	Status as of 2015
1	West of Cwm Mawr	289038	172608	●	●	●	Present
2	West of Cwm Mawr	289170	172491	●	●	●	Present
3	Nant Cwm Bach	289654	171836	●	●		LOST post 1996
4	Monknash Coast	290996	169518	●	●	●	Present. At risk of cliff fall
5	West of Nash Point	291035	169439	●	●	●	Present. At risk of cliff fall
6	West of Nash Point	291063	169407	●	●	●	Present. At risk of cliff fall
7	West of Nash Point	291078	169402	●	●	●	Present. At risk of cliff fall
8	West of Nash Point	291213	169162	●		●	Present. At risk of cliff fall

Site	Site Name	Easting	North-ing	1983 Survey	1996 Survey	2015 Survey	Status as of 2015
9	West of Nash Point	291449	168547	●	●	●	Present. At risk of cliff fall
10	Nash Point	291964	167994	●	●	●	Present
11	St Donat's West	293040	167639	●	●	●	Relocated
12	St Donat's West	293414	167683	●	●		LOST post 1996
13	St Donat's West	293414	167683	●	●		LOST post 1996
14	ST Donat's East	293789	167832	●			LOST post 1983
15	St Donat's East	293845	167864	●		●	Present
16	St Donat's East	294008	167879	●	●		LOST post 1996
17	St Donat's East	294029	167885	●	●		LOST post 1996
18	St Donat's East	294078	167896			●	New
19	East of St Donat's	294355	167879	●	●	●	Present
20	St Donat's East	296137	167366	●	●		LOST post 1996
21	St Donat's East	296852	167156	●	●		LOST post 1996
22	Stout Point	297342	167010	●	●	●	Relocated at risk of cliff fall
23	East of Stout Point	297342	167010	●	●	●	Relocated at risk of cliff fall
24	West of Aberthaw	297977	166950	Reported as one larger area	Reported as one larger area	●	Present
25	West of Aberthaw	298230	166823			●	Present
26	West of Aberthaw	298250	166813			●	Present
27	West of Aberthaw	298259	166814			●	Present
28	West of Aberthaw	298578	166679			●	Present
29	West of Aberthaw	298844	166591			●	Present
30	West of Aberthaw	298861	166586			●	Present
31	West of Aberthaw	298998	166558			●	Present
32	West of Aberthaw	299056	166556			●	Present
33	West of Aberthaw	299081	166543			●	Present
34	West of Aberthaw	299136	166526			●	Present
35	West of Aberthaw	299157	166525			●	Present
36	West of Aberthaw	299399	166434			●	Present
37	Font-y-Gary	304607	165924	●	●	●	Present
38	Font-y-Gary Lifeguard Station	305105	165911	●	●	●	Present
39	Rhoose below disused quarry	305544	165839	●	●	●	Present
40	Rhoose	305943	165776			●	New
41	Font-y-Gary nr path	305949	165773	Reported as one larger area	Reported as one larger area	●	Present
42	Porthkerry	307873	166154			●	Present
43	Porthkerry	307894	166186			●	Present
44	Porthkerry	307955	166216			●	Present
45	Porthkerry	307986	166216			●	Present
46	Porthkerry	308001	166223			●	Present
47	Porthkerry	308050	166222			●	Present
48	Porthkerry (Bulwarks)	308077	166216			●	Present
49	Porthkerry	308097	166219			●	Present
50	Porthkerry	308219	166243			●	Present
51	Porthkerry	308259	166264			●	Present
52	Barry Island Jacksons Bay	312072	166680	●	●	●	Present
53	Barry Island Jacksons Bay	312128	166711	●	●	●	Present
54	Penarth	318657	169887	Surveys did not cover this area		●	New, possibly a survivor of a once larger population ?

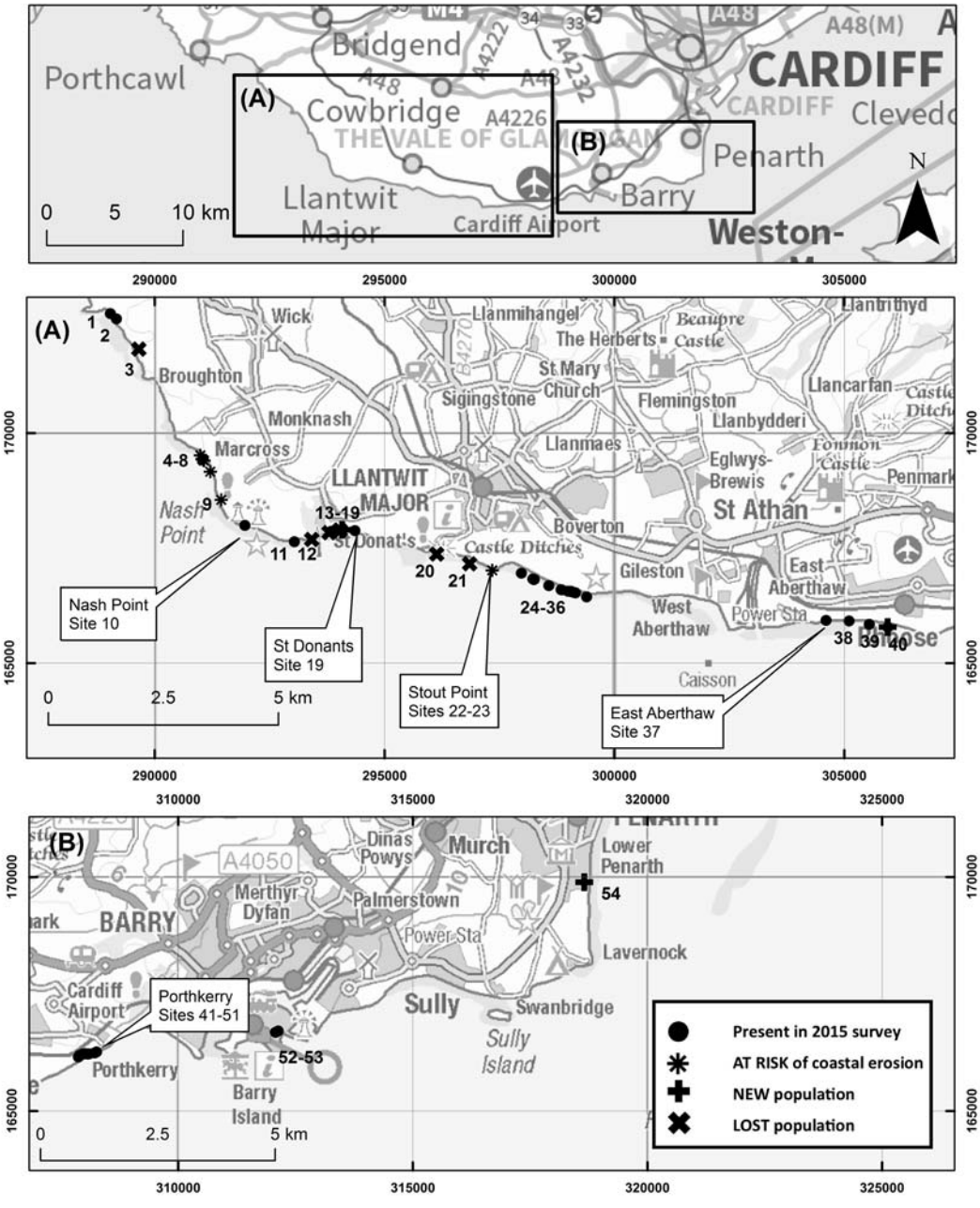

Figure 1. Location of *A. capillus-veneris* along the Vale of Glamorgan Coastline, the largest populations are labelled. Contains *Ordnance Survey map © Crown Copyright and database rights 2017.*

Some observations on bracteole fusion and the occurrence of aberrant axillary bracteoles in *Atriplex* (Oraches) on North Wales coasts

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The following notes are based on observations made while prizing apart fresh bracteoles of Oraches (*Atriplex* spp.) to reveal the seeds and the orientations of their radicles. It should be noted that Flores-Olvera *et al.* (2011), using scanning electron microscopy, showed that in the main inflorescences of *Atriplex* spp. the 'bracteoles' develop as accrescent (enlarging with age) tepals, rather than being bracteoles in the strict sense. Nevertheless, for continuity with the common usage they are referred to as 'bracteoles' here. In several cases bracteole characters are considered crucial for definitive identification of the annual species and hybrids, particularly important being the extent of fusion between the bracteole pairs and the occurrence or not of stalks on some of those growing from axils.

With varying expressions of implied precision, the extent of bracteole fusion has long been included in binary keys, for example in Clapham *et al.* (1962), Stace (2010). Several of the British and Irish *Atriplex* spp. also occur on the Atlantic coast of Canada and a key by Bassett *et al.* (1983) used similar wording about bracteole fusion. As noted by Leaney (2010) the extent of bracteole fusion is difficult to discern in the field and he pointed out that some of the wording about fusion as well as some illustrations of bracteoles could be misleading. Most British literature about *Atriplex* since the 1980s has largely followed the extensive accounts by Taschereau (1985a, 1985b &1988). The information about the hybrids in Stace *et al.* (2015) relies partly on work by Taschereau, with extra information from other authors who had also done artificial hybridization experiments.

It became clear when opening bracteoles that while fusion can be expressed as a proportion of the overall length, the morphology of fusion and the radicle orientation might merit closer consideration. This seemed particularly so with bracteoles from plants having the vegetative characters of either *A. glabriuscula* (Babington's Orache) or *A. prostrata* (Spear-leaved Orache) × *A. glabriuscula*. It was also clear that the bracteoles originating from axils were of different shapes from those in the terminal inflorescences and aberrations were seen often enough to prompt questions about the development of axillary bracteoles.

Methods

Samples of most of the range of annual *Atriplex* taxa, including several hybrids, occurring in north-west Wales were collected during the late summer to early autumn periods of 2014-16. These came mainly from Anglesey (v.c.**52**), with a few from adjoining shores of Caernarfonshire (v.c.**49**). Small terminal fruiting sections were usually collected after noting the more obvious vegetative characters. Some bracteoles often fall off after collection, so only those still attached were chosen for detailed examination. Normally this was done within 24hrs of collection and before much wilting had happened. Overall lengths of bracteoles were measured to 0.1mm with callipers, any obvious stalks being measured separately. Bracteole pairs were opened by inserting fine forceps from the side near the tip and then pushing downwards to lever them apart, while at the same time trying to keep the seed still attached in the original orientation to one of the pair. With the thicker fleshy bracteoles of *A. glabriuscula* one of the pair often broke across rather than fully separating; remaining fragments were then picked off with forceps to fully expose the extent of actual fusion. Images of opened bracteoles were recorded using a Dino-Lite Basic Digital Microscope (AM-2011) linked by USB connection to a laptop computer. This small unit has four miniature LED lights in a ring

around the lens so the rougher surfaces where there had been fusion tended to reflect light differently from the smoother free surfaces. Adjustments were made later in Photoshop Elements to enhance the contrast and make the texture of the torn tissue stand out slightly more.

Bracteole fusion

Atriplex glabriuscula was said to have bracteoles fused by 'up to the middle' (Clapham *et al.*, 1962) and '>1/3 to c1/2 of their length' (Stace, 2010). Observations here show that when opened the fleshy bracteole pairs of *A. glabriuscula* have broad pads where they were fused (See images Colour Section Plate 1 & legends Table 1). On the series of images arrows have been drawn to show the apparent limits of the fusion. Even where they had been pressed tightly together, the surfaces near the lateral angles appeared to have been free. The fleshy bracteole pairs of *A. glabriuscula* often require some force to part them so when they break across this can sometimes give a false impression that fusion was more than 1/3 the length when it was actually about this or slightly less. Breakage can also make it appear as if fusion extends fully to or beyond the lateral angles.

Table 1.: Legend to photos in Colour Section Plate 1.
Terminal (a & b) and aberrant axilliary bracteoles (d – f)

Image	Taxon	Length mm	Location / Habitat
A1	*A. glabriuscula*	8.0	Aberffraw, sand beach
A2	*A. glabriuscula*	5.6	Carmel Head, shingle beach
B1	*A. prostrata* × *A. glabriuscula*	9.4	Aber Ogwen, Menai Strait, gravel shore
B2	*A. prostrata* × *A. glabriuscula*	6.6	Tal y Foel, Menai Strait, gravel shore
C	*A. Prostrata*	6.2	Porth Cwyfan, side of track to shore
D	*A. prostrata* × *A. glabriuscula*		Cae Aur, Menai Strait. shingle
E	*A. prostrata* × *A. glabriuscula*		Tal y Foel, Menai Strait, gravel shore
F	*A.* ×*gustafssoniana*		Belgian Promenade, Menai Strait

Having opened a large number of terminal inflorescence bracteoles from plants in the broad *Atriplex prostrata s.l.* group, the pattern of bracteole fusion appeared to fall into three categories:

(a). Fusion pads broad and extending round to either side of the seed. Radicle apical pointing. Plate 1, images A1 & A2.

(b). Fusion pads distinct, but not extending much alongside the seed. Less broad than (a), only c1/5 of the seed diameter and. Radicle usually oblique pointing. Plate 1, images B1 & B2.

(c). Attachment across a truncate base, narrow and elastic, barely visible after separation of the bracteoles. Radicle pointing laterally. Plate 1, image C.

Category (a) bracteoles fit the external diagnostic shape of *A. glabriuscula* which was emphasised by Leaney (2010) as a useful field character. They also came from plants where only the first 4 or 5 nodes were opposite, the stem was thickened and coloured red at the main branch nodes and the leaves were so fleshy that they easily broke across when bent. All the above are characters of *A. glabriuscula*. These bracteoles also fitted the size range (4-10mm) given by Taschereau (1985a) for the species. A distinctive biotype, apparently of the same species, was found in an isolated and leeward facing cove with a shingle beach on the north coast of Anglesey. In this case the bracteole pairs were towards the lower end of the above length range and so fat as to be almost spherical. Category (c) bracteoles, with a truncate base, thin walls and few tubercles keyed out as *A. prostrata s.s.*, though some at 8mm were longer than the 2-6mm given by Taschereau (1985a). As the fusion was narrow the pairs were easier to open but they were apt to spring back closed if not fully teased apart.

More problematic to ascribe an identity to were the category (b) bracteoles. In North Wales this is a frequent biotype, particularly along the stony shores of the Menai Strait where much drift weed accumulates on the strand lines. Adhering strictly to the binary keys for species, these bracteoles would key out as *A. prostrata* because the fusion was obviously much less than 1/3 of the length. There were however distinct fusion pads almost as wide as in category (a), but due to the more truncate basal shape the pads did not extend much round to the side of the seeds. In size these bracteoles were often as large and spongy as those of *A. glabriuscula*. The vegetative parts of the plants resembled the *A. glabriuscula* nearby on the same shores. They thus appeared to be intermediate between *A. prostrata s.s.* and *A. glabriuscula*. Caution was needed in accepting them as hybrids because Taschereau (1988) indicated that both primary hybrids and hybrid derivatives between these two species were very rare. The reasoning was explained more fully by Stace *et al.* (2015) as due to the two species being largely autogamous, with male and female flowers closely clustered together and ripening at the same time. Artificially induced hybrids also had a low rate of germination. In spite of the contrary reasoning, the Menai Strait plants with intermediate characteristics do appear to be derived from hybrids, possibly having back crossed with *A. glabriuscula*, resulting after many generations in a fertile biotype. Intermediate plants of this form were encountered in several places round Anglesey during the September 2015 BSBI Workshop led by *Atriplex* Referee John Akeroyd. He agreed with conclusions reached earlier by Ian Bonner and me that they were *A. prostrata* × *A. glabriuscula*. From the maps showing where Taschereau obtained his specimens while in Britain, it seems that he did not collect from North Wales himself and the only sample sent to him was *A. glabriuscula* from an open coast location on the north coast of Anglesey.

The same type of fusion pads were seen in the very large bracteoles of *A.* ×*taschereaui* (Taschereau's Orache) = *A. glabriuscula* × *A. longipes* (Long-stalked Orache). In this hybrid they extend laterally by less and are narrower than in *A. glabriuscula*, so when fresh the bracteoles are partly open. The small acutely pointed bracteoles of *A. littoralis* (Grass-leaved Orache) were also noted as being fused with distinct pads at the base. *A.* ×*gustafssoniana* = *A. prostrata* × *A. longipes* (Long-stalked Orache) had rather narrow basal fusion similar to *A. prostrata*, but often with a curving basal shape.

Especially in *A. glabriuscula* the bracteoles probably serve to provide buoyancy and protection for the seeds as they are dispersed by the sea and then cast up with strand line debris on relatively exposed shores. The greater fusion is thus likely to be part of their functional morphology, but these fleshy bracteoles are still vulnerable to damage by strand line invertebrates. Fly larvae were found inside and next to the seed in some. Bonding should be stronger where the fusion pads are oblique to the axis, hence the tendency towards cuneate basal shapes. Fusion apparently constrains and influences the orientation of the radicle. At germination the first 6–7mm of root growth in *Atriplex* spp. was shown to be just by cell expansion (Katembe *et al.*, 1998).

Axillary bracteoles

Whether stalked or not, bracteoles occurring in axils are nearly always different and larger than those in terminal inflorescences. Axillary bracteoles should therefore be considered separately when trying to identify Oraches, a point that was not always made clear in some identification guides. The difference is particularly striking in *A. patula* (Common Orache). The axillary bracteoles in this species being acutely elongated and much larger so they bear little resemblance to those in the terminal inflorescences.

When Taschereau (1985b) grew *A. longipes* under greenhouse conditions he found that the frequency with which stalked bracteoles occurred increased with the crowding of the plants. Coincidentally, *A. longipes* is normally found where it is crowded by taller salt marsh plants such as *Bolboschoenus maritimus* (Sea Club-rush). In the samples of several *Atriplex* taxa collected in North Wales additional short branches were quite often found growing from axils with or without leaflets similar to those

that subtend the glomerules in some terminal inflorescences. Often these extra branches had only one or a very few small bracteoles in a cluster at the apex or even just single pairs. These bracteole pairs were often shaped more like leaflets than the accrescent tepal 'bracteoles' in the terminal inflorescences of the same plants. Aberrations were noticed quite often of which some are shown on Colour Section Plate 1 (explanatory). Although the aberrant ones had seeds, the pairs were frequently partly open or twisted out of alignment so the seed was not as closely enclosed as in normal terminal inflorescence bracteole pairs. On opening a few of the abnormal bracteole pairs other incompletely developed structures were found partially covering the seed. A provisional interpretation is that the partially developed inner structures could have derived from tepals that did not enlarge and what would otherwise have been leaflets came to partly enclose the whole.

Whether a bud in an axil develops into a branch with multiple bracteole (tepal) pairs enclosing seeds or whether it forms just a single reproductive unit should be controlled by hormones (auxins). The implication is that abnormal axillary bracteoles, including those with stalks, are prone to occur when the auxin influence is less determinate. This might be expected to occur towards the end of the vegetative growth season and for environmental reasons, including the effects of crowding as found by Taschereau (1985b). The crowding effect has also been noticed where *A. laciniata* (Frosted Orache) had become overwhelmed by more vigorous *A. glabriuscula*. *A. laciniata* belongs to a different section of the genus and does not hybridise with those in the *A. prostrata s.l.* complex (Stace *et al.*, 2015). The presence of short stalks on axillary bracteoles may not always indicate the influence of *A. longipes* in the ancestry of plants in the *A. prostrata s.l.* complex.

Conclusions

Separation of *A. glabriuscula*, *A. prostrata* and the several hybrids in the *A. prostrata s.l.* group can certainly be assisted by reference to bracteole fusion. This can also be helped by an appreciation of the morphology of that fusion rather than simply estimating it externally as a proportion of the bracteole length. Radicle orientations seem to align with the amount of fusion and so may sometimes be a proxy for the extent of the less easily seen fusion pads. In the light of the finding by Flores-Olvera *et al.* (2011) that 'bracteoles' are really accrescent tepals with pentamerous origins, the slight asymmetry often apparent between bracteole pairs becomes more explicable. The origin of the axillary bracteoles may now merit some re-investigation considering that axillary bracteoles differ so much from those in the glomerules of the main inflorescences and seem particularly prone to abnormalities. This could have implications for the occurrence of stalks as a taxonomic indicator. Aberrations such as the incomplete closure of axillary bracteole pairs might even have provided occasional chances for hybridisation between normally autogamous taxa.

Owing to past wording about *A. glabriuscula* and *A. prostrata* bracteole fusion in several frequently consulted reference works and the probability of differing degrees of introgression of hybrids, an unknowable proportion of records of *A. prostrata* from some coastal areas may perhaps be regarded as no more precise than *A. prostrata* agg. The coastal Oraches still remain one of those difficult groups where multi-access tables of many characters, including those that require opening of bracteoles, could offer better guidance than the choices in dichotomous keys.

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Callitriche palustris (Narrow-fruited Water-starwort) in Westmorland (v.c.69), new to England

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On 14th July 2016 we conducted a plant survey of a recently-fenced patch of land at Haweswater Reservoir, in the English Lake District, for the Royal Society for the Protection of Birds. Having completed our survey, we dropped down from the car-park at the head of the valley to the extensive 'drawdown' zone of the reservoir by the inlet stream, to do a spot of recording.

The large areas of exposed silty and muddy gravel provided a number of interesting records, including abundant *Spergularia arvensis* (Corn Spurrey) on the gravel ridge at the upper limit of the reservoir. Some patches of *Viola canina* (Heath Dog-violet) on the exposed upper shore, and a few plants of *Persicaria minor* (Small Water-pepper) and *Limosella aquatica* (Mudwort) closer to the water on wet silt were all new records for the catchment.

Towards the current shoreline, amongst huge populations of seedlings and tiny plants of *Lythrum portula* (Water-purslane), were some small plants of *Callitriche stagnalis* (Common Water-starwort) with the usual spathulate leaves, but also, in damp sandy areas and in shallow puddles, very many plants of another *Callitriche*, with rather short and narrow-lanceolate to almost parallel-sided leaves. Green fruits were visible on some of these plants, but when PLB lifted one plant from a shallow pool close to the stream, we were astonished to find that ripe fruits, previously hidden beneath the sediment, were jet-black, with the styles absent, or only short and ascending. Such black fruits, we knew, were indicative of *Callitriche palustris*. Yet we also knew that the map of this species in the BSBI handbook of the genus (Lansdown, 2008) indicated the species only in a tiny cluster of sites in the Scottish Lowlands, a single site in Ireland, but none in England.

Casting about over the large areas of exposed gravel and sand, we found vegetatively-similar plants scattered widely, with a total population perhaps into the low thousands. Very few of the plants were seen fruiting, but we did eventually find a scatter of plants with black fruits. Some samples were brought home for closer examination, which served to confirm our tentative identification.

We emailed Richard Lansdown (BSBI referee for the genus) shortly thereafter, adding a number of photos showing the habit of the plant and its distinctive 'heart-shaped' black fruit, taller than wide, with a narrow wing around the upper half (see Colour Section Plate 1). Richard replied the same day, confirming that we had indeed found *Callitriche palustris,* and commenting that "this is one of very few *Callitriche* species that I would confirm based on a general photograph", and furthermore that our find constituted "the first confirmed record of *C. palustris* for England".

This latter comment was a considerable surprise, since, by this stage, we had consulted the BSBI Distribution Database, which gave twenty or so English records, mostly recent: these we had taken to be recent discoveries since Lansdown's book was published.

In a further contact from Richard, he remarks that "I am sure that most of the [English] records are errors of data entry…". After some emails and postal exchanges with vice-county recorders, or in some cases original finders, it became clear that – as Richard had suggested – a large proportion of these existing English records were indeed based upon errors of data-entry. This situation has since been rectified on the DDb, with suspect records now annotated as 'needs checking' and not, therefore, currently mapped (Pete Stroh, pers. comm.). During an earlier chance conversation about unusual plant distributions Andy Jones declared that he considered English records for *C. palustris* were errors produced when the standard MapMate 'two-three' abbreviation had been used. Entering *"capal"* returns several choices where *Callitriche palustris* is listed immediately above the more often intended *Caltha palustris* (i.e. Marsh-marigold).

Since *Callitriche palustris* was disclosed in the British Isles only recently (Ireland in 1999, R.V. Lansdown, in Preston *et al.* 2002, and UK in 2000, Mitchell 2006) it was also clear that many earlier records – for instance those from older herbarium specimens – could only be the result of more-recent cataloguing errors, since this species would be 'off the radar' for the great majority of field-botanists.

The nearest site to Haweswater appears to be that at another reservoir a hundred kilometres to the northwest, at Ornockenoch, near Gatehouse of Fleet (v.c.**73**), where the plant was found by Paul Stanley in 2013.

Richard Lansdown also encouraged us to attempt to collect seeds for the Millennium Seed Bank. We returned to the site on 9th September, and found the site looking much as it had been two months earlier. We had anticipated by this stage in the season that the *Callitriche* plants would be much better developed, and with many more ripe fruits. For some reason – and disappointingly – this turned out not to be the case, and again rather few plants in fruit were found. Permission had been sought from landowners United Utilities to collect material, and fruits were gathered from about fifteen plants. From these, 148 apparently-viable seeds were extracted at Kew for the Seed Bank (email, S. Miles, 1 February 2017).

During the search, several plants were found, to our somewhat inexpert eyes vegetatively similar to *C. palustris,* with the ripe fruits not black, but green to brownish. The styles were strongly deflexed, identifying the plants as *C. brutia.* As we had found previously with *C. palustris,* only a very few fruiting plants of this second species were found. Hence it was not possible to judge the relative proportions of the two species in this mixed population – a rather unsatisfactory position!

Searches for *C. palustris* in similar sites in Lakeland, such as the drawdown zone at Thirlmere Reservoir, and the eastern shore of Derwent Water, have so far drawn a blank. The jet-black fruits are obvious enough once exposed to view, and it is difficult to believe that the species has previously been widely overlooked. It is tempting to suppose that the plant is currently expanding its range, and may already be awaiting discovery more widely. It is a curious feature of its distribution that – to judge by the Handbook's map – it seems almost ubiquitous across northern and central Europe (indeed Lansdown remarks that it is "the most widespread *Callitriche* species"), and yet with this marked gap in distribution that includes most of the British Isles and neighbouring parts of north-west Europe.

Acknowledgement:
We thank Richard Lansdown for his original identification and subsequent exchanges, and for his comments upon an earlier draft of this note.

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Juncus inflexus × *J. conglomeratus* – Postscript

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Previously, I have written a short note about the hybrid between Hard Rush and Compact Rush, *Juncus inflexus* × *J. conglomeratus*, (= *J.* ×*ruhmeri*) (Wilcox, 2015). The new *Hybrid flora of the British Isles* (Stace *et al.*, 2015) mentions the hybrid but states there are no convincing specimens in the wild. The type specimen, originally in the herbarium in Berlin, was destroyed during the war and they have informed me they have no material named as this hybrid, therefore there is no type specimen.

There is a second specimen (4 stems of one plant) that is deposited in Wien (**W**) Austria named as this hybrid. It is stamped: Herb. Mus. Hist. Natur. Vindob. Acqu. 1966 No. 10250 and has the following two labels:

1st Label – Juncus conglomeratus × J. glaucus = J. ruhmeri ASCHERS. & GR.
– Kärnten –
Südkärnten : nahe dem bahnhof von Bleiburg auf einer Anschüttung drei Stöcke unter den Eltern

[Roughly translates (with help from E. Vitek) as – Southern Carinthia: near the railway station of Bleiburg on a deposition (of gravel or earth material) three (rootstocks) pieces among the parents]

16. August 1965 H. Melzer

2nd Label – *Juncus conglomeratus* L. × *J. inflexus* L.
[rills of the stem fewer and sharper than in the usual *J. effusus* × *inflexus*].
Confirm. Sven Snogerup 1978.

As previously reported, an artificial hybrid between female *J. inflexus* and male *J. conglomeratus* has been made. *J. inflexus* × *J. effusus* (Soft Rush) (*J.* × *diffusus*) is different mainly in the ridging pattern (see Wilcox, 2010), but is otherwise very similar in general appearance. However, after a careful examination of the specimen from **W**, it shows that it is *J.* ×*diffusus*. Therefore, (unfortunately) there is no evidence that *J.* ×*ruhmeri* has ever existed in the wild.

As *J. effusus* hybridises with *J. inflexus* (*J.* ×*diffusus*) and with *J. conglomeratus* (*J.* ×*kern-reichgeltii*) it is possible that *J. inflexus* × *J. conglomeratus* could be overlooked. If anyone feels they may have a putative hybrid between any of the three parents mentioned (or other rushes and their hybrids) I would welcome specimens from anywhere in the world.

Acknowledgements:
Thanks to Ernst Vitek, Wien (**W**), Austria, for the material and to Rachel Webster (Curator) and Lindsey Loughtman (Curatorial Assistant) for arranging the loan to Manchester (**MANCH**).

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Carex chordorrhiza (String Sedge) population monitoring at Insh Marshes RSPB Reserve (v.c.96)

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Carex chordorrhiza (String Sedge) is a nationally rare plant with only two populations in the UK, one of which occurs at RSPB's Insh Marshes National Nature Reserve, Inverness-shire (v.c.**96**) (Cadbury, 2016). Around 80% of the known populations at Insh are on the RSPB reserve (Cowie and Sydes, 1995). The last survey of String Sedge at the Insh Marshes National Nature Reserve was by Legg *et al*. (1995*b*) and given the recent expansion of reedbed (Rickerby, 2012), which could potentially pose a threat to String Sedge, it was thought appropriate to repeat the survey. From August 29th to September 2nd 2016, surveys were performed to map String Sedge's current distribution within particular compartments of Invertromie and Insh Fen, which were previously covered in the 1995 study.

Similar survey methods to Legg *et al*. (1995*b*) were used. Each compartment was walked in parallel transects 10–20m apart. Aerial photographs were used for assistance in navigation and mapping. When String Sedge was found, the perimeter of the colony was recorded with a handheld GPS device (Garmin 62S). If the patch was large, transects were then walked through it to see if the cover was consistent throughout. Of the two sites surveyed at Insh Marshes, Invertromie was not surveyed in its entirety due to the presence of a very dense reedbed.

In agreement with previous reports (Cadbury, 2016), results from this study show String Sedge distribution has increased at Insh Marshes, with a 24% expansion in the Insh Fen compartment and a 9% expansion in the Invertromie compartment (Fig. 1, 2). The patches have not only expanded in area, but also in number with several new patches mapped in both compartments.

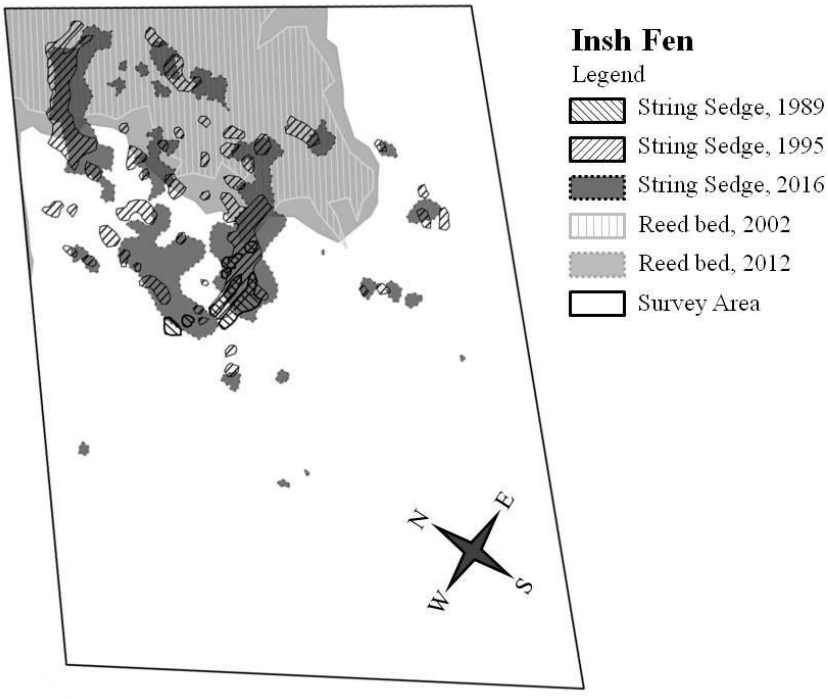

Fig. 1: Records of String Sedge and reedbed distribution on Insh Fen

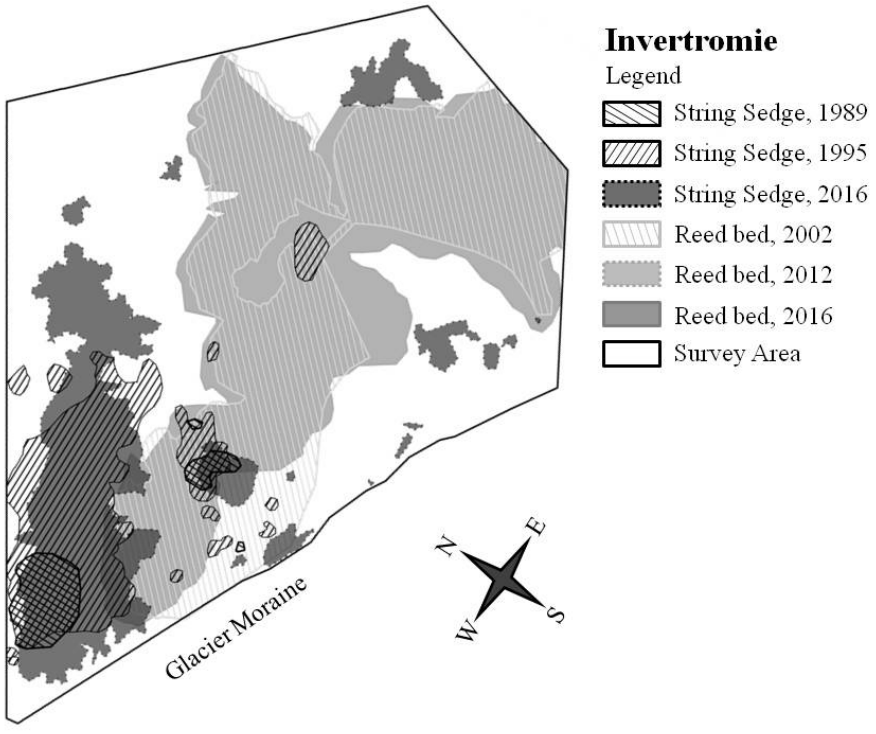

Fig. 2: Records of String Sedge and reedbed distribution on Invertromie

For Insh Fen, many smaller patches recorded in 1995 appear to have joined to form larger patches over the past 19 years. String Sedge occurs both within and outside the reedbed, which increased by 20% from 2002 to 2012 in this compartment (Rickerby, 2012; Fig. 2). Personal observation noted that reeds are less dense at the Insh Fen compartment compared to the Invertromie compartment, which may explain why String Sedge maintained a stronger presence in reedbeds at Insh Fen compared to Invertromie. In some areas, String Sedge formed a dense short sward under the reedbed.

For Invertromie, the largest String Sedge patch has expanded further northeast, skirting the edge of the dense reedbed (Fig. 2). String Sedge has also filled in the now cleared reedbed area near the glacier moraine, contributing to the overall 9% String Sedge growth at this site.

Rickerby (2012) notes a 15% increase of reedbed at Insh marshes from 2002 to 2012, a trend that appears to have continued into 2016 (Fig. 1, 2). Areas where the reedbed is denser, such as at Invertromie, may produce conditions that are not suited for prolific String Sedge growth. The one section of Invertromie that was grazed, an area adjacent to the glacier moraine, resulted in a more open sward that has since been colonized by String Sedge. This indicates the good resiliency of this rare species to continue to grow and expand when the opportunities arise.

Overall, results indicate that String Sedge has expanded in area by 9% at Invertromie and 24% at Insh Fen since 1995, increasing to just under six times the size of the initial populations mapped in 1989. Most of this expansion represents growth of existing patches, with only several new patches identified. These new patches were restricted to areas away from the reedbed. This is not surprising because, under good conditions, the runners of the plant can grow up to 70cm per year (Legg *et al*., 1995*b*). In addition, runners are often broken

over winter (Legg *et al*., 1995*a*), and potentially dispersed by flood water allowing the plant to become established in new locations. Frequent flooding of the Insh Marshes (Grieve *et al*., 1995) may have helped facilitate String Sedge's expansion and growth. In addition, the String Sedge expansion adjacent to the glacier moraine may be due to the grazing and subsequent reduction in reed distribution in that area.

Evidence from this study indicates robust and prosperous String Sedge populations on the Insh Marshes. Continued reedbed expansion, if unchecked, may pose a threat to the status of String Sedge here in the future, but only if reedbeds become dense, as String Sedge is capable of inhabiting less dense reedbed areas. The survey also indicates that String Sedge appears to expand quicker in areas of fen which are grazed, although the sample size is small with only one grazed and one un-grazed compartment surveyed.

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On-line databases, what a citizen needs to know – a personal opinion

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There are a number of on-line databases available if you want to enter your natural history observations. I have experience of one that deals with flowering plants though the same would apply for insects, birds, etc.

If all goes well, the community as a whole benefits because your observations are not left in your field notes and may be used by others who share your interests. They may be used as part of important national projects and other initiatives which have value to us all.

There are issues, however, and those who benefit most from volunteers posting data are not always good at explaining the systems. If you ask direct questions, they will tell you but it may not be a complete answer and you may not know which questions you should ask.

The data

Generally three sorts:

- Scientific – which plant, where, when
- Personal data – your name, where you have been, what you have seen and when
- Crucially, a link between these two. This may also include your email address. This aspect is hidden but it makes your data more valuable because it enables 'verification'.

Access to the database

It may not be 'open source' like Wikipedia. So you may only be able to view your own records which you have posted using your own password; and you would not be able to see records you had made (still with your name as recorder) which had been posted by someone else, using a different password. More people than you would think, have unlimited access to

many databases so if you are told 'only a few people would have access', this is not entirely true, particularly if there is a sharing agreement with another organisation (see below). It may be possible for someone to take your data which you entered and repost it still with your name as recorder, but with their name as reporter (or similar), under their password and then, to all intents and purposes, they 'own' it. You will no longer see this data and the fact that this has happened will be hidden from you.

What happens next?

Your data is 'verified' by a local expert and then it might be 'locked'. You might need to ask an administrator to 'unlock it' in order to amend or delete it. Whatever the system on the database, it does not always work seamlessly for you to remove your own data. This is so that 'verified data' stays verified. And that is important because the database may have a data-sharing agreement with any number of other organisations, some of whom may be paying for their agreement. You might be relaxed about the scientific data but you need to think very carefully about the personal, because there will always be a link so as to provide for continuing verification.

Personal security

If you are a young volunteer, starting off on your career, you may wish to use your data in a research paper you plan to publish, or something of this nature. If someone used your data and published first, you would not get the credit for important new insights. On the other hand, it might help to have your name all over the digital field – this might be quite professionally useful. You might also be vulnerable if people could deduce where you spend a lot of time, particularly if this is in quite isolated spots. You need to really consider the pros and cons. Older people are often more cautious about sharing personal data because they have more experience, and think a bit deeper.

Data security

Scientific data is intellectual property and many would think it questionable that data with your name as recorder should be taken by someone unknown, appropriated without your knowledge, and sent anywhere on the planet without your consent or knowledge. Virtually at the touch of a button.

Data can be corrupted by accident, carelessness or, very rarely, deliberately and so if someone comes back to you to verify it, maybe months or years after your original work, you cannot know how much (if any) relationship it has with your original posting. This could be serious if you have a professional reputation to consider, or just an embarrassment if you find that data which turns out be unreliable has been out there for years, without your knowledge, let alone your authorisation.

My position

I am a volunteer working in the natural history field. I do not post data on any on-line database. I only share data with people I can trust not to put my name on any on-line database. I donate data on that same basis and would expect to be consulted if anyone posted that data on an on-line database without my name attached. (I would normally agree to that but I ought to be asked). I intend to be careful about the granularity of data that I share (that means that place and time are now deliberately a bit fuzzy!). I have no professional reputation to consider in the natural history field. I am an amateur.

What I would like to see

- Completely open source databases in the natural history field so that all contributors have unlimited access to all the data on the database. It should be a totally joint enterprise.
- Contributors of records to be advised of specific agreements to share data and this information kept up to date.
- The use of a personal identifier instead of an individual's name and the link kept off-line by a trusted organization (like BSBI) so that the data can be verified.
- Organisations which promote or recommend on-line databases that volunteers (or any other citizen) might use, ensure that information about the database is complete (and not misleading by omission or use of technical terms). That is the only way there could be informed consent.
- Volunteers are fully briefed in a neutral way about the issues in this paper. This should be done in a way that ensures that they have a genuine choice and they do not feel they are being unreasonable or unhelpful if they decline to use on-line databases, or that it may result in them not being offered further interesting volunteering opportunities.

This is an edited version of the original note and the full version is available from the author on request.

On-line databases, what a citizen needs to know – a response

TOM HUMPHREY (BSBI Database Officer), *c/o CEH, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxon, OX10 8BB*; (tom.humphrey@bsbi.org)

The issues that Margaret's article raises are timely, coming at the point when complete, fully detailed BSBI records are beginning to be published by the NBN Atlas. I think that it's worth considering why we collect and compile records: we do so to disseminate knowledge about plant distribution for the benefit of civic society; to aid research and to assist the conservation of vulnerable taxa or habitats. BSBI shares records in accordance with policies that we've developed in consultation with our members and in response to the changing demands from funding bodies, researchers and from wider society. There is simply no point in amassing data if they are only to be kept secret and, were we not to share knowledge and expertise, one might call into question the very reasons for the Society's existence.

I agree with Margaret's characterisation of a 'complete' record as consisting of the classic 'what', 'where', 'when' and 'who' (though I would also add 'verified by'). A satisfactory record, intended to stand the test of time, should include these attributes in full. A record omitting details such as the recorder's name or a well-defined locality (a place-name and at least a 2 km resolution grid-reference) would usually be discarded with prejudice by anyone who later questioned its veracity.

To allow recorders to be properly acknowledged and credited for their efforts and to avoid inadvertent misattribution of records (deliberate plagiarism is vanishingly rare in the botanical community) it's vital that recorder names remain attached to records. The trustworthiness of an observation often stands on the reputation of the recorder – whether an established expert or a student who is just starting-out on their career. The Creative Commons license that we'll use to share data with the NBN Atlas requires acknowledgement of the author of each record. We share data in accordance with relevant privacy legislation so, while recorder names are usually considered to be a critical public component of an occurrence record, personal details such as a recorder's email address are not shared outside of the BSBI.

I should like to correct a misconception in the opinion piece, which suggests that there is a substantial risk that records might be arbitrarily edited or misattributed by data compilers. The editing guidance given to county recorders recommends that edits to records strictly reflect the intent of the original recorder, limiting the scope of changes that are permissible. The BSBI's central database rigorously stores a permanent edit history for all our records, so that it is always possible to see how a record has been modified, why and by whom.

For the overwhelming majority of species, the aims of conservation are best served by making known the precise location of vulnerable plants – because the threats from inadvertent habitat damage through ignorance are far greater than the risk of malicious damage. There is a short list of taxa for which, for conservation reasons, we mask some locality details before data is made public.

Ironically, the modern trend in favour of shared data represents a return to the Victorian roots of the BSBI – a period when open publication of botanical records and widespread exchange of specimens was a matter of pride. The return to a more open data model is challenging, both from a fund-raising perspective and for the possible friction that greater access creates over privacy and privileged access to private land for recorders. Ultimately, I am absolutely convinced that the short-term difficulties are surmountable and that openness with data is of benefit to all stake-holders. Like most scientific discourse, recording thrives when there is open sharing of verifiable data of high integrity.

Mycorrhiza and chlorophyll-deficient plants – some observations

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Michael Chalk's paper about the chlorophyll-deficient form of *Ophrys sphegodes* in *BSBI News* **134**: 9, raises some interesting questions. For most plants an inability to produce chlorophyll means death. The number of germinating seeds which have such a serious genetic error is likely to be small since natural selection would weed them out, because they would die once the food reserves in the seed had been exhausted.

However, orchids have minute dust like seed, which can only germinate if it comes into contact with the particular fungus with which it can form mycorrhiza. The minute orchid seeds contain no food reserves and the germinating orchid seedling relies on the mycorrhizal partner for all of its nutritional requirements. In most species of orchid once green leaves are produced the seedling can make its own food by photosynthesis and it is no longer reliant on the mycorrhizal partner. A few species of orchid, such as *Neottia nidus-avis*, Bird's-nest Orchid, never produce chlorophyll and remain dependent on the mycorrhizal fungus throughout their whole life.

It is the ability of germinating orchid seeds to derive all their nutrition from the mycorrhizal fungus that means that if an orchid seed germinates which cannot produce chlorophyll it can survive simply by maintaining its dependency on the mycorrhizal partner throughout its life.

The underground world of orchid roots and their mycorrhiza is poorly understood. Many of the species of fungi that form the mycorrhiza also form ectomycorrhiza with trees such as *Fagus sylvatica* (Beech). This means that using the fungal hyphae, the mycorrhiza connect many plants in a community and nutrients, sugars and water can probably pass from one plant to another via the mycorrhiza. Chlorophyll-deficient orchids and parasitic species, such as *Neottia nidus-avis,* have found a way to exploit this situation.

In the Chilterns *Epipogium aphyllum*, the Ghost Orchid, is notoriously elusive. It appears in some years, but can also go for twenty or more years without being seen. Admittedly it is so tiny that it could easily be missed, but could the fact that it so rarely appears be because being parasitic on its mycorrhizal partner it has almost given up the need to flower and just exists asexually underground?

Recent taxonomic and nomenclatural changes in *Rosa* L.

ROGER MASKEW, *Coppice House, Banalls Lane, Stoke Bliss, Worcestershire, WR15 8RZ*

Following recent research the following changes have been made to our standard list of dog-roses. They are included in a new dichotomous key (see pages 47-48)

Rosa glauca Pourr. (Red-leaved Rose) *vice R. ferruginea* Vill.

R. canina L. (Dog-rose) *vice R. canina* L. incl. groups *Lutetianae* and *Transitoriae*

R. corymbifera Borkh. (Hairy Dog-rose) *vice R. canina* L. group *Pubescentes*

R. squarrosa (A. Rau) Boreau (Glandular Dog-rose) *vice R. canina* L. group *Dumales*

R. caesia Sm. (Northern Dog-rose) *vice R. caesia* Sm. subsp. *caesia*

R. vosagiaca (N.H.F. Desp.) Déségl. (Glaucous Dog-rose) *vice R. caesia* Sm. subsp. *vosagiaca* (N.H.F. Desp.) D.H. Kent

R. tomentella Léman (*R. obtusifolia* auct. non Desv.) (Round-leaved Dog-rose) *vice R. obtusifolia* Desv.

R. villosa L. (*R. pomifera* Herrm.) (Villous Downy-rose) added

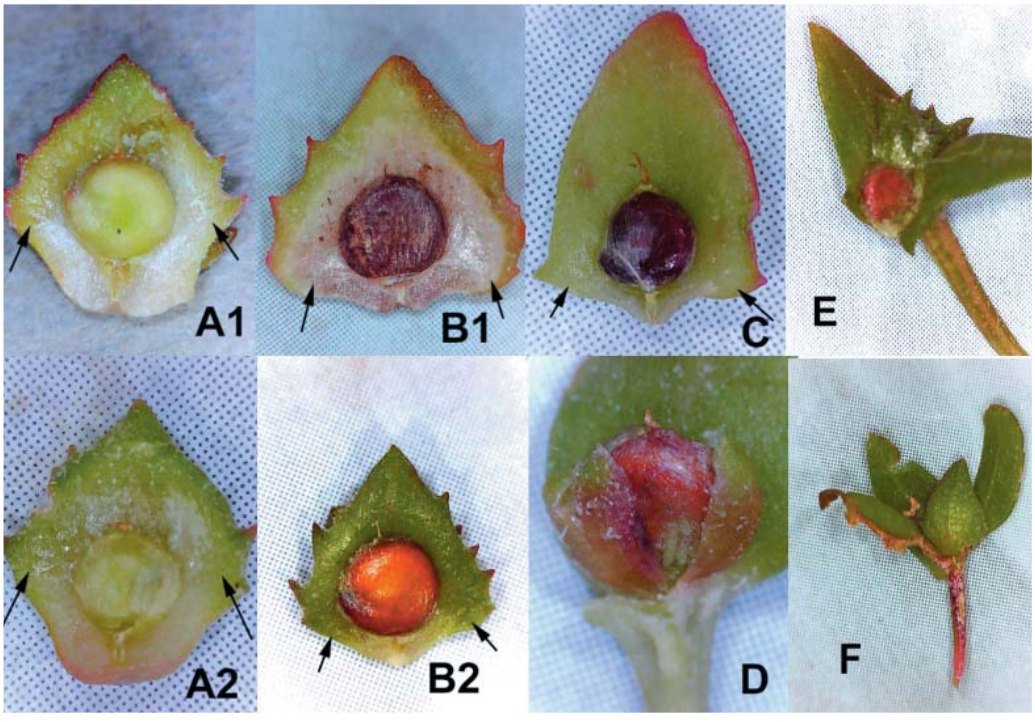
New dichotomous key to native and alien species of *Rosa* L.

ROGER MASKEW, *Coppice House, Banalls Lane, Stoke Bliss, Worcestershire, WR15 8RZ*

Four hybrids are included in the key; *R.* 'Hollandica', *R.* ×*alba*, and two others (*R. canina* × *R. vosagiaca*, *R. caesia* × *R. canina*) which are widespread and frequent and often occur in the absence of at least one parent, the latter being more or less restricted to northern Britain. Also included are the very rare aliens *R. gallica*, *R. luciae*, *R. setigera* and *R. villosa*.

1 Leaflets glabrous, or occasionally with sparse hairs usually confined to the subfoliar veins.. 2
1 Leaflets conspicuously hairy at least on the subfoliar veins..... 12
2 Styles exserted and fused into a column..... 3
2 Styles free not exserted into a column..... 6
3 Leaflets 4-6cm across, usually 3..... **R. setigera**
3 Leaflets 0.5-1.5cm across, 5-9..... 4
4 Styles pubescent; stems ± procumbent; semi-evergreen..... **R. luciae**
4 Styles glabrous; stems procumbent or climbing; deciduous..... 5
5 Flowers often numerous, in groups of at least 6 or more; stems strongly climbing and spreading ..... **R. multiflora**
5 Flowers in groups of 1-6; stems procumbent or occasionally climbing..... **R. arvensis**
6 Hips purplish-black when ripe; low shrub; stems erect, up to 75cm; leaflets mainly 9-11 ..... **R. spinosissima**
6 Hips red when ripe; stems climbing and arching; leaflets 5-7..... 7
7 Leaflets, glaucous and strongly red-tinged..... **R. glauca**
7 Leaflets, green, not red-tinged..... 8
8 Pedicels, hips and sepals densely glandular..... **R. virginiana**
8 Pedicels, hips and sepals eglandular..... 9
9 Stylar orifice *c.*1/5 diameter the disc; styles glabrous or pubescent in a small globose head not covering disc; pedicels 1.0-2.0(2.5)cm, not hidden by bracts..... 10
9 Stylar orifice more than 1/5 diameter of the disc; styles in a domed villous head, partly or completely covering the disc; pedicels 0.5-1.0cm, at least partly hidden by large bracts 11
10 Leaflets uniserrate, ± eglandular, stipules and rachides ± eglandular..... **R. canina**
10 Leaflets glandular biserrate or multiserrate; stipules and rachides with many odourless glands..... **R. squarrosa**
11 Sepals erect or spreading-erect; usually persistent until after the hips are ripe; stylar orifice *c.*1/3 diameter of the disc..... **R. vosagiaca**
11 Sepals patent or reflexed, usually falling before the hips are ripe, stylar orifice less than 1/3 diameter of the disc..... **R. canina × R. vosagiaca**
12 Disc strongly conical; styles exserted and fused into a column, occasionally becoming separated later..... **R. stylosa**
12 Disc concave, flat or convex; styles exserted and fused into a column or not..... 13
13 Petiole and rachis distinctly furrowed; flowers 6-8cm across, usually *flore pleno*. **R. ×alba**
13 Petiole and rachis not furrowed; flowers 3-5cm across, very rarely *flore pleno*..... 14
14 Leaflets with many conspicuous, viscid glands giving a fruity odour when fresh..... 15
14 Leaflets eglandular or with either odourless glands or those giving a resinous odour when fresh..... 17

15 Sepals erect or spreading-erect, persistent until after the hips are ripe; stylar orifice *c.*1/3 diameter of the disc..... **R. rubiginosa**
15 Sepals reflexed, falling before the hips are ripe; stylar orifice *c.*1/5 diameter of the disc....16
16 Pedicels glandular-hispid; prickles strongly curved; leaflets mainly rounded at base ..... **R. micrantha**
16 Pedicels eglandular; prickles curved with stout bases or deltate; leaflets mainly cuneate at base..... **R. agrestis**
17 Styles exserted and fused into a column, flowers often numerous, in groups of at least of 6 or more..... **R. multiflora**
17 Styles not exserted and not fused into a column; flowers in groups of 1-6..... 18
18 Stems with numerous acicles..... 19
18 Acicles absent..... 21
19 Sepals reflexed, falling before the hips are ripe..... **R. gallica**
19 Sepals erect or spreading-erect, persistent until after the hips are ripe..... 20
20 Hips depressed-globose, 1.5-3.0cm in diameter, leaflets broadly ovate, dark shiny green and strongly rugose above..... **R. rugosa**
20 Hips globose, 0.8-1.5cm in diameter, leaflets narrowly elliptical-ovate, light green, matt and scarcely rugose above..... **R. 'Hollandica'**
21 Pedicels eglandular; leaflets pubescent at least on the subfoliar veins..... 22
21 Pedicels glandular-hispid; leaflets pubescent or tomentose..... 25
22 Stylar orifice *c.*1/5 diameter of the disc; styles glabrous or pubescent not covering the disc; pedicels variable in length, not hidden by bracts..... 23
22 Stylar orifice more than 1/5 diameter of the disc; styles in a domed villous head, partly or completely covering the disc; pedicels 0.5-1.0cm, at least partly hidden by large bracts. 24
23 Leaflets glandular biserrate or multiserrate; stipules and rachides glandular; sepals glandular-bipinnate, strongly reflexed; pedicels 0.5-1.0cm..... **R. tomentella**
23 Leaflets eglandular, uniserrate; stipules occasionally with a few stipitate glands on the margins; sepals pinnate, ± eglandular, loosely reflexed; pedicels 1.0-2.0 (2.5)cm.....**R. corymbifera**
24 Sepals erect or spreading-erect, usually persistent until after the hips are ripe; stylar orifice *c.*1/3 diameter of the disc..... **R. caesia**
24 Sepals patent or reflexed, usually falling before the hips are ripe; stylar orifice less than 1/3 diameter of the disc..... **R. caesia** × **R. canina**
25 Stylar orifice *c.*1/5 diameter of the disc; pedicels 2-3.5cm; sepals patent or reflexed, usually falling before the hips are ripe..... **R. tomentosa**
25 Stylar orifice at least 1/3 diameter of the disc; pedicels 0.5-2(2.5)cm; sepals erect or spreading-erect, persistent until long after the hips are ripe..... 26
26 Prickles arcuate-acuminate, widening at base; sepals spreading-erect, pinnate; stems often zig-zag in lower parts, rarely suckering; stylar orifice *c.*1/3 diameter of the flat disc; pedicels 1-2(2.5)cm..... **R. sherardii**
26 Prickles completely straight, subulate; sepals strongly erect, ± entire; stems straight in lower parts, usually strongly suckering; stylar orifice usually at least 1/2 diameter of the concave disc; pedicels 0.5-1(1.5)cm..... 27
27 Petals with stipitate glands along distal margin; hips usually globose, (1.5)2.0-3.0cm across, dull maroon, strongly glandular-aciculate; leaflets oblong-ovate, usually with parallel sides, terminal leaflet 5.0-7.0cm long..... **R. villosa**
27 Petal margins eglandular; hips broadly ellipsoid or globose, 1.0-1.5 (2.0)cm across, usually red, often glandular-hispid; leaflets elliptical or ovate, terminal leaflet 2.5-4.5cm long...**R. mollis**



Terminal (A & B) and aberrant axilliary bracteoles (D – F) in *Atriplex.*
Photo I Rees © 2016 (see page 34 for details))

Callitriche palustris at Haweswater Reservoir, Westmorland (v.c.69). Habit photo by P.L. Brown; close-ups of fruits by F.J. Roberts, all © 2016 (p. 38)

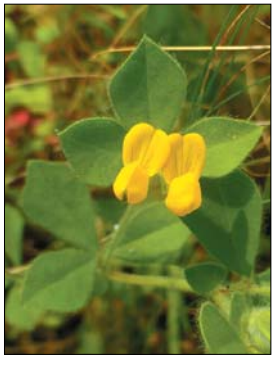
Fig. 1. The habitat of *Pachyphragma macrophyllum* (centre) close to where it escaped from RHS Harlow Carr Gardens

Phyla nodiflora var. *minor* at West Quantoxhead (v.c.5).
Photo Ro. FitzGerald © 2016 (p. 69)

Fig. 2. The streamside habitat of *Pachyphragma macrophyllum* amongst *Allium ursinum* by the Oak Beck, Harrogate
Both photos by K. Walker © 2016 (p. 75)

Saxifraga oppositifolia (Purple Saxifrage), Pen y Ghent,. An entry in the rare species category in the BSBI Photographic Competition 2016.
Photo Gordon Haycock © 2016 (p. 80)

1. *Lotus ornithopodioides* container site, with Eric Clement



2. Flowers frontal aspect

3. Flowers lateral aspect

4. Fruits

All *Lotus ornithopodioides* photos taken at Hindhead (v.c.**17**) by G. Hounsome © 2016 (p. 77)

Unusual cluster of *Orobanche purpurea* (Yarrow Broomrape), North Norfolk Coast. A late (and unjudged) entry in the rare species category in the BSBI Photographic Competition 2016. Photo Henry Padfield © 2016 (p. 6 & 80)

Ophrys ×pietzschii, a hybrid between Fly & Bee Orchid, Somerset. An entry in the rare species category in the BSBI Photographic Competition 2016.
Photo Helena Crouch © 2016 (p. 80)

Fig. a. *Listera ovata* (Common Twayblade) with already existing conditions (left) and with shadow behind (right) to show the plant more clearly

Fig. b. Skewed *Papaver somniferum* (Opium Poppy) corrected by rotation and hatched areas covered with clones

Fig. c. *Potentilla reptans* (Creeping Cinquefoil) with flower close-up inset in MS *Word*.
All photos © J Presland (see p. 64 for details)

Spiranthes romanzoffiana (Irish Lady's-tresses): A Wild Goose Chase

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Spiranthes romanzoffiana (Irish Lady's tresses) is an enigma. Essentially a North American species, it's only European populations are found in Britain and Ireland. In itself this is not unique, being matched by plants such as *Eriocaulon aquaticum* (Pipewort) and *Potamogeton epihydrus* (American Pondweed), as well as by creatures such as *Nematostella vectensis* (Starlet Sea Anemone). What is perhaps more intriguing is that its mode of reproduction and spread in the British Isles is not clear, despite the species being widespread in the Inner and Outer Hebrides and northern and western Ireland, with a few small colonies on the Scottish Mainland and, for a while, in Devon.

Frank Horsman recently delivered the very welcome news of the discovery of a large and flourishing colony of Irish Lady's-tresses at Loch Mor on Benbecula in 2009 (*BSBI News* **134**: 7-8). When surveyed in 2010 a number of plants at Loch Mor had multiple flowering stems, including two with four closely-associated stems and one with five; in Horsman's extensive experience these were unique. He noted that such multi-stemmed plants recalled populations in North America ('the home country') and made a particular point of the fact that Greenland White-fronted Geese wintered around Loch Mor. Three maps accompany the article (figs 1-3 in the colour section), but they do not really add to the article and I am at a loss to understand the relevance of figure 3. It was not explicitly stated, but Frank Horsman gives the distinct impression that he is again advocating the theory that Irish Lady's tresses is or was bought to the British Isles by Greenland Whitefronts, which, like the lady's-tresses, 'were much more widespread in the periglacial period than they are now' (presumably Horsman means the most recent *post-glacial* period, as 'periglacial' refers to a suite of environment conditions that have occurred many times and in many places).

In my opinion, it is a shame that this theory has been given another airing, even implicitly, as it is so full of holes. Firstly, the claimed co-incidence of Greenland Whitefront's wintering areas with the range of Irish Lady's-tresses is in fact marginal; the main site for the goose in Ireland is in Co. Wexford, about as far away from any known *Spiranthes* in Ireland as it is possible to get, and several other wintering areas have either no orchids (Caithness, Orkney, Wales) or very few (Islay). Conversely, Devon has no wintering Greenland Whitefronts (and of course, even if there was a good co-incidence, this would not demonstrate any sort of *causality*; a simpler and much more likely explanation is that both orchid and goose favour the same sort of habitats). Secondly, Irish Lady's-tresses does not occur anywhere within the breeding range of Greenland Whitefront, which lies on the tundra of west Greenland, nor anywhere on its migration route to the British Isles. There is simply no possibility, based on the known facts, that Greenland Whitefronts can, at the present time, transport either the seeds or any vegetative part of Irish Lady's-tresses from North America to Britain or Ireland. That should be the end of it! If we want to go back in time to a period when the distribution of either or both orchid and goose were different and perhaps confluent in order to find an explanation for the amphi-Atlantic distribution of *Spiranthes romanzoffiana*, the net would be better cast much wider than a tundra

breeding goose. I am particularly disappointed because once such theories are aired they have the bad habit, however unconvincing they are, of becoming mainstream.

Orchids are, of course, well-known for their ability to move long distances as wind-blown seed. The widely scattered distribution of Irish Lady's-tresses, with 'new' sites being found on a regular basis, makes wind-blown seed the most plausible mechanism for dispersal, but this presupposes that it produces seed. In North America the proportion of flowers setting seed is high – over 75%. But, until recently ripe seed capsules had never been found in Scotland and only three times in Ireland, and it was thought that little or no seed was produced in the British Isles. More recently, careful examination of plants from Colonsay in the Inner Hebrides revealed that *c.*40% of the flowers had their pollinia removed and *c.*70% had pollen on their stigmas (Scobie, 2007), while at the largest Irish colony pollinia were found on the probosci/thorax of visiting bumblebees and on the stigmas of randomly checked flowers (Duffy & Stout, 2008). A small but consistent proportion of flowers on Colonsay sets seed, although much lower than the proportion of flowers that are pollinated, and the number of seeds per capsule is also very low – but the little seed that is produced *is* viable (Scobie, 2007). What is surprising is that examination of more than 1000 flowers at the Irish site produced no ripe capsules (Duffy & Stout, 2008).

Irish Lady's-tresses can reproduce vegetatively through the development of an additional bud at the base of the stem, but this is unlikely to account for any long distance dispersal – I can think of no British Orchid that disperses vegetatively. (Of course, in theory Greenland Whitefronts are possible vectors for the transportation of vegetative material of Irish Lady's-tresses from one British or Irish site to another, but if we are looking for vectors *within* the British Isles, possible candidates would seem to be endless.)

When the impossible has been eliminated (i.e. transport by Greenland Whitefronts), what is left, however improbable, should take centre stage. I would suggest that dispersal via wind-blown seed is the most likely mechanism for the current distribution of Irish Lady's-tresses, and that understanding the current poor seed production is important both to solve a scientific mystery and for its future conservation. The 'new' population reported by Frank Horsman offers good opportunities for research: e.g. do plants in this large and flourishing population produce ripe capsules?

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Is the hybrid between Britain's two butterfly orchids, *Platanthera ×hybrida*, under-recorded?

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Introduction

At the beginning of 2016, I was asked to make a short presentation to my local flora group on an eight-year field study I made in Ard Dorch on the Isle of Skye (v.c.**104**) into the morphology and ecology of the two *Platanthera* species, *P. bifolia* and *P. chlorantha* (Lesser and Greater Butterfly orchid respectively). Populations of the two were sympatric, often intermingled in places. I have previously published a summary of some of the results in *BSBI News* (Swainbank T. & A., 2015a & 2015b) and a further note on the longevity of individual plants and climate influences is in preparation. Putting together the presentation gave me a chance to review the hundreds of images I had taken over the years and it became obvious that a few of the plants that I had attributed as *P. bifolia* were abnormal – the pollinaria were not lined up against each other in parallel. Rather they were at an angle to each other, but not as great as is conventionally the case for the other species, *P. chlorantha*.

I had long suspected that there may be hybrids amongst the orchids I studied and each year marked a few as suspect. Reviewing the 2015 cohort of flowering plants of *P. bifolia*, based on the angle subtended by the pollinaria, I concluded that four of the 48 flowering plants (8%) were the hybrid *Platanthera ×hybrida*. All were growing alongside plants which were definitely *P. chlorantha* and never in habitats avoided by *P. chlorantha* such as the boggier areas with limited sward and a constant water flow.

Fortuitously preparation of the presentation brought me to the herbarium at the University of Oxford and I was able to review the collection of *Platanthera* material there. Excitingly there were two examples of *P. ×hybrida*, one collected by George Claridge Druce in 1909 from Sligachan, (Fig. 1), only 10 miles from my own study area. It looked exactly like some of the images of my own putative hybrids.

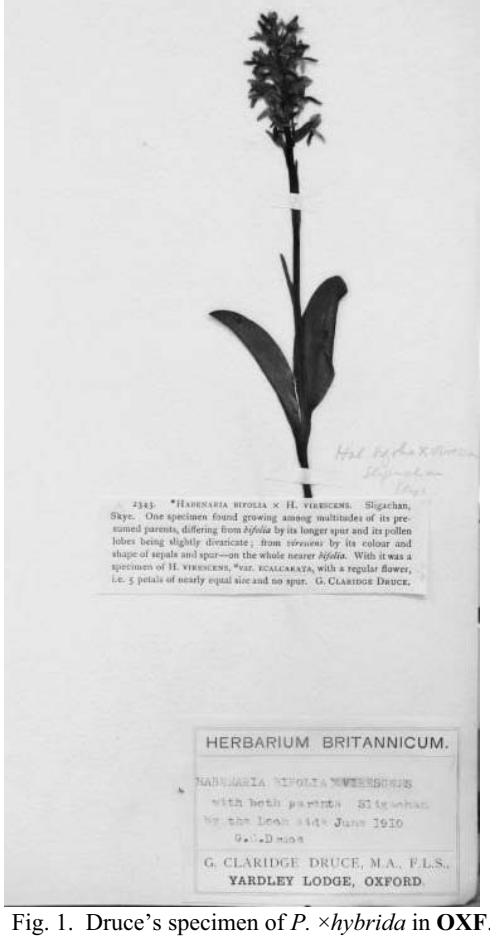

Fig. 1. Druce's specimen of *P. ×hybrida* in **OXF**. Photo T. Swainbank © 2016

Emboldened, I therefore confirmed the presence of *P. ×hybrida* (inside front cover) on Skye (v.c.**104**) to the VC Recorder, Stephen Bungard. Druce's record became the first observation for Skye and mine the second. Druce's description is interesting "*One specimen growing among multitudes of its parents differing from bifolia by its longer spur,and its pollen lobes being slightly divaricate, from virescens* [i.e. chlorantha] *by its colour and the shape of sepals and spur –on the whole nearer bifolia*".

Having moved to Oxfordshire in late 2015, after a little research to find locations in the south of England where there were potentially sympatric populations of the two parents, I visited Cranham Common in Gloucestershire in May and June 2016. There is a single record for *P. ×hybrida* on the BSBI database from there in addition to both parents. In fact, I found numerous putative hybrids; indeed it was quite difficult to assign plants to either *P. bifolia* or *P. chlorantha*, and there appeared to be strong evidence of introgression.

The hybrid is easily overlooked, and in consequence I believe that it is under-recorded. To confirm whether my hypothesis might be correct I therefore used open records on the BSBI distribution database to identify locations where there were potentially sympatric populations of the two parents and then compared the results with records for the hybrid. The precision in the records needed for such a study is quite a challenge to the database, because much of the data is only at tetrad level at best.

Status of *P. ×hybrida*

A succinct summary of the status, distribution and fertility of the hybrid is given by Stace, Preston & Pearman (2015). The status of the hybrid is now accepted as such, rather than as a simple variant of *P. bifolia*, despite the two parents being indistinguishable at a molecular level (Bateman *et al.*, 2009). As Bateman & Sexton (2008) note there has been a reluctance to admit the occurrence of hybrids, prioritising a strong fidelity between orchid and pollinator. Darwin (1890) recognised and accepted the status of the hybrid, yet some subsequent authors of Floras were reluctant to accept it. Indeed Godfery (1933) who must have seen the Druce specimens, regarded them as a mere variant of *P.bifolia*. If you disregard the hybrid then it seems challenging not to regard *P. chlorantha* also as merely a variant of *P. bifolia*, which is then consistent with the molecular level analysis. We wait to see if there is some subtle difference at that level which has yet to be recognised.

The hybrid has characteristics that lie intermediate between the two parents as noted by Nillsen (1985) save that in a study by Claessens and Kleynan (2006), unusually the hybrid spur was found to be longer than that of either parent. The hybrid is distinguished from the parents by the length of the caudicle, the stalk-like part of the pollinaria supporting the pollinia, and the distance between the viscidia.

The morphological characteristics measured in 2015 on Skye were intermediate between the parents as shown in Table 1. (Spur length was not measured).

The pollinaria do not lie in parallel as is the case with *P. bifolia* nor are they as wide apart as with *P. chlorantha*. I found that a shortcut - measurement of the subtended angle between the pollinaria – worked rather well and could with some care be used on photographs where no measuring scale had been included. On an admittedly small number of plants from my Skye study the average subtended angle is shown in Table 2:

Hybrids collected at Cranham Common had an average subtended angle of 22° though again only a handful of measurements were made.

Table 1

	Flowering date (average for the population)	Height of flowering spike (cm) (average)	Lowest leaf width at widest point (cm) (average)	No of flowers (average)	No of plants
P. ×hybrida	11/07/2015	23.4	2.9	11.7	4
P. bifolia	30/06/2015	17.2	2.4	11.8	48
P. chlorantha	07/07/2015	26	3.5	10.8	71

Table 2

P. bifolia	Maximum 5° (not always tightly parallel)
P. ×hybrida	26°
P. chlorantha	45°

On Skye, *P. bifolia* flowers seven to nine days earlier than *P. chlorantha*. As Cleassens & Kleynan (2011) noted, this relationship is reversed in more southerly locations such as the south of France and northern Germany southwards where *P.chlorantha* is the earlier flowering plant.

Again on Skye *P. bifolia* plants were in flower for almost three weeks, but *P. chlorantha* plants for rather less, around two weeks before 'going over' so that the overlap in flowering periods was around seven to 11 days. It is interesting to note that the flowering period of the hybrid is closer to *P. chlorantha* than *P. bifolia*. There are of course too few observations to give any statistical validity to the conclusion.

Platanthera are reward-giving orchids – the nectar held within the spur of the orchid is available to pollinating night flying moths with a sufficiently long proboscis; these are probably attracted by the scent of the orchid rather than its colour. In the case of *P. chlorantha* pollinia attach to the eyes of the moths because of the wide gap between the viscidia, whereas with *P. bifolia* pollinia attach to the proboscis.

Much of the past debate contended that *P. bifolia* and *P. chlorantha* were both pollinator specific such that hybridisation was unlikely, though Bateman *et al.* (2012) consider this pollinator specificity to be exaggerated. The pollination literature is quite extensive and a summary of identified pollinators is provided by Cleassens and Kleynan (2011); they note that there is some pollinator overlap, including three hawkmoths, *Deilephila porcellus*, (Elephant Hawkmoth), *D. elpenor* (Small Elephant Hawkmoth) and *Hyloicus pinastri* (Pine Hawkmoth). The specificity argument also ignores the possibility of casual visits by other moths and indeed other insects. In my own study, despite moth trapping at the peak flowering time in the eight-year study period, I was never able to confirm moth pollination. Fruit set was low and very variable year by year, such that vectors beyond those accepted so far, perhaps including autogamy, might be at work.

Boberg *et al.* (2014) found regional and habitat differences in the pollinator fauna of *P. bifolia*, and that the plant's spur length correlated with the length of the proboscis.

Bateman & Sexton (2009) found in Britain at least that the spur length of both the parents is correlated with latitude but that the ratio between the two is constant with the spur length of *P. bifolia* 2/3 that of *P. chlorantha*. My results from Skye are entirely consistent with these results.

With an intermediate viscidia gap the hybrid matches neither of the parents and could therefore be expected to suffer limited pollen removal. Nevertheless Claessens *et al.* (2008) photographed pollination by a Shark Moth (*Cucillia umbricata*).

If pollinator specificity is less relevant, then hybridisation is possibly limited rather more by the geographical isolation which normally applies to the two species. Again the habitat preferences are probably exaggerated but it is a mystery why there seem to be so few co-locations. On Skye, a classic location for *P. bifolia* is that of damp, peaty acid soil with low sward. *P. chlorantha* is also abundant, sometimes sympatric with *P. bifolia*, but with no hint of the calcicole habitats often suggested as a preference for *P. chlorantha*. Indeed *P. chlorantha* seems to be more catholic in its habitat preferences than *P. bifolia* and seems to like heavier swards (perhaps therefore a little more fertile).

Interestingly, Esposito *et al.* (2016) found that the mycorrhizal communities associated with each species showed clear differences, but in sympatric populations those differences were reduced. Where there were hybrids the community resembled that of *P. bifolia* and they speculated that the hybrid might therefore simply be a variant of *P. bifolia*.

Distribution

As is the case for both parents, *P.* ×*hybrida* is widely distributed. For Britain and Ireland, the BSBI database holds 31 records. Generally the numbers are sparse; Bateman & Sexton (2009) found that only 0.27% of a population at Bix Bottom were hybrids. In Europe there are records from, *inter alia*, Thuringia in Germany

(Heinrich, 2004), Valencia autonomous region in Spain (Fabregat 2008), Sweden and Belgium. Again the numbers were low but at a location in South Holland, Claessens & Kleynan (2006) found that the hybrid predominated and was numbered in thousands. Similarly in the Crimea (Faterega, 2014) at suitable locations the hybrid predominated, replacing *P. bifolia* which was rare.

In Estonia Kungla (2016) found that the hybrid appears to be able to set fruit and the seed is viable.

Data Analysis and Conclusions

Accepting the hybrid's status as a separate entity and not merely a variant, but rather close to *P. bifolia*, is it under recorded in the UK? I analysed all the open records on the BSBI distribution database for the two parents to find places where the two might grow together and then compared these with known occurrences of the hybrid. If there were lots of places where both species occurred and were sufficiently close together then the hybrid ought to occur there, though perhaps in small numbers. If these locations did not largely correspond with locations for the hybrid then the conclusion would be that the hybrid is under-recorded.

The first step was to look for locations where populations of the two parents might be sympatric. From the BSBI database all records for *P. bifolia* and *P. chlorantha* were downloaded and combined into a single Excel spreadsheet for data analysis. The records were sorted on vice-county, place name and grid reference. Records for Ireland were ignored so that the analysis concentrated only on England, Scotland and Wales. There were 14,552 records for *P. chlorantha* and 6,606 records for *P. bifolia*.

I used locations – place names – rather than grid references, in order to make the analysis easier and the results simpler to use. Records for place names which were too broad (e.g "near Launceston" or "Vice County 24"), or where the record was to a precision of no better than monad level were eliminated. A correction was made for records where the place name was slightly different but obviously the same as that for another record (e.g. Auchalton Meadow and Auchalton Meadow SWT Reserve). The data was then scored where for a particular place name both parents occurred. This gave a total of 105 locations where, potentially, the two species were sympatric but perhaps not sufficiently close for cross breeding.

A further sift was then made where only records with a precision of a six-figure grid reference or better were retained (678 records in aggregate for the two species). Grid references were then used to determine whether the two parents grew within less than 200m of each other on the unsupported assumption that moth pollinators would not travel more than that distance in an evening. If yes then this became a possible site for the hybrid of which there were 61 unique locations with a further six where the two species were recorded within 200 and 300m of each other.

The 200m cut off was arbitrary; I can find no information about the distance a pollinating moth might travel between one plant and the next, except for Darwin (1890) who quotes an observation of a *Platanthera* pollinating moth travelling 0.5 miles (800m) but this seems extreme. There have been a very few studies on the distance that a moth might travel to a moth trap from which 140m seems to be the limit. Using a hurdle of less than 200m seems a reasonable compromise. If this is too far then limitations of the data come into play because few of the database records are better than six-figure grid references (noting that plants with the same six-figure grid reference could be 140m apart). If too near then the number of sites for the potential hybrid will be too low.

On Skye the two parent species were typically separated by no more than a few metres.

The total of 61 unique locations might be exaggerated by misidentification; in some instances almost all the records were for one species with perhaps just one for the other, suggesting that the recorder might have made an error (even herbarium specimens can be wrongly attributed).

Countering such potential overestimation however, because much data was excluded in

the analysis through its unsuitable precision, other locations where there may indeed be sympatric populations might not have featured.

There were a further six locations where the parents lie within 200 and 300m of each other.

The list of potential locations for the hybrid where both parents are within 200m of each other is shown in Table 3 (the 'Sympatric list' p. 57). Table 3 also includes locations where the parents are within 200–300m of each other.

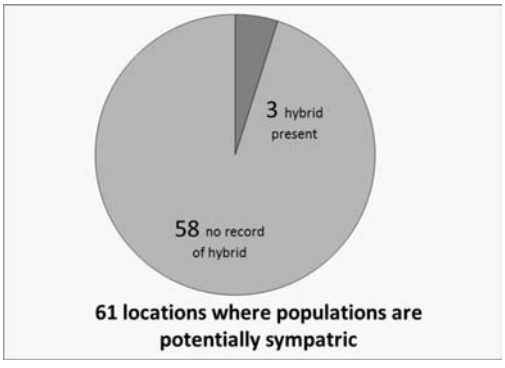

Fig. 3

A similar analysis of the records for the hybrid was made. The BSBI database has only 30 records, and these were analysed down to a mere 13 unique locations (Table 4 p. 58). The precision of the records was relaxed because there are so few but a mention of just the vice-county for instance was discarded.

The two lists were then compared, and the results are shown in pie chart form in Figures 3 and 4.

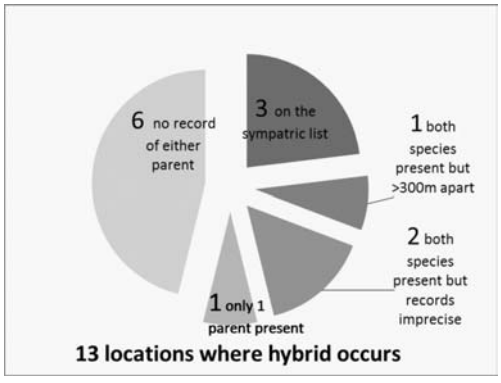

Fig. 4

The correspondence between the two lists is low. Only three locations for the hybrid agree to locations where the parents are within 200m of each other (see Table 3), *i.e.* 5% of the total possible. Another location for the hybrid agrees to the list in Table 3 but where the parents are between 200 and 300m of each other. Under-recording therefore seems to be a strong possibility.

Looking at the hybrid data those four locations represent only less than a third (30%) of those where it is has been found. The balance probably says more about the completeness of records on the database because:

- two locations on the hybrid list correspond to records for both species but the grid references are insufficiently precise to determine whether they are sympatric
- one location has a record for only one of the parents in the database
- six locations have no records in the database for either parent

Some of this might be explainable by reconsidering the cut off of 200m (and 300m) to find co-locations for the parents but more likely it appears that the database has been pushed as far as it is possible for this type of comparative analysis.

Limitations of the BSBI Database

The most obvious limitations are that for rare plants the precision on older records is insufficient; a minimum of a six-figure grid reference is needed. Anything that simply refers to a particular vice-county provides very little of use, other than boosting the species count for that particular vice-county. The analysis inevitably excluded much old data because by and large only recent records are at six-figure grid reference or better.

Secondly it is not easily adapted to provide information about plant communities rather than data for a single species, nor is there adequate information about abundance. Hopefully as we get to more automated methods of adding to the database these

weaknesses will fall away, but would such an increase in records make the task of assessing their veracity more challenging?

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Table 3: Locations where both parents are close together

V.c.	Place Name	Example Grid Reference	Hybrid present?
Parents closer than 200m apart			
2	Goss Moor	SW948601	
2	Greenscoombe, Luckett Wood	SX392724	
2	Tregonetha Downs	SW959628	
5	Thurlbear Quarry Lands	ST272208	
7	Calstone Down	SU04646830	
7	Morgan's Hill - WWT Reserve	SU028672	
8	Bentley Wood SSSI	SU250295	
8	Coulston Hill	ST952533	
8	Ebsbury	SU0539335332	
8	Great Cheverill Hill, Beeches South	ST973517	
8	Groveley Castle	SU051353	
8	Hound Wood	SU230305	
8	Little Cheverill - SPTA W ranges	ST974517	
8	Middleton Down WWT Reserve	SU049233	
8	Scratchbury and Cotley Hills SSSI	ST915437	
8	Stockton Wood & Down SSSI	ST960365	
11	Punch Bowl, Winter's Down, Exton	SU599217	
12	Micheldever Spoil Heaps HWT reserve	SU520444	
12	Northbrook Woods, Bentley	SU806457	
13	Rewell Wood	SU9802107470	
15	Trundle Wood	TQ88075838	
24	Aston Clinton Ragpits SSSI	SP887108	
24	Fivearch Wood, Wotton Estate	SP676158	
33	Cranham Common	SO89661252	Yes
40	Llanymynech & Llynclys Hills SSSI	SJ272239	Yes
43	Rhos yr Hafod SSSI	SN909679	
44	Cae Blaen Dyffryn SSSI	SN604442	
47	Cwm Nant-y-meichiaid	SJ128149	
48	Tir Stent	SH7532216873	
62	Deepdale	SE933913	
66	Byerley House Wood	NZ103443	
75	Auchalton Meadow	NS335036	
86	Denny Muir SSSI	NS76128358	
86	South Braes SSSI	NS615770	
87	Braes of Greenock, Nr Callander	NN626063	
87	Callander Golf Course, area B	NN6412207658	
87	Quadrant NS99SE: Brucefield	NS959916	
87	Quoiggs Meadow SSSI	NN8305405241	
88	Coilcambus Meadow	NN7752218121	
88	Croftintygan Meadow SSSI	NN672391	
88	Fearnan Cowpark SSSI	NN724450	
88	Kiltyrie	NN626363	
88	Morenish Meadow	NN60413499	
90	Glenquiech	NO426614	

V.c.	Place Name	Example Grid Reference	Hybrid present?
93	Loch of Strathbeg: Fen to north of Cowie's Marsh	NK060586	
97	Sanna Beagh (NM4468)	NM444685	
97	Scotstown (NM8163)	NM81846382	
98	Duror	NM98945514	
98	Strachur, Field NW of School	NN098009	
100	Arran W: Rough pasture W. of Lakin Fm	NR899305	
102	Bolsay track, Port Charlotte	NR2366257754	
102	Bruichladdich Garden	NR2598860180	
102	Loch Gruinart	NR293661	
104	Allt Dearg House, track to	NG47952966	
104	Ard Dorch	NG57572904	Yes
104	Ardnish	NG66712398	
104	Black Park Broadford	NG649231	
104	Skerinish, E of	NG42035091	
104	Torrin	NG574207	
104	Ullinish	NG321372	
105	Aultbea Surgery	NG87768883	
Parents between 200 and 300m apart			
8	West Lavington	SU011523	
11	Bottom Copse, Corhampton And Meonstoke	SU58402050	Yes
12	Selborne Common, South	SU736329	
13	Duncton	SU964162	
69	Helsington Barrows	SD487901	
95	Boat of Garten, Golf Course	NH94301801	

Table 4: Locations where the hybrid has been recorded

V.c.	Place Name	Indicator Grid Reference
2	St Anns Chapel, Gunnislake	SX4171
11	Bottom Copse, Corhampton	SU5820
22	Buscot	SU29J
23	Bix Bottom, Warburg Reserve	SU78
33	Cranham Common	SO89831282
33	Stroud, NE, Bulls Cross	SO80
40	Llynclys Hill	SJ27232372
46	Cors Caron NNR, Tregaron	SN674616
63	Canklow	SK4291
70	Skirwith	NY63
73	Kirkcudbright	NX96
86	Balgair	NS58Z
101	Barrahormid	NR78
104	Ard Dorch	NG5761229032
104	Sligachan	N/A

Vascular plant Red Data List for Great Britain: a summary of amendments in years 10 & 11 (2015-16) of the annual amendments process

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Following previous updates (Leach 2007, 2010; Leach & Walker, 2011, 2013, 2015), the GB Red List Group – formerly the Species Status Assessment Group – for vascular plants has now agreed further changes to the GB *Red Data List* covering years 10 and 11 (2015-16) of the annual amendments process. As usual, these are being submitted to JNCC to be incorporated into the master list on the JNCC website; in addition, a copy of the revised *Red Data List,* including the Waiting List, will soon be available via the 'Resources' page of the BSBI website.

The amendments, summarised below, fall into four categories: (a) additions to the Main List; (b) amendments to threat statuses given to taxa already on the Main List; (c) additions to the Waiting List; (d) nomenclatural, taxonomic and other changes. For an explanation of the various lists, see Cheffings & Farrell (2005) and Pearman & Leach (2017). It should be noted that, as usual, all new or amended threat statuses have been determined in accordance with the IUCN threat criteria used to compile the original GB *Red Data List* (IUCN 2001, 2003). In the following account, threat categories are abbreviated as follows: EX extinct, EW extinct in the wild, CR critically endangered, EN endangered, VU vulnerable, NT near threatened, DD data deficient, LC least concern (= not threatened) – for definitions, see Cheffings & Farrell (2005).

Additions to the Main List

- *Angelica archangelica*. There is mounting evidence to suggest that some coastal occurrences of *A. angelica* in N. Scotland may have arisen from sea-borne dispersal of seed from native populations in Norway or the Faroe Islands (Stroh & Scott, 2017). We acknowledge that at least one record from Shetland, relating to the Scandinavian subsp. *littoralis*, was in all probability the result of natural colonisation, and that this taxon (and the species as a whole) should now be added to the Main List. In the absence of any extant populations of the putative native taxon, the species and subspecies are, for now, given a status of EX. Subsp. *archangelica*, for which comparable evidence of native status is presently lacking (Stroh & Scott, 2017), is added to the Waiting List.
- *Hieracium* species. Three recently described hawkweeds have been added to the Main List, as follows: *H. attenboroughianum* (Attenborough's Hawkweed), a Welsh endemic described by Rich (2014), is added as EN; *H. dolorense* (Dollar Hawkweed) and *H. kintrawense* (Raven's Crag Hawkweed), two Scottish endemics described by McCosh (2015a), are added as EN and CR respectively. In addition, *H. nigrifactum* (Dusky-headed Hawkweed), a Scottish endemic described in Sell & Murrell (2006) but inexplicably omitted from previous versions of the Main List, is now added as LC.
- *Potentilla* species. As summarised by Rumsey (2016), the conventionally accepted taxa *P. argentea*, *P. tabernaemontani* and *P. crantzii* are treated by Sell & Murrell (2014) as comprising 13 species, four of which are considered to be endemic. While we are proposing, for now, that these taxa should be added to the Waiting List (see below), there are nevertheless two geographically restricted endemics, the English *P. cryeri* (Grassington Cinquefoil) and the Scottish *P. scotica* (Scottish Cinquefoil), for which the case has been made for their inclusion in the Main List (Rumsey 2016). We accept Rumsey's

conclusions and, on the basis of our current knowledge of their populations, *P. cryeri* is added to the Main List as VU, while *P. scotica* is added as DD.

- *Sorbus arvonicola* (Menai Strait Whitebeam) is added to the Main List as CR. It was included as a legitimate but un-named taxon by Rich *et al.* (2010, pp 151-2), being later named and formally described by Sell & Murrell (2014, pp 522-3). The population of this Welsh endemic is estimated to be around 30 trees (Rich *et al*. 2010).
- *Sorbus* ×*avonensis*, originally named as a hybrid by Rich (2009), was given specific rank as *S. avonensis* (Avon Gorge Whitebeam) by Sell & Murrell (2014). There seems to be general acceptance that this is a valid change (T.C.G. Rich, pers. comm.); as such, and with a current population of about 40 trees (L. Houston, pers. comm.), it is now added to the Main List as CR.
- *Taraxacum ciliare* (Channel Island Dandelion), long known from the Channel Islands, has recently been confirmed from the British mainland, in the New Forest (Richards 2015). Like other members of Section *Palustria*, Richards (2015) considers it likely to be "rare and potentially threatened" – as such, we have decided, for now, to add it to the Main List as DD.

Amendments to taxa already listed on the Main List

- Leach & Walker (2015) listed changes to threat statuses of 43 GB species restricted to England, to bring them into line with those given in the England *Red List* (Stroh *et al.*, 2014). An analysis of threatened taxa with *nearly* all (>90%) of their GB range in England has thrown up a further eight species for which we think there is a strong case for their GB threat statuses to be updated (Table 1, p.62). All but one of these are now considered to be more threatened than previously.
- Threat statuses of two *Hieracium* species need updating: *H. candelabrae* (Candelabra Hawkweed) and *H. ornatilorum* (Large-flowered Hawkweed), both previously EN, are amended to CR on account of recent population declines and the extremely small size of extant colonies. Counts in 2013-14 revealed 20-40 plants of *H. candelabrae* and just 15 plants of *H. ornitalorum* (B. Burrow, pers. comm.).
- *Linum perenne* subsp *anglicum*, previously listed as LC, has been subject to a detailed re-assessment by Rumsey (2017, in prep.). He concludes that, following a recent decline of populations and loss of many sites, this GB endemic is now threatened. In line with Rumsey's recommendation, it is now amended to EN.
- *Polygonum maritimum* (Sea Knotgrass), previously listed with a threat status of VU, is amended to EN following collation of population counts which showed that in recent years the total GB population has been consistently <250 plants (D.A. Pearman, unpubl. report).
- In consultation with A.J. Richards, *Taraxacum retzii* (De Retz's Dandelion), previously listed as LC, is amended to DD. An extremely scarce and rarely recorded member of Section *Erythrosperma*, it is apparently restricted to a small number of sites – mainly sandy heaths – in southern England.

Additions to the Waiting List

Sixteen taxa are being added to the Waiting List. Apart from *Angelica archangelica* subsp. *archangelica*, already mentioned, these are recently described and/or poorly recorded taxa for which there is presently insufficient information to determine their taxonomic merit or threat status. The taxa in question are all ones included in Vol. 2 of Sell & Murrell (2014), comprising one Lady's-mantle (*Alchemilla acutidens*), two *Cochlearia* species (*C. briggsii* and *C. islandica*), nine segregates within the *Potentilla crantzii/argentea/tabernaemontani* 'complex' (*P. argentata*, *P. billotii*, *P. brevifoliata*, *P. confinis*, *P. decumbens*, *P. demissa*, *P. longifrons*, *P. paucidentata* and *P. tenuiloba*), and three whitebeams (*Sorbus humphreyana*, *S. subeminens* and *S. waltersii*).

Nomenclatural, taxonomic and other changes

- *Hieracium* species. McCosh (2015b) re-assessed the taxonomic position of a number of hawkweeds, concluding that British populations of several (otherwise Scandinavian) taxa should be considered as distinct (GB endemic) taxa. As such, the following changes are required to the Main List: *H. acroleucum* (Pale-headed Hawkweed) is replaced by *H. pseudacroleucum* (English name, ditto); *H. caesionigrescens* (Linton Halls Hawkweed) is replaced by *H. lintonense* (ditto); *H. crinellum* (Blunt-leaved Hawkweed) is replaced by *H. subcrinellum* (ditto); *H. integratum* (Toothless Hawkweed) (EN) is now separated into two taxa, *H. pseudintegratum* (ditto) (CR) and *H. arnsidense* (Arnside Hawkweed) (CR); *H. prolixum* (Ben Hope Hawkweed) is replaced by *H. benhopense* (ditto); *H. rhomboides* (Rhombic-leaved Hawkweed) is replaced by *H. rhombicum* (ditto); *H. stenstroemii* (Stenströhm's Hawkweed) is replaced by *H. cambrense* (Cambrian Hawkweed).
- There has been continuing discussion as to whether *Rhinanthus angustifolius* (Greater Yellow-rattle) should be considered an archaeophyte. Originally presumed to be a neophyte, we were later persuaded that it was an archaeophyte (Leach & Walker 2015). Its true status is probably intractable and, as such, we now think it would be better listed as a 'neophyte or archaeophyte' rather than an 'archaeophyte'. Its threat status is unaffected, however, so it remains on the Main List as LC.

Acknowledgements

The GB Red List Group for vascular plants is coordinated by BSBI and includes representatives from the BSBI, Natural Resources Wales, Natural England, Natural History Museum, Plantlife and Scottish Natural Heritage. Thanks to Brian Burrow, Lynne Farrell, Libby Houston, Andy Jones, John Martin, David McCosh, David Pearman, Tim Rich, John Richards, Pete Stroh, Fred Rumsey, Ian Taylor and Kevin Walker for assistance in gathering together the relevant information and/or helpful comments on the draft.

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Table 1: Taxa largely restricted in GB to England that require amended GB threat statuses as a result of those given in the England *Red List* (Stroh *et al.* 2014)

Taxon	Old GB threat status	Amended GB threat status	Notes
Bromus secalinus	VU	NT	95% of GB range lies within England; appears to be spreading again after an earlier decline, and certainly not threatened currently
Chenopodium murale	VU	EN	95% of GB range within England; a more severe decline that previously estimated
Euphorbia exigua	NT	VU	95% of GB range within England; a more severe and widespread decline than previously estimated, more or less gone from northern Britain (Preston *et al.* 2002) – if VU in England, must also be at least VU in GB
Fumaria vaillantii	VU	EN	97% of GB range within England; a more severe decline than previously estimated
Gentiana pneumonanthe	LC	NT	94% of GB range within England; always surprising that this species was assessed as LC, given the severity of known historic losses. England Red List assessment of NT seems much nearer the mark
Hottonia palustris	LC	VU	98% of GB range within England; a more severe decline than previously estimated
Juncus compressus	NT	VU	96% of GB range within England; a more severe decline than previously estimated
Trifolium fragiferum	LC	VU	92% of GB range within England. Non-English populations known to have declined, so given that the species is threatened (VU) in England we think it must also be similarly threatened at GB level. Assessment is for the native subsp. *fragiferum*

Extracting Records from the Scottish Saltmarsh Survey

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In 2010 Scottish Natural Heritage and SEPA commissioned a comprehensive new survey and condition assessment of the saltmarshes of Scotland, including all sites over 3ha and a sub-set of smaller sites. A team of six surveyors undertook work on nearly 250 Scottish saltmarshes from June 2010 to August 2012. The final report was published last year (Haynes, 2016) and SNH kindly agreed to let me extract plant records from the underlying data for incorporation into the BSBI Distribution Database (DDb).

For each saltmarsh I received two MS Excel Spreadsheets, one of which concerned sample quadrats and the other 'Target Notes'. From these I extracted over 20,000 plant records which are now in the DDb. Three passes were made through the data to extract named taxa from the quadrat lists, to extract named taxa from the Target Notes, and to use NVC listings to infer taxa. This last was undertaken after advice from Ian Strachan, one of the primary surveyors, and erred on the side of caution.

Extraction of records was not a quick process as the data had not been collected in a manner intended for this purpose, but once I had constructed suitable templates it was possible to convert each straightforward spreadsheet in less than 15 minutes. However, some turned out not to be entirely straightforward. I briefly fell into an elephant trap when I failed to notice that one surveyor had presented results in an unexpected order – leading me initially to use the wrong grid references for his quadrats. Errors such as dates differing between two spreadsheets for the same quadrats, or a set of quadrats being listed that actually belong to another site, took time to sort out.

During the process it was necessary to convert some nomenclature to current practice. Grid references in the original reports are 10-figure (i.e. a 1m square); these were reduced to 8 figures to avoid spurious precision.

Where possible, plants listed as 'Additional Species' were also extracted. Those listed that did not appear elsewhere were assigned to a tetrad or monad (best available) on the basis of all the Quadrat and Target Note grid references. For the majority of these Additional Species records, it was not possible to assign them to a tetrad or better and so these potential records were ignored.

With a few exceptions (e.g. *Salicornia*, *Spartina*), anything recorded as Genus sp., e.g. *Carex* sp., was ignored and two species were excluded as being too improbable. The latter will probably come back to bite me.

This was a great deal of work and unsurprisingly a lot of records are of common saltmarsh species: *Agrostis stolonifera* (Creeping Bent), *Armeria maritima* (Thrift), *Festuca rubra* (Red Fescue), *Glaux maritima* (Sea-milkwort), *Juncus gerardii* (Saltmarsh Rush), *Plantago maritima* (Sea Plantain), *Puccinellia maritima* (Common Saltmarsh-grass) and *Triglochin maritimum* (Sea Arrowgrass) each have >1000 records. However, a number of new hectad records have come out of the study. In my own patch (v.c.**104**) the biggest effects were on *Carex oederi* (Small-fruited Yellow-sedge) and *Eleocharis uniglumis* (Slender Spike-rush), each with quite a few new sites. One of the most significant finds was of several new populations of *Carex salina* (Saltmarsh Sedge), previously known only from Loch Duich, in Lochs Sunart and Nevis.

Already, SEPA has asked for a subset of the extracted data which highlighted *Spartina* in the Firth of Lorn which had escaped their notice.

With the amount of data manipulation undertaken it would be surprising if I have not introduced some new errors. I have undertaken a variety of cross-checking procedures but no doubt some errors remain and for these I take full responsibility. The records are from 34 Scottish vice-counties and the relevant

Recorders have been given a simple query to find their records on the Ddb.

Acknowledgements
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Digital plant photography – point, shoot and beyond

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The range of digital photography

Anyone can pick up a digital camera, point it at a subject, press the shutter button and get an acceptable photo. But it is very easy to go beyond this and achieve a wider range of better photos. However, this may not be evident from the information supplied with a camera or from the Internet. Maybe a better source of help for beginners is someone who is not an acknowledged expert but has learned how to take a range of photos successfully and can explain how in a common-sense way. It was this thinking that led me to publish my book *Easy Digital Plant Photography*. It is available only from Amazon, because it's unlikely to interest booksellers – my local bookshop doesn't stock any books on photography – and it would be vastly more expensive to make it available to them for no real purpose. The book aims to show how, in a series of steps, the facilities of the camera can enable better results, and then does the same for editing and gives examples of things you can do with the photos afterwards. This article doesn't attempt to reproduce this systematic guidance, but gives examples of techniques which might not be immediately obvious but could be assimilated easily.

Becoming a better point and shoot photographer

If the camera is set to take pictures in an automatic mode, it will automatically set the right exposure for you and all you have to do is press the shutter button. However, there are additional things you can do to get the most out of a point and shoot approach, though they can vary from one camera to another. Examples are:

- When you look at your pictures on some devices, such as a television, for instance, the screen may be a different shape from them and they may get cut off at the edges. So it's best to frame your picture to take in a slightly more extensive view than you want.
- Some scenes or subjects look blurred on the LCD monitor. If you press the Shutter button halfway down, they should come into focus.
- Sometimes, even if the view is free from blurring, it is helpful to hold the shutter button half way down and look at what is on the viewfinder before taking the picture. The most obvious use of this is when you need to be precise about the exposure. Usually, in the halfway position, there will be some sort of confirmatory sign or sound to confirm that the exposure is acceptable. On my *Panasonic Lumix TZ60*, a green circle indicates this. However, one or more other items often appear – green rectangles in my case. Everything within a rectangle should be correctly exposed. If you prefer the exposure to relate to another part of the picture, release the Shutter button and move the camera till that part is within a green rectangle when you press the Shutter button halfway down again. Then keep it halfway down while you move the camera to get the view you want and press it down fully to take the picture.

Beyond point and shoot

There are various buttons on the front or top of a camera which will help with such matters as getting the shape you want for your photos, i.e. 3×2 or 4×3, turning the flash on or off, adjusting the sharpness, brightness or colour of your photo and, on some cameras, taking moving objects or exposing on one small spot in a scene – even sometimes taking panoramas or pictures viewed through glass. I find flash settings helpful because on my camera the flash can be turned on or off. I normally have mine off because there is not much my camera can't take without it and keeping it on wastes the battery and can be embarrassing in situations where flash photography is forbidden and the flash goes off automatically.

There are many things you can do, beyond mere adjustment of settings, to get more effective photos. How, for instance, can you to get a plant to stand out from its background so that its features are clear, when plant and background look very similar? One approach is to blur the background so that it interferes less with the subject. Many cameras have a mode which keeps the aperture at a wide level – confusingly indicated by a low numerical measure. In the *TZ60*, the mode is called Aperture priority. A wide aperture gives a narrow depth of focus, so that, if you expose on a near object, the background will be less clear than it would be in the automatic mode. This makes the plant stand out more. The background can also be blurred by zooming in from a distance. Another approach is to manipulate the relative brightness of plant and background. In sunny conditions, for instance, I made a Twayblade stand out more from the grassy slope on which it grew by getting someone to stand in a position which cast a shadow over the background but not over the plant and then exposing for the sunny part of the picture. I got a picture of a nice bright plant against a relatively dark background (Colour Section Plate 4, fig. a)

Editing photos

Digital photography opens up doors to correcting photos that don't come out as you want. Editing photos is sometimes described as a kind of cheating. However, photography has always been an artificial process. To begin with it was chemistry and now it's electronics. Both sometimes disagree with human eyes over what was photographed, and editing allows the photo to be converted into what we think the scene was really like. It also allows photos to be adapted to illustrate particular points or to be used creatively.

Editing is best done on a computer, using a photo editing program. The programs supplied with *Windows* are not up to the job. The program I use is *Photoshop Elements*, but there are free programs which will do most of what is needed. The one I have used most is *Paint.net*, a completely different program from the *Paint* supplied with *Windows.* It is not difficult to use, though its presentation gives the impression that it is. It looks intimidating at first sight, with a complex screen with many labels and symbols for entry into a vast array of techniques with no indication of where to start. I am hoping that the guidance in my book opens a new world in this area of activity, with clear, step by step instructions, both for this program and for *Photoshop Elements*. Here, I use examples from *Paint.net*, since this enables readers to try things out without paying anything. If you cope with *Paint.net*, you can manage *Photoshop Elements*.

A simple routine for editing

To begin with, I suggest learning a simple routine for editing each photo, which I introduce in steps because I don't use all of it for every photo. Bear in mind that, if you abandon an operation, you usually cannot move on until you have cancelled it. If you complete something and then don't like it, you can cancel it by clicking the Undo arrow at the top left of centre on the screen. It can be restored by the Redo arrow.

Sometimes the only editing I use is Sharpen, because most photos benefit from it, so I begin with the version of my routine for that. It consists, in order, of opening, sharpening, resizing and saving the edited photo. To open

a picture, right-click on it, then click on Open with, then on Paint.net. *Paint.net* opens, with the picture on view and its label at the top left. Alternatively, click the File menu at the top, then Open, then navigate to the photo you want, highlight it and click Open. I begin sharpening for all photos, but cancel it if it proves unnecessary. Click on the Effects menu at the top of the screen, hover over Photo and choose Sharpen. Move the slider until you see the change in the picture which suits you. Then click OK. Finally, click the File menu, then Save as. In the box that appears, check where it's going to put the picture (shown in the top box) – usually where it came from unless you want to change it. The File name should be what it was called to start with and the File type is the format used – I always use JPEG. If you want your changed picture to replace the original, you now click Save. If you want to keep both, you have to change the name – just putting an x on the end is sufficient. Then click Save. You are invited to save the configuration. We are not told what this is, but it won't be ignored, so just click on OK and it's happy. The edited picture then transfers to the folder chosen.

More editing options

Among the many other things you can do beyond this simple routine are cropping the picture (chopping bits off the edges), rotating it, changing its brightness, contrast or colour, removing reflections or haze, removing parts of the picture that you don't want, changing parts of a picture without affecting the rest, drawing lines on the picture (to label it for instance) and adding text. An example is the straightening of a lopsided photo of an Opium Poppy plant (Colour Section Plate 4, fig. b). The picture is first rotated to straighten it through the Layers menu, which can be achieved without knowing what layers are. Rotation leaves cut-off areas at the corners. These can be covered by clones – areas copied from the adjoining parts of the picture and then superimposed – with the Clone stamp tool, accessed by clicking Tool near the top left and choosing Clone stamp. Basically, you then set the brush width at the top of the screen, hold down the Ctrl key while you click on the clone, release Ctrl and drag a circle over the area too be covered. Beware of a second circle which follows the main one around. If you let this stray into an area of different appearance from the main one, it adds it to the clone and superimposes things you don't want. It's then best to use Undo to get back to before things went wrong, reset the clone and try again.

Using photos

My book covers showing photos on the camera, printing them out from the camera, showing them on a computer screen and a projector, storing them, sending them to someone online, combining pictures and including them in a *Word* or other document to be printed out, using charts and tables incorporating pictures, building a free website to display photos and publishing a book with plant illustrations for virtually no cost. There is also advice on how to convert predigital slides and photos to digital form and correcting any faults in them. Building a website was described in *BSBI News* **134** (January 2017).

Using a photo may require the creation of a picture of a plant with a flower close-up inset (see Colour Section Plate 4, fig. c). This can be created in the editing program or directly in *Word*. In *Word*, place the cursor where you want to insert your picture. You find your larger picture, copy it, then return to Word and Paste it in. Alternatively, you can use the Insert menu or drag and drop. Click on the picture and you can then drag a corner to get it the size you want. The smaller picture is then inserted separately and sized. Then click on it and then on Picture tools at the top of the screen. In the menu that appears click on Text wrapping, then on In front of text – or More layout options and then In front of text, then OK. You can then drag it on to the bigger picture, where the size and position can, if necessary, be refined.

Adventives & Aliens News, 11

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It is good to see two non-native aquatics in the compilation below (see v.cc.**2** & **11**), and it will be interesting to learn how the Cornish example, *Alisma parviflorum* (American Water-plantain), fares over the coming seasons. One "aquarists' throw-out" that more than held its own was *Sagittaria subulata* (Narrow-leaved Arrowhead) at Shortheath Pond (v.c.**12**) – first formally recorded there in 1962, it was finally reported as having gone in 2015, a probable casualty of deteriorating water quality (E.J. Clement, pers. comm.).

Plant containers or planters, as they are sometimes known, will be familiar to aliens enthusiasts as a potential source of interesting records. Some are very large, contain large volumes of often foreign soil and are worth searching from March right through to October. Some botanists might have reservations about recording plants accidentally introduced in this way, but it does not seem so very different from scouring tips when that was permitted and /or botanically worthwhile, and could produce lists that are equally valuable, especially when some species prove to be more pioneering than others (see v.cc.**6** & **12**).

And finally, if I could make yet another brief plea to members here, I would very much welcome more records of self-sown woody plants, particularly trees (see v.c.**17**), as thus far this feature has been deficient in them. Many thanks.

V.c.2 (E. Cornwall)

Inula hookeri C.B. Clarke (Hooker's Fleabane). Heligan (SX009454), 12/8/2013, C. Wild: on waste ground near Heligan Mill. See *BSBI News* **81**: 54 for drawings of this Himalayan species and p. 53 for details of records up to 1999. *Buphthalmum salicifolium* (Willow-leaved Yellow-oxeye) is rather similar but has receptacular scales, smaller capitula, broader ligules, and little branched stems (completely unbranched in *I. hookeri*). The southern/central European, S.W. Asian *I. ensifolia* L. has narrower, parallel-veined leaves, not pinnately-veined.

Alisma parviflorum Pursh (American Water-plantain). Eden Project (SX052545), 11/6/2015, I. Bennallick *et al.*: in damp area adjoining main road into site. If not the only, certainly one of very few, British/Irish sites for this garden aquatic.

V.c.6 (N. Somerset)

Eclipta prostrata (L.) L. (False Daisy). Bath (ST75426584), 24/9/2016, R. Randall (det. M. Berry): one plant in flower in large tree planter outside bathroom centre, London Road. An annual composite from the tropics with small (*c.*6mm across), white radiate capitula, a variable indumentum of appressed hairs and opposite leaves; rather close, taxonomically, to *Guizotia*/*Sigesbeckia*. Prior to the two occurrences reported here and an extra record mentioned in *BSBI News* **114**: 43, the only records were pre-1930, Clement & Foster (1994). See also v.c.**12**.

V.c.9 (Dorset)

Rumex sanguineus var. *sanguineus* (Bloody Dock). Swanage (SZ0298079665), 3/8/2016, D. Leadbetter: one plant in pavement, De Moulham Road. A garden plant little(?) grown for its strikingly marked lower leaves. See also v.c.**14**.

V.c.10 (Isle of Wight)

Egeria densa (Large-flowered Waterweed). Staplers (SZ511887), 7/2016, P. Stanley: established in shallow pond, flowering prolifically (and still doing so in October). For some details on vegetative recognition see *BSBI News* **101**: 39 and Colour Section, Plate 2 of the same issue for photographs of flowering plants.

V.c.11 (S. Hants)

Euphorbia oblongata (Balkan Spurge). Chandlers Ford (SU442212 to SU452112), 13/10/2015, M. Rand: extending for more than 100m of shaded verge (Peverills Wood), still there in 2016. Martin provided the following potted history of the species in v.c.**11**: "Before 2000 it had been recorded in just four sites, at two of which it has persisted for over a decade,

casual at the others; since 2008 another dozen sites have been logged; while some of these are no doubt ephemeral, the most recent (this one) is well established."

Orontium aquaticum L. (Golden-club). Turf Hill/New Forest (SU211176), 4/2016, B. Knowles (conf. C. & C. Chatters & M. Rand): very well established in former gravel working, where discovered by an ecologist during a newt survey; with Goldfish as an alien associate belonging to a quite different regnum. A native (Araceae) of the eastern US, it is sold as an ornament of garden ponds, etc. Only the third British/Irish record. Given the ecological sensitivities of the area within which the pond is situated, it is understandable that there are plans afoot to eliminate the species from this site.

Phalaris aquatica (Bulbous Canary-grass). Southampton (SU409121), 3/4/2016, Hampshire Flora Group (det. E.J. Clement & M. Rand): well established in grassland between railway and A33 western approach road. Grown as game food/cover, etc., it can find its way onto various types of waste ground and can sometimes persist. Martin adds that "it is worth checking any perennial *Phalaris* growing in a dry area near human activity."

V.c.12 (N. Hants)

Eclipta prostrata (False Daisy). Longstock Park Nurseries (SU367388), 27/10/2006, B. & J. Goater (det. M. Rand/conf. E.J. Clement/ comm. H. Crouch): one plant in large tub at nursery. (See v.c.**6**).

V.c.13 (W. Sussex)

Euphorbia oblongata (Balkan Spurge). Elsted (SU8144619568), 4/8/2016, D. Nelson: garden escape on lane bank (north side).

Hyoscyamus albus (White Henbane). East Marden (SU8006914974), 21/8/2011, J. Simons: abundant in field edge, "presumably as a green manure", with *Phacelia ramosissima* (Branching Phacelia). A far less exotic means of introduction for this Mediterranean species than the "Egyptian woollen rags" cited in Clement & Foster (1994). It differs from the familiar *H. niger* (Henbane), in having pale yellow flowers without the net of darker veins, and stem leaves all petiolate rather than sessile. A third species from the eastern Mediterranean, *H. aureus* L. (Golden Henbane) has been recorded in the past, though would probably be less suitable as a green manure. It differs from the present species in having flowers of a richer golden yellow colour, with very dark centres.

Gnaphalium luteoalbum (Jersey Cudweed). Pagham (SZ8912297284), 23/2/2016, D. Nelson & J. Oakley: several large plants at extreme western end of East Front Road, north side by amusement arcade.

V.c.14 (E. Sussex)

Rumex sanguineus var. *sanguineus* (Bloody Dock). Eastbourne (TQ6267000530), 23/6/ 2016, M. Berry (conf. E.J. Clement): one rosette on bare ground in reseeded area, The Oval.

Limonium sinuatum (L.) Miller (Statice). Peacehaven (TQ43040096), 14/9/2012, M. Shaw: on verge of A259 for *c.*100m. Part of sown seed mix originally, it could not be found in 2016. The specific epithet refers not to the winged stems, but the sinuate-lobed basal leaves, which might have disappeared or been obscured by flowering time.

Geranium nodosum (Knotted Crane's-bill). Upper Vert Wood (TQ5141013858), 4/5/2016, Sussex Botanical Recording Society (det. M. Berry): large patch at wood edge adjacent to lay-by. Eric Clement informs me that this a rather old-fashioned garden plant, such that it might have been established at the Vert Wood site for some considerable time.

Catananche caerulea (Blue Cupidone). Eastbourne (TQ6222900021), 25/7/2016, M. Berry: one plant self-sown in concrete passageway between gardens, off Charlton Road. A blue-flowered perennial composite from the western Mediterranean, it has silvery hyaline phyllaries with brown excurrent mid-veins. A quite popular bed-filler about Eastbourne, the lack of pappus hairs might explain the rarity of self-sown plants without the confines of gardens/herbaceous borders.

Allium tuberosum Rottler ex Spreng. (Chinese Chives). Bexhill (TQ7358507035), 28/9/2016, M. Berry & J. Linsell (det. M. Berry/conf. E.J. Clement): one plant in alleyway parallel with B2191, escaped from garden. The late flowering time and bracteolate pedicels are very

unusual in a British context, it also has narrow (4.5-5mm), linear leaves and grows from a cylindrical (tuber-like) bulb. Grown as a leaf vegetable, it can produce abundant viable seed.

V.c. 16 (W. Kent)

Euphorbia oblongata (Balkan Spurge). In chronological order and the recorder R. Burton in every case (as for the *Gnaphalium luteoalbum* records that follow on):

Eynsford (TQ5366), 20/7/2011: *c.*20 plants bank of Sparepenny Lane. Until at least 2014; Eynsford (5466), 25/7/2013: on bank in Priory Lane; Swanley village (5369), 14/7/2014: single plant in Wood Street; Eynsford (5465), 30/9/2014: one plant, near north end of Polyhaugh, still there in 2016; Sutton-at-Hone (547695), 17/6/2015: along *c.*20m of bank, north side Ship Lane, far from houses; Erith Marshes (49127991), 4/7/2015: for *c.*2m on track, origin unknown.

Gnaphalium luteoalbum (Jersey Cudweed). Northumberland Heath (TQ50517741), 26/7/2014: about three plants on paving blocks, frontage of 28 Hind Crescent; Stone Marshes (57767520), 25/7/2015: two plants between paving blocks of unused vehicle holding area, with *Senecio inaequidens* (Narrow-leaved Ragwort); Bexleyheath (475761), 16/7/2016: many on brick paving at 133 Gipsy Road; Eltham (4375), 27/7/2016: *c.*20 on paving blocks in front of 180 Glenesk Road; Istead Rise (6369), 18/8/2016: *c.*50 plants on pavement by 25-31 Castlefields. Rodney adds that the seed in this part of London might have originated ultimately from a Romford nursery, where *G. luteoalbum* was grown by a New Zealand immigrant, "who had known it in his native country where it grows in a single coastal locality." He also postulates that in the case of its suburban habitats at least "there are strong elements of chance and observer bias in the recorded distribution of the plant."

V.c. 17 (Surrey)

Citrullus lanatus (Water Melon). Thursley Cricket Ground (SU899399), 11/10/2016, E.J. Clement & G. Hounsome: one plant, crack in patio of pavilion. For Graham Easy's illustrations of nearly every Cucurbit you are likely to meet with (including this one) arrayed comparatively over a double page, please see *BSBI News* **38**: 16-17.

Reference:

CLEMENT, E.J. & FOSTER, M.C. (1994). *Alien plants of the British Isles*. BSBI, London.

Phyla nodiflora var. *minor* discovered in West Quantoxhead (v.c.5)

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In September 2016 I was square bashing in several monads at the NW end of the Quantock ridge (v.c.**5**). These squares include the village of West Quantoxhead, some intensive maize fields and semi-improved pasture, hedges and road verges. Soils are neutral to acid, and the squares had low (or zero) records post 2000, so my recording was intended to remedy that. Rarities were not expected, and finding a good population of *Stachys arvensis* (Field Woundwort) in the edge of an arable field felt likely to have been the highlight of the exercise. However the route back to my car took me through a somewhat suburban part of West Quantoxhead, a road of detached houses with extensive gardens. Most of these have fences adjoining the road but one stands higher with the garden hedge half way down quite a steep slope. Below this a rough grass bank descends to the pavement. This must once have been considered part of the garden – there is one scrappy surviving plant of a winter heather – but it looks to have been long uncultivated.

I was interested to see this bank dotted with abundant little white flowers, the size of daisy heads, but being little umbels of tiny white florets, darkening to purple in the middle of the head. The leaves were simple, tapering to the base but not really with petioles, rather roughly hairy. About 3 × 2m of the grass was densely interwoven with its trailing stems, and among the flowers were very curious little brown heads, the dead flowers tightly clumped but with ragged projections (like a bad hair day). I

collected some, took photographs (Colour Section Plate 2), and continued back to the car quite pleased to have found something so energetically naturalised, and new to me.

At home my pleasure rapidly turned to shame and frustration – not only could I not name the plant, but I couldn't even put it in a family. I spent a depressing evening searching all my garden books as well as Stace, the aliens books, foreign floras – everything on the shelves – all without finding a clue. Luckily rescue was near. A few days later I was meeting Jeanne Webb, a friend and colleague in the Somerset Rare Plants Group (SRPG) and could show her a specimen of my nemesis. She got the family at once, Verbenaceae, because she recognised that the tiny flowers had the same construction as *Lantana camara*, the gross gaudy shrub of Mediterranean hotels and parks. She then looked in notebooks kept on visits to Cyprus with Desmond Meikle (a family friend, botanical guru, and author of the *Flora of Cyprus*) and from her notes she was able to go to the genus *Phyla*, and indeed to the species *P. nodiflora*, as later confirmed by Fred Rumsey. This is included and illustrated in several popular Mediterranean floras, but I had missed it by searching the wrong families.

Initially we were both delighted to have an answer, but then some details shadowed the identification with doubt. Firstly there were almost no records in UK sources. Clement & Foster's *Alien Plants* said 'Pre-1930 only' and cited specimens in **OXF** (giving synonyms *Lippia nodiflora* and *Verbena nodiflora*) with the curious English name 'Frogfruit' (this gets even madder in on-line sources which call this species 'Turkey Tangle Frogfruit'). There was nothing else, no presence on MapMate (SRPG's chosen database), in DDb – nothing. It also turned out that the taxonomy of the genus is complicated, and has been argued over for years, and there were several closely similar plants in the group.

The entry in the *Flora of Cyprus* was spot on with appearance and habit, but describes what were then considered two separate species – *P. nodiflora,* found growing wild in moist and marshy places in Cyprus, and *P. filiformis* from more ruderal and disturbed habitats, sometimes used as a lawn grass substitute. The critical differences were minute, and we realised that we were unable to make a certain distinction. By now we were determined to solve the problem – being keen to gain such an unusual record for Somerset, and happily Fred Rumsey agreed to look at a specimen and confirmed our plant as *P. nodiflora.* We already knew that a number of taxonomic questions haunted the genus, and Fred was able to refer us to work done at Missouri Botanic Gardens, and also for the recent *Flora Gallica*, which has lumped the two species we were struggling to separate. The plant 'patchily naturalised in central and northern Europe' (including ours) is now considered to be *P. nodiflora* var. *minor* (Hook) N.O'Leary & M.E.Múlgura. This was originally a garden escape, having rather showier flowers (in its tiny way) than the true species. It is probably sterile, but as the West Quantoxhead population shows, it can spread vigorously by vegetative runners, and persist in quite thick grass. 'It would seem likely that all British records are of var. *minor*' (F. Rumsey, pers. comm.).

The voucher specimen is now in **BM** to prove the plants post-1930 presence in Britain, and this healthy population suggests that it could be found elsewhere even if the plant's rather invasive habit and inconspicuous nature may sometimes have led to its extermination from gardens before it had a chance to become naturalised!

Acknowlegments:
My thanks to Jeanne Webb for her accurate memory and determination skills, to Helena Crouch for alerting us to the taxonomic questions, and to Fred Rumsey for his informative help with the confirmation.

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Dorycnium hirsutum (Canary Clover) in Britain and Ireland

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Dorycnium hirsutum (L.) Ser. (Canary Clover) is a garden perennial grown primarily for its attractive silvery-grey looks and shrubby stature, and to a lesser extent for its dense heads of small pinkish-white flowers. The BSBI distribution map indicates records from over thirty hectads, one in Ireland, the rest in south/central England, all post-1987, with the majority for the period from 2000 onwards. Robin Walls, who has kindly and skilfully illustrated the plant for us (see p. 72), informs me that it was recorded in Dorset (v.c.**9**) for the first time in 2011 at Portland Cheyne Weare, "on calcareous stony ground." In S. Hants (v.c.11), where thus far it has occurred either on waste ground or as a pavement weed, it was recorded for the first time in 2007 at Southampton, with two more records since, both in 2009, at Highcliffe and New Milton, coastal sites all (M. Rand, pers. comm.). There is some doubt, however, about whether or not these plants/populations are truly persistent.

At the time of writing, there are a total of nine records for the whole of Sussex. It is extant at all three of the East Sussex (v.c.**14**) sites known to me, having been present in two of them for at least two or three years. At the third of these sites, at Camber, where it is naturalised on shingle over an area of about five by three metres (TQ97031846), it has probably been present for closer to seven or eight years. Is it as long-lived in parts of the country that are more landlocked? I do not know if it still persists at the other Sussex sites, five for the Brighton area and one for North Berstead near Bognor Regis (v.c.**13**, and the first Sussex record, in 2002), but all six also correspond to coastal tetrads.

For our purposes *Dorycnium* can be distinguished from *Lotus* by the red-black keel (yellow keel in *Lotus*); and from *Anthyllis* by the one- to four-seeded fruit exceeding the calyx and leaves of five leaflets (one- to two-seeded fruit enclosed by inflated calyx and leaves of up to fifteen leaflets in *Anthyllis*). The three 'British/Irish' *Dorycnium* species can then be separated by the following partial key:

Corollas greater than or equal to 10mm: *Dorycnium hirsutum* (L.) Ser. Mediterranean. Up to 1m.

Corollas less than 10mm:

Leaflets ovate to obovate, leaves more or less pinnate (leaflets arranged as in *D. hirsutum*): *D. rectum*(L.)Ser. Mediterranean. Up to 2m.

Leaflets linear to narrowly ovate-oblong, leaves more or less digitate: *D. pentaphyllum* Scop. Mediterranean. Up to 1m.

The best known of these is probably *D. rectum* (Greater Badassi), because it was one of a suite of interesting alien species discovered at the famous Brockham Hill 'bomb crater' (v.c.**17**), having been last recorded there in *c*.1968. However it is now a very rare if not extinct British/Irish casual, the most recent record being one for Oxfordshire (v.c.**23**) in 2002 (*New Journal of Botany* **1**: 71). *D. pentaphyllum* (Badassi), formerly known from v.cc.**15** & **16**, is as rare or even rarer. *D. hirsutum* is the species British and Irish botanists are most likely to encounter, and indeed are encountering, its capacity to persist for at least a few years (and possibly for many more) compensating somewhat for the vagaries of horticultural fashion.

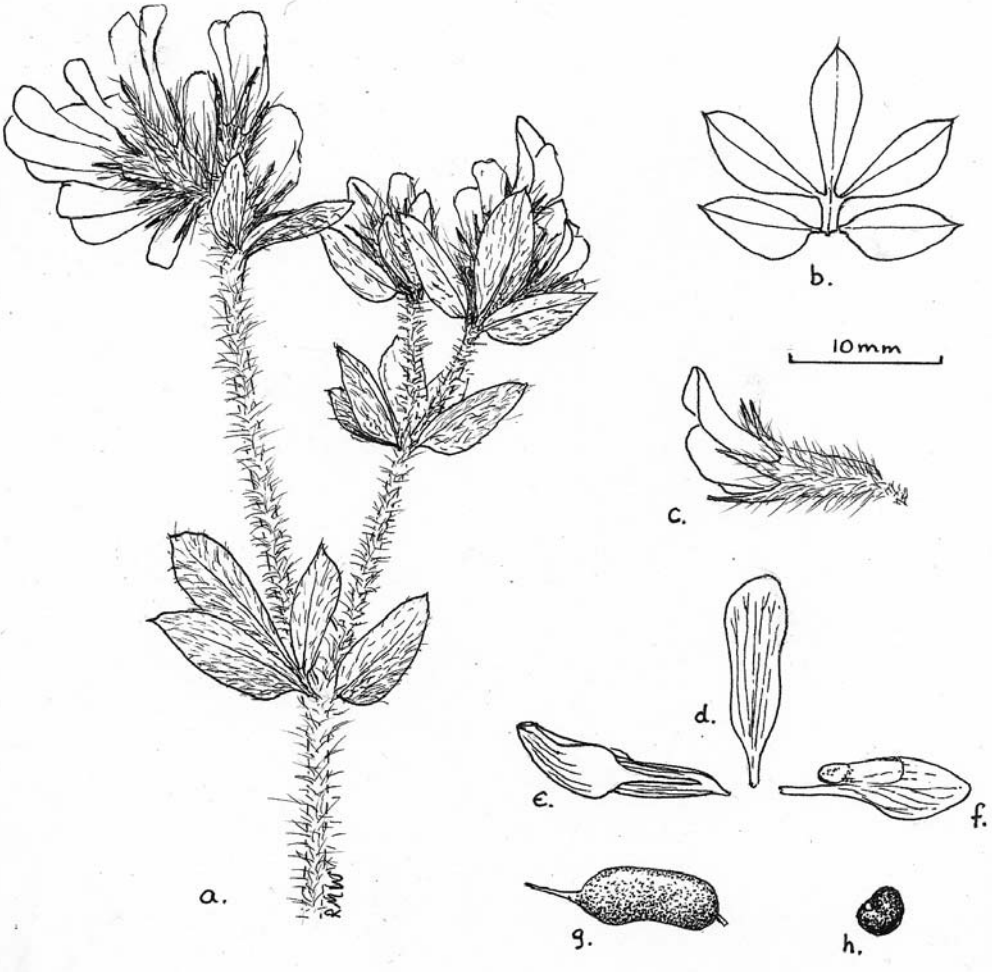
From the rather insignificant nature of the difference separating the genera (see above), it should not come as any great surprise that recent DNA studies indicate *Dorycnium* should be sunk into *Lotus* (the same applies for *Tetragonolobus*), the genus in which *D. hirsutum* was placed by Linnaeus in 1753!

I am very grateful to Robin Walls for producing the fine, botanically accurate drawings of *D. hirsutum* that accompany this note, and for details of the v.c.**9** record. I would also like to thank Martin Rand for his summary of the status of *D. hirsutum* in v.c.**11**, and Eric Clement for his constructive comments.

Dorycnium hirsutum (L.) Ser. del. R.M.Walls

a. flowering stem, b. leaf, c. flower, d. standard,

e. keel and stamens, f. wing, g. pod, h. seed



Cardamine occulta, another small white-flowered weedy brassica

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With around 200 species, *Cardamine* L. is the fourth-largest genus in the family Brassicaceae and new species are still being described, particularly from Eastern Asia. Here, we briefly detail recent research which has clarified the status of the taxon informally called 'Asian *C. flexuosa*'. This taxon came to prominence in 2006 when a phylogenetic study by Lihová *et al.* (2006) showed that European and Eastern Asian plants traditionally treated as *C. flexuosa* represented two distinct taxa. Chromosome number data also supported there being two distinct evolutionary lineages: European *C. flexuosa* is tetraploid (2n = 32, Marhold, 1994; Kučera *et al.*, 2005) while the Eastern Asian plants are octoploid (2n = 64, Lihová *et al.*, 2006; Mandáková, unpublished data; Marhold *et al*., unpublished data). The Eastern Asian taxon was dubbed 'Asian *C. flexuosa*' by Lihová *et al.* (2006) and subsequently variously ascribed to *C. hamaltonii* and *C. flexuosa* subsp. *debilis*, however a review of the taxonomic literature by Marhold *et al.* (2016) determined that *Cardamine occulta* Hornem. was the correct name for this taxon.

Morphologically *C. occulta* is distinct from *C. flexuosa* (key characters are given in table 1). The two species also have different parentage: *C. flexuosa* was finally conclusively shown to be an allopolyploid originating from the diploids *C. hirsuta* and *C. amara* in 2014 by Mandáková *et al.* and three distinct diploid genomes have been identified within *C. occulta* corresponding to *C. amara*, *C. parviflora* (or perhaps their unknown close relatives) and another, as yet unidentified taxon (Mandáková *et al.*, in prep.).

Cardamine occulta is thought to have originated in Eastern Asia, where it is associated with man-made habitats such as rice paddies and orchards (Marhold *et al.*, 2016). The earliest known record of *C. occulta* in Europe is from a nursery in Valencia, Spain in 1993 (Crespo *et al.*, 2013) and the next confirmed specimen is from 2003, collected in a rice field ditch in Piedmont, Italy by Michel Desfayes. Since then there have been a number of records across Europe (see Marhold *et al.*, 2016), but not from the UK. Elsewhere in Europe *C. occulta* occurs primarily in anthropogenic habitats such as flower beds and pots, roadsides and pavements, often where there is irrigation (inside back cover). Naturalised *C. occulta* records are currently restricted to the vicinity of Lake Constance.

As far as we are aware, *Cardamine occulta* has not been reported from the wild in the UK, under any guise. However, the authors found *C. occulta* growing as a container weed at Avondale Nursery, Coventry (v.c.**38**) in 2014, in pots which had been bought in from a supplier in Norfolk and it still persisted at the nursery in March 2017 (inside back cover). Given the recentness of its recognition as a species, and therefore absence from British floras, it is likely that *C. occulta* is naturalised in the UK but has been overlooked. In order to document the spread of this new alien we encourage close examination of *Cardamine*, particularly in gardens, and are happy to review specimens or pictures.

The table on the next page details a few of the morphological differences that can be used to differentiate *C. occulta* from the two species in the UK it is most similar to: *C. flexuosa* and *C. hirsuta*. When identifying *Cardamine* spp. it is important to bear in mind that they can exhibit a large amount of phenotypic plasticity in response to environmental variables and therefore it is often best to use a combination of characters to identify them.

The following references contain photos and diagrams of *C. occulta*:

Epitype:
http://ibot.sav.sk/herbarium/object/SAV0006529

Hepenstrick & Hoffer-Massard 2014:
http://pd.zhaw.ch/publikation/upload/207561.pdf

Dirkse *et al.* 2015:
http://natuurtijdschriften.nl/search?identifier=537564

Table 1: Characters to differentiate *Cardamine occulta* from *C. flexuosa* and *C. hirsuta*

	C. occulta	*C. flexuosa*	*C. hirsuta*
Basal rosette leaves	few to absent	terminal leaflet only marginally bigger than lateral leaflets	terminal leaflet larger than lateral leaflets
Terminal leaflet margins	3-5 lobed	repand, crenate or dentate	entire, repand, crenate or 3-5 lobed
Stem hairiness	glabrous or sparsely hirsute	hirsute	usually glabrous, occasionally hirsute at base or sparsely hirsute throughout
Stem waviness	flexuous or straight	flexuous	generally not flexuous
Stem branching	often much branched	mainly branches from the base	mainly branches from the base
Fruiting pedicels	divaricate to ascending	divaricate	erect to ascending
Stamens	6	6	4, 5 or 6*

* The presence of four stamens is a reliable character for differentiating *C. hirsuta* from other *Cardamine* spp. however *C. hirsuta* flowers can also have five or six stamens, often varying within an inflorescence. In *C. hirsuta* stamen number tends to increase with a decrease in growing temperature (Matsuhashi *et al.*, 2012).

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Pachyphragma macrophyllum (Hoffm.) Busch (Caucasian Penny-cress) naturalised by streamsides in Yorkshire (v.c.64)

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Pachyphragma macrophyllum (Hoffm.) N. Busch (*Thlaspi macrophyllum* Hoffm.) (Caucasian Penny-cress) is a white-flowered, rhizomatous penny-cress endemic to the Caucasus and Pontic Alps (Rich, 1991). In its native range, it is found in deciduous forests, mainly of *Fagus orientalis*, occurring from sea-level to around 1900m altitude (Davie & Akeroyd, 1983). In Britain, it has been cultivated in gardens since at least 1822 (Dines, 2002), but less enthusiastically than other white-flowered crucifers, presumably due to its garlic scent and vigorous growth. It was first reported as naturalised in a wood near to Failand (North Somerset, v.c.**6**) in 1964 (Davie & Akeroyd, 1983) where it still survives today (Helena Crouch, pers. comm.). Since then it has been recorded as a naturalised relic of cultivation in the grounds of large houses in Shropshire (v.c.**40**) and Cumbria (v.c.**70**) (Clement, 1980) and on the edge of a wood near Fife (v.c.**85**). All other records appear to refer to ornamental plantings in private or public gardens. In March 2015, the author discovered a few patches of *P. macrophyllum* in semi-natural woodland near to Harrogate (v.c.**64**) along streamsides invaded by escapes from the Royal Horticultural Society's Harlow Carr garden (Wallace, 2005; Walker, 2009). These populations were revisited in early May 2016 as part of a study to map the spread of these non-native species away from the garden.

In 2016 five patches of *P. macrophyllum* were found adjacent to the Oak Beck in damp, shaded woodland dominated by *Acer pseudoplatanus* (Sycamore) with small amounts of *Alnus glutinosa* (Alder), *Ulmus glabra* (Wych Elm) and *Salix caprea* (Goat Willow). The ground flora was relatively species-poor (8-14 species 4m^2) and dominated by *Allium ursinum* (Ramsons) and more locally *Anemone nemorosa* (Wood Anemone), *Cardamine bulbifera* (Coralroot), *Luzula sylvatica* (Great Wood-rush) and *Mercurialis perennis* (Dog's Mercury) (Table 1). The vegetation-type was closely allied to the *Allium ursinum* sub-community of *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland (W8f), the typical vegetation type of damp, circum-neutral loams in the more humid parts of northern England (Rodwell, 1993). Twenty-seven associates were recorded with *P. macrophyllum* including five non-native species that had originated from Harlow Carr (*Cardamine bulbifera*, *Hedera colchica* (Persian Ivy), *Ranunculus aconitifolius* (Aconite-leaved Buttercup), *Tellima grandiflora* (Fringecups) and *Trachystemon orientalis* (Abraham-Isaac-Jacob); Table 1, p. 76). The largest patch of *P. macrophyllum* was 2m in diameter (5.3m^2) with *c.*160 flowering stems (Figure 1). The four other patches were less than 1m^2 and had 6, 33, 45, 12 flowering stems. Plants formed discrete patches with dense clusters of stems and leaves extending to *c.*30-40cm height and arising from a dense interconnected mass of tough, surface-running rhizomes. The soils were all heavy alluvial loams overlying millstone grit (Almscliff Grit) with a shallow surface layer of sand deposited during floods.

Pachyphragma macrophyllum occurs within a number of herbaceous borders at Harlow Carr where it has been present since at least the early 1980s (Paul Cook, pers. comm.) and presumably 'escaped' when rhizomes were 'dumped' in garden waste to the rear of the property. This area, which borders an un-named stream that drains into the Oak Beck, supports a large stand of *P. macrophyllum* (see fig. 1, Colour Section Plate 2) and other garden escapes that have spread many kilometres downstream (e.g. *Cardamine bulbifera*, *C. raphanifolia* (Greater Cuckooflower), *Doronicum pardalianches* (Leopard's-bane), *Lysichiton americanus* (American Skunk-cabbage), *Ranunculus aconitifolius*, *Tellima grandiflora*). *P. macrophyllum* has spread up to 2km downstream and

at present would appear to be having a negligible impact on associated species unlike *Cardamine bulbifera* which is highly invasive within the flood-zone of the Oak Beck and the River Nidd over approximately 10 kilometres (Walker, 2009). *P. macrophyllum* does, however, appear to be able to 'hold its own' against *Allium ursinum* possibly because its early growth allows it 'overtop' *A. ursinum* before its main period of growth in late-May (see fig 2, Colour Section Plate 2). The extent to which *P. macrophyllum* is regenerating in the wild is unknown. The established population in Somerset is self-incompatible with very low seed-set (Davie & Akeroyd, 1983). Consequently established 'populations' may represent single clones (Tim Rich, pers. comm.) with regeneration from the dispersal of root fragments. Further observations are needed to assess if this is the case in Yorkshire.

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Table 1. Vascular plant species recorded with *Pachyphragma macrophyllum* in five 2×2m quadrats. 'Frequency' is the number of quadrats in which species were recorded and '% abundance' is the range in the percentage cover. Species recorded in only one quadrat are listed below the table. Non-native species originating from RHS Harlow Carr Gardens are denoted with an asterisk.

Species	Frequency	% abundance
Allium ursinum (Ramsons)	5	3-90
Anemone nemorosa (Wood Anemone)	3	1-25
*Cardamine bulbifera** (Coralroot)	5	1-30
Dryopteris filix-mas (Male-fern)	2	<1
Ficaria verna (Lesser Celandine)	2	1-5
Galium aparine (Cleavers)	3	1-10
Geum urbanum (Wood Avens)	2	<1
Luzula sylvatica (Great Wood-rush)	3	1-15
Mercurialis perennis (Dog's Mercury)	2	5-30
*Pachyphragma macrophyllum**	5	2-60
Stellaria nemorum (Wood Stitchwort)	2	1-5

Species recorded in one quadrat only: *Acer pseudoplatanus* (seedling), *Aegopodium podagraria* (Ground-elder), *Anthriscus sylvestris* (Cow Parsley), *Cardamine flexuosa* (Wavy Bitter-cress), *Carex remota* (Remote Sedge), *Chrysosplenium oppositifolium* (Opposite-leaved Golden-saxifrage), *Filipendula ulmaria* (Meadowsweet), *Hedera colchica**, *H. helix* (Ivy), *Hyacinthoides non-scripta* (Bluebell), *Ilex aquifolium* (Holly), *Ranunculus aconitifolius**, *R. repens* (Creeping Buttercup), *Rubus fruticosus* (Bramble), *R. idaeus* (Raspberry), *Tellima grandiflora**, *Trachystemon orientalis**.

Lotus ornithopodioides in Surrey (v.c.17)

GEORGE HOUNSOME, *14 St John's Rise, Woking, Surrey, GU21 7PW*; (george.hounsome@btinternet.com)

On 25th July 2016 Eric Clement and I were botanising in Hindhead (v.c.**17**) in a rather unpromising car park at the Devil's Punchbowl Hotel. One of the glories of the car park, at SU88933567, was a large, collapsing, heavy-gauge polythene planter with the stump of a sawn-off tree (Colour Section Plate 3, 1), possibly a palm of some sort. Mixed with the scruffy ruderals on it was a yellow peaflower that Eric recognised instantly as *Lotus ornithopodioides* (Southern Bird's-foot-trefoil), found throughout the Mediterranean.

A description of the plant we found would be: hairy annual, branched from base; decumbent/ascending branches to 45cm; lvs pinnate with five lflts; lflts obovate, acute, basal pair to 8mm, distal trio to 20mm; fls on peduncle to 30mm, in pairs/threes facing the same way (Colour Section Plate 3, 2 & 3), *c.*5mm, yellow, sessile with three lflt-like bracts; pods glabrous to 35 × 3mm, slightly curved, strongly flattened laterally, torulose, with c.15 seeds (Colour Section Plate 3, 4). The species as described in Blamey & Grey-Wilson (1993) more or less fits the plant we found except that ours had fewer, smaller flowers, not really surprising as the poor thing was eight hundred miles north of its preferred latitude. In the Mediterranean it is usually found in damp places, not the way I would describe the Hindhead habitat, but perhaps the wet, warm June had something to do with it.

Lotus ornithopodioides is listed in Clement & Foster (1994) as an esparto casual with records from 1-4 localities, but there are no records in the BSBI Distribution Database. A credible origin for this plant is that the sawn-off tree was container-grown in Southern Europe and imported for sale in Britain, complete with *Lotus* seeds in the soil. I don't know when it was purchased or when the tree was cut down, but the state of the container suggests that it was a year or two ago, so perhaps the plant has managed to persist for a short while. I will go along next year to check but the planter will surely be tidied away soon. The status of a plant accidentally brought to Britain in a pot is debatable, but it was educational to see it.

I would like to thank Eric Clement for comments on this note.

References:

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BSBI Distribution Database, accessed 26/7/16.

CLEMENT, E.J. & FOSTER, M.C. (1994). *Alien plants of the British Isles*. BSBI. London.

Baccharis halimifolia in *BSBI News* 134: 48-50 – a response

JOHN DAVID, *Head of Horticultural Taxonomy, Royal Horticultural Society, RHS Garden Wisley, Woking, Surrey, GU23 6QB*; (johndavid@rhs.org.uk)

The article by Laura Jones was of great interest to me for a number of reasons, but principally because I was unaware that *Baccharis halimifolia* occurred outside of gardens in the UK. It was also intriguing to read that, despite its long history of occurring at the South Hampshire locality, there was no evidence of it spreading or becoming invasive. The name immediately drew my attention as I was aware of it having been listed by the EU Commission as a species of Union Concern, as pointed out in the article. For those unfamiliar with the EU Regulation the listing of a species as being of Union Concern means that it is subject to very tight restrictions in that it is not allowed to be imported, exported, traded, exchanged or moved or even possessed if the person comes into possession of the species after the date that the species is listed. The Regulation also requires the Government agencies to imple-

ment control measures for any species on the list and report annually to the EU Commission on their progress with managing or eradicating populations of these species in its territory. As readers will by now realise, Laura Jones's report should result in a visit to Little Haven by the Environment Agency and it will be the matter of less than a day's work to eradicate the plants. There will, of course, need to be monitoring to ensure that no new plants arise from any seed remaining in the soil.

In her article Laura Jones points out that this species "is available in horticulture today" citing Merrick (2015) as listing four nurseries from which it could be obtained, "despite being listed as an alien species of European Union concern (under EU IAS Regulation 2014)". While I am sure it was not the intention of the author, the statement could be read to suggest that the RHS *Plant Finder* (Merrick, 2015) was wilfully listing the species in defiance of the EU Regulation. I would therefore draw both Laura Jones's and BSBI readers's attention to the exhortation on p. 16 of that edition of the RHS *Plant Finder*: "Please, never use an out of date edition." Had the author availed herself of the 2016 Edition of the RHS *Plant Finder* she would have found a detailed explanation of the EU Regulation on p. 6 with a statement that the plants so listed had been removed. While the author is correct that the EU Regulation came into force in 2014, the first list of species of Union Concern did not come into effect until August 2016. In this the RHS *Plant Finder*, rather than ignoring or being unaware of the EU Regulation, implemented the list before it became law.

By coincidence the very next article (and 'cover story') on the first report of *Myriophyllum heterophyllum* occurring in ponds in West Sussex, is also relevant to the EU Regulation. This species is included on the second list of species of Union Concern which is due to be approved by the EU Commission later this year.

Sarracenia (Pitcherplants) on the East Devon Commons

ROGER SMITH, *12 Castlewood Avenue, Highweek, Newton Abbot, Devon, TQ12 1NX*; (r.smith192@btinternet.com)

In 1999 Pete Gotham, then RSPB reserves officer for Aylesbere Common, showed me some Pitcherplants that had been established on Colaton Raleigh Common for several years. I regret to say I jumped to conclusions and identified the plants as *Sarracenia flava* L. (Trumpets), a species I had previously been shown in Hampshire ten years before. The similarity was obvious, but at that time I was unaware of the number of closely related species and the bewildering range of hybrids available through the horticultural trade. The record was duly published as *S. flava* in 2000 (Margetts, 2000). I visited the plants once or twice over the years and thought no more about it.

In July 2016, the Botany Section of the Devonshire Association visited the area and found a *Sarracenia* plant in flower. The flower was red so it couldn't be *S. flava*, otherwise known as the Yellow Pitcherplant. Casting around for all available evidence it transpired that there were plants in two places both of which I had seen and photographed in 1999 when neither were in flower although David Allen had seen and photographed a yellow flowered plant on the Common some time before 2004 (Allen, 2004). Looking back at my original 35mm photographs of the plants it is now obvious to me that two species were present in 1999, both the pitchers and the sites are clearly different and can be tied to the more recent GPS acquired grid references.

Roger Hamling kindly returned to the sites a few days after the meeting and took more photographs of both plants which Pete Stroh, BSBI Scientific Officer, kindly forwarded to Al Langley at Cambridge University Botanic Garden. Al suggested the yellow flowered plant with the characteristic closed hood is *S. minor* Walter var. *minor* (Hooded Pitcherplant) and the plant with the red flower is a horticultural hybrid involving *S. flava*. The original account for *Sarracenia* in *A new flora*

of Devon (Smith, Hodgson & Ison, 2016) referred only to *S. flava*, but in this case only, we had the opportunity to rewrite the text to include these, our current thoughts, before the *Flora* was published. Finally, I don't condone the practise of planting introduced species in wild places and it is just as well that neither plant appears to have the invasive potential of *S. purpurea* L. (Pitcherplant).

References:

ALLEN, D.J. (2004). *Heathland in East Devon and the Blackdown Hills.* Sprint Press, Exeter.

MARGETTS, L.J. (2000). 92nd report on Botany. Vascular plants. *Rep. Trans. Devon. Ass. Advt. Sci.*, **132**: 306-312.

SMITH, R., HODGSON, B. & ISON, J. (2016). *A new flora of Devon*. The Devonshire Association for the Advancement of Science, Literature and the Arts, Exeter.

NEWS OF MEMBERS

CHRIS METHERELL, *Woodsia House, Main Street, Felton, Northumberland, NE65 9PT*; (01670 783401; chris@metherell.org.uk)

We would like to offer our congratulations and thanks to the following people who have been members for 60 years.

Mrs S.E. Erskine of Faringdon, v.c.22; Mr D.G. Hewett of Llanfairfechan, v.c.49; Dr J. Hodgson of Hope Valley, v.c.57; *Dr H.A.P. Ingram of Cupar, v.c.85; Dr J.A. Kiernan of London, Canada; Mr H.J. Killick of Abingdon, v.c.22 and Mr H.W.S. Smith of Epsom, v.c.17.

*Sad news of the death of Dr Ingram reached us just as we were going to press.

Our special congratulations and thanks go to two members who been with us for 70 years; Mrs G.M. Gent of Wellingborough, v.c.32 and Mr R.D. Meikle of Minehead, v.c.5 and also to .Prof. C.D. Pigott of Grange-over-Sands, v.c.69 who is our longest standing member having joined the old Botanical Society and Exchange Club in 1945!

Marsh Botany Award

We note and congratulate **Ken Adams** as the winner of the 2016 award, which is for an individual's lifetime achievement and an outstanding contribution in the field of botanical conservation. We listed award winners up to 2010 in *BSBI News* **116**: 4; those since that date have been:

2015 **Dr Chris Preston**
2014 **Rod Corner** and **Jeremy Roberts**
2013 **Dr Camilla Lambrick**
2012 **Dr Margaret Bradshaw**
2011 **Gwynn Ellis**

OBITUARY NOTES

CHRIS D. PRESTON, Obituaries Editor, *19 Green's Road, Cambridge, CB4 3EF*; (cdpr@ceh.ac.uk); assisted by the General Editor GWYNN ELLIS

Since the publication of *BSBI News* **134**, we regret to report that the news of the deaths of the following members has reached us, three of very long standing. We send regrets and sympathies to all the families.

Mr M. Edmunds of Otley, West Yorkshire, a member since 1956

Dr H.A.P. Ingram* of Cupar, Fife. a member since 1957

Mr E.R. Meek* of Aboyne, Aberdeenshire, a member since 1992

Dr M.V. Prosser of Canon Pyon, Herefordshire, a member since 1994

Mr B.W. Ribbons* of Norwich, Norfolk, a member since 1949

Mr R.W. Tavender of Upton-on-Severn, Worcestershire. a member since 1986

An obituary of those marked * will appear in the *BSBI Yearbook*

NOTICES

BSBI eNews

JIM MCINTOSH, *c/o Royal Botanic Garden, Inverleith Row, Edinburgh, EH3 5LR*
(Tel: 0131 2482894; jim.mcintosh@bsbi.org)

BSBI *eNews* is a short monthly electronic newsletter for recorders, referees, officers, staff and active members. I took over as its compiler and editor in spring 2016. Recent editions have included articles on Atlas 2020, validation, iRecord, MapMate and the provision of BSBI records to the NBN. The current issue and recent back-issues are available to everyone on the publications page of the BSBI website (Resources > Publications). We also send out an email with a link to the newsletter to all County Recorders & Referees. Please let me know if you are a Recorder or Referee and have not received the monthly BSBI *eNews* emails but would like to. Or if you have not yet seen BSBI *eNews* – then take a look on the BSBI website.

BSBI Photographic Competition

JIM MCINTOSH, *c/o Royal Botanic Garden, Inverleith Row, Edinburgh, EH3 5LR*
(Tel: 0131 2482894; jim.mcintosh@bsbi.org)

Remember to take photographs for this year's BSBI Photographic Competition while out and about this field season. The categories in 2017 are 1) Plants in the Landscape and 2) Archeophytes. Full details were published in *BSBI News* **134**, along with a report of the 2016 competition, and are on the BSBI website.

All the images themselves (from both the 2016 and 2015 competitions) can be viewed as a fantastic gallery display on the BSBI's new Flickr site (see also back cover and Colour Section Plate 3). To find it, search for "BSBI Flickr" in your browser. If you select Albums you will find there is one album for each of the competition categories.

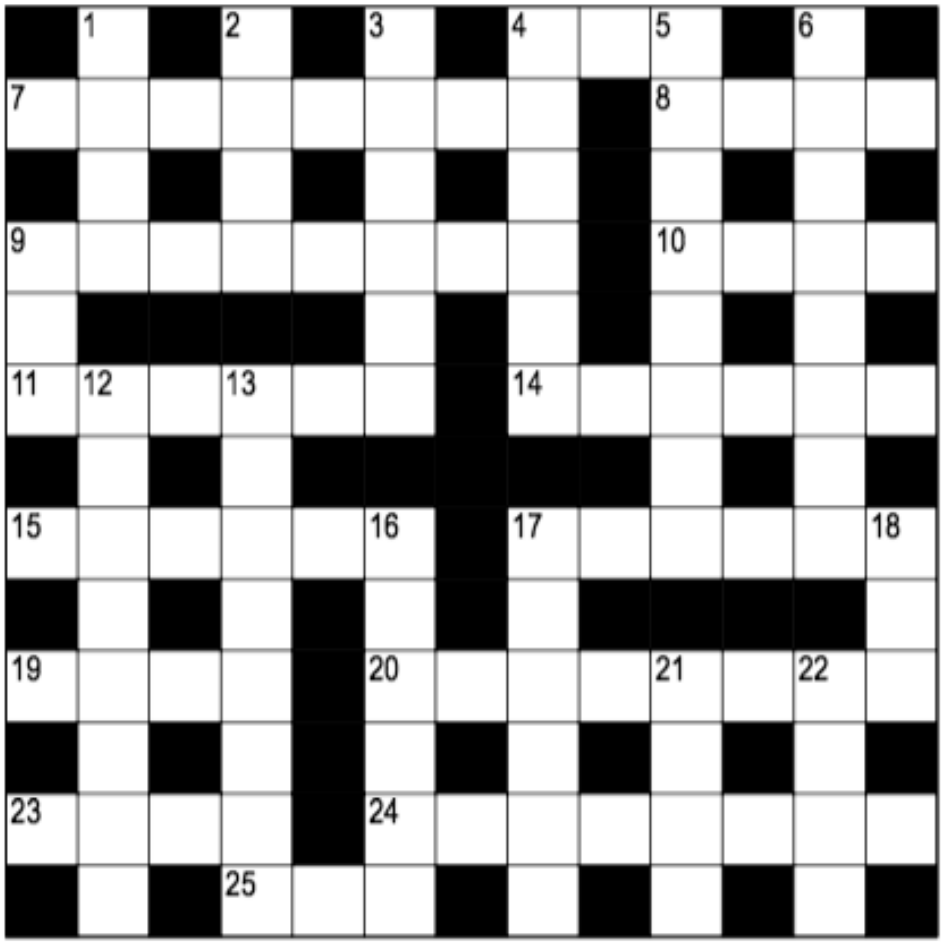
Diary for 2017

CHRIS METHERELL, *Woodsia House, Main Street, Felton, Northumberland, NE65 9PT*; (01670-783401; chris@metherell.org.uk)

2017	**Committee, etc.**	**Location**
Tuesday 6 June	Welsh Summer Meeting and AGM.	Holywell, Flint
Saturday 2 September	Committee for Ireland	Dublin
Saturday 23 September	Irish AGM	Belfast
Wednesday 27 September	Meetings and Communications	London
Tuesday 3 October	Records and Research	London
Tuesday 10 October	Training and Education	Shrewsbury
Thursday 12 October	Publications	London
Wednesday 1 November	Council	London
Saturday 4 November	Scottish AGM	Edinburgh
Saturday 25 November	AEM & AGM	London

BOTANICAL CROSSWORD 31

by CRUCIADA



ACROSS

4. Has he great expectations of a fruit seed? (3)
7. Yellow composite robust in the past (8)
8. Her husband introduced Sumac genus (4)
9. Drainage organised for fragrant member of the Rubiaceae (8)
10. Pinch Mr Stewart 's aquatics (4)
11. Fix the Spanish founder of genetic science (6)
14. Where to consult the oracle about most of larkspur (6)
15. Six originally soft detectives get sticky (6)
17. EU pass plan for poison-arrow trees (6)
19. Said to flog biological unit (4)
20. Moral: dig vigorously for *Calendula* (8)
23. Roman places for meeting to discuss what's left out of flowering plant collections (4)
24. First bit taken from spurge induces elation (8)
25. Pine (roughly) for expensive coat, we hear (3)

DOWN

1. Say nothing about Asian legume (4)
2. Not cultivated by Oscar, they say (4)
3. Learn'd how to scatter a *Lolium* (6)
4. Country in which to botanise out of the flowering season? (6)
5. Heal thyself, Miss Scales! (8)
6. Spooner to make home for female rabbit with cultivation tool (5,3)
9. Take heads of fragrant orchid to fit location (3)
12. Ignore re composition of fleabane (8)
13. Where prisoner stands, willingly they say, to alleviate sting (4,4)
16. Subduing effect experienced when ground, for example, is not so dry (6)
17. Carelessly, I prune tree, say, before it's mature (6)
18. Turf out leaders of some old dynasty (3)
21. How plants develop in good line (4)
22. Bale I sold containing garlands of flowers (4)

RECORDERS AND RECORDING

Panel of Referees and Specialists

JEREMY ISON, *40 Willeys Avenue, Exeter, Devon, EX2 8ES*; (Tel.: 01392 272600; Jeremy_ison@blueyonder.co.uk)

Since the publication of the 2017 *Yearbook* the following changes have been made.

Ken Adams will replace **Fiona Cooper** as referee for *Populus nigra* subsp. *betulifolia*. His postal address is included in the *Yearbook* as recorder for v.cc. 18 & 19, and his email address is ken.adams@virgin.net.

Mark Lynes will be assisting **Margaret Bradshaw** as joint referee for *Alchemilla*. Mark's contact details are: Westlands, 21 Akeferry Road, Westwoodside, DONCASTER, DN9 2DX, Phone 07795825340, email maslyni@gmail.com Twitter @AlchemillaMan.

Panel of Vice-county Recorders

PETER STROH, *c/o Cambridge University Botanic Gardens, 1 Brookside, Cambridge CB2 IJE*; (peter.stroh@bsbi.org)

In my last note in News I was extremely remiss not to mention the retirement of Jackie Muscott, Recorder for **West Lothian** (v.c.**84**), in November 2016. Jackie took on the role of VCR following the retirement of Mike Scott in 1986 and very quickly made her mark through the publication of *A Check list of the Flowering Plants and Ferns of West Lothian* (Muscott, 1989), and soon after contributed considerably to the wonderfully readable and comprehensive *Plant Life of Edinburgh and the Lothians* (Smith *et al*., 2002), the first Flora in Scotland to present records at monad precision – a real trail-blazer in this regard. Those who know Jackie best will testify to how prodigious a field botanist she is. A quick look at our database shows that she has contributed a remarkable 255,000 records since 1987, including 160 new vice-county records, and covering the length and breadth of Scotland! Alongside the many articles written and the countless identification workshops and field meetings organised, Jackie was a committed member of the BSBI Scottish Committee for many years, and continues to be a highly regarded member of the botanical community. As I write, no one has yet taken up the mantle in **West Lothian**, (v.c.**84**) so please do contact Jim McIntosh if you are interested in learning more about the role.

In **Anglesey** (v.c.**52**) Hugh Knott has recently resigned as joint VCR, although he continues to be very active in recording the flora of the island. Stepping into the breach is none other than Nigel Brown, previously sole VCR for Anglesey from 1996-1998 and joint Recorder with Ian Bonner from 1998-2015. Ian is the first point of contact; he can be reached at bonner@caetrefor.co.uk or at 15 Littledean Hill Road, Cinderford, Gloucestershire, GL14 2BD. I'm sorry to report one more retiree; Tim Rayner, newly appointed VCR for **Sussex** (v.c.**13** & v.c.**14**), has stepped down, and Paul Harmes, whom Tim replaced, has very generously agreed to temporarily resume his role, working alongside Matthew Berry, who remains as joint Recorder.

In other news, Duncan Donald (**West Ross**; v.c.**105**) has a new email address 16dandk@ gmail.com, as does John Hawksford in Staffordshire (v.c.**39**); hawksford-john@ gmail.com, and Liz Lavery in West Perthshire (v.c.**87**) eldlavery@outlook.com. If you wish to contact Caroline Mhic Daeid

(**Kerry**; v.c.**H01** & v.c.**H02**) for all things botanical in Kerry, her email address is carmhic@ gmail.com. And lastly, Ian Green (Moray, v.c.**95**) has moved house to Eastview, Lachlanwells, Forres IV36 2RA, and Philip Sansum's. (**Stirlingshire**; v.c.**86**) address was incorrectly printed in the Yearbook – written correspondence should be sent to 7B Blane Avenue, Blanefield, Glasgow, G63 9HU.

As ever, thank you to all VCRs, past and present, for your dedication, help and expertise.

References:

MUSCOTT, J. (1989). *A Check list of the flowering plants and ferns of West Lothian*. Royal Botanical Society of Edinburgh, Edinburgh.

SMITH, P.M., DIXON, R.O.D. & COCHRANE, P.M. (eds). (2002). *Plant life of Edinburgh and the Lothians*. Edinburgh University Press, Edinburgh.

Submitting and verifying plant records using iRecord

KEVIN WALKER, *Suite 14, Bridge House, 1-2 Station Bridge, Harrogate, HG1 1SS*; (kevin.walker@bsbi.org)

TOM HUMPHREY, *c/o CEH, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxon, OX10 8BB*; (tom.humphrey@bsbi.org)

DAVID ROY, *CEH, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxon, OX10 8BB*; (dbr@ceh.ac.uk)

iRecord is an online application for managing and sharing biological records. The system is being actively developed by the Centre for Ecology of Hydrology (CEH), and is increasingly being used by wildlife recorders as their primary means of inputting, storing, managing, and sharing their observations. iRecord also provides a system for experts to verify records submitted by others. A smartphone application was launched in 2016 and is rapidly growing in popularity for recorders to capture wildlife sightings in the field.

How many plant records are there and where do they come from?

Currently there are around 700,000 vascular plant records held within iRecord, and associated surveys that use the same underlying database system (collectively held within an 'Indicia data warehouse'). Most of these are *ad hoc* records, but records from a range of other organisations and monitoring schemes are captured by the same system and shared with iRecord. Schemes currently contributing large numbers of plant records include RISC (Recording Invasive Species Counts), a public engagement project that aims to capture sightings of around 20 invasive non-native plant species[1], and the National Plant Monitoring Scheme, run by BSBI, CEH and Plantlife and launched in 2015. In addition, records collected using the BSBI's *New Year Plant Hunt* smart phone app in 2017 were also captured within the Indicia data warehouse linked to iRecord.

Are the records verified and if so by whom?

All records submitted via iRecord are automatically checked ('auto-validated') against a series of 'rule-sets' defined by the BSBI and including a check against the known range of a species (based on BSBI distribution data). Additionally, records can be verified 'manually' by authorised users including VCRs, botanists who have been authorised by VCRs to check records for his or her vice-county and national experts who check records from their area of expertise (e.g. non-native invasives). The verification system is very flexible and allows the verifier to flag, query or comment on a record. Many recorders also submit photos to aid with this verification process.

Currently all verification occurs within iRecord but we plan to extend this to records imported from iRecord into the BSBI's own Distribution Database (see below).

What happens to records that are currently held within the iRecord warehouse?

National Schemes such as BSBI are responsible for establishing the flow of records from iRecord to support research and conservation. All plant records from iRecord (and associated Indicia surveys) will therefore be made available to the BSBI's Distribution Database in early 2017. These records will initially be partitioned separately from the BSBI's main data set, accessible to VCRs to review, verify or download, but not treated automatically as part of the BSBI Database. VCRs will be able to select which parts of iRecord/Indicia they wish to assimilate into the BSBI's database. There will be two-way exchange of verification annotations between iRecord and the BSBI database, so verification work can be done in either or both systems as the user verifier prefers. All verified[2] plant records held within the iRecord/Indicia system will also be forwarded on to the NBN Gateway (and its successors) so that they are publicly available for use by others. The dataset will be affiliated to BSBI and CEH.

How can I submit my records via iRecord?

It is very easy to submit plant records via iRecord. These can be entered online via the website (http://www.brc.ac.uk/irecord/) or smartphone app (http://irecord.org.uk/app). Note that you have to register with iRecord to use the smartphone app and records submitted by the app can only currently be edited online. CEH are working on improvements to the iRecord App for plant recorders, and also developing a tailored 'plant recording card' designed specifically for the efficient entry of records recorded in monads or tetrads to support atlas recording. This will be available for testing in late 2017.

I'm not a VCR or referee. Can I become an "authorised verifier" on iRecord?

If you would like to become an authorised verifier for a particular area or region then please contact your local VCR first to check that they are happy for you to verify records on their behalf. If you are interested in verifying a specific species or group of species then please contact us and we will check with the relevant national referee.

I'm a VCR or referee. Do I have to verify records on iRecord?

There is no expectation that VCRs or referees will verify records on iRecord or after records are imported into the DDb, although we hope that this role can be delegated to 'trusted' verifiers for specific areas or species groups. For those that do, however, the benefits will include access to an increasing body of records which we are sure will contain new and interesting records. More generally it will help to improve the quality of plant records available to others and raise the profile of the BSBI as the key organisation involved in plant recording in Britain and Ireland.

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[1] *Aceana* sp., *Ailanthus altissimus*, *Azolla filiculoides*, *Carpobrotus edulis*, *Cortaderia* sp., *Crassula helmsii*, *Fallopia japonica*, *Gunnera* sp., *Heracleum mantegazzianum*, *Hydrocotyle ranunculoides*, *Impatiens capensis*, *I. glandulifera*, *Lagarosiphon major*, *Lysichiton americanus*, *Ludwigia* sp., *Mimulus* sp., *Prunus laurocerasus*, *Rhododendron ponticum*.

[2] Verified records will include those that have been checked manually by BSBI referees/ recorders as well as those that have been 'auto-validated' using rule-sets developed using BSBI distribution data. The validation/verific-ation status of each record will be 'flagged' so that users accessing the records via the NBN Gateway are aware as to the level of checking that has taken place.

BSBI New Year Plant Hunt 2017

Kevin Walker (BSBI Head of Science), *Suite 14, Bridge House, 1-2 Station Bridge, Harrogate, HG1 1SS*; (kevin.walker@bsbi.org)
Louise Marsh (BSBI Communications Officer), *234 London Road, Leicester, LE2 1RH*; (louise.marsh@bsbi.org)

Summary

The BSBI's sixth New Year Plant Hunt (NYPH) was held between 1st and 4th January 2017. Volunteers submitted lists of native and non-native plants found in flower in wild situations during a three-hour walk at sites throughout Britain and Ireland. In 2017, results were submitted for the first time via a smartphone app and online (https://nyph.bsbi.org/). 416 recording groups or individual recorders submitted 460 lists (28 more than in 2016), comprising 7123 records of 492 species. The average number of species recorded was 15.5. This was significantly lower than the averages for 2014-2016 which all exceeded 20 species. The difference, however, was much less marked for non-native species. The rank order of the top five species found in flower were almost identical to previous years (*Bellis perennis* (Daisy), 1st; *Senecio vulgaris* (Groundsel), 2nd; *Taraxacum* (Dandelion), 3rd; *Poa annua* (Annual Meadow-grass), 4th; *Ulex europaeus* (Gorse), 5th). The vast majority of species recorded were flowering late (58%) rather than early (15%) or as would be expected at New Year (11%). These proportions were almost identical when non-native species were excluded or when they were compared to previous years. The lower incidence of flowering in 2017 appears to be the result of lower temperatures in October to December 2016 when compared to the same period in 2013, 2014, 2015, all of which had exceptionally mild weather in many parts of Britain and Ireland during the months preceding the NYPH.

Introduction

Since 2012, the Botanical Society of Britain & Ireland (BSBI) has run an annual hunt for plants in flower during a four-day period over the New Year (usually 1st to 4th January). Since the first New Year Plant Hunt (NYPH) was carried out by BSBI members Tim Rich and Sarah Whild in Cardiff in 2012, the scheme has grown rapidly with more than 850 participants taking part at 432 locations in 2016 (Marsh, 2016). FLORON, the Dutch botanical society, have also been running a similar scheme since 2014, largely inspired by the NYPH (Year End Plant Hunt; Sparrius, 2016). Although intended to provide a fun (and competitive) activity for botanists during a quiet period, these surveys also have a serious element. Observations of 'unseasonal' phenological events are being reported from around the globe in response to rising temperatures which are predicted to exceed 2˚C above pre-industrial levels in the coming decades. Citizen science projects such as NYPH are therefore helping to reveal the impacts of these changes, as well as gathering novel information on plant phenology more generally. Through the use of new technologies, such as social media and online apps, the NYPH has also raised the profile of the BSBI and introduced its work to new audiences.

Method

In 2017 volunteers picked a day between 1st and 4th January and recorded all native plants and any naturalised non-natives (but not obviously planted species) that they found in flower on a walk not exceeding 3 hours (excluding breaks and travelling between sites). Recorders were encouraged to restrict their recording to a single area or site but in a few cases multiple sites were visited within the three hour period (for example at stops along a motorway). Recorders were encouraged to check that plants were actually flowering, for example by checking that catkins were open, that grasses had open florets with stigmas or anthers on show, etc. Ferns and fern-allies were excluded from lists.

In 2017 the majority of lists were submitted via the NYPH smartphone app or online via

the NYPH webpage (https://nyph.bsbi.org/). This substantially increased the efficiency of data entry and reduced errors during data processing. It also made it easier to verify records, as all the records were available to review on iRecord, often with accompanying photographs. Data processing prior to analyses included checking the completeness of lists and that site details were correct, checking doubtful records and that taxa matched those given by Stace (2010), and removing taxa identified to genus only.

For analyses, each species was categorised as native or alien following Preston *et al.* (2002) and allocated to one of four categories based on flowering phenology (Table 1). The typical flowering months were taken from Clapham *et al*. (1987) in the first instance and Sell & Murrell (1996 *et seq*) for species not covered by Clapham *et al*. Species were then categorised as 'expected' if they flower all year and are therefore expected to be in flower at New Year; flowering 'early' if they typically flower in the spring and complete flowering by summer at the latest; 'late' if flowering extends from the summer into the autumn; and 'early or late' for species with an extended flowering period (spring-autumn) or just flowering in the summer.

Table 1. Categories used to classify species flowering at New Year based on typical flowering phenology.

Phenology	**Description**
Expected	Flowering all year
Early	Flowering in the spring, many extending into summer
Late	Flowering in the summer and autumn
Early or late	Flowering in the summer or from the spring to the autumn

Results

Number of participants

A total of 416 recording groups, families or individual recorders took part in the NYPH in 2017 compared to 405 in 2016 (Table 2), i.e. an increase of 2.7%. It has not proved possible to give an accurate number of individual participants for 2017 due to limitations with the recording app, which led to many group lists being recorded under one name only. In 2016, however, we were able to record numbers of individual participants and reached a total of 865. We therefore estimate that this year's total is likely to be around 888 (i.e. an increase of 2.7% over last year). Both these figures are underestimates as they exclude recorders who submitted miscellaneous records via social media but chose not to use the app or email a list. This means their records have not been through our verification process and therefore cannot be included in this analysis.

Table 2. The number of groups/individuals participating in the New Year Plant Hunts, 2014-2017

	2014	**2015**	**2016**	**2017**
Groups/Individuals	70	c.300	405	416

Number of lists

In 2017, 460 lists were submitted – this is a slight increase on the total of 432 recorded in 2016 (Table 3). At the country level, twice as many lists were submitted for Ireland than in 2016 and there was a slight increase in the number of lists recorded in Wales. In comparison, there were slight decreases in Scotland and England. The lists submitted covered 392 hectads (fig. 4 p. 91). Although the majority of lists were concentrated in the more populated areas of Britain and Ireland, good numbers were also recorded in remoter regions. Locations surveyed ranged from Donegal to Norfolk, southwest Ireland (inside front cover) to northwest Scotland, and included both Orkney and the Channel Isles.

Table 3. The number of lists submitted for the New Year Plant Hunt, 2014-2017

Lists	2014	2015	2016	2017
England	32	101	297	282
Wales	5	10	19	28
Scotland	10	9	64	43
Ireland	3	21	50	104
Channel Isles	1	2	2	3
Total	51	143	432	460

Number of species

In 2017 the total number of species recorded in flower was 492. This is 119 less than in 2016 (Table 4). As in previous years, this total included a large number of non-native species naturalised in wild locations: in 2017 these comprised 46% of all the species recorded in flower which is comparable, and certainly not significantly different, from the numbers recorded in previous years (40-49%).

Table 4. The number of plant species recorded in flower during the New Year Plant Hunt. The percentages are given in parentheses.

Species	2014	2015	2016	2017
Native	135 (60%)	206 (56%)	313 (51%)	264 (54%)
Alien	89 (40%)	160 (44%)	298 (49%)	228 (46%)
Total	224	366	611	492

Number of records

In 2017 the total number of records submitted was 7123 which was substantially less than the 9160 submitted in 2016, despite the increase in the number of lists recorded (Table 5). As in previous years, a much greater proportion of records was for native (63%) rather than non-native taxa (37%).

Table 5. The number of records submitted as part of the New Year Plant Hunts, 2014-2017. The percentages are given in parentheses.

Records	2014	2015	2016	2017
Native	741 (63%)	1874 (65%)	6210 (68%)	4509 (63%)
Alien	432 (37%)	1019 (35%)	2950 (32%)	2614 (37%)
Total	1173	2893	9160	7123

List length

In 2017 the average list length was 15.5 species, or 9.8 for native species and 5.7 for non-natives (Table 6). These figures were significantly lower than in all three previous years (>20 species), although the differences for all species and natives alone were more marked than for non-natives (Table 5; Fig. 1).

Table 6. The average number of species recorded in flower during the New Year Plant Hunt, 2014-2017. The significance of the differences between years was tested using a One-way ANOVA with Tukey's HSD used to test for significant differences between means (means with the same letter are not significantly different from one another).

List length	2014	2015	2016	2017	F-value	P-value
Native	14.5a	13.1a	14.4a	9.8b	16.05	<0.001
Alien	8.5a	7.1a	6.9a	5.7a	3.24	<0.05
Total	23.0a	20.2a	21.2a	15.5b	10.01	<0.001

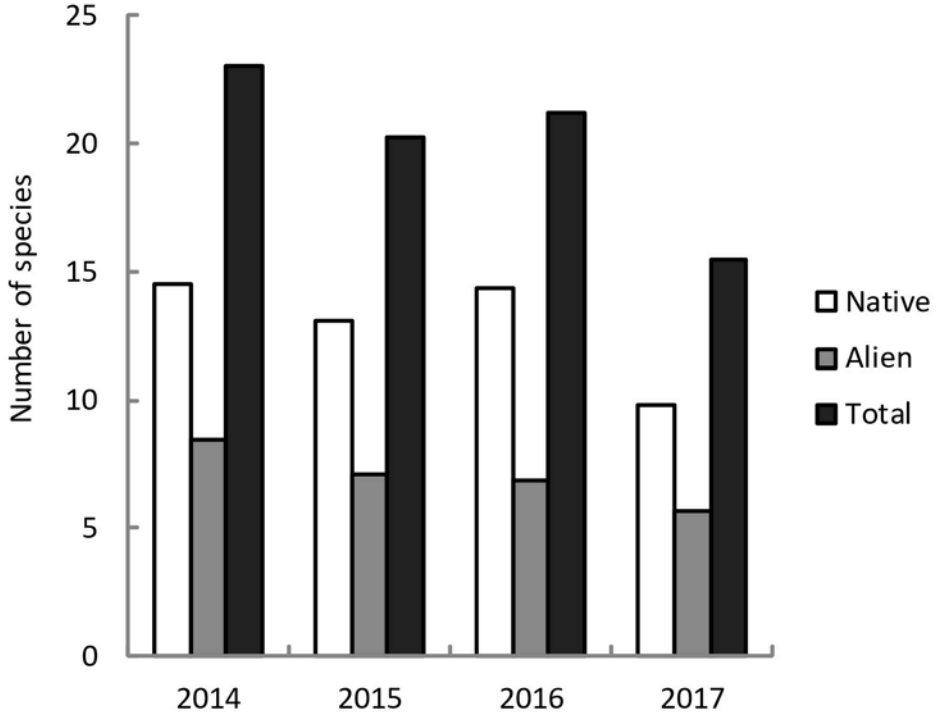

Fig. 1. The average number of species recorded in flower at New Year, 2014-2017

Species rank

In 2017 the species most frequently recorded in flower were *Bellis perennis* (Daisy), *Senecio vulgaris* (Groundsel), *Taraxacum* (Dandelion), *Poa annua* (Annual Meadow-grass) and *Ulex europaeus* (Gorse) (Table 7). For these five species, the rank order was almost identical to previous years. Other species, however, showed a significant increase in flowering when compared to 2016, most notably *Stellaria media* (Chickweed), although these differences were less marked when compared to 2014 and 2015.

Table 7. The top 10 species recorded in flower in 2017 shown in relation to the rank orders in previous years. The change in position from 2016 is shown

Scientific name	Common name	2014	2015	2016	2017	Diff
Bellis perennis	Daisy	2	1	1	1	=
Senecio vulgaris	Groundsel	1	3	3	2	1
Taraxacum	Dandelion	3	1	2	3	-1
Poa annua	Annual Meadow-grass	5	4	4	4	=
Ulex europaeus	Gorse	13	5	5	5	=
Capsella bursa-pastoris	Shepherd's-purse	7	6	11	6	5
Euphorbia peplus	Petty Spurge	7	8	14	7	7
Stellaria media	Chickweed	6	10	29	8	19
Lamium purpureum	Red Dead-nettle	9	13	8	9	-1
Veronica persica	Common Speedwell	9	12	22	10	12

Phenology

Of the species recorded in flower in 2017, 58% were flowering late, whereas only 15% were flowering early and 11% as would be expected at New Year (Fig. 2). In comparison, 16% of species have a long flowering period and therefore it is not possible to say whether a species is flowering early or late at New Year. These figures were scarcely different when non-native species were excluded (Table 8) and were very similar to previous years and there is no evidence to suggest that these proportions have differed significantly over the last four winters.

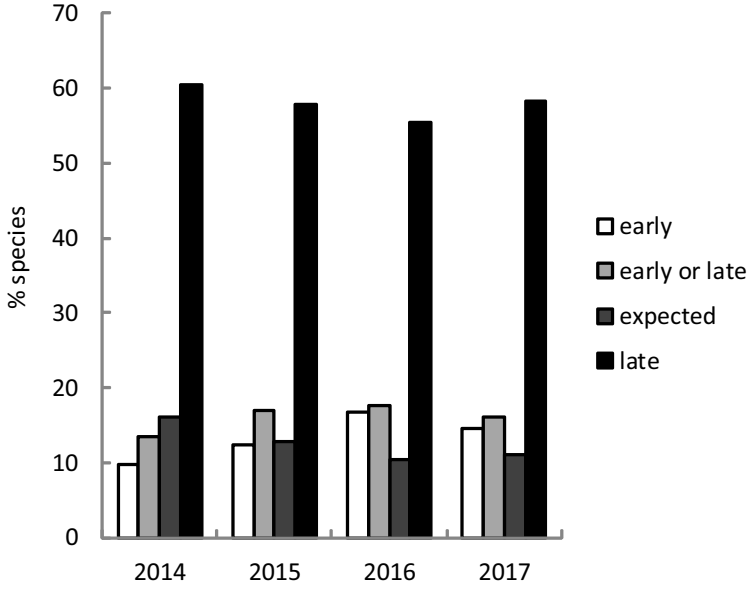

Fig. 2. The % of all species recorded at New Year that were flowering early, late or as expected, 2014 2017. Species which typically flower from the spring to autumn are categorised as 'early or late'. Species that normally flower at New Year are categorised as 'expected'.

Table 8. The % of native species recorded at New Year that were flowering early, late or as expected, 2014-2017. Species which typically flower from the spring to autumn are categorised as 'early or late'. Species that normally flower at New Year are categorised as 'expected'.

Phenology natives (%)	**2014**	**2015**	**2016**	**2017**
Early	10	12	13	14
Early or late	13	17	17	17
Expected	13	10	6	8
Late	65	61	63	60

Discussion

When compared to the previous years, far fewer species were recorded in flower in 2017 (Fig. 1). This was particularly the case for natives, but less so for non-natives, where the difference across all four years was only marginally significantly different (Table 6). A comparison of the weather data for October to December would suggest that this is largely due to temperature (Fig. 3). These months were exceptionally mild 2013-2015 even when compared to the recent averages (1981-2010), especially 2015 where the December anomaly was +4˚C. In comparison, this period was much colder in 2016, especially November, and the widespread frosts presumably curtailed the flowering of many species.

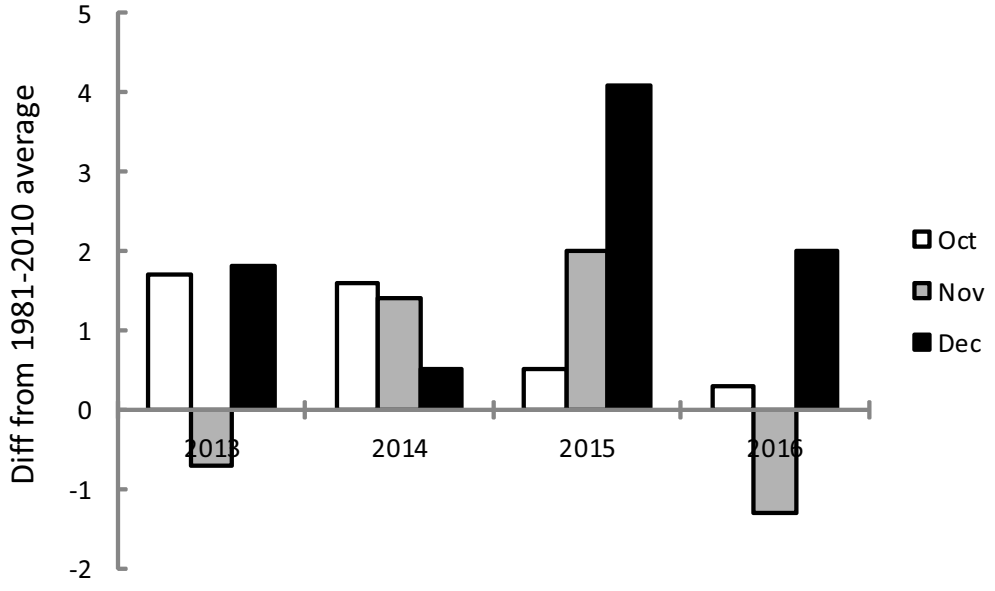

Fig. 3. UK mean temperature 1981-2010 anomalies for October to December, 2013-2016. Data from UK Met Office (http://www.metoffice.gov.uk/climate/uk/summaries)

Despite these differences, the NYPH results have consistently shown that far more species are flowering late rather than early at New Year. This largely reflects the smaller number of species that flower early in the year, but also the large number of naturalised non-natives that extend their flowering into the winter months. This may be because they are often exploiting thermophilous (heat-loving) habitats, such as walls and pavements in urban areas, which maintain temperatures a degree or two above the surrounding countryside, thereby reducing the impacts of winter frosts.

Further work is required before we can be certain about the causes of these unseasonal events and should include attempts to correlate NYPH data with climate data whilst removing the potential confounding effects of latitude and whether lists have been recorded in urban or non-urban areas. We hope to publish a more in-depth analysis of NYPH 2017 results before next year's New Year Plant Hunt and look forward to receiving more data in future years.

Acknowledgments

We owe a huge debt of gratitude to the 100s of botanists who took part in the NYPH in 2017! We would also like to thank the NYPH 'team' who worked tirelessly to make the project a success, most notably Karolis Kazlauskis (Centre for Ecology and Hydrology) and Tom Humphrey (BSBI Database Officer) for developing and supporting the smartphone app and website; Ryan Clark, Ian Denholm, Richard Mabbutt and Ciara Sugrue for providing support over the busy New Year period; and to BSBI Country Officers Maria Long, Jim McIntosh and Polly Spencer-Vellacott for enthusing recorders so successfully in Ireland (Maria), Scotland (Jim) and Wales (Polly).

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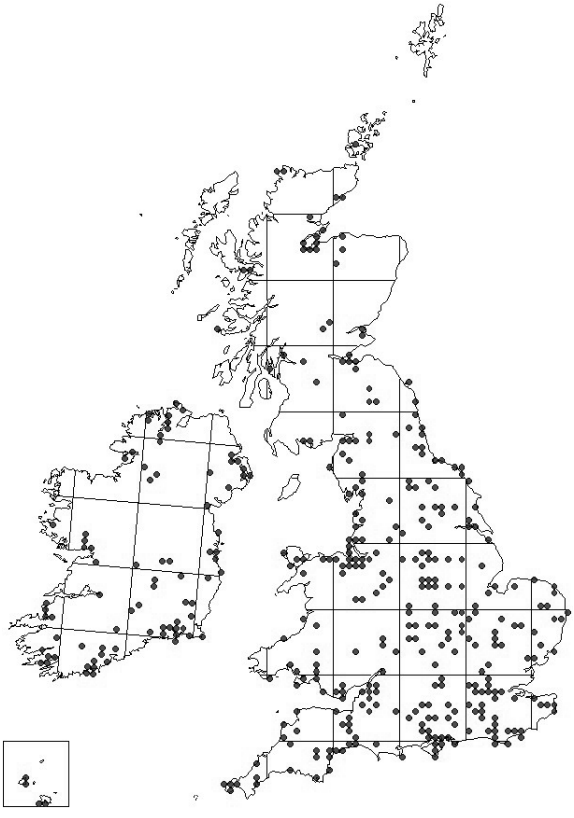

Fig 4. Map showing the distribution of New Year Plant Hunt lists received in 2017.

Recording our attitudes to our garden 'weeds' – some hated, some treasured

MICHAEL BRAITHWAITE, *Clarilaw Farmhouse, Hawick, Roxburghshire, TD9 8PT*; (mebraithwaite@btinternet.com)

Despite the much improved publicity about BSBI, our membership numbers are not rising as quickly as we might wish, so I have been pondering what further initiatives could be taken. I notice that the New Year Plant Hunt now has a large following with 460 lists submitted in 2017 and wonder whether something similar could be done for garden weeds, not to observe first-flowering dates but to comment on those that are especially hated or gladly tolerated. Gardens would probably have to be divided between various categories, especially in respect of size, before interesting comparisons could be drawn.

I offer here a commentary on our own garden. Rather than present the data in tabular format I give a tour of the garden. I have limited the area to that of our front garden, excluding the drive, a miniature wildflower meadow and a wooded strip. Our front garden is a rectangle close to 40×30m. It is relatively little altered from its origin as the garden of a mid-nineteenth century farmhouse. It has a lawn, a vegetable patch, some fruit bushes, a herba-

ceous border and a small woodland bit. It is divided by a gravel path and is bounded in part by a hedge and in part by a shrubbery of yew and holly. That gives eight habitats. I list 10 hated species ranked from -1 to -10, where -10 is the worst, and 10 treasured species ranked from +1 to +10 where +10 is our favourite.

The lawn is hand-weeded to keep it free from *Bellis perennis* (Daisy), *Taraxacum* agg. (Dandelion) and *Cirsium* spp. (Thistles). It is not treated with herbicides. It boasts several strong patches of *Ophioglossum vulgatum* (Adder's-tongue) (+10) which we cut round for a month in the summer, a recently established colony of *Dactylorhiza purpurella* (Northern Marsh-orchid) (+8), about eight clumps of *Crepis mollis* (Northern Hawk's beard) (+7), which are self-sown from plants I cultivated in the shade of fruit bushes many years ago, and a splendid patch of *Crocus nudiflorus* (Autumn Crocus) (+6) which has expanded over the years from an introduction long before our time. *Veronica filiformis* (Slender Speedwell) was abundant in the 1980's but is now very sparse, despite being unmolested.

The vegetable patch boasts *Fumaria purpurea* (Purple Ramping-fumitory) (+9), spotted when we went round the property before purchasing it. It is at its most spectacular when allowed to grow up the wigwams of runner beans. There is a little *Veronica polita* (Grey Field-speedwell) (+2), very scarce in this area, with *Veronica agrestis* (Green Field-speedwell) (+1), also a scarce species. Troublesome species are *Sagina procumbens* (Procumbent Pearlwort) (-8) and *Poa annua* (Annual Meadow-grass) (-7) which are near-impossible to weed efficiently. *Epilobium montanum* and *E. obscurum* (Willowherbs) (-1) are also a nuisance.

The fruit bushes are invaded from the hedge-bottom by *Elytrigia repens* (Common Couch) (-5). The herbaceous border is invaded by *Aegopodium podagraria* (Ground-elder) (-10) from its headquarters under the hedge and by *Ranunculus repens* (Creeping Buttercup) (-6) which got out of control during a recent wet season. *Symphoricarpos albus* (Snowberry) (-2) suckers from the hedge in one area of the border. The woodland bit is infested with *Allium paradoxum* (Few-flowered Garlic) (-9), again spotted before we purchased the property, which is uncontrollable.

The gravel path has been colonised by *Fragaria vesca* (Wild Strawberry) (-4) from a patch of 'Alpine Strawberries' and we find it very herbicide-resistant. However we encourage a little *Geranium pratense* (Meadow Crane's-bill) (+4) along the path, though it needs some culling, and tolerate some *Veronica peregrina* (American Speedwell) (+5) as a curiosity which predates our ownership of the house. The hedge-bottoms harbour species already referred to and also *Urtica dioica* (Common Nettle) (-3) and *Galium odoratum* (Woodruff). We have a love/hate relationship with the latter and I have not ranked it, because, although it is a robust cultivar that is spectacular in flower, its rhizomes spread aggressively. Naturalised *Lunaria annua* (Honesty) (+3) is seen as a positive that can be readily controlled if need be. The shrubbery is much overrun by *Hedera helix* (Common Ivy) but it isn't really a problem.

A BSBI survey of garden weeds along these lines could be based on quite a simple survey form with space for up to 10 hated species to be listed and ranked and up to 10 treasured species likewise. A habitat would be required for each, to be chosen from a pre-defined list and possibly some indication of quantity. Some information about the size of the garden and the date when the house was built would also be asked for.

There would certainly be a wide variation between gardens, but whether there would be a change over time is more debatable. In contrast to garden bird surveys the species selection would be subjective and the perception of hated and treasured species might change as much as the populations of the species themselves. No doubt the statisticians would dislike that, but any change in attitudes to plants would be a fascinating part of the study.

Please email me if you would like to be included in a pilot survey.

NOTES FROM THE OFFICERS

From the Scottish Officer – *JIM MCINTOSH*

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BSBI Scottish Recording Conference & Workshop 2017

Twenty-six members, mostly Scottish Recorders, participated in a very enjoyable Recording Conference & Workshop at FSC Kindrogan over the weekend of the 10-12 March. It began on Friday afternoon with a major (optional) session on MapMate during which a range of short talks were given interspersed by practical sessions. The main programme included several talks on an Atlas 2020 theme, including a progress report and one showing some early results, and several on the theme of data validation again interspersed by practical sessions. Light relief was provided by Arthur Copping who held an Agrostis ID workshop and Ian Strachan, Paul Smith and I held sessions on Conifer Id, the Vegetative Key and Making the most of GPSs, respectively. After-dinner entertainment on the Saturday night was provided by Recorders giving an illustrated round-up of news from their counties. On Sunday, we heard the latest on BSBI Data and the NBN and talks on Rare Plant Registers and Axiophytes. The conference concluded with a lively and wide-ranging Q&A session. As always participants particularly enjoyed the chance to meet and socialise with fellow recorders and members over meals and in the bar.

All the talks are available as pdfs via the Scotland page of the BSBI website – take a look!

Scottish Officer Report for 2016

If you would like to know more about what the Scottish Officer has been up to, a detailed Annual Report appears in the 2017 BSBI Scottish Newsletter and has been posted on the BSBI Scotland webpage.

Extracting Records from Survey Reports

Elsewhere in this edition of *BSBI News* you can read Stephen Bungard's article on how he extracted over 20,000 records from a recently published SNH commissioned report on the survey of 250 Scottish saltmarsh sites (p. 63). The data is dated 2010-2012 and contains many new hectad records and a few new county records including some for very significant species such as *Carex salina.* This is a great contribution to BSBI Recorders' datasets for what is, perhaps, a rather under-recorded habitat.

If you have the computer skills and patience to undertake similar work, or are aware of similarly significant survey reports (by NGOs or national agencies) whose records would make a valuable contribution to the BSBI's Atlas 2020 data holding please let your Country Officer know. This would be a great way to augment Atlas 2020 coverage in under-recorded areas and habitats.

From the Irish Officer – *MARIA LONG*

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(Tel.: 00 353 87 2578763; maria.long@bsbi.org)

A short note from Ireland this time around. Firstly, I'd like to mention that we are always glad to receive records from visiting botanists – so send any records you may have made in Ireland to the VCR, or to me as Irish Officer, and I can pass them on. This note was prompted by conversations with the three Donegal VCRs recently. They are especially keen to receive records so fish them out if you've been on holidays in stunning Donegal! Secondly, we have written up the initial findings of the Irish Species Project, which ran in 2014 and 2015, and focused on surveying for eight uncommon or declining species right across Ireland. This appears in the most recent edition of *Irish Botanical News*, published in

March 2017, and I hope you take a look. I'd also like to take the opportunity to point out that this is an excellent all-round publication, and is likely to contain much of interest to many botanists, not just those who are Ireland-based. All back issues are available for download on the Irish BSBI webpage: http://bsbi.org/ireland

From the Hon. Field Meetings Secretary – *JONATHAN SHANKLIN*

11 City Road, Cambridge CB1 1DP; (fieldmeetings@bsbi.org)

Field meetings are now underway throughout the components of the BSBI, but mostly at a local level. Have you been on one yet? They are a great opportunity to get outdoors and meet other botanists to share experiences. Everyone, from vice-county recorder to beginner, has always something new to learn, and occasionally you can inspire others. On a recent visit to London for a Council meeting I took the opportunity of a free morning to see a bit of the city that I wouldn't normally go to, at least in part to satisfy a personal project of recording a liverwort in each monad in the inner city. Going along the Parkland Walk (an old railway track from Finsbury Park towards Highgate) I chanced upon a grandmother, mother and toddler who were enjoying the open air and who wanted to know what I was looking at. I explained that I was looking for tiny plants called liverworts, which were similar to mosses. The toddler picked up on this, learning a new word "moss" and quickly learning to recognise it. A potential future bryologist or botanist!

There are still many counties which would appreciate assistance with recording for Atlas 2020, but where we haven't organised field meetings and where there are no local meetings. Don't let this stop you from recording, or even from offering to organise a local meeting to help the vice-county recorder. All efforts will be very welcome.

Whilst our Annual Summer Meeting will go some way to helping Flintshire achieve good coverage for the Atlas, it isn't just about tetrad recording. There are opportunities to learn about plant identification, to see new plants and to socialise with other botanists. It is also the Welsh AGM, so there will be some exhibition material, and the opportunity to buy botanical books. Do come and join us – the weather in Flintshire is often much better than other parts of North Wales as the mountains provide a shielding influence from the prevailing south-westerly winds. The Meteorological Station at Hawarden holds several maximum temperature records, and this shows in the flora. Far more plants were recognisable in February when I visited the county than I could do in the Cambridgeshire fens during the same month. There will be a wide range of plants to see, with habitats ranging through heather moorland, arable fields, urban, brownfield, limestone grassland, woodland, coastal saltmarsh and sand-dunes. Since the flyer went out, a lot more information has been placed on the ASM web page, so do have a look, and then do decide to come and participate. I look forward to seeing you there.

STOP PRESS

List of Members May 2017

By the time you read this a new *List of Members*, in pdf format, will be available on the Members only section of the BSBI website, correct up to April 2017. Members who do not have email or internet access but would like to see a copy are asked to contact the Membership Secretary, who may be able to help.

Index to BSBI News 111-120

As mentioned in the last issue, an Index to *BSBI News* **111-120** has now been completed and is, or soon will be, posted as a pdf on the BSBI Website. Printed copies will be sent to those members who sent a SAE. A limited number are still available on receipt of an addressed envelope or label stamped at £1.22. The envelope this mailing arrived in is ideal for this purpose!

Solutions to Botanical Crossword 31

ACROSS
4. PIP 7. SOLIDAGO 8. RHUS 9. GARDENIA
10. NICK 11. MENDEL 14. DELPHI 15. VISCID
17. UPASES 19. CELL 20. MARIGOLD 23. FORA
24. EUPHORIA 25. FIR

DOWN
1. SOYA 2. WILD 3. DARNEL 4. POLAND
5. PRUNELLA 6. DUTCH HOE 9. GYM
12. ERIGERON 13. DOCK LEAF 16. DAMPER
17. UNRIPE 18. SOD 21. GROW 22. LEIS

Crib to Botanical Crossword 31

ACROSS
4. Dickens character 7. SOLID/AGO 8. heRHUS-band 9. anagram DRAINAGE 10. Nick Stewart
11. MEND/EL 14. DELPHI(nium) 15. VI/S/CID
17. anag EU PASS 19. sounds like 'sell'
20. anagram MORAL DIG 23. F(L)ORA
24. EUPHOR(B)IA 25. sounds like 'fur' (but I have hedged my bets as to whether pine and fir are the same thing)

DOWN
1. anagram SAY 0 2. Oscar Wilde
3. anag LEARND 4. ref the book universally known as 'Poland' 5. Selfheal – Prunella Scales
6. Hutch Doe (groan!) 9. GYM(nademia)
12. anag IGNORE RE 13. DOCK/lief
16. double definition 17. anag I PRUNE
18. Some Old Dynasty 21. G/ROW 22. baLE I Sold

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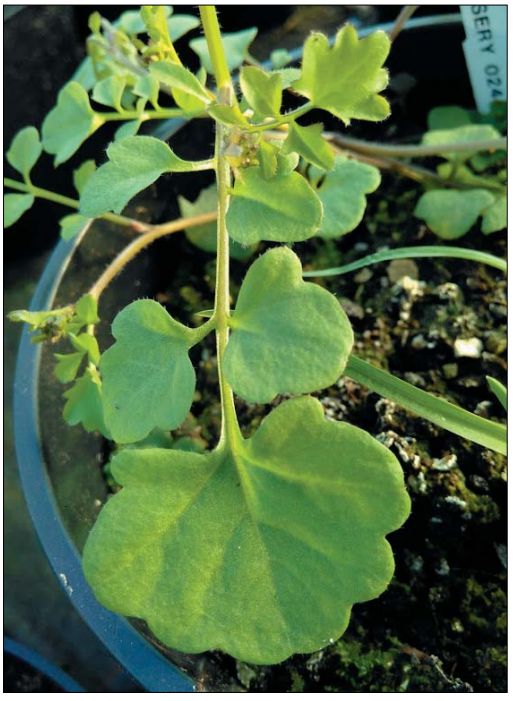

Cardamine occulta growing as a container weed at Avondale Nursery, Coventry (v.c.38), with distinctly lobed leaflets, 2017

Cardamine occulta in an urban levada, Serrado E Cova, Madeira, 2014

Both photos © E. Cooke (p. 73)

Group photo on day 2 of the New Year Plant Hunt at Glengarriff Woods Nature Reserve, West Cork (v.c.H3). Photo C. Heardman © 2017 (p. 85)

Tragopogon pratensis (Goat's-beard), Oxfordshire, a runner-up photograph in the common species category in the BSBI Photographic Competition 2016. Photo Tess Wright © 2016 (p. 6 & 80)

Ruscus aculeatus (Butcher's Broom) a runner-up photograph in the rare species category in the BSBI Photographic Competition 2016. Photo Roy Sexton © 2016 (p. 6 & 80)