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Epipactis dunensis under pines in National Trust woodland, Sefton Coast. Photo P.H. Smith © 2008 (see p. 6)

Chris Boon, v.c. recorder for Bedfordshire, signing copies of his 'Flora' on 4.12.2011, with Alan Outen, contributor on Bryophytes. Photo L. Farrell © 2011

Floral reversion in *Sambucus nigra*, Newbridge Demesne, Co. Dublin. Photo T.J.J. McCloughlin © 2011 (see p. 45)

Fig. 1: *Ophrys apifera* var. *badensis*, Mendip Hills (v.c.6), 20 June 2008

Fig. 2: *Ophrys apifera* var. *friburgensis* Freyhold (syn. *O. apifera* var. *botteronii*), Mendip Hills (v.c.6), 2 July 2009

Fig. 3: *Ophrys apifera* var. *friburgensis* Freyhold (syn. *O. apifera* var. *botteronii*), Mendip Hills (v.c.6), 3 July 2011

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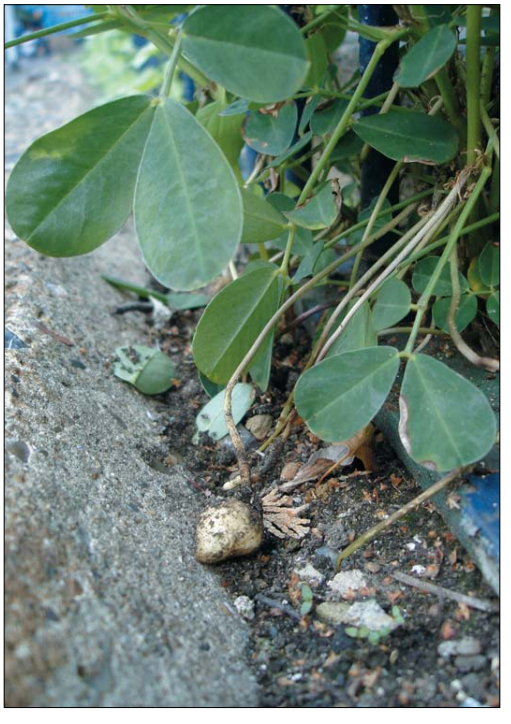
Photos 1, 4, 5, 6 © R. Mielcarek; photos 2, 3 © S. Mackie (see page 48)

Arachis hypogaea – whole plant

Arachis hypogaea – showing descending peduncles



Arachis hypogaea – showing developed ‘Peanut’ on exhumed peduncle

All *Arachis hypogaea* photos taken at Porlock Street, Southwark, by G. Hounsome © 2006

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IMPORTANT NOTICES

From The President

IAN BONNER, *Cae Trefor, Tynygongl, Anglesey, LL74 8SD*
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As I write, Spring is arriving, even on Anglesey, and one feels the urge to get out there, enjoy the flora and recommence recording!

With this edition of *News* you should have received the Annual Review, summarising our considerable achievements during 2011; also final details of the Spring Conference and AGM at Reading in May, where I hope to meet many of you. Not only will this be a very enjoyable weekend but there are important proposals to put to you about changes to the structure of the Society.

You will have read elsewhere that, for various reasons, our membership numbers have dipped over the last few years. We could all help with reversing this trend by publicising the Society more. To this end a Publicity and Communications policy is being drafted, and some of the ideas are to be aired in Reading. Meanwhile we should all try and recruit at least one new member to our Society. There is an attractive membership leaflet available; also lots of information about us on our website.

Some good news in the current economic climate is that our funding from the three Country Agencies looks to be secure for 2012-13. This particularly supports the Plant Unit and Country Officers in their demanding programme of data collation, interpretation and dissemination – thus making real use of the high quality records that have been collected by us, the members, on a voluntary basis.

Wishing you a most enjoyable and rewarding recording season!

BSBI AGM – Corporate Structure

IAN BONNER, President

In amongst the usual agenda items at the AGM you will see listed "Corporate Structure".

Although not the most riveting of titles, your Council is persuaded that this is now a very important issue needing to be addressed by the whole Society. Until now the BSBI has operated as an unincorporated association. This is the most flexible form which a simple membership charity can take. We are strongly advised that this is no longer appropriate for the Society as it has evolved – particularly the level of contract work we undertake for the country conservation agencies and the number of staff we now employ.

The solution is to become a Company Limited by Guarantee. This is the accepted form for larger membership charities and will permit us to carry on all our existing activities. Your own position as members, funders, supporters and volunteers will be completely unchanged. The difference is that the BSBI will henceforward be legally separate from the members. This means that in the event of something going catastrophically wrong and the BSBI becoming insolvent, there is no risk of members having to contribute to any deficit.

BSBI will, of course, remain a charity, and this proposal is partly prompted by Charity Commission guidance on how we protect our members, while effectively managing the charity on your behalf.

At the Council meeting on 21st March the trustees were given a short presentation by Antony Timmins, our Honorary Treasurer, explaining the reasons why such a change is important, setting out the stages that have to be gone through and a recommended timetable. The Council agreed with the proposals, set up a small working group to progress matters, and are taking advice from solicitors experienced in charity administration.

It is planned to make a presentation on this at the AGM in Reading, followed by time for questions and answers, so that we consult members fully and take your views into account, before presenting formal resolutions to you later in the year.

Council would like to complete the process by January 2013; but this will necessitate a Special Meeting in the autumn to deal with the formal resolutions. It is proposed to hold this in conjunction with the AEM in Cambridge on 23rd – 24th November.

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 496042) (rgellis@ntlworld.com)

Having had two bumper issues of *BSBI News*, this issue is somewhat 'thinner' in terms of quantity of articles, although there are still some valuable and interesting pieces, for which we offer our thanks to the authors. However, we hope that the apparent 'demand for space' that came about following the shift of editorial policy with the advent of the *New Journal of Botany* has not caused people to feel that *BSBI News* no longer needs articles! We most certainly do, and would especially welcome smaller pieces from 'new' or less experienced authors. Our policy remains to publish most material we are sent, unless it is clearly outside the Society's sphere of interest. We may reject the odd item if we feel it does not offer sufficient interest to members, and may ask for revisions to be carried out. However, unlike the *NJB*, this is not strictly a 'refereed' journal (although we may ask for second opinions on some articles, if they are considered to be potentially erroneous or contentious). Please note, however, that material considered of sufficient scientific interest to merit publication in the *NJB* may be asked by us to be referred to the *NJB*, rather than being published here, as that journal, also, needs to be fully supported.

In addition to interesting articles on all kinds of subjects relevant to British botany and botanists, we are always keen to receive good quality photographs and illustrations. While these are often relevant to specific articles, if members have high quality images that they are happy for us to use occasionally to 'fill gaps' or to be used as a special cover illustration, we would be pleased to have them. Generally, we use high quality JPEG files as material in *BSBI News* (taken at 300 dpi and above), although we can also handle BITMAP (.bmp) files and TIF (.tif) files. If there is a need to handle original hard copy photographs, these can be scanned by us and returned to the owners.

Finally, for contributors, please remember that we prefer copy to be in plain, un-formatted WORD text, with no use of **bold**, and *italics* except to indicate the use of scientific or non-English terms, or necessary emphases.

Please submit ALL material for publication to the Receiving Editor: Trevor James, preferably electronically, at: trevorjjames@btinternet.com (noting the double 'jj' in the middle!). Deadlines for submission are: 1st March, 1st August and 1st December in any year. We can handle reasonably large file attachments to emails (up to 10Mb is fine, possibly more), but if there are several large files, please submit them in separate emails, or on a disc, sent to the appropriate address above.

Marjory Wainwright

We are delighted to announce that Marjory Wainwright is still alive and well despite the announcement of her demise in *BSBI News* **119** which was the result of a very unfortunate error on the part of the Membership Secretary. He accepts that he was solely responsible and offers his sincere apologies to Marjory, her family and friends for any distress the news may have caused.

Pat Brennan Memorial Fund – a correction

The Secretary/Treasurer of the Bentham-Moxon Trust, Michael Godfrey, has drawn our attention to the following.

Three applications for grants from the Pat Brennan Memorial Fund at the end of January were traced back to the BSBI website where we had listed the Fund. We have also previously published a note in *BSBI News* drawing attention to this fund. In fact, the Pat Brennan Memorial Fund was closed some five years ago and transferred, with the approval of the Charity Commission for England and Wales, to the Bentham-Moxon General Funds.

Like a number of other small funds administered by Bentham-Moxon, the Pat Brennan Fund no longer generated enough income to make annual or even bi-annual awards. The capital of these small charities was transferred to the Bentham-Moxon Trust, as their overall objectives were the same. The Bentham-Moxon Trust makes awards annually to botanists whose work supports the mission and furthers the work of the Royal Botanic Gardens, Kew. The Trust has said that it has no objection to our making details of this Fund known to our members. Full details of it, including an application form, can be found on their website:
http://www.kew.org/about-kew/policies-information/bentham-moxon/

Blinks – a correction

For one of the articles in *BSBI News*, 119 – concerning 'Blinks' – an out-of-date address was given for Mike Wilcox, the author, who now lives at 43 Roundwood Glen, Greengates, Bradford, West Yorkshire, BD10 0HW. If people respond to his request for specimens with ripe seed, please note this change of address.

As the note was mistakenly published in the the January *News* instead of this one, it is repeated here on page 44, but this time with the correct address.

Cotswold Water Park Marsh Horsetails – a correction

After publication of Jack Oliver's piece about the forms of *Equisetum palustre* (Marsh Horsetail) at Cotswold Water Park (*BSBI News* 120: 45-48), we realised that one of the black-and-white illustrations in the text had been duplicated, and the correct one (Fig. 4) had been omitted. The correct Figure 4. (Two 3-whorled *E. palustre* polystachions (nos. 3 and 7 on the Table in his article); with some cones lost) is now given here, with apologies to Jack for the error.

Fig. 4. Two 3-whorl *E. palustre* polystachions (nos. 3 and 7 on Table); some cones lost.

Wrexham Herbarium

The last minute insertion of an extra item in *News* **119** meant that we had to pull this comment on an item in that issue.

The note on page 14 announcing the destruction of the Wrexham herbarium is a cautionary tale of what could lie in wait for many of our local herbaria. When institutions are put under the control of bureaucrats, who have little interest in, or knowledge of, the collections in their care, anything can happen, even by accident. And it is not just the smaller institution or museum that is at risk. Many of our larger repositories of herbarium specimens have no taxonomist on the staff or even a curator who can look after them.

Membership Secretary – New email address and phone problems

The Membership Secretary now has a new email address – membership@bsbi.org.uk – and this is the one given as a direct link on the BSBI website. His other email address – rgellis@ntlworld.com is still operational and there are no plans to close it down; both will work alongside each other and both will be looked at regularly for any messages.

My apologies to anyone who has had difficulty contacting the Membership Secretary by phone. A few glitches have resulted in the failure to record messages and, regrettably, the loss of some messages before they could be answered. Hopefully this has now been rectified.

Pay subscriptions with PayPal

BSBI has now set up a way to pay for BSBI subscriptions online using PayPal at – www.bsbi.org.uk/subscriptions.html

This is currently only available to 'Ordinary' members who pay £25 / €30 or £27 / €33 per annum but we plan to include eventually all classes of membership and also payment for pre-publication offers and Conferences as is already the case for the Edinburgh Conference 'A great leap forward – biological recording since the 1962 *Atlas of the British Flora*' 20th–21st September, 2012 (see separate flier enclosed with this mailing).

And finally (or tailpiece) – Mary Briggs MBE

With the retirement of Mary Briggs as Obituaries Editor, the curtain has fallen on one of the longest running 'acts' in the history of the BSBI. Mary joined the Society in 1960 and was invited to take over as Secretary of Meetings Committee in 1964. Until her retirement from Publications Committee this Spring, she has been a permanent presence at one or more Committees for every one of the intervening 48 years – what a record!!

For over 25 of those years she served as Honorary General Secretary, a post she only relinquished when persuaded to stand for election as the first, and so far only, Lady President of the society.

A profile of Mary appeared in *BSBI News* **1(3)** (1972) at the start of her stint as 'Hon. Gen. Sec.' And it speaks volumes for her character that the following words are as apposite today as when first written over 40 years ago.

> 'Secretarially speaking, it seems important to put Mary Briggs' reliable efficiency before all her other attributes … but her willingness to help comes a very near second.
>
> [However] it is Mary's kindness, thoughtfulness and trouble-taking warmth; her ability to put herself into other peoples' places and to do the things that she feels would be most helpful, that strikes you over and over again … . It is Mary who always writes letters of condolence, sends cards to encourage the young, flowers to help in illness and reminders about functions that possibly less busy people may forget.'

We will miss Mary at our meetings but she promises to come to some of our *extra curricula* activities – in the pub and restaurant after meetings – and long may she continue to do so.

NOTES

Where is the boundary? – another twist to the v.c. boundary debate

RODNEY BURTON, *'Sparepenny Cottage', Sparepenny Lane, Eynsford, Kent, DA4 0JJ*; (rmb@rodneyburton.plus.com)

I don't disagree with Arthur Chater's view about the immutability of vice-county boundaries (*BSBI News* **119**: 42), but there can still be problems of interpretation.

The boundary between v.c.16 and v.c.17, close to where it runs into the River Thames to meet v.c.21 on the other side, runs along the south wall of the South Dock in the Surrey Docks group. This was also the boundary between the London Boroughs of Lewisham and Southwark when the Greater London Council came into being in the 1960s, but that boundary was moved south by about 100 metres in, I think, 1994 by Report no.637 of the Local Government Boundary Commission for England. When I stand (or, more safely, kneel) on the edge of the wall, I am definitely in v.c.16, but the visible plants growing out of the dock wall have their aerial parts in v.c.17, though the roots are in v.c.16. Which vice-county do I record them as being in?

In this case, the realistic approach was to ignore this wall of the dock altogether. Anything growing on it can also be found on other walls of the dock, wholly in v.c.17, which have a slightly richer flora. There must be other cases where there is not such an easy way out – plants bang in the middle of a boundary stream perhaps?

Distribution, ecology and conservation of *Epipactis dunensis* in the sand-dunes of the Sefton Coast, Merseyside.

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Introduction

Epipactis dunensis (Dune Helleborine) (see Front Cover) is a rhizomatous, perennial, usually self-pollinating herb whose taxonomy is somewhat problematic, the plant being "one of the difficult group of autogamous (self-pollinating) *Epipactis*" (Foley & Clarke, 2005). It was first formally recognised and described by T. & T.A. Stephenson (1918) as *Epipactis viridiflora* forma *dunensis*, having previously been reported by Wheldon & Travis (1913) as distinct from *E. helleborine* (then known as *Helleborine latifolia* Druce). The latter authors collected their material on what are now the Sefton Coast sand-dunes in north Merseyside (v.c.59: South Lancashire), naming it *E. viridiflora* Reichb., a species originally described in France. Subsequently, this taxon was described either as a subspecies of *E. leptochila*, a plant typically of southern English beechwoods, or as the full species *E. dunensis* (Foley & Clarke, 2005; Harrap & Harrap, 2005; Stace, 2010). Carey & Dines (2002a) mapped all records under *E. leptochila*, with no mention of *dunensis*.

Before the 1960s, *E. dunensis* was thought to be confined to coastal sand-dunes in north-west England and north Wales, but, from about 1967 onwards, inland populations, apparently of this taxon, were reported from eastern and northern England and southern Scotland (Harrap & Harrap, 2005), some being named *E. dunensis* ssp. *tynensis* (Tyne Helleborine) (Kreutz, 2007). In addition to morphological studies, many of these populations have recently been investigated genetically (Squirrell *et al.*, 2002; Richards & Squirrell, 2009), this work providing evidence

that *E. leptochila* is specifically different from *E. dunensis.* Furthermore, Harrap (2009) stated that it is reasonable to deduce that all records of '*leptochila*' in northern England are referable to *E. dunensis* (or *E. dunensis* ssp. *tynensis*) and recommended further morphometric studies. However, Richards & Squirrell (2009) considered that the 'classic' duneland *E. dunensis* is inseparable from the Tyne Helleborine and that inland plants in northern England should all be regarded as *E. dunensis*, with the possible exception of Lindisfarne plants, which were named *E. sancta* (Lindisfarne Helleborine) by Delforge & Gévaudan (2002). This population is morphologically distinct but genetically similar to west coast *E. dunensis* (Richards & Squirrell, 2009). Finally, Lynes (2010) advocated that it was not yet established that all inland populations were referable to *E. dunensis*, pointing out the *leptochila*-like appearance of some plants on the Tyne riversides. He stated that insufficient work had been done on morphology. Neither had all populations been genetically sampled.

Coastal sand-dune populations of *E. dunensis* are known from Sandscale Haws, Cumbria (v.c.69), Lytham St Anne's, Lancashire (v.c.60), the Sefton Coast, Newborough Warren and Aberffraw, Anglesey (v.c.52). The plant is typically found in the higher and dryer parts of dune slacks, often amongst *Salix repens* (Creeping Willow), and has also spread into adjacent pine plantations (Summerhayes, 1951; Harrap & Harrap, 2005). Young (1948) proposed the name *E. dunensis* f. *pinetorum* for taller, more robust and brighter green plants growing in the Sefton plantations, but this did not achieve general acceptance. In its dune habitat, *E. dunensis* is a component of the UK National Vegetation Classification (NVC) communities SD7: *Ammophila arenaria-Festuca rubra* semi-fixed dune; SD8: *Festuca rubra-Galium* verum fixed-dune; SD12: Carex *arenaria-Festuca ovina-Agrostis capillaris* dune grassland and SD16: *Salix repens-Holcus lanatus* dune-slack (Foley & Clarke, 2005).

E. dunensis is considered to be endemic to Britain (Cheffings & Farrell, 2005; Foley & Clarke, 2005; Harrap & Harrap, 2005). However, because of taxonomic uncertainties, the current Great Britain Vascular Plant Red Data Book (Cheffings & Farrell, 2005) treats this species as 'Data Deficient'. It is also listed as a Species of Conservation Importance in North-west England (Regional Biodiversity Steering Group, 1999) and as being of priority conservation concern in the North Merseyside Biodiversity Action Plan (BAP) (Merseyside Biodiversity Group, 2001).

Epipactis dunensis on the Sefton Coast

As *Epipactis* (or *Helleborine*) *latifolia*, the Dune Helleborine has been known on the Sefton Coast dunes since the early 19th century, being listed by Whittle (1831) for the Southport area. Hall (1839) mentioned its occurrence at Crosby Marsh and amongst the sand hills between Waterloo and Crosby, while Dickinson (1851) described it as "Not rare in moist, grassy spots on the sand-hills at Crosby, Formby and Southport".

Having separated it from the Broad-leaved Helleborine in 1913, Wheldon & Travis (1913) found the plant widely scattered on the sand dunes from Hall Road (Blundellsands) northwards, occurring in some places "in fair quantity". Its habitat was defined as: "….the low secondary dunes built by *Salix repens*, and it does not usually occur either in the wetter part of the dune valleys, or on the more elevated and drier marram-clad dunes." Fifty years on, *E. dunensis* was stated to be occasional, locally common, on open, fixed sand dunes and in pine plantations at intervals from Hall Road to Southport (Savidge *et al*., 1963). A further half-century suggests little change in status, the *New flora of south Lancashire* (2011, archive version) describing this species as "Occasional to locally frequent along the Sefton Coast; rare inland with records from the Wigan flashes". It has been recorded in 17 coastal tetrads (nine post-2000) (D.P. Earl *in litt.*, 2011).

Gateley (1990) made the first attempt to survey the Sefton Coast population of *E. dunensis*. During a NVC survey of the

dune system in 1988 and 1989, he counted 870 specimens of *E. dunensis* between Hightown and Birkdale and also recorded 251 spikes of the related *E. phyllanthes* (Green-flowered Helleborine). *E. phyllanthes* was first described as a distinct species (under *E. pendula*) by Thomas (1941), the pine woods at Formby on the Sefton Coast representing the type locality. It is widely scattered but local in England and Wales, the *New atlas* recording it in 86 post-1986 hectads (Carey & Dines, 2002b).

As Gateley's study was not done at an ideal time of year, a more detailed survey was commissioned in 1992 to take place during the flowering/fruiting season. He found 836 plants of *E. dunensis* and 624 of *E. phyllanthes* (Gateley, 1992). However, the northernmost section of the dunes at Southport and Ainsdale Sand Dunes National Nature Reserve (NNR) was not included, the latter site having been covered by Turner (1992) the previous year. Turner counted 1075 *E. dunensis* on the NNR, giving a grand total of 1911 spikes for this species in 1991/92. The highest concentrations of *E. dunensis* were found on Ainsdale NNR, the northern and southern extremities of the dune system having relatively few plants.

The 2008 survey – rationale

The North Merseyside Biodiversity Action Plan stressed the urgent need to repeat Gateley's coast-wide survey to create an up-to-date baseline, against which a target for maintaining the species' range could be quantified. The limited information available on population sizes elsewhere suggested that the Sefton Coast might hold the largest numbers of *E. dunensis* in Britain and that quantitative information could therefore have national significance. Accordingly, it was decided to organise a comprehensive survey in 2008. Merseyside Biodiversity Group obtained funding from the SITA Trust to employ a consultant who would train volunteers to conduct the survey and compile the results. As Gateley (1992) counted *E. phyllanthes* in his survey, it was decided to include this taxon in the 2008 study. It was also hoped that information on habitats and environmental impacts could be obtained.

Materials and methods

A consultant ecologist (PEM) was commissioned to co-ordinate the study and 30 volunteer field workers recruited and trained by the local records centre, Merseyside BioBank. For purposes of the field survey, the sand dune system was divided into 23 units from Hesketh Golf Course in the north to Crosby Marine Park in the south (Table 1, see p. 14; Fig. 1, see Colour Section, plate 1 for figs 1–4). Groups of units coincide with the boundaries of the nine divisions adopted by Gateley (1992). Each unit was searched systematically by teams of two or three volunteers, the terrain being divided into habitat 'patches'containing the target species. Each patch was numbered and its position recorded using a hand-held GPS device. For each patch, the numbers of flowering and non-flowering spikes *of E. dunensis* and *E. phyllanthes* were recorded. Where it was difficult to distinguish between the two taxa, plants were recorded as 'indeterminate'. One of five habitat categories was chosen for each patch: pine plantation, dune scrub, Creeping Willow, open dune or other. The percentage of bare sand was noted, along with any evidence of grazing by Rabbits (*Oryctolagus cuniculus*) or livestock and trampling damage to flower-spikes. The 2008 survey took place between mid-July and early September to include the main flowering season of both *E. dunensis* and *E. phyllanthes*, and involved an estimated 700 person-days.

West Lancashire Golf Course, Hillside Golf Course and Southport Municipal Golf Course could not be covered in 2008, but were surveyed the following year. Unfortunately, it was not possible to include units 3 (Hesketh Golf Course) and 6 (Southport & Ainsdale Golf Course). However, on the basis of previous visits, these areas were thought unlikely to support significant numbers of *E. dunensis* and *E. phyllanthes*. Incomplete coverage was achieved on unit 5 (Birkdale Sandhills Local Nature Reserve) and unit 12 (Freshfield Dune Heath etc.). Birkdale LNR formed part of Gateley's (1992) Division 8.

However, large parts of this unit were inaccessible in 2008, due to dense scrub invasion, especially of *Hippophae rhamnoides* (Sea Buckthorn). Much of Freshfield Dune Heath has acidic soils unlikely to support the two target species. Thus, in his comprehensive dune heath survey in 2004, Gateley (1995) did not record these taxa.

Overall, therefore, the 2008/09 survey is considered to have included the great majority of Sefton Coast habitat containing the target species.

Results

Distribution of plants

Fig. 2 shows the distribution of patches of habitat containing *Epipactis* spikes, the size of symbol representing the number of flower-spikes counted on a log scale. Patches were recorded along most of the length of the dune system but were less frequent at the northern and southern extremities and in the golf courses, some of which were not surveyed. The distribution of target species within the 20 recording units is shown in Figs. 3 & 4. Sixteen units contained *E. dunensis*, 11 supported *E. phyllanthes*, while indeterminate spikes were found in seven units. High densities of *E. dunensis* are evident in Altcar Rifle Range, the northern area of the National Trust estate and parts of Ainsdale Sand Dunes NNR and Ainsdale Sandhills LNR. *E. phyllanthes* is also widely distributed but with concentrations in the northern National Trust estate and parts of Ainsdale Sand Dunes NNR.

In total, 494 patches of habitat supporting the two target species were recorded, covering an area of 177476m^2 (17.8ha). Of the 23 units, Ainsdale NNR (unit 11) had the largest number of patches supporting *E. dunensis*, totaling 252 and covering 8086m^2.

Numbers of plants

A total of 7146 individuals of *E. dunensis*, 1543 of *E. phyllanthes* and 252 indeterminates was recorded over the two years, only 2.8% of plants being unidentified. In addition, two spikes of *E. helleborine* (Broad-leaved Helleborine) were recorded on the National Trust estate at Formby Point (Fig. 4). The ratio of *E. dunensis* to *E. phyllanthes* in 2008/09 was 4.6:1, compared with 3:1 in 1992 (Gateley, 1992). Reflecting the distributions shown in Figs. 2, 3 & 4, the highest numbers of *E. dunensis* were recorded from unit 11 (Ainsdale Sand Dunes NNR), unit 19 (Altcar Rifle Range) and unit 14 (National Trust and associated fields), with totals of 2984, 1622 and 1089 plants, respectively (Fig. 3). *E. phyllanthes* was most abundant on the National Trust estate (770 spikes), in Ainsdale Sand Dunes NNR (399) and at Hillside Golf Course (131) (Fig. 4). The sites surveyed in 2009 contributed relatively small numbers of extra records, unit 7 (Hillside Golf Course) having 25 *E. dunensis* and 131 *E. phyllanthes*, while unit 20 (West Lancs Golf Course) supported only 12 *E. dunensis*. None was found on Southport Municipal Golf Course (unit 2). These data are summarised in Table 2 (p. 15).

Table 3 (p. 16) shows how the distribution of the two target species changed between the 1992 and 2008/09 surveys. Ainsdale NNR remains the headquarters locality on the Sefton Coast, with 2984 *E. dunensis* plants in 2008, representing 42% of the total, compared with 1075 (56%) previously. Unfortunately, *E. phyllanthes* was not counted here in 1992 but the NNR returned the second highest count (399; 26%) for this species on the coast in 2008/09. The National Trust estate remains important for both species, *E. dunensis* increasing between the two surveys from 187 (10%) to 1089 (15%), while *E. phyllanthes* numbers, although rising from 520 to 770, declined as a proportion of the total population from 83% to 50%. Altcar Rifle Range shows a major gain in *E. dunensis* numbers from 57 (3%) in 1992 to 1622 (23%) in 2008. At this site, *E. phyllanthes* also increased from 16 to 69 plants. In other parts of the dune system, the percentage contributions from the two surveys remained similar, except for the area including Cabin Hill, Ravenmeols sandhills and Lifeboat Road. Here, although *E. dunensis* numbers rose from 414 to 730, this represented a drop from 22% to 10% of

the year totals. Similarly, for *E. phyllanthes*, the percentages fell from 8 to 4.

Habitat preferences

Table 3 shows that about 73% of *E. dunensis* and 69% of *E. phyllanthes* plants were associated with pine plantations (see inside Front Cover), these consisting largely of *Pinus nigra* ssp. *laricio* (Corsican Pine) planted in the late 19th and early 20th centuries. Dune scrub supported 11.5% of *E. dunensis* and 16% of *E. phyllanthes*. On the Sefton dunes, this extensive habitat comprises a diverse mixture, especially of *Populus* (poplars), *Betula* (birch) and *Hippophae rhamnoides* (Smith, 2009). *Salix repens* provided a habitat for 10% of *E. dunensis* but only 4% of *E. phyllanthes.* Few plants were found in the open dunes. A similar pattern emerges for the 'indeterminates', pine plantation supporting 41%, dune scrub 48% and Creeping Willow 4%. Relatively small numbers of spikes were located in 'other' or 'unspecified' habitats, the former category including woodland of *Fagus sylvatica* (Beech) and *Betula* and a *Rubus* (Bramble)-dominated community.

Relationship with bare sand

Most habitat patches had hardly any bare sand, 85% of them being recorded with 0 or ≤1%, while 9% of patches had 1-10% bare sand. Only 5% of patches showed more than 20% cover of bare sand.

Evidence of grazing and damage to flower-spikes

Signs of Rabbit-grazing were recorded in 48% of habitat patches, with apparent damage to flower-spikes attributed to this cause in 29% of patches. No evidence of grazing was seen in 44% of patches. Pedestrian trampling was thought to be a cause of damage in 8% of patches. Only two patches were considered to show signs of grazing by livestock, these being in the northern part of Ainsdale NNR. Slugs were thought to have damaged flower spikes in three habitat patches.

Discussion

This study demonstrates that the population of *E. dunensis* on the Sefton Coast dune system is much larger than previously thought, the number of plants counted in 2008/09 representing an almost four-fold increase on Gateley's (1992) total; while the *E. phyllanthes* population is 2.5 times that recorded in 1992. Some of this increase may have been due, in part, to better coverage, this being achieved by the involvement of a large number of volunteers. As some volunteers reported difficulties navigating through areas of dense woodland and scrub, it is likely that under-counting took place, so the populations may have been under-estimated. Gateley's survey seems to have coincided with a poor year for *E. dunensis*, local botanists remarking that there were fewer plants than usual in evidence (Gateley, 1992). In contrast, the present study was conducted during a sequence of unusually wet summers, which may have benefited the plant, especially on the drought-prone soils of the pine plantations. Thus, the numbers of *E. dunensis* at Lifeboat Road pinewoods, Formby, roughly doubled between 2007 and 2008. Spikes in the latter summer were noted as being particularly large and floriferous (PHS, personal observations). Harrap & Harrap (2005) stated that *E. dunensis* can be badly affected by drought, while Lewis *et al*. (2009) remarked that *E. phyllanthes* in dune woodland at Kenfig NNR benefited from the wet summers of 2007 and 2008.

Elsewhere, the habitats of coastal *E. dunensis* are reported to be fixed-dune, and the dryer parts of dune-slacks with much *Salix repens*, though invasion of nearby pine plantations was reported 60 years ago (Summerhayes, 1951). This accords with its preferences on the Sefton Coast, though the proportion of the population under pine canopy has evidently increased since Gateley's (1992) survey. His methodology was different from that adopted in the present study, so direct habitat comparisons are problematic. However, he reported about 21% of *E. dunensis* plants in pine plantations, as opposed to the 2008/09 figure of 73%. *E. phyllanthes* seems always to have favoured the plantations over other Sefton Coast habitats (Thomas, 1941). This was confirmed in the present study, 69% of *E. phyllanthes*

being found under pine, an almost identical figure to the 70% found by Gateley (1992). Due to suppression of other vegetation by the dense shade, *Epipactis* plants are easier to locate in the pine plantations than in other habitats, so this may have biased the results.

The *Salix repens* habitat (SD16) remains important for *E. dunensis*, with 10% of plants, though the earlier survey reported as many as 53% of plants associated with this vegetation type (Gateley, 1992). As a habitat for both target species, dune scrub is also relatively important, with 12% of *E. dunensis* and 16% of *E. phyllanthes.* However, hardly any plants were found in open mobile-dunes or in dense grassy fixed-dune swards.

Gateley (1992) suggested that *E. dunensis* shows a tolerance of, or preference for, heavily modified sand dune vegetation types, such as pine plantations, poplar scrub, areas recently cleared of trees, along fence-lines or near the edges of footpaths. The present study quantitatively supports an association with plantations and scrub but not with other disturbed habitats, though an occasional concentration of plants along fence-lines was noted and there was some indication of increased occurrence on steep slopes within the pine plantations, where soil instability may have been a factor. However, our data suggest that the two taxa largely avoid areas with a high proportion of bare sand.

Gateley (1992) reported that flower spikes in the open dunes and sometimes also in pine plantations are commonly bitten off by Rabbits. We also recorded this form of damage in 29% of habitat patches, though it seems unlikely to cause significant population mortality. Although most of the dune area is accessible to pedestrians, recorded trampling damage was minimal, while picking of such relatively unattractive flowers seems unlikely and was not observed. Livestock grazing on the dunes for conservation purposes takes place mainly in winter and also appears to have no significant impact on the target species.

Literature searches suggest that little research has been done on the ecology of *E. dunensis.* Its relative frequency and range of occupied habitats on the Sefton Coast provides an opportunity for further detailed study, this having direct relevance to the future management of the species.

Conservation

Sefton's coastal *E. dunensis* population seems to be the largest recorded in Britain. Cooper (1992) estimated minimum numbers at Sandscale Haws Nature Reserve, Cumbria, as 500 *E. dunensis* and 750 *E. phyllanthes*, though Halliday (1997) reported in excess of 1000 plants. However, more recent counts for this site suggest populations of about 2000 for each taxon, fluctuating from year to year (P. Burton, pers. comm.). Lytham St. Anne's LNR, and associated dunes, Lancashire, support very few plants, with only about 20 *E. dunensis* and five *E. phyllanthes*, according to Skelcher (2009). Unfortunately, there are no count data for Newborough Warren, where *E. dunensis* is most abundant in pine forest, but also occurs around the edges of slacks or on small hummocks within slacks in the open dunes. However, the total population is thought to be much less than that of the Sefton Coast (G. Williams *in litt*., 2010). At Aberffraw, 18 spikes of *E. dunensis* were counted in dune slack habitat in July 2005 (G. Williams *in litt*., 2010).

As *E. dunensis* is seemingly endemic to Britain, this country has an international responsibility for its conservation (Cheffings & Farrell, 2005). Although this species is not included in the UK BAP it does benefit from a Species Action Plan in the North Merseyside BAP, an objective of which is to maintain its current local range and status (Merseyside Biodiversity Group, 2001).

Almost all the habitat supporting *E. dunensis* lies within sites designated for their nature conservation interest, most being within the Sefton Coast Site of Special Scientific Interest and Special Area of Conservation, though the presence of this taxon is not given as a reason for notification. A few outlying areas are covered by non-statutory local wildlife site designation ('Sites of Local Biological

Interest') under Sefton Council's Unitary Development Plan.

Gateley (1992) considered that the greatest threats to *E. dunensis* on the Sefton sand-dunes are physical loss of its habitat (*e.g.* by development) and the growth of dense grassy vegetation. He also mentioned that increasing woody vegetation on the dunes enriches the soil, producing a denser sward around scrub patches and in areas from which scrub has been removed during management operations. Over the past 20 years, development threats to the dunes have largely disappeared, though small-scale works, such as cycleways, could affect some plants and need to be carefully assessed. Most parts of the dune system are subject to management operations intended to maintain or restore 'favourable condition'. These include control of dune-scrub, which has become a major problem affecting duneland biodiversity over recent decades (Smith, 2009). Introduced in about 1900, a dominant scrub species here is *Hippophae rhamnoides.* Its spread reduces plant species-richness, lowers soil pH and increases soil nitrogen (Isermann *et al*., 2007). Our survey did not record any *E. dunensis* directly associated with *H. rhamnoides*, so control of this shrub should not adversely affect the former species. However, other areas of scrub dominated by *Populus*, *Betula*, etc. have been shown to support *E. dunensis*. The present study provides site-based information that can be used to pinpoint scrub patches meriting retention.

On Ainsdale Sand Dunes NNR, a 'dune restoration project' began in the early 1990s to remove about 40ha of plantation woodland and associated scrub near the sea to restore open dune conditions. By 1996, two phases (20.5ha) out of four had been completed, the remaining work being delayed pending further assessment (Smith, 2009). It is intended eventually to remove the remaining frontal woodland. Our survey counted about 1300 spikes of *E. dunensis* under these pines, representing 44% of the NNR population and 18% of that for the dune system as a whole. Although *E. dunensis* is able to grow in open dune habitats, especially when dominated by *S. repens*, woodland removal may well reduce this sub-population, although other specialist duneland biota would no doubt benefit (Smith & Lockwood, 2011). Compensation for potential losses at Ainsdale has been provided by about 30ha of new pine planting over the past 20 years at Altcar Rifle Range. This woodland already supports1600 plants of *E. dunensis*.

Most areas of coastal woodland have been managed since 2002/03 under the auspices of the Sefton Coast Woodlands Forest Plan. This seeks to involve all land-owners in improving the condition of their woods by, for example, thinning, selective felling and re-planting. As well as providing data on the location of *E. dunensis* concentrations that might be affected by woodland management, our study should contribute usefully to a forthcoming review of the Forest Plan.

The wide distribution and increasing status of *E. dunensis* on the Sefton Coast suggests that recent management of the dune system has created favourable conditions for this species. It is hoped that the survey results can be used as a baseline to judge the effectiveness of future management actions.

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Table 1. Unit numbers and names adopted during the survey

Unit no.	Unit name	Unit no.	Unit name
1	Southport Marine Lake dunes	13	Formby Golf Course
2	Southport Municipal Golf Course	14	National Trust and associated fields, Formby
3	Hesketh Golf Course	15	Range Lane to Albert Road, Formby
4	Queen's Jubilee Nature Trail	16	Cabin Hill NNR
5	Birkdale Sandhills LNR, and Birkdale Green Beach	17	Lifeboat Road to St. Joseph's Hospital, Formby
6	Southport & Ainsdale Golf Course	18	Albert Road to Lifeboat Road, Formby
7	Hillside Golf Course	19	Altcar Rifle Range
8	Falklands Way dunes, Ainsdale	20	West Lancashire Golf Course
9	Kenilworth Road dunes, Ainsdale	21	Hightown Dunes and Meadows
10	Ainsdale Sandhills LNR	22	Hall Road to Sniggery Farm Track, Blundellsands
11	Ainsdale Sand Dunes NNR	23	Crosby Marine Park
12	Freshfield Dune Heath, Woodvale airfield and Willow Bank Caravan Park		

Table 2. Counts of flowering and non-flowering *E. dunensis, E. phyllanthes* and indeterminate flower spikes from the combined 2008 and 2009 survey data.

	E. dunensis			*E. phyllanthes*			Indeterminate		
Unit No	Flowering	Non flowering	Total	Flowering	Non flowering	Total	Flowering	Non flowering	Total
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
4	23	0	23	0	0	0	0	0	0
5	183	1	184	0	0	0	0	0	0
7	22	3	25	105	26	131	15	2	17
8	3	0	3	1	0	1	0	5	5
9	0	0	0	0	0	0	0	0	0
10	280	11	291	35	0	35	8	0	8
11	1703	1281	2984	368	31	399	119	54	173
12	2	0	2	0	0	0	0	3	3
13	19	100	119	0	60	60	0	0	0
14	931	158	1089	484	286	770	10	25	35
15	22	12	34	6	14	20	0	0	0
16	0	41	41	0	0	0	0	0	0
17	136	304	440	12	27	39	0	0	0
18	0	215	215	0	8	8	0	0	0
19	1607	15	1622	69	0	69	0	11	11
20	2	10	12	0	0	0	0	0	0
21	5	57	62	1	10	11	0	0	0
23	0	0	0	0	0	0	0	0	0

Table 3. Changes in distribution of *E. dunensis* (E.d.) and *E. phyllanthes* (E.p.) between 1992 and 2008/09 (indeterminate plants not included)

Area	Division 1992	Units 2008/09	E.d. 1992	% of total	E.p. 1992	% of total	E.d. 2008/09	% of total	E.p. 1992	% of total
Seaforth - Hightown	1	20-23	0	0	0	0	74	1	11	0.7
Altcar	2	19	57	3	16	2.6	1622	22.7	69	4.5
Cabin Hill - Lifeboat Rd.	3	15-18	414	21.7	48	7.7	730	10.2	67	4.3
National Trust	4	14	187	9.8	520	8.3	1089	15.2	770	49.9
Formby GC - Woodvale	5	12-13	34	1.8	19	3	121	1.7	60	3.9
Ainsdale NNR	6	11	1075	56.3	-*		2984	41.8	399	25.9
Ainsdale LNR	7	8-9	37	1.9	21	3.4	294	4.1	36	2.3
Birkdale LNR & golf courses	8	5-7	107	5.6	0	0	209	2.9	131	8.5
Southport dunes	9	1-4	0	0	0	0	209	2.9	131	8.5
Totals			1911		624		7146		1543	

* *E. phyllanthes* was not counted on Ainsdale NNR in 1992

Table 4. Number and percentage of *E. dunensis*, *E. phyllanthes* and indeterminate spikes in different habitats

	E. dunensis		*E. phyllanthes*		Indeterminate	
Habitat	№ recorded	% of total	№ recorded	% of total	№ recorded	% of total
Creeping Willow	719	10.1	62	4	9	3.6
Dune Scrub	821	11.5	241	15.6	120	47.6
Open Dune	52	0.7	1	0.1	None recorded	
Pine Plantation	5192	72.7	1061	68.8	103	40.9
Other	314	4.4	171	11.1	20	7.9
Unspecified	48	0.7	7	0.5	None recorded	
Total	7146		1543		252	

Aquatic plants in nineteenth-century canals and their persistence into the twenty-first century: Yorkshire examples

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Preston (1995) suggests that the flora of 19th century English canals was more luxuriant than now and regrets the difficulty of comparing plants in present-day canals with those in the past because of a lack of records. He mentions that old photographs exist but points out that they tell little about hidden submerged vegetation. My study aimed to use the example of some Yorkshire canals: (1) to explore the extent to which aquatic plant taxa that were present in 19th century canals have persisted to the 21st century; (2) to consider whether a meaningful picture of vegetation in 19th century canals can be achieved using old records.

Five canals or canal systems with diverse histories were considered. Like most English canals they were built in the second half of the

18th century or the early 19th century. Some have been continuously navigated, others have been abandoned, and some of these have later been restored for leisure navigation. They were chosen because they are the Yorkshire canals for which I found most 19th century records.

1. Barnsley canals (Barnsley Canal and Dearne & Dove Canal)
These canals linked the River Calder at Wakefield with the Sheffield and South Yorkshire Navigation at Swinton (about 40km) with branches to Barugh, Worsbrough and Elsecar. The system closed to navigation in stages between 1906 and 1952 and fell into dereliction (Russell, 1983). Approximately half of the system is now dry or in-filled, otherwise water levels have been maintained by fixed weirs for angling or industrial water supply, or the canal bed is a wet ditch, often extensively occupied by emergent aquatic plants. Some restoration has been undertaken on the Elsecar branch (Glister, 2004).

2. Calderdale canals (Aire & Calder Navigation and Calder & Hebble Navigation)
This waterway, which extends for about 43 km from Castleford via Wakefield and Brighouse to Sowerby Bridge, is a mixture of canal and river navigations. The canal sections make up about 34km. In addition there are truncated branches which formerly reached Dewsbury and Halifax. The waterway has been continually open to navigation, although seemingly it is now used only by leisure traffic.

3. Chesterfield Canal
This canal linked Chesterfield to the River Trent (73km). The South Yorkshire section (5.5km) between Shireoaks and Norwood Tunnel was abandoned and became derelict about 1908, following the collapse of the tunnel (Russell, 1983), but was restored for leisure navigation between 1995 and 2003.

4. Leeds & Liverpool Canal
This canal has been continuously open to traffic and is now used only for leisure navigation. About 62km of the canal is in Yorkshire.

5. Ripon Canal
This is a short canal (3.5km) that links Ripon to the River Ure. Commercial traffic ceased by the end of the 19th century (Hadfield, 1973). The derelict canal had been restored throughout for leisure navigation by 1996.

Nineteenth-century records
Historic Yorkshire floras were searched for 19th century records of aquatic plants attributable to specific canals; either because they refer to a named canal or because they are canal records from a geographical location that is reconcilable with a particular canal. Sources that yielded relevant records were: Baines (1840) *Flora of Yorkshire*; Miall & Carrington (1862) *Flora of the West Riding*; Gissing (1867) *Flora of Wakefield and its neighbourhood*; Lees (1888) *Flora of West Yorkshire*; Crump & Crossland (1904) *Flora of the Parish of Halifax* (issued serially from 1896). Henry Payne & William T.Y. Smith's unpublished 1857 *Flora of Barnsley and neighbourhood* was also valuable. The original of this Barnsley flora, which was thought lost, was recently re-discovered in the Barnsley Archives (Coles, 2011). I used a 1922 transcription published by Edmondson (2004).

Because plants occupy a continuum from open water through wetland to terrestrial habitats, the problem of which species should be regarded as aquatic plants arises when searching historic floras as well as when recording in the field. A checklist can help (Goulder, 2008). In this study the list of 184 taxa regarded as the aquatic vascular plants to be found in England and Wales by Palmer & Newbold (1983) was used as a checklist. Nomenclature has been aligned with Stace (2010), assisted by Bentham & Hooker (1937) and Clapham, Tutin & Warburg (1962).

The number of aquatic plant species that were linked to specific 19th century canal systems ranged from 33 in the Calderdale canals down to six in the Ripon Canal (Table 1, p. 22). Plants that usually have a submerged habit were generally well represented by *Potamogeton* species: eight species in the Leeds & Liverpool Canal, seven in the Barnsley canals, six in the Calderdale canals,

four in the Chesterfield Canal, and one in the Ripon Canal (Table 2, p. 22). Otherwise, relatively few species that are usually found as submerged plants were recorded. These included: *Ceratophyllum demersum* (Rigid Hornwort) in the Barnsley canals and Calderdale canals; *Elodea canadensis* (Canadian Waterweed) in the Barnsley canals, Calderdale canals and Leeds & Liverpool Canal; *Myriophyllum alterniflorum* (Alternate Water-milfoil) in the Barnsley canals and Calderdale canals; *Zannichellia palustris* (Horned Pondweed) in the Barnsley canals, Calderdale canals and Ripon Canal.

Representing plants that usually have an emergent and/or floating-leaved habit, *Glyceria maxima* (Reed Sweet-grass) was recorded in the 19th century in all five canal systems. Other records include: *Acorus calamus* (Sweet-flag) and *Alisma plantago-aquatica* (Water-plantain) in the Barnsley canals and Calderdale canals; *Butomus umbellatus* (Flowering Rush) in the Chesterfield Canal and Leeds & Liverpool Canal; *Sagittaria sagittifolia* (Arrowhead) in the Barnsley canals, Calderdale canals and the Leeds & Liverpool Canal; *Sparganium emersum* (Unbranched Bur-reed) in the Calderdale canals and the Leeds & Liverpool Canal (Table 2).

Recording in 2010-2011

Aquatic plants in Yorkshire canals were recorded in May-September 2010-2011. The post-1990 alien *Hydrocotyle ranunculoides* (Floating Pennywort) was added to the Palmer & Newbold (1983) checklist. Recording was done visually from the tow path. Submerged plant material was retrieved using either a grapnel (with permission from British Waterways) or a walking pole, extensible to 1.5m, with a hook attached to its end. Plants were also recorded in lock by-pass channels, when there was access. Inaccessible emergent plants on the far bank were sometimes identified using binoculars. Recording was along the following lengths of canal:

1. Barnsley canals: Barnsley Canal from Shaw Bridge (SE372101) northwards for 7.5km, and the Barugh Branch from Smithy Bridge (SE347079) north-westwards for 2.1km; Dearne & Dove Canal from close to Everill Gate Bridge (SE409025) north-westwards for 1.0km; the Elsecar Branch from Elsecar (SE387001) north-eastwards for 3.3km; the Worsbrough Branch from Worsbrough Bridge (SE352034) eastwards for 0.4km (in all 14.3km of canal).

2. Calderdale canals: Aire & Calder Navigation from Fairies Lock (SE396249) south-westwards for 7.1km to Broadreach Lock; Calder & Hebble Navigation from Tuel Lane Tunnel at Sowerby Bridge (SE062237) for 4.8km south-eastwards to Long Lees Viaduct and the Salterhebble (Halifax) Arm (0.5km); from Ledgard Bridge at Mirfield (SE201197) 1.5km eastwards to Shepley Lock; from Long Cut End Bridge (SE231203) 3.3km eastwards to Mill Bank Lock, and the Dewsbury Arm (1.2km) (in all 18.4km of canal).

3. Chesterfield Canal: from Norwood Tunnel at Kiveton Park (SK500825) for 7km eastwards to beyond Shireoaks.

4. Leeds & Liverpool Canal: from Priest Holme Railway Bridge at Gargrave (SD918539) for 6km eastwards towards Skipton; from Apperley Bridge (SE194377) south-eastwards for 13.9km to Granary Wharf, Leeds (in all 19.9km of canal).

5. Ripon Canal: the whole 3.5km from Canal Head, Ripon (SE315708) south-eastwards to the River Ure.

The number of aquatic plant species recorded in 2010-2011 ranged from 43 in the Leeds & Liverpool Canal down to 28 in the Chesterfield Canal (Table 1). The canals with most taxa that were recorded both in 2010-2011 and in the 19th century were the Calderdale canals (15 species) and the Leeds & Liverpool Canal (10 species), while the Ripon Canal had only 2 persisting species (Table 1). The proportion of the species recorded in the 19th century that had persisted to 2010-2011 ranged from 56% in the Leeds & Liverpool Canal and 47% in the Barnsley canals down to 33% in the Ripon Canal (mean = 45%) (Table 1). Species that were recorded in the 19th century made up

between 52% (Calderdale canals) and 6% (Ripon Canal) of the modern canal flora (Table 1).

Those species that were recorded in the 19th century and were also found in 2010-2011 are indicated in Table 2. Submerged plants in this category were largely represented by species of *Potamogeton*: *i.e*. *P. crispus* (Curled Pondweed), *P. pectinatus* (Fennel Pondweed), *P. perfoliatus* (Perfoliate Pondweed) and *P. pusillus* (Lesser Pondweed) in the Leeds & Liverpool Canal; *P. crispus*, *P. pectinatus* and *P. perfoliatus* in the Barnsley canals; *P. crispus* and *P. pusillus* in the Calderdale canals; *P. pectinatus* in the Chesterfield Canal. The only other persisting submerged species was *Ceratophyllum demersum* in the Barnsley canals.

There was more representation of emergent and floating-leaved plants amongst the species recorded in both the 19th century and 2010-2011. This category included: *Glyceria maxima* in all five canal systems; *Acorus calamus* and *Alisma plantago-aquatica* in the Barnsley canals and Calderdale canals; *Oenanthe crocata* (Hemlock Water-dropwort), *Sagittaria sagittifolia* and *Sparganium emersum* in the Calderdale canals and Leeds & Liverpool Canal.

Discussion

The number of species recorded in the 19th century from each of the five Yorkshire canal systems (Table 1) is most likely an underestimate of the species richness of these canals at that time. This is partly because the authors of the floras consulted were aiming at county- or parish-wide recording rather than site-specific records. Plants are sometimes recorded as being found generically in canals but are not reconcilable to a specific canal; such records could not be used in the present study. Furthermore, for common and widely-distributed species, there is less emphasis on providing detailed information about distribution, hence canal locations are liable to have been omitted. It is also possible that some species were missed in the 19th century because they were not separated from related taxa of similar appearance. For example, *Potamogeton trichoides* (Hairlike Pondweed), which has sometimes been confused with *P. pusillus* (Preston, 1995), has been present in the Calderdale canals since at least 1939 (Cheetham & Sledge, 1941), and continued to be abundant in 2011, but was not recorded in the 19th century. There are other potential problems with *Potamogeton* records (Cheetham & Sledge, 1941). *P. pusillus* and *P. berchtoldii* (Small Pondweed) are potentially difficult to separate, hence a "*P. pusillus* var. *tenuissimus*" record for the Leeds & Liverpool Canal (Lees, 1888) was conservatively ascribed to *P. pusillus* rather than to *P. berchtoldii*. Also, following Lees (1888), and Preston (1995), records of "*P. gramineus*" in earlier floras were ascribed to *P. Obtusifolius* (Blunt-leaved Pondweed)..

The wide range in number of species recorded in the 19th century, from 33 in the Calderdale canals to six in the Ripon Canal (Table 1), may indicate real difference in species richness, but is very likely also to be a reflection of difference in botanical-recording effort. Nevertheless, if those taxa that were recorded persisted to the same extent as all the components of the 19th century canal flora, then the percentage of recorded species that persisted to 2010-2011 (33-56% - Table 1) can be regarded as an estimate of the proportion of total 19th century species which persisted to the 21st century. These results for Yorkshire canals align with Greenwood (2005) who described long-term change in species composition of aquatic plants in the Lancaster Canal, north-west England. He compared largely 19th century records with post-1998 records and found that 15 out of 25 (60%) of aquatic taxa recorded before 1910 were still there. It is clear that a substantial proportion of the 19th century canal flora has persisted to the 21st century. Note, however, that the persistent species include any that may have been lost for a time, perhaps because of changes in canal management and usage or periods of pollution, but have been able to recolonise.

The number of species recorded in 2010-2011 (Table 1) is also probably an underestimate. This is important because if species for which

there are 19th century records were missed in 2010-2011 then the estimates of the proportion of the 19th century species that persisted into the 21st century (Table 1) are too low.

More intensive recording in 2010-2011 would most likely have yielded more species. Substantial lengths of some of the canals were not visited and most sites were visited only once. Furthermore, turbidity sometimes made it more likely that submerged species were missed. The proportion of 2010-2011 species that were also recorded in the 19th century was very variable (from 52% in the Calderdale canals to 6% in the Ripon Canal). This is probably because the plants recorded in 2010-2011 fall into three categories: 1) species recorded in the 19th century; 2) species present in the 19th century but not at that time recorded; 3) species that have colonised since the 19th century. It follows that the fewer the records that are available from the 19th century, the greater is the representation of category 2 plants in the modern flora, leading to much too low an estimate of the percentage of the modern flora that has persisted from the 19th century. This problem is shown by the Ripon Canal and the Chesterfield Canal. There were only six and nine species respectively recorded in the 19th century, while the apparent percentage of the modern flora that had persisted from the 19th century was only 6% and 14 % (Table 1). In contrast, the greatest number of species recorded in the 19th century was 33 in the Calderdale canals. Here there were probably fewer category 2 species; hence the proportion of the modern flora that is known to have persisted from the 19th century (52%) is relatively high. It is not, however, unexpected that an appreciable proportion of the modern Yorkshire canal flora appears to have colonised since the 19th century (category 3 species). Species recorded in 2010-2011 that are known or suspected to be newcomers include native plants extending their range, either naturally or with human help, and newly-introduced alien plants. For example: *Elodea nuttallii* (Nuttall's Waterweed) in all five canal systems; *Hydrocharis morsus-ranae* (Frogbit) in the Barnsley canals; *Hydrocotyle ranunculoides* in the Barnsley canals and Calderdale canals; *Luronium natans* (Floating Water-plantain) and *Potamogeton epihydrus* (American Pondweed) in the Calderdale canals; *Nymphaea alba* (White Water-lily) and *Nymphoides peltata* (Fringed Water-lily) in the Leeds & Liverpool Canal; *Typha angustifolia* (Lesser Bulrush) in the Chesterfield Canal.

Records from historic floras (Table 2) allow some speculative assessment of the nature of vegetation in working Yorkshire canals in the 19th century. The many *Potamogeton* records suggest that *Potamogeton* species were perhaps an important component of the submerged vegetation. It is unknown whether they made up luxuriant clear-water vegetation or formed sparse scattered populations. It is probable, however, that 19th century horse-drawn boats generated less turbidity than present-day propeller-driven power boats. Nor is it evident how important, in abundance terms, were other submerged plants (*e.g*. *Ceratophyllum demersum*, *Elodea canadensis*, *Myriophyllum alterniflorum*, *Zannichellia palustris*).

Species that generally have an emergent habit are relatively well represented in the 19th century records (Table 2). All five canal systems, then as now, had *Glyceria maxima*, and it may have been widespread in so far as this was permitted by boat traffic. This species is, for example, described as being by the Leeds & Liverpool Canal from Apperley Bridge to Skipton (33km) by Baines (1840) and from Gargrave to Saltaire (33km) by Lees (1888). Photographs of the Barnsley Canal and the Leeds & Liverpool Canal between 1900 and 1910 (Ellis, 2009) show stands of emergent marginal vegetation. Species cannot be identified, but the dominant plant is possibly *G. maxima*. There might also have been separate stands of other tall marginal plants (*e.g*. *Acorus calamus*, *Butomus umbellatus*, *Carex acutiformis* (Lesser Pond-sedge)) and/or an intermingling of species.

Species that can be emergent, floating-leaved or submerged, depending upon water depth and season (e.g. *Alisma plantago-aquatica*, *Sagittaria sagittifolia*) may have been mixed with the taller plants, or may have replaced them, or

have formed a fringe beyond the taller plants. Diverse aquatic herbs may have colonised cattle-poached margins inside grazed taller vegetation at sites where pasture abutted the canal on the opposite side to the tow path. The present-day existence of such communities in the continuously-navigated Leeds & Liverpool Canal might be regarded as supporting these suggestions. For example: 1) between Leeds and Newlay Bridge (7.6km) in September 2011 *Glyceria maxima* was the most abundant of the taller emergent species, followed by *Butomus umbellatus*, but there were also extensive stands of emergent *Sagittaria sagittifolia*, sometimes along both sides of the navigable centre channel; 2) about 100m of apparently recently-poached margin south-east of Highgate Swing Bridge, Gargrave (SD949536) in July 2010 had *Glyceria maxima* and *Oenanthe crocata* (both recorded in this canal in the 19th century - Table 2) along with eight other aquatic plant species that are associated with boggy margins: *Acorus calamus*, *Caltha palustris* (Marsh-marigold), *Glyceria fluitans* (Flote-grass), *Mentha aquatica* (Water Mint), *Myosotis scorpioides* (Water Forget-me-not), *Nasturtium officinale* agg. (Water-cress), *Ranunculus sceleratus* (Celery-leaved Buttercup) and *Veronica beccabunga* (Brook-lime).

Further speculation about the nature of the 19th century canal vegetation is probably too risky without more evidence. Additional evidence might be sought. 19th century herbaria and regional natural history journals are potentially fruitful sources. Also, a search for 19th century photographs might provide more information on emergent and perhaps floating-leaved communities. It is also important to remember that it is unlikely that canal vegetation was constant throughout the whole of the 19th century. Potential reasons for this include: change in the pattern and extent of canal traffic consequent upon economic change and development; periods of intermittent or long-standing pollution from industrial and/or domestic sources; canal management, including dredging, and maintenance and development of infrastructure; colonisation by new species and loss of existing species in response to competition and/or change in water quality; change in the extent of shading by canal-side trees.

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Table 1: Number of aquatic plant species recorded in Yorkshire canals

	Barnsley canals	Calderdale canals	Chesterfield Canal	Leeds & Liverpool Canal	Ripon Canal
n of species recorded in the 19th century	19	33	9	18	6
n of 19th century-recorded species persisting to 2010-2011	9	15	4	10	2
% of 19th century-recorded species persisting to 2010-2011	47	46	44	56	33
n of species recorded in 2010-2011	35	29	28	43	33
% of 2010-2011 species also recorded in the 19th century	26	52	14	23	6

Table 2: Nineteenth-century records of aquatic plants in Yorkshire canals

	Barnsley canals	Calderdale canals	Chesterfield Canal	Leeds & Liverpool Canal	Ripon Canal
Acorus calamus (Sweet-flag)	d,f*	d*	0	0	0
Alisma plantago-aquatica (Water-plantain)	f*	e*	0	0	0
Apium inundatum (Lesser Marshwort)	0	d	0	0	0
Baldellia ranunculoides (Lesser Water-plantain)	b,c,d	0	0	0	0
Butomus umbellatus (Flowering-rush)	0	0	d*	a,b,d*	0
Callitriche stagnalis (Common Water-starwort)	0	e	0	0	0
Carex acutiformis (Lesser Pond-sedge)	0	d,e	d	d*	d*
Carex paniculata (Greater Tussock-sedge)	0	0	0	d	
Carex vesicaria (Bladder-sedge)	0	e	0	0	
Catabrosa aquatica (Whorl-grass)	0	0	0	0	d
Ceratophyllum demersum (Rigid Hornwort)	d*	d,e	0	0	0
Eleocharis acicularis (Needle Spike-rush)	d	d,e	0	0	0
Eleocharis palustris (Common Spike-rush)	0	e	0	0	0
Elodea canadensis (Canadian Waterweed)	b,f	e	0	d	0
Equisetum fluviatile (Water Horsetail)	0	e	0	0	0
Equisetum palustre (Marsh Horsetail)	0	e	0	0	0
Galium palustre (Common Marsh-bedstraw)	0	d,e*	0	0	0
Glyceria fluitans (Floating Sweet-grass)	0	e	0	0	0

	Barnsley canals	Calderdale canals	Chesterfield Canal	Leeds & Liverpool Canal	Ripon Canal
Glyceria maxima (Reed Sweet-grass)	d*	d,e*	d*	a,d*	d*
Groenlandia densa (Opposite-leaved Pondweed)	0	0	0	d	0
Hippuris vulgaris (Mare's-tail)	0	0	0	d	0
Iris pseudacorus (Yellow Iris)	0	e*	0	0	0
Lemna minor (Common Duckweed)	0	e*	0	0	0
Lemna trisulca (Ivy-leaved Duckweed)	0	e	0	0	0
Mentha aquatica (Water Mint)	0	0	d*	0	0
Myriophyllum alterniflorum (Alternate Water-milfoil)	d	c,d,e	0	0	0
Oenanthe crocata (Hemlock Water-dropwort)	0	c,d*	0	a,b*	0
Persicaria amphibia (Amphibious Bistort)	0	e*	0	0	0
Phalaris arundinacea (Reed Canary-grass)	0	e*	0	0	0
Potamogeton alpinus (Red Pondweed)	d	0	0	d	0
Potamogeton crispus (Curled Pondweed)	b,d,f*	b,e*	0	d*	d
Potamogeton friesii (Flat-stalked Pondweed)	0	0	d	0	0
Potamogeton lucens (Shining Pondweed)	d,f	0	0	b,d	0
Potamogeton natans (Broad-leaved Pondweed)	0	e	0	0	0
Potamogeton obtusifolius (Blunt-leaved Pondweed)	b,c,d,f	d,e	d	d	0
Potamogeton pectinatus (Fennel Pondweed)	c,d*	d,e	d*	d*	0
Potamogeton perfoliatus (Perfoliate Pondweed)	d*	d	d	d*	0
Potamogeton polygonifolius (Bog Pondweed)	d	0	0	d	0
Potamogeton pusillus (Lesser Pondweed)	0	e*	0	d*	0
Ranunculus circinatus (Fan-leaved Water-crowfoot)	0	0	0	0	d
Ranunculus sceleratus (Celery-leaved Buttercup)	f*	0	0	0	0
Rumex hydrolapathum (Water Dock)	0	0	d	0	0
Sagittaria sagittifolia (Arrowhead)	d,f	b,d,e*	0	b,d*	0
Solanum dulcamara (Bittersweet)	0	e*	0	0	0
Sparganium emersum (Unbranched Bur-reed)	0	b,c,d,e*	0	b,d*	0
Sparganium erectum (Branched Bur-reed)	0	e*	0	0	0
Typha latifolia (Bulrush)	f*	0	0	0	0
Zannichellia palustris (Horned Pondweed)	d	e	0	0	d

From: [a]Baines (1840); [b]Miall & Carrington (1862); [c]Gissing (1867); [d]Lees (1888); [e]Crump & Crossland (1904); [f]Payne & Smith 1867 (Edmondson, 2004). Sometimes several records refer to the same field observation. *Indicates recorded in both 2010-2011 and the 19th century; (-) indicates no 19th century records. Only species on the Palmer & Newbold (1983) checklist of aquatic plants are included.

Salicornia 3 (seeds): sinking and sorting

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In a previous note (Hambler, 2011), I suggested that the seeds of different *Salicornia* (glasswort) aggregate species, being of different sizes, and with a variable density of seed-coat indumentum, would have different sinking velocities in sea water. Further, this would predispose them to eventual deposition by tides in sites favourable to their ecological 'requirements'. The first part of the hypothesis is tested here. An account of an estuarine shore-line in Kent, with *S. europaea* agg. and *S. procumbens* agg. occupying different, but not exclusive zones, in relation to the tides, and with *Sarcocornia perennis* (Perennial Glasswort) occupying an intermediate position, was presented in the foregoing note. Evidence is sought suggesting that the relative hydrodynamic properties of the seeds of these aggregates (and of *Sarcocornia*) may facilitate the establishment and maintenance of such a zonation. As Beeftink (1985) wrote of *Salicornia*: seed deposition on mud flats seems to profit from the re-working of the topsoil and from sedimentation of the silt by tidal currents and wave action.

The plants

Whole plants were collected from the shore of The Solent, between Lepe and Lower Exbury, in late September 2010, when pollination was assumed to have occurred. Among these, some were clearly identifiable as belonging to the *S. europaea* aggregate, and others to the *S. procumbens* aggregate, as recognised by Stace. (2010). Specific names *sensu stricto* are suggested for four phenotypically distinctive sorts chosen (as in the work of Jefferies *et al*. 1981) on the basis of their resemblances to the descriptions, and to the clear interpretative line drawings of fertile spikes by D.H. Dalby, in Stace's *Flora*. Some of the individual plants, from which seeds were obtained, are illustrated by photographs (see Colour Section, plates 2 & 3). This is possibly the first time that experimental results have been linked to colour photographs of *Salicornia* phenotypes in the botanical literature.

The plants were kept for a month after collection in an unheated glasshouse with their roots in 'sea water'(35gm sea salt per litre tap water, made up using 'kitchen' rather than laboratory equipment), and were sprayed with clean 'sea water' daily. Only one 'sort' (*S. c.f. europaea sensu stricto*) exhibited any obvious stress, in that the apices of flowering spikes withered (Photos 4 & 6). Seeds were removed, opportunistically, during the month of October, from disintegrating spikes as soon as a sufficient number became available. Obviously – damaged seeds and others of atypical appearance were discarded. As I reported in a previous note, the only reference to seed release I have located suggests that wetting after a period of drying could assist seed-escape in nature. If this is generally true, release during a rising tide might facilitate tidal sorting. Seeds were released here by 'assisted' disintegration of the flowering spike.

The aggregate species and seed escape

Within the *S. europaea* aggregate (Photos 1–6) some plants *c.f. S. ramosissima sensu stricto*, with red flowers, eventually became purple (the Purple Glasswort of Stace). Others, with somewhat larger flowering spikes and segments, were clear green, produced little or no red pigmentation, and yellowed with age. These were regarded as *c.f. S. europaea sensu stricto* – the Common Glasswort of Stace. They respectively resembled the two Medway estuary plants shown in black and white photographs in my previous note. Apart from an absence of red pigmentation several plants showed a tendency for the tips of the flowering spikes to wilt and blacken under the glasshouse conditions. It is assumed, however, that temporary residence of the plants in a glasshouse has not significantly affected any of the results presented here.

Within the *S. procumbens* aggregate (Photos 7 & 8) all of the plants used were initially green becoming yellowish, and eventually translucent. Specimens with, short, cylindrical, blunt-ended, up-curved flowering spikes were regarded as *c.f. S. fragilis* (Yellow Glasswort). Specimens with longer, distinctly tapering (to the tip) up-curved flowering spikes were regarded as *c.f. S. dolichostachya* (Long-spiked Glasswort). The translucency often revealed seeds (some green) within the spikes. Yellowing appeared to be a result of resorbtion of the green component of chlorophyll - suggesting translocation of materials away from the photosynthetic tissue to the seeds during senescence.

Apparatus and protocol

The apparatus (Fig. 1) consisted of a 40cm - long glass tube, with a 5.5mm internal diameter, clamped vertically. A short length of rubber tubing with a spring clip closure was attached at the bottom, and a 30cm. length column from the top was delimited by means of a sticky tape marker on the tube. The tube could be completely filled, by means of a turkey-baster, with 'sea water', and could be drained by opening the clip. The only other requirements were a fine pipette, a very fine water-colour paint brush to manipulate the seeds, a stop-clock, and photographic equipment to record the changing appearance of plants during maturation of their seeds.

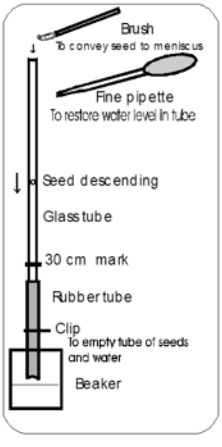

Fig. 1. *Salicornia* seeds – apparatus to find sinking times of seeds.

Seeds, from a given previously-photographed plant, were placed one at a time from the tip of the brush into the water at the meniscus (maintained by adding sea water by means of the fine pipette) at the top of the tube. The time taken for each seed to sink to the 30cm marker was noted to the nearest second. As many seeds as possible, or convenient, from one individual of a given 'sort' were tested. The seeds accumulated at the bottom of the tube were flushed out into a suitable container at the end of each run, and the tube was then completely re-filled from the top by means of the turkey-baster. A single set of seeds passed through the system a second time, and tested a day later, gave a repetition of the first result, suggesting that the technique was reliable. Times of sinking for individual seeds in each sample were tabulated. The results presented here are representative.

The precise concentration of the salt solution (or of the natural estuarine water) used in any such series of tests need not be known (sufficient must be made up, or collected in nature, for an entire sequence). The comparative rates only are important. Seeds from a number of different plants were tested with the samples available ranging from *c.*30 to nearly 100 from each plant. Results from three *Salicornia* plants from each of the aggregates, for which photographs and records of changes in appearance from flowering to senescence were kept, are presented graphically together with a representative graph related to *Sarcocornia* (Figs. 2 & 3, p. 26). The size of seed samples varied between 30 and 80 according to availability of shed seeds at any one time. Each data set was sorted in descending order of magnitude by means of Microsoft Excel SORT application to provide an immediate visual analogy to hydrodynamic sorting.

Results, discussion and a conclusion

Much larger samples would be needed to show the likely bimodality of *S. europaea* agg. (the seeds are of two sizes), or to reveal a precise modal value for sinking times. Statistical information is therefore not reported here. It would be unprofitable to calculate sinking velocity *per se* without a precise and repeata-

Fig. 2.1 Photos 5 & 6 (right)

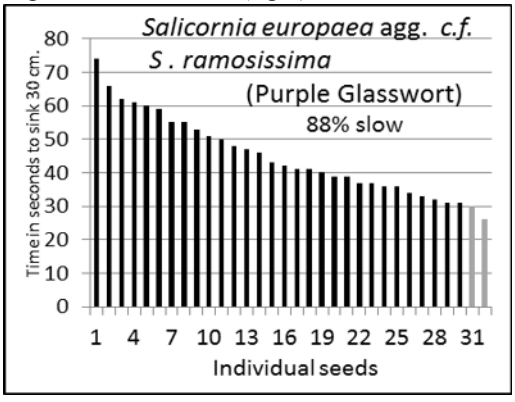

Fig. 2.2 Photos 4 & 6 (left)

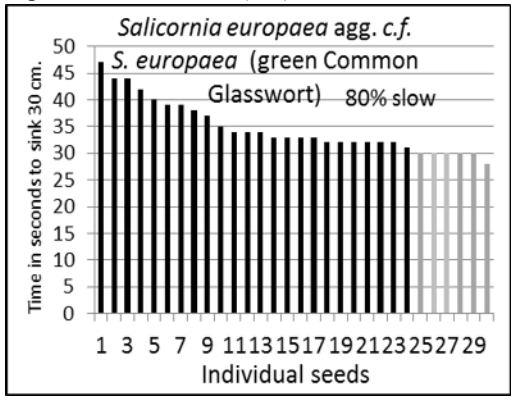

Fig. 2.3 Photo 7 (left)

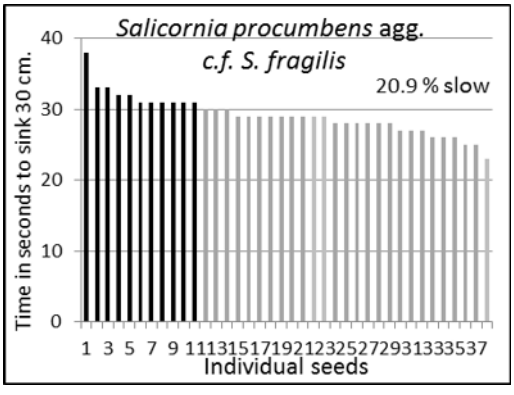

Fig. 2.4 Photo 7 (right)

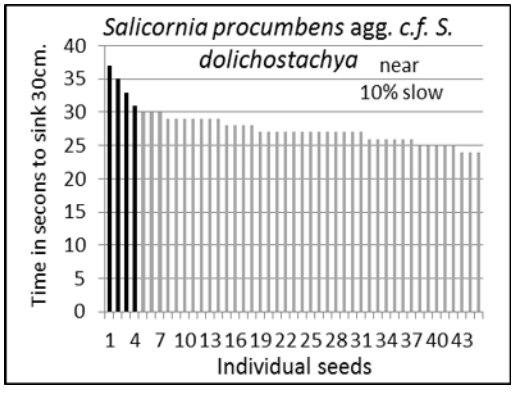

Fig. 2.5

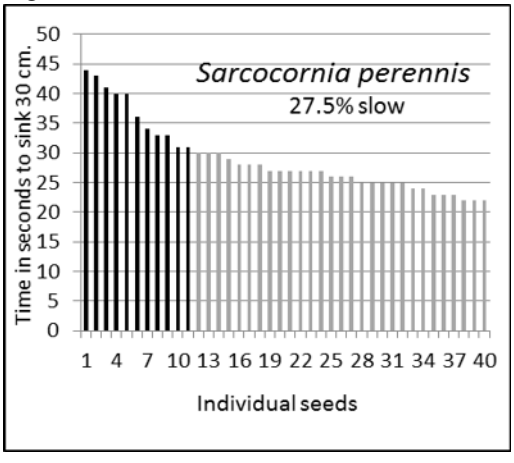

Fig. 2.6

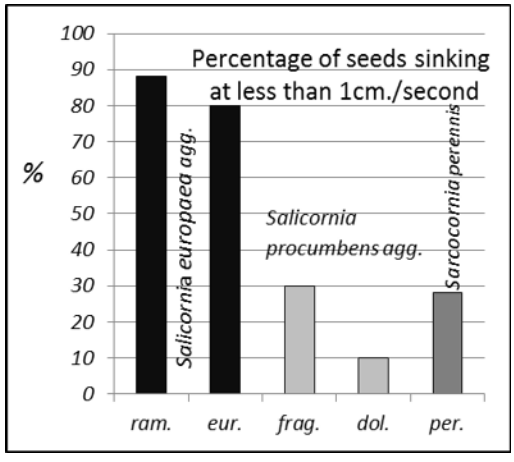

Fig. 2. Diagrams to illustrate the proportion of seeds 'sinking slowly' (black columns) from four *Salicornia* plants, two representing the *S. europaea* aggregate, and two representing the *S. procumbens* aggregate with each other and with the proportion in a sample from *Sarcocornia perennis*; also a diagram representing a conversion of the same data to percentages, with abbreviated specific names indicated.

Fig. 3.1 Photo 2

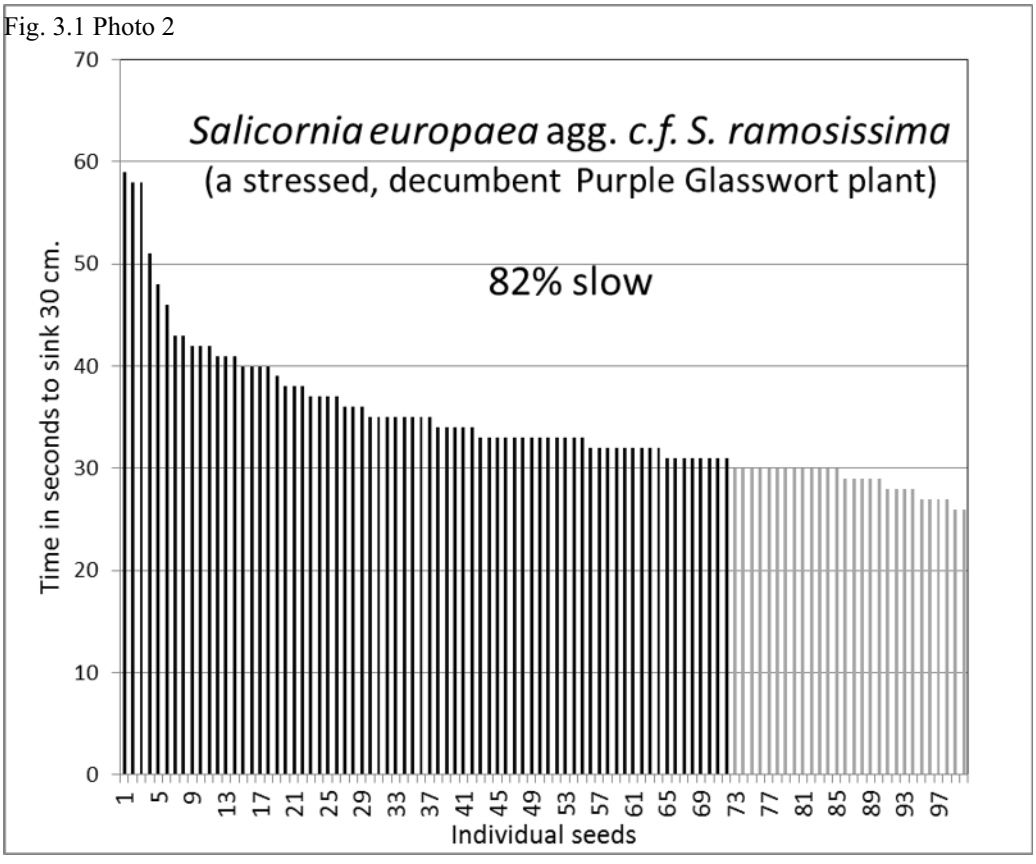

Fig. 3.2

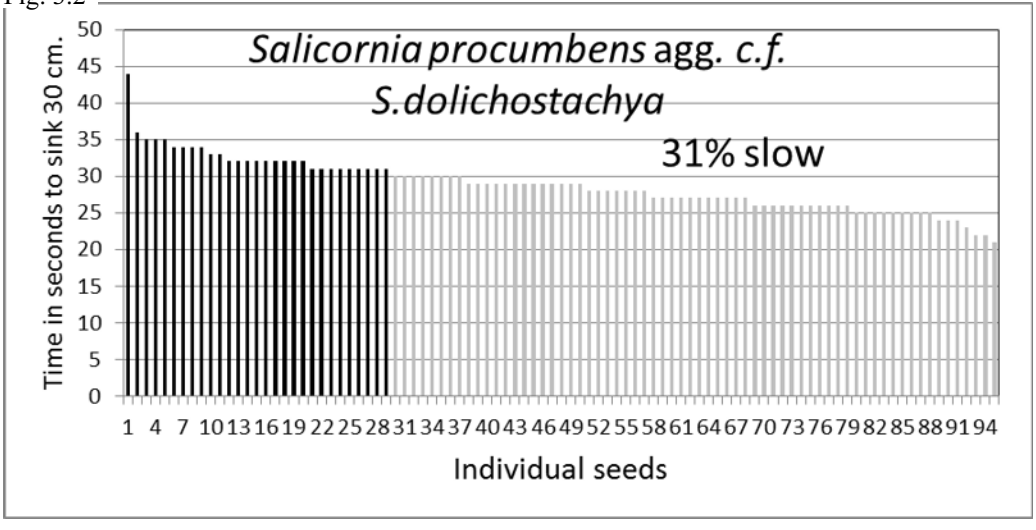

Fig. 3. *Salicornia* seeds – as Fig. 2, but with larger samples from two additional plants – one from each aggregate

ble, laboratory-standard, sea-salt concentration. The sinking time of each seed through 30cm of the same, constant, but imprecise, solution was therefore used in comparisons. The survivability of an individual must reside with it alone, rather than on a mean value for its cohort. Raw data sorted by magnitude allowed differences between samples to be visualised, and allowed a suitable arbitrary division between 'slow' and 'fast' to be selected.

Transformation of the data to percentages in histogram columns also gave a clear indication that the *S. europaea* agg. seeds generally sank more slowly than those of either *S. procumbens* agg. or of *Sarcocornia perennis*. It is doubtful whether further investigation within each aggregate will prove profitable unless much larger samples, and more precise recording techniques, could be used.

Finally, it may be concluded that the differing rates at which seeds of the two *Salicornia* aggregates were found to sink provides evidence that tidal sorting may indeed be a possibility. It could assist in the arrival of seeds, and the maintenance of populations, of different *Salicornia* sorts or species at 'appropriate' levels in relation to tides, and may be important in their spatial distributions on a tidal slope, or on a salt marsh. A result for *Sarcocornia perennis* suggests that its position in a primary zonation would be among the *Salicornia* tetraploids. Its usual occurrence is recorded (Stace, 2010) as in middle and upper parts of salt marshes. This is suggestive of its intermediate position in the shoreline zonation at Chetney, as described in my previous note.

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Salicornia: photographs – a visual aid

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Seven species of *Salicornia* are described in the latest British *Flora* (Stace, 2010). It has often been suggested that colour photographs would convey and preserve invaluable information about *Salicornia* specimens. Attempts to key out a specimen involve linear measurements (to tenths of a millimetre), and to perceptions of colour that need to be made on fresh (but ageing) plants. Yet it is not necessary to have a micrometer and a text handy to allow different sorts of Glasswort to be compared, and possibly recognised, at sight. In fact, most British specimens (even allowing that 20-30 'sorts' may exist) must be fitted mentally into one or other of two aggregates.

I hope that photographs here (see Colour Section, plates 2 & 3) will support the notion that a picture is worth a thousand words. Such permanent recording would contribute to the work of naturalists and field ecologists, and would assist the reader of works on cryptic characteristics of *Salicornia* to know what visually distinguishable 'sorts' are involved. A photograph of an entire plant with a 'neutral', shadowless background, together with a 'close-up' of spikes and flowers taken with a macro-lens, will allow (if a ruler is included in each photograph) accurate measurements to be made much more easily than on the fresh plant.

This note refers to specimens from a collection of living *Salicornia* 'sorts', made along The Solent coast between Lepe and Lower Exbury (SU4701). The plants were posted to me in September 2010, kept rooted in 'sea water', and observed until seed-loss. Several of the photographs presented here (see Colour Section, plates 2 & 3) relate to plants from which seed was collected for the experiments reported in '*Salicornia* 'sorts' 3 …' in this issue (p. 24–28).

Absent species

British *Salicornia,* excluding the distinctive *Salicornia pusilla* (One-flowered Glasswort), which is not considered here, comprise two aggregates, each represented by three *sensu stricto* species. These together comprise perhaps 20 – 30 'sorts' in S.E. England alone. Neither *S. emerici* (Shiny Glasswort) (formerly *S. nitens*), of the *S. procumbens* aggregate, nor *S. obscura* (Glaucous Glasswort), of the *S. europaea* aggregate, are considered here. These 'scattered' or 'probably under-recorded' species, are characterised by possession of primary branch systems only. They were illustrated with line drawings by S.J. Roles (in Ball & Tutin, 1959). Drawings of apical spikes by D.H. Dalby (in Stace, 2010) appear to be the only other extant illustrations.

Habit

Habit is important in the identification of well-grown *Salicornia* taxa by means of keys, where the length of branches in relation to the main stem and the length of the terminal spike are important. However, even when the main stem has been damaged and there is no terminal spike (Photos 1 & 7), visual assessment is often sufficient to identify a mature specimen.

Size and shape of fertile spikes

The commonest members of the two aggregate species are easily distinguished from one another by the appearance of the generality of their mature fertile spikes: *S. europaea* agg. has short spikes, with bulging fertile segments. *S. procumbens* agg. has longer spikes with barrel-shaped fertile segments.

Within the *S. procumbens* aggregate, the major feature separating the two species is the appearance of flowering spikes. Those of *S. fragilis* (Yellow Glasswort) are blunt and cylindrical; those of *S. dolichostachya* (Long-spiked Glasswort) are long(er), and taper to a sharp(er) apex (Photos 1 & 7). Although Ball & Tutin (1959) reported that *S. dolichostachya* is far from uniform in habit, their suggestion that this taxon possibly includes more than one species might not now be taken too seriously.

The field botanist is often confronted by specimens which cannot be keyed out for various reasons. Stace (2010) suggests that identification of the three species within each aggregate should be attempted only on several fresh, well-grown plants from unshaded populations developing ripe fruit. However, it is possible for a field botanist to distinguish the aggregates from each other around their flowering time, and to suggest a specific name for some specimens. A name may be suggested even when plants are not well-grown, and even subsequent to early damage which has removed the dominance of the main shoot apex(see Photos 1 & 7). The stunted, decumbent specimen of Photo 2 and the large erect specimen of Photo 3 are both Purple Glasswort.

Colour

Colour is mentioned in every description of *Salicornia* taxa. All the aerial parts of every individual of every *Salicornia* plant are green initially. Axial vegetative parts of all plants lose their green chlorophyll colour sequentially, revealing yellow (xanthophyll) colouration as chlorophyll is degraded. Later, the peripheral succulent stem tissue collapses, until only brown wiry stems and branches remain at fruiting time. Both Yellow Glasswort and green Long-spiked Glasswort (*S. procumbens* agg.) exhibit these changes, and their green embryos within the seeds are characteristically visible in the translucent, disintegrating spikes (Photo 8). There seems little 'inclination' to produce the red/purple pigment betacyanin in these two segregates, although an occasional speck of red around the flower-pores or a pink tinge to the flower

spikes reveals a latent ability in some specimens.

Within the S. *europaea* aggregate the production of betacyanin is more evident, and the most obvious characteristic separating the two common 'segregates' is a greater predisposition to produce red/purple colouration of the mature flowering spikes by *S. ramosissima* (the 'Purple Glasswort') of middle and upper parts of salt marshes. It was shown by Bothe (1976) that the red pigment betacyanin (an osmolyte) was synthesised by *Salicornia europaea* (? agg.) as a result of, and maybe as an alleviator of, osmotic stress. Such stress increases landward. Marshal & Park (1976a) quoted L.D. Clark and N.J. Hannon, who showed that soil salinity on a marsh increased landward to a maximum at or just above mean high water (MHW). Work by Jefferies & Gottlieb (1982) appears to confirm the genetic isolation and an apparent lack of genetic variability of the two *S. europaea* 'microspecies'. The intensity of red/purple colouration is greatest in environmentally stressed and stunted Purple Glasswort (Photo 2). That the aqueous red pigment may act as a light-filter (by absorbing green light) was mentioned by Stafford (1994). This could partially account for the near-black appearance of some plants (Photo 2).

Photography notes

The photographs presented here were taken on 35mm negative film by means of an Olympus camera with a 50mm lens, supplemented by a 2×OP Macro Teleplus MC7 intermediate lens for the 'close-ups'. The film used was Kodak ColorPlus. Ambient indoor light and electronic flash were utilised together. Whole plants were supported on a clear acrylic sheet over a neutral background to avoid intrusive shadows. The prints were prepared by means of Arcsoft Photostudio, a computer application which allowed contrast and brilliance to be controlled (without altering colour), and enabled background scratches and debris (on the acrylic sheet) to be eliminated. 'Close-up' photographs of flower spikes make simple the measurement and recording of taxonomic characteristics.

A conclusion

A photographic archive of *Salicornia,* if produced, could begin to reduce the taxonomic confusion around this 'extremely difficult genus'. A quarto sheet with a habit photograph to scale, and 'close-up' photograph(s) of flowering parts at a standard enlargement would contain more useful information than most herbarium sheets, and would be transferable via the Web among interested individuals and institutions.

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Lesser Water-plantain in the Sefton Coast sand dunes, Merseyside

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Introduction

Lesser Water-plantain (*Baldellia ranunculoides*) is a perennial plant restricted to habitats at the water's edge, where potential competitors are constrained by fluctuating water levels, disturbance or exposure. It is said to grow usually in somewhat calcareous or brackish water over a variety of substrates (Preston, 2002), though Halliday (1997) links it to base-poor conditions in Cumbria. Ellenberg indicator values show that the species is light-loving (L = 8), is associated with shallow water that may dry up for extensive periods (F = 10), grows in weakly basic to moderately acid soils (R = 6), is adapted to moderately infertile conditions (N = 2) and is intolerant of salinity (S = 0) (Hill *et al*., 2004).

Kozlowski *et al*. (2009) state that *B*. *ranunculoides* shows a strong decline in practically all regions of its European range and is probably the most threatened species within its genus. Although fairly widespread in the British Isles, the plant has been declining for many years, especially in England, this being attributed to the loss of small water bodies and the overgrowth of others in the absence of grazing. The *New atlas* gives a change index of -1.08 (Preston, 2002). Because of this continuing decline, this species has been UK Red Data Book designated as "Near Threatened" (Cheffings & Farrell, 2005) and highlighted for special study in 2011 for its Threatened Plants Project by the Botanical Society of the British Isles. It is also listed as a Species of Conservation Importance in North West England (Regional Biodiversity Steering Group, 1999). Two subspecies occur in Britain but all Sefton Coast plants are thought to be *B*. *ranunculoides* ssp. *ranunculoides.*

Status in South Lancashire

As with many other wetland plants, *B*. *ranunculoides* has declined dramatically in South Lancashire (v.c.59) since the 19th century, having been described as "frequent, both in Wirral and on the Lancashire side of the Mersey" by Dickinson (1851). He associates the plant with ponds and ditches at Bootle, Formby, Southport, *etc*. in what is now Sefton. Much later, Green (1933) refers to it as "frequent" in marshes, mentioning particularly sand dune slacks. However, by the time of Travis's Flora (Savidge *et al*., 1963), the plant was "Rare, locally common, occurring mainly in coastal localities", the only inland sites mentioned being Lydiate (1887) and Baguley Moor (pre-1900). The *New flora of South Lancashire* (2010 archive version) summarises the current status of *B*. *ranunculoides* as "Very local along the Sefton Coast; probably extinct inland …" (D.P. Earl *in litt*., 2010).

Methods

In July and August 2011, all known and likely sites for *B*. *ranunculoides* on the Sefton Coast sand-dune system were visited. The plant had already been recorded by us in about eight localities since 2003. With the exception of a drainage ditch, all these were ponds or scrapes dug for conservation purposes. None had been found in dune-slacks. Therefore our search concentrated on man-made wetlands. Sites supporting *B*. *ranunculoides* were recorded using the methodology of the BSBI Threatened Plants Project, recording forms being completed for each site. Data collected included national grid reference, number of plants, area occupied, associated vascular taxa (within 1m of the target species) and vegetation type, based on the UK National Vegetation Classification.

Results

B. *ranunculoides* was identified at 13 sites over a linear distance of about 6km, within tetrads SD21V, SD30E, SD31B and SD31C (three hectads). Five sites were found on

Ainsdale Sand Dunes National Nature Reserve (NNR), three on Birkdale Sandhills Local Nature Reserve (LNR), two on Royal Birkdale Golf Course and one on Freshfield Dune Heath Nature Reserve. A total of 422 plants was counted, ranging from 1 to 227 plants per site (Table 1, p. 35). By far the largest number (227) was found at a Royal Birkdale scrape (site no. 9) excavated in 2006/07. The total area occupied by the plant was 374m^2, the largest single site (204m^2) being at the same Royal Birkdale scrape.

In all cases, the habitat of *B. ranunculoides* was an artificially deepened scrape or pond. They vary greatly in age and depth, some dating back to the mid-1970s, though several of the older ones were re-profiled in the 1990s. Many of them had recently dried up due to the extreme drought of spring and early summer 2011 but all would normally hold some water for much of the year. At deeper sites, the plants were mainly situated around the water's edge, none growing in water more than about 30cm in depth.

The vegetation in which *B. ranunculoides* was found was usually either one of the wetter dune-slack types, such as SD15: *Salix repens-Calliergon cuspidatum* dune-slack or SD14: *Salix repens-Campylium stellatum* dune-slack (Rodwell, 2000), or a freshwater swamp community. The latter included S10: *Equisetum fluviatile* swamp, S20: *Schoenoplectus tabernaemontani* swamp and S21c *Scirpus* (= *Bolboschoenus*) *maritimus* swamp, *Agrostis stolonifera* sub-community (Rodwell, 1995). Often, these stands were relatively tall and dense, *B. ranunculoides* being confined to the edges or more open areas within the stand.

Table 2 (p. 35) lists 50 vascular associates of *B. ranunculoides*, all being native, and eight (16%) regionally notable. The most frequent are *Eleocharis palustris* (Common Spike-rush) (11 occurrences), *Hydrocotyle vulgaris* (Marsh Pennywort) (10), *Mentha aquatica* (Water Mint) (10), *Equisetum palustre* (Marsh Horsetail) (7), *Myosotis laxa* (Tufted Forget-me-not) (7), *Agrostis stolonifera* (Creeping Bent) (6) and *Ranunculus flammula* (Lesser Spearwort) (6). These are common and characteristic wetland plants on the Sefton Coast (Smith, 2009).

Discussion

Reflecting its declining status nationally, *B. ranunculoides* is evidently now an uncommon plant on the Sefton Coast, confined in small numbers to a few excavated scrapes and ponds, though earlier literature indicates that it was once found more widely in dune-slacks and ditches (e.g. Dickinson, 1851; Green, 1933). In 2003, Smith (2006) found *B. ranunculoides* in a drainage ditch in the northern Birkdale frontal dunes but this site has since become overgrown by tall emergent aquatic plants and no longer supports the plant. Similarly, a semi-aquatic slack at Birkdale in which the species was recorded during the same study has become overgrown with *Phragmites australis* (Common Reed) and *Salix repens* (Creeping Willow), searches failing to reveal any *B. ranunculoides*. Interestingly, the target species was absent from many sites that were apparently similar to those supporting it. There is no obvious explanation for this, although the plant was generally absent from dryer, more heavily vegetated scrapes. These include several of the Ainsdale NNR scrapes that were re-profiled in the 1990s to make them shallower and therefore more suitable as Natterjack Toad (*Epidalea calamita*) breeding sites (Simpson, 2002). There is no clear evidence of a link between age of site and occurrence of *B. ranunculoides*, though the largest population was found in one of the more recently excavated scrapes at Royal Birkdale Golf Course (Table 1).

Conservation

B. ranunculoides seems able to survive in a wide variety of wet dune-slack and swamp vegetation types within this largely calcareous dune system, this being reflected in the species-richness of vascular associates. The high proportion of regionally notable associated plants emphasises the nature conservation value of these habitats. However, the small populations and restricted distribution of *B. ranunculoides* on the Sefton dunes makes it

highly vulnerable. Indeed, Kozlowski & Matthies (2009) state that many extant populations of this species are very small and therefore susceptible to environmental stochasticity. The present study has clarified the status and tentatively identifies measures that might encourage future survival of *B. ranunculoides*. They include the creation of scrapes that hold water for most of the year and the management of existing ones so that they do not become over-clogged with dense vegetation. Such actions are likely to benefit other sand-dune biota, including rare plants and aquatic fauna, such as dragonflies (Odonata) (Smith, 2009).

Some of the Ainsdale NNR sites are surrounded by pine woodland, the resulting shelter creating ideal conditions for invasion of broad-leaved trees and shrubs, such as birch (*Betula*) and willows (*Salix*), which are rapidly colonising scrape surrounds. Management action is required to address this problem. Grazing of duneland may help to reduce the rate of vegetation development in scrapes as well as controlling scrub invasion. Currently, seasonal livestock grazing is practised on several land holdings in the dunes, including parts of Ainsdale NNR and Freshfield Dune Heath, and is proposed on Birkdale Sandhills LNR. Such management is also beneficial in encouraging Rabbit-grazing, as this species avoids areas of ungrazed coarse vegetation (Drees & Olff, 2001). Plassmann *et al*. (2010) emphasise that long-term grazing can play an important role in maintaining the conservation interest of sand dune vegetation, though the benefits they quantified were less marked in slacks than in dry dune habitats. However, Smith & Lockwood (2011) linked a large increase in a population of *Gentianella campestris* (Field Gentian) in Ainsdale NNR slacks to the interaction between year-round Rabbit grazing and winter sheep-grazing at low stocking densities.

Kozlowski & Vallelian (2009) have demonstrated a strong negative influence of nutrient enrichment on morphological and reproductive traits of *B. ranunculoides*, concluding that long-term survival and establishment of new populations are significantly reduced in eutrophic habitats. Therefore, maintenance of low nutrient status in the Sefton Coast wetlands is crucial to the future of *B. ranunculoides*. Indeed, Kozlowski & Vallelian (2009) emphasise that the presence of viable populations of this plant can be used as an indicator of valuable aquatic habitats for organisms that require low nutrient conditions. Many of the specialist plants and animals of the Sefton Coast wetlands fall into this category. Nutrient enrichment of sand dune habitats can occur in various ways, a significant source in Britain being aerial deposition of nitrogen, mainly from industrial and agricultural sources (Jones *et al.*, 2004). While stock grazing may help to remove such excess nutrient inputs, grazing alone may be insufficient to mitigate entirely the adverse impacts of enhanced nitrogen (Plassmann *et al*., 2009).

The fact that *B. ranunculoides* is now restricted to the Sefton Coast in v.c.59 provides further evidence for the vital importance of this dune system to the conservation of a large suite of notable vascular plants in north-west England (Smith, 2009; Smith & Lockwood, 2011).

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Table 1. Details of Sefton Coast sites with Lesser Water-plantain

Locality	No.	Site	Grid ref. (SD)	No. of plants	Area Occupied (m^2)	Date of scrape	Vegetation Type (NVC)
Ainsdale NNR	1	Slack 48	289109	21	11	?	SD15
Ainsdale NNR	2	Slack 104	297116	1	0.1	1993	SD14
Ainsdale NNR	3	Slack 13c	285101	22	18	1976	S20
Ainsdale NNR	4	Slack 13b	285101	26	31	1976	S10
Ainsdale NNR	5	Slack 39a	291102	1	0.1	1998	SD15
Ainsdale NNR	6	Slack 39b	291103	20	3.5	1998	SD15
Ainsdale NNR	7	Slack 5	285106	28	29	1991	S21c
Royal Birkdale	8	1	313141	1	0.1	2006/07	S21c
Royal Birkdale	9	2	315151	227	204	2006/07	SD15
Birkdale LNR	10	Slack 14	305137	26	61	1976	SD15
Birkdale LNR	11	Slack 47	303136	4	0.75	1984	SD15
Birkdale LNR	12	Slack 53	300129	44	16	1997	S20
Freshfield Dune Heath	13	pond	299092	1	0.1	2007	?
Total				422	374		

Table 2. Associates of Lesser Water-plantain on the Sefton Coast

SCI = Species of Conservation Importance in North West England; Occurrence = total number of occurrences in 13 sites

Taxon	English name	Status	Occurrence
Agrostis stolonifera	Creeping Bent		6
Alisma plantago-aquatica	Water-plantain		1
Anagallis tenella	Bog Pimpernel	SCI	1
Apium inundatum	Lesser Marshwort	SCI	2
Apium nodiflorum	Fool's-water-cress		1
Bolboschoenus maritimus	Sea Club-rush		3
Caltha palustris	Marsh-marigold		1
Carex arenaria	Sand Sedge		1
Carex flacca	Glaucous Sedge		1
Carex hirta	Hairy Sedge		1
Carex nigra	Common Sedge		2
Carex oederi	Small-fruited Yellow-sedge	SCI	1
Centaurium erythraea	Common Centaury		1
Charophyta	Stoneworts		4
Eleocharis palustris	Common Spike-rush		11
Epilobium hirsutum	Great Willowherb		1

Taxon	English name	Status	Occurrence
Epilobium obscurum	Short-fruited Willowherb		1
Epilobium palustre	Marsh Willowherb		1
Epilobium parviflorum	Hoary Willowherb		1
Equisetum arvense	Field Horsetail		2
Equisetum fluviatile	Water Horsetail		3
Equisetum palustre	Marsh Horsetail		7
Galium palustre	Common Marsh-bedstraw		2
Hippuris vulgaris	Mare's-tail	SCI	1
Hydrocotyle vulgaris	Marsh Pennywort		10
Juncus articulatus	Jointed Rush		1
Juncus bufonius	Toad Rush		1
Lathyrus pratensis	Meadow Vetchling		1
Littorella uniflora	Shoreweed		1
Lythrum salicaria	Purple-loosestrife		1
Mentha aquatica	Water Mint		10
Myosotis laxa	Tufted Forget-me-not		7
Phragmites australis	Common Reed		1
Potamogeton gramineus	Various-leaved Pondweed	SCI	2
Potamogeton natans	Broad-leaved Pondweed		1
Pulicaria dysenterica	Common Fleabane		2
Ranunculus flammula	Lesser Spearwort		6
Ranunculus lingua	Greater Spearwort		1
Rubus caesius	Dewberry		1
Sagina nodosa	Knotted Pearlwort		1
Salix cinerea	Grey Willow		2
Salix repens	Creeping Willow		4
Samolus valerandi	Brookweed	SCI	3
Schoenoplectus tabernaemontani	Grey Club-rush	SCI	4
Senecio jacobaea	Common Ragwort		1
Sparganium erectum	Branched Bur-reed		2
Triglochin palustris	Marsh Arrow-grass	SCI	1
Tussilago farfara	Colt's-foot		1
Typha latifolia	Bulrush		2
Veronica catenata	Pink Water-speedwell		1
Total 50 taxa		8 SCI	

New flora of the British Isles, 3rd ed. (2010): treatment of *Salix* in first reprint (2011)

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The first reprint of edition 3 of *New flora of the British Isles* was issued in October 2011. The few nomenclatural changes in it were listed in *BSBI News* **118**: 8-9, when Trevor James also wrote an explanatory note concerning the confusing change to the name of the Crack Willow.

I thought that members might appreciate a fuller account of the changes relating to the Crack Willow, so below I offer the text in the reprint that has replaced the entries for species 4 and 5 on page 323 of the *Flora*.

I would be happy to provide an electronic version of this text on request to: cstace@btinternet.com, but I regret that I cannot deal with postal enquiries.

4. S. euxina I.V. Belyaeva (*S. fragilis* auct. non L., *S. decipiens* auct. non Hoffm.; *S. fragilis* var. *decipiens* W.D.J. Koch) – Crack Willow. Tree to 15m; twigs very brittle at branches, glabrous from the 1st, shiny pale yellowish-brown; leaves 5-10(12) x 1.5-3(4)cm, glabrous from the 1st, ± glossy on upperside, glaucous on lowerside, more coarsely serrate than other taxa in section *Salix*; stamens 2(-3); (2n=76). Intrd-surv; only males occur here, sparsely scattered in damp places over most of lowland BI but not well recorded, always(?) planted; Turkey and Transcaucasus.

Traditionally Crack Willow has been called *S. fragilis*, with 4 vars, but this binomial refers to hybrids between Crack and White Willows, so *S.* x *fragilis* replaces *S.* x *rubens* for the hybrid. Of the 4 vars. of *S. fragilis*, plants known as var. *decipiens* are referable to *S. euxina*, but the other 3 vars. (incl. var. *fragilis*) come under the hybrid.

4 x 7 x 9. S. euxina x S. alba x S. triandra = S. x alopecuroides Tausch ex Opiz (*S.* × *speciosa* Host) occurs very sparsely in Br and Ir; it is intermediate, with 2-3 stamens; female unknown.

5. *S.* x *fragilis* L. (*S.* x *rubens* Schrank, *S.* x *basfordiana* Scaling ex Salter; *S. euxina* x *S. alba*) - Hybrid Crack-willow. Tree to 30m; represented by range of variants and cultivars linking *S. euxina* with *S. alba*; always some pubescence on young twigs and leaves; 2n=76. Archaeophyte; frequent over most of lowland BI but most often of cultivated origin.

All plants accurately determined as *S.* x *rubens* belong here. They involve as 1 parent *S. alba* with either brown (vars. *alba* or *caerulea*) or yellowish (var. *vitellina*) twigs; hybrids of such origin with yellowish twigs can be called nothovar. **basfordiana** (Scaling ex Salter) Stace. Of trees once known as *S. fragilis*, the commonest variant (var. **russelliana** (Sm.) W.D.J. Koch - Bedford Willow) is a female tree with long narrow leaves with rather uneven teeth; var. **furcata** Ser. ex Gaudin is a male tree with at least some catkins forked and rather wide (some >3cm) leaves. Both arose in cultivation and would be better as cultivars. Var. **fragilis** exists as both sexes and could be native in S Br; the leaves have a rather remote and even serration.

An overdose of hyphens

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I am in the final stages of work on a photographic field guide to British wild flowers. My aim in *Harrap's wild flowers* is to produce a guide that is up to the task of accurate identification. But I also I want it to be 'user friendly' and thus help to make botany more accessible, and I have tried hard to remove as many barriers as possible to an active participation. I am, of course, following the scientific nomenclature of 'Stace 3', and as far as possible using the same English names, but I have some serious issues with the use of hyphens in those English names. It is clear that there are far more hyphens in use in plant names than in everyday English and that their use is inconsistent, confusing and, in some cases, just plain bizarre. They make some plant names appear obscure and long-winded, and follow 'rules' that make no obvious sense. Thus I will be departing from Stace 3 in many cases and I thought it worthwhile to document my reasoning, partly in the hope that my methodology will be more widely followed (or at least understood), and partly to solicit feedback.

Many botanists have a studied disinterest in English names, preferring to use the scientific names. In my experience it is a commonly held belief that you cannot be serious about botany if you use the vernacular. Thus, in the BSBI's 'skill pyramid' one does not get much beyond Level 3 using vernacular names, and to attain Level 5 one 'always' uses scientific names (www.bsbi.org.uk/field_skills.html). An even more extreme example is that some of the *Biological floras* published by the British Ecological Society will tell you *everything* about a plant *apart* from its English name. As a result, some botanists are not very familiar with English names and give them little thought (and in published work there are sometimes sloppy inaccuracies that would not be tolerated in scientific names). Whatever 'serious' botanists may think, however, English names are important if you want to communicate with non-botanists, or indeed with the overwhelming majority of people that have an interest in and affection for wild flowers. Lists of English names have recently been produced for bryophytes and fungi for that very reason.

Many wild flowers have long had vernacular names, reflecting their importance as sources of food and medicine and the fact that they were a part of everyday life for most people, catching the eye with their form and beauty. Other wild flowers have 'book names', which have little or no relationship to the vernacular but were invented by botanists. The result is a wonderful tapestry of language, a tapestry that I very much enjoy, and I would fiercely resist attempts to 'systematise' (= sanitise) these names. But, given that English names matter, they should, as far as possible, be clear and accessible: clear, in that they make some sort of sense; accessible, in that anyone with a good grounding in English should be able to read and write them accurately without further ado, and that the average person should be able to use an index successfully. This is where hyphens rear their ugly heads….

To illustrate the problem, take three genera of the pea family: *Hippocrepis*, *Vicia* and *Lathyrus*, and examine their English names:

Horseshoe Vetch *Hippocrepis comosa*
Wood Bitter-vetch *Vicia orobus*
Tufted Vetch *Vicia cracca*
Wood Vetch *Vicia sylvatica*
Hairy Tare *Vicia hirsuta*
Bush Vetch *Vicia sepium*
Yellow-vetch *Vicia lutea*
Sea Pea *Lathyrus japonicas*
Bitter-vetch *Lathyrus linifolius*
Meadow Vetchling *Lathyrus pratensis*
Marsh Pea *Lathyrus palustris*
Broad-leaved Everlasting-pea *Lathyrus latifolius*
Narrow-leaved Everlasting-pea *Lathyrus sylvestris*
Yellow Vetchling *Lathyrus aphaca*

Apparently there is a grouping known as the 'bitter-vetches' (actually two species in different genera), 'pea' is different from 'everlasting-pea' (actually four species in the same

genus), and 'yellow-vetch' must be different from plain 'vetch', and will be found far-removed from it in an index (actually five species in two genera).

Of course, English names are not necessarily logical, and nor should they be, but by removing some of the hyphens in the above examples, three 'false groups' would be eliminated, the 14 species would be indexed in four places rather than eight, and it would probably be easier to appreciate that 'vetch', 'vetchling', 'tare' and 'pea' are pretty much interchangeable terms.

To cut a way through this maze, let me start by stating my guiding principles:

1. English names should be treated as proper names and capitalised.
2. Hyphens should only be used where they are essential (or at least useful) to the sense in order to prevent ambiguity, where they are necessary to aid correct reading and/or pronunciation, or to make it clear that a group of words is a name.
3. Where an English name is made up of three or more words, it is not necessary *per se* to insert a hyphen somewhere.
4. English names do not have to reflect taxonomic relationships.
5. but... English names should not be hyphenated in such as way as to promote false groupings.
6. English names can by hyphenated, if necessary, to form compound group names where the group really exists.

Let me take these one by one:

1. English names should be treated as proper names and capitalised.

Using capitals, it is always clear that a Small Scabious is *Scabiosa columbaria*, while a small scabious could be a diminutive example of one of several species in the family Dipsacaceae. It also avoids the somewhat strange constructions where, if a plant name contains a 'proper' name, capitals can appear in odd places (e.g. 'perforate St John's-wort'). Fortunately, Stace 3 and the BSBI embrace this principle, but it is ironic that in the botanical world it is Plantlife that persists in using the lower case, just as in the bird world it is the RSPB that is more or less the *only* organisation in Britain to do so with the names of birds.

2. Hyphens should only be used where they are essential (or at least useful) to the sense in order to prevent ambiguity, where they are necessary to aid correct reading and/or pronunciation, or to make it clear that a group of words is a name.

Hyphens can quite properly be used in compound adjectives to prevent ambiguity. There are, of course, numerous examples of this, including:

Small-leaved Lime *Tilia cordata*
Small-flowered Buttercup *Ranunculus parviflorus*
Balm-leaved Figwort *Scrophularia scorodonia*

Hyphens are used legitimately to aid reading / pronunciation:

St John's-wort (rather than 'St John'swort') for *Hypericum*
Mouse-ear (rather than 'Mouseear') for *Cerastium*.
Alpine Saw-wort (rather than 'Sawwort') for *Saussurea alpina*

They can also be used to make it clear that a group of words is a phrase – in this case, a name. In general, I think it helps to hyphenate the possessive (*e.g.* Jacob's-ladder) and phrases where the component words could not stand alone (*e.g.* Lords-and-ladies) as in the following examples:

Monk's-hood *Aconitum napellus*
Pellitory-of-the-wall *Parietaria judaica*
Mind-your-own-business *Soleirolia soleirolii*
Touch-me-not Balsam *Impatiens noli-tangere*
Venus's-looking-glass *Legousia hybrida*
Sheep's-bit *Jasione montana*
Shepherd's-needle *Scandix pecten-veneris*
Lily-of-the-valley *Convallaria majalis*

Conversely, we must accept that many vernacular names do not obviously refer to plants, however they are punctuated, and that adding unnecessary hyphens will not change this; thus there is no need to hyphenate. This is what they look like without the hyphen:

Herb Robert *Geranium robertianum*
Little Robin *Geranium purpureum*
Grass Poly *Lythrum hyssopifolia*
Ragged Robin *Silene flos-cuculi*

Fat Hen *Chenopodium album*
Creeping Jenny *Lysimachia nummularia*
Yellow Rattle *Rhinanthus minor*
Gallant Soldier *Galinsoga parviflora*
Shaggy Soldier *Galinsoga quadriradiata*
Sweet Flag *Acorus calamus*
Water Soldier *Stratiotes aloides*
Herb Paris *Paris quadrifolia* (which also gets around the dilemma of whether or not to capitalise 'Paris', given that it is not a reference to the city)

3. Where an English name is made up of three or more words, it is not necessary *per se* to insert a hyphen somewhere.

Some of the most baffling instances of hyphenation are where hyphens seem to have been put in for no apparent reason. Thus:

Early-purple Orchid *Orchis mascula* – 'Early' and 'Purple' are not at all connected. One does not modify the other. It is an orchid that flowers early and has purple flowers.

Small-white Orchid *Pseudorchis albida* – there is no reason to think that the smallness of the plant is connected to the colour of the flowers (of course, 'small' and 'white' *may* both refer to the flowers, but for this to be clear it would have to be 'Small-white-flowered Orchid').

My impression is that some authors / editors have an aversion to a name that has three or more words unless a hyphen is placed *somewhere* in the name, even if it serves no real purpose (see also point 5 below).

4. English names do not have to reflect taxonomic relationships.

We should accept that the vernacular is … the vernacular. We know that House-leek *Sempervirum tectorum* is not a close relation of Wild Leek *Allium ampeloprasum,* and do not need the names to tell us. Rather, they tell a little of the history of man's interaction with the plants concerned.

The system of scientific nomenclature has been developed to reflect taxonomy, subject to strict rules. There is no need to try to impose similar rules on English names. This can be demonstrated by the method of *reductio ad absurdum*. If English names had to reflect taxonomic relationships and the principle were applied universally, a whole raft of familiar (and ancient) flower names would be swept away. What would happen to Redshank, Fat Hen, Cowslip.... Unfortunately, however, in dozens of cases, it appears that a hyphen has been added simply because species are not related (or not closely related), as in the following examples:

Purple-loosestrife *Lythrum salicaria*
Yellow Loosestrife *Lysimachia vulgaris*

Black-bindweed *Fallopia convolvulus*
Field Bindweed *Convolvulus arvensis*

Chickweed-wintergreen *Trientalis europaea*
Common Wintergreen *Pyrola minor*

Golden-samphire *Inula crithmoides*
Rock Samphire *Crithmum maritimum*

In the first example Purple-loosestrife (family Lythraceae) is hyphenated (with 'loosestrife' un-capitalised) to indicate it is unrelated to Yellow Loosestrife (family Primulaceae). I would argue that this system is far too cryptic and if you are able to decode the message of the hyphen – a distant relationship – you already know the answer, and, if you did not know the answer, you will never decode the message. Worse, one is indexed under L as 'Loosestrife' the other under P as 'Purple-loosestrife'. Maddening!

Notably, this 'rule' is not applied entirely consistently, and in Stace 3 we have:

White Water-lily *Nymphaea alba*, Yellow Water-lily *Nuphar lutea* and Fringed Water-lily *Nymphoides peltata*

Greater Celandine *Chelidonium majus* and Lesser Celandine *Ficaria verna*

White Bryony *Bryonia dioica* and Black Bryony *Tamus communis*

5. but... English names should not be hyphenated in such as way as to promote false groupings.

Current usage includes the following examples:

Field-rose *Rosa arvensis,* Dog-rose *R. canina,* Harsh Downy-rose *R. tomentosa*

c.f. Burnet Rose *R. spinosissima*, etc.

Black-poplar *Populus nigra*

c.f. White Poplar *P. alba,* Grey Poplar *P. ×canescens*

Crack-willow *Salix fragilis*
c.f. Bay Willow *S. pentandra*, etc.

Common Dog-violet *Viola riviniana,* Early Dog-violet *V. reichenbachiana,* Heath Dog-violet *V. canina,* Pale Dog-violet *V. lactea*
c.f. Sweet Violet *V. odorata,* Hairy Violet *V. hirta,* Marsh Violet *V. palustris*

Musk-mallow *Malva moschata*, Tree-mallow *M. arborea*, Marsh-mallow *Althaea officinalis*
c.f. Common Mallow *M. sylvestris*

Are there really four types of rose? What is so different about *Populus nigra* or *Salix fragilis* (to use its old name), and what, exactly, is the difference between a violet and a dog-violet, or a mallow and a musk-/tree-/marsh-mallow? There are many more examples. Simply remove the hyphens, however, and these false trails vanish. In practice it is usually easy to test whether you are dealing with a 'false' group - the group name is probably artificial if one would commonly refer to the plant by just part of the compound name (e.g. a rose, poplar, willow, violet or mallow).

Many of these 'false groups' appear to have been created to encompass the 'needs' of other names. Thus 'Caucasian-stonecrop' *Sedum spurium* appears to be hyphenated because there is also 'Lesser Caucasian-stonecrop' *S. stoloniferum,* which would otherwise, shock-horror, have three words but no hyphens! This process can lead to misleading conclusions. Milk-parsley *Thyselium palustre* has a hyphen (although, for example, Fool's Parsley *Aethusa cynapium* does not), presumably to accommodate the needs of Cambridge Milk-parsley *Selinum carvifolia,* a species in a different genus.

6. English names can by hyphenated, if necessary, to form compound group names where the group really exists.

Some groups do exist and have legitimate compound names. To qualify, there should be a *group* of species, rather than just one, and one should seldom or never reduce the name further, to a single root word. Thus, *Nymphaea* is never referred to as a 'lily', it is *always* a 'water-lily'. Similarly, *Oenanthe* are *never* reduced to 'dropworts', they are always 'water-dropworts'.

I would suggest that the following are legitimate hyphenated group names:
Filmy-fern (*Hymenophyllum*)
Water-lily (*Nymphaea*, *Nuphar* and *Nymphoides*)
Water-crowfoot (*Ranunculus*)
Meadow-rue (*Thalictrum*)
Golden-saxifrage (*Chrysosplenium*)
Lady's-mantle (*Alchemilla*)
Parsley-piert *(Aphanes)* – a very small group, but 'piert' makes no sense on its own
Water-milfoil (*Myriophyllum*)
Water-cress (*Nasturtium)*
Evening-primrose (*Oenothera*)
Rock-rose (*Helianthemum*)
Sea-lavender (*Limonium*)
Forget-me-not (*Myosotis*)
Bird's-foot Trefoil (*Lotus*)
Water-starwort (*Callitriche*)
Sea-blite (*Suaeda*)
Dead-nettle (*Lamium*)
Hemp-nettle (*Galeopsis*)
Cow-wheat (*Melampyrum*)
Hawk's-beard (*Crepis*)
Water-dropwort (*Oenanthe*)
Hedge-parsley (*Torilis*)
Bur-reed (*Sparganium*)

Some of these hyphenated group names could be reduced to one word, *e.g*. 'waterlily', 'watercress' and 'deadnettle'. I notice that 'sow-thistle' *Sonchus* in Stace 1 had become 'sowthistle' in Stace 2 and 3. Others may follow, but considerations of sense or pronunciation will prevent this in many cases. Thus we could use 'waterdropwort', but this is, I think, too cumbersome, and therefore it is better (in terms of reading and pronunciation) to use a hyphen and make it 'water-dropwort'.

Thorny problems

I have found some issues hard to resolve. I am unsure what to do with the following, and would appreciate suggestions:
Wild Service-tree *Sorbus torminalis*
Butterfly-bush *Buddleja davidii*
Wayfaring-tree *Viburnum lantana*

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Appendix:
Below are fuller listings of names with the various issues. They do not cover the whole British flora, however, being biased towards the species that I am including in the photographic guide.

Examples of the misuse of hyphens:

1. False group (or sub-group) names used within the same genus or family.
   Lady-fern *Athyrium filix-femina*, Brittle Bladder-fern *Cystopteris fragilis*, Hard-fern *Blechnum spicant*, Soft Shield-fern *Polystichum setiferum*
   c.f. Oak Fern *Gymnocarpium dryopteris*
   Yellow Horned-poppy *Glaucium flavum*
   c.f. Welsh Poppy *Meconopsis cambrica*
   Common Ramping-fumitory *Fumaria muralis*
   c.f. Common Fumitory *F. officinalis*
   Purple Milk-vetch *Astragalus danicus*
   c.f. Tufted Vetch *Vicia cracca*
   Caucasian-stonecrop *Sedum spurium*
   c.f. English Stonecrop *S. anglicum*
   Field-rose *Rosa arvensis*, Dog-rose *R. canina and* Harsh Downy-rose *R. tomentosa*
   c.f. Burnet Rose *R. spinosissima*
   Black-poplar *Populus nigra*
   c.f. White Poplar *P. alba*, Grey Poplar *P. ×canescens*
   Crack-willow *Salix fragilis*
   c.f. Bay Willow *S. pentandra*, etc.
   Common Dog-violet *Viola riviniana*, Early Dog-violet *V. reichenbachiana*, Heath Dog-violet *V. canina*, Pale Dog-violet *V. lactea*
   c.f. Sweet Violet *V. odorata*, Hairy Violet *V. hirta*, Marsh Violet *V. palustris*
   Musk-mallow *Malva moschata*, Tree-mallow *M. arborea*, Marsh-mallow *Althaea officinalis*
   c.f. Common Mallow *M. sylvestris*
   Rock Sea-spurrey *Spergularia rupicola*
   c.f. Sand Spurrey *S. rubra*
   Treacle-mustard *Erysimum cheiranthoides*
   c.f. Tower Mustard *Turritis glabra*, Black Mustard *Brassica nigra*, White Mustard *Sinapis alba*, Hoary Mustard *Hirschfeldia incana*, Hedge Mustard *Sisymbrium officinale*, Garlic Mustard *Alliaria petiolata*
   Perennial Wall-rocket *Diplotaxis tenuifolia* and London-rocket *Sisymbrium irio*
   c.f. Sea Rocket *Cakile maritima*, Tall Rocket *Sisymbrium orientale*
   Horse-radish *Armoracia rusticana*
   c.f. Wild Radish *Raphanus raphanistrum*
   Swine-cress *Lepidium coronopus*, Winter-cress *Barbarea vulgaris*, American Winter-cress *Barbarea verna*, Creeping Yellow-cress *Rorippa sylvestris*, Large Bitter-cress *Cardamine amara*, Hairy Rock-cress *Arabis hirsuta*, Field Penny-cress *Thlaspi arvensis*
   c.f. Thale Cress *Arabidopsis thaliana*, Hoary Cress *Lepidium draba*, Shepherd's Cress *Teesdalia nudicaulis*
   Sea-kale *Crambe maritima*
   c.f. Kale *Brassica oleracea* var. *viridis*
   Common Marsh-bedstraw *Galium palustre*
   c.f. Fen Bedstraw *G. Uliginosum*, *etc.*
   Viper's-bugloss *Echium vulgare*
   c.f. Bugloss *Anchusa arvensis*
   Pink Water-speedwell *Veronica catenata* and Green Field-speedwell *V. agrestis*
   c.f. Wood Speedwell *Veronica montana*, *etc.*
   Cat-mint *Nepeta cataria*, Apple-mint *Mentha × villosa*
   c.f. Corn Mint *Mentha arvensis*, Spear Mint *Mentha spicata*
   Common Blue-sowthistle *Cicerbita macrophylla*
   c.f. Perennial Sowthistle *Sonchus palustris*
   Red Star-thistle *Centaurea calcitrapa*
   c.f. thistles in several genera.
   Nodding Bur-marigold *Bidens cernua*
   c.f. Corn Marigold *Glebionis segetum*
   Common Michaelmas-daisy *Aster × salignus*
   c.f. Daisy *Bellis perennis*
   Greater Water-parsnip *Sium latifolium*
   c.f. Wild Parsnip *Pastinaca sativa*
   Milk-parsley *Thyselium palustre*
   c.f. Fool's Parsley *Aethusa cynapium*
   Greater Butterfly-orchid *Platanthera chlorantha*, Chalk Fragrant-orchid *Gymnadenia conopsea*, Common Spotted-orchid *Dactylorhiza fuchsii*,

Early Marsh-orchid *D. incarnata*, Early Spider-orchid *Ophrys sphegodes*
c.f. Lady Orchid *Orchis purpurea* etc.
Grape-hyacinth *Muscari neglectum*
c.f. Tassel Hyacinth *M. comosum*

2. To distinguish unrelated plants
Wall-rue *Asplenium ruta-muraria*
c.f. rues Rutaceae
Marsh-marigold *Caltha palustris*
c.f. Corn Marigold *Glebionis segetum*, etc.
Oregon-grape *Mahonia aquifolium*
c.f. Grape-vine *Vitis vinifera*
House-leek *Sempervirum tectorum*
c.f. Wild Leek *Allium ampeloprasum*
Sea-buckthorn *Hippophae rhamnoides*
c.f. Buckthorn *Rhamnus cathartica,* Alder Buckthorn *Frangula alnus*
Bog-myrtle *Myrica gale*
c.f. myrtles Myrtaceae
Procumbent Yellow-sorrel *Oxalis corniculata,* Pink-sorrel *Oxalis articulata,* Wood-sorrel *Oxalis acetosella*
c.f. Common Sorrel *Rumex acetosa*, Mountain Sorrel *Oxyria digyna*
Dame's-violet *Hesperis matronalis*
c.f. Viola spp.
Purple-loosestrife *Lythrum salicaria*
c.f. Yellow Loosestrife *Lysimachia vulgaris*
Water-purslane *Lythrum portula*, Hampshire-purslane *Ludwigia palustris*, Iceland-purslane *Koenigia islandica*
c.f. Pink Purslane *Claytonia sibirica*
Enchanter's-nightshade *Circaea lutetiana*
c.f. Deadly Nightshade *Atropa belladonna*, Black Nightshade *Solanum nigrum*
Horse-chestnut *Aesculus hippocastanum*
c.f. Sweet Chestnut *Castanea sativa*
Spurge-laurel *Daphne laureola*
c.f. Cherry Laurel *Prunus laurocerasus*
Bastard-toadflax *Thesium humifusum*
c.f. Ivy-leaved Toadflax *Cymbalaria muralis*, Common Toadflax *Linaria vulgaris*
Sea-heath *Frankenia laevis*
c.f. heaths Ericaceae
Water-pepper *Persicariua hydropiper*
c.f. peppers *Capsicum*
Black-bindweed *Fallopia convolvulus*
c.f. Field Bindweed *Convolvulus arvensis*
Water-violet *Hottonia palustris*
c.f. Viola spp.
Sea-milkwort *Glaux maritima*
c.f. milkworts *Polygala*
Chickweed-wintergreen *Trientalis europaea*
c.f. Common Wintergreen *Pyrola minor*
Ground-ivy *Glechoma hederacea*
c.f. ivies *Hedera*
Bog-rosemary *Andromeda polifolia*
c.f. Rosemary *Rosmarinus officinalis*
Cornelian-cherry *Cornus mas*
c.f. Wild Cherry *Prunus avium*
Thorn-apple *Datura stramonium*
c.f. apples *Malus*
Ground-pine *Ajuga chamaepitys*
c.f. pines *Pinus* spp.
Golden-samphire *Inula crithmoides*
c.f. Rock Samphire *Crithmum maritimum* (of course, the real 'samphires' are the marsh samphires *Salicornia* spp., which the books insist on calling 'glasswort', or is it just that we 'do different' in Norfolk?)
Hemp-agrimony *Eupatorium cannabinum*
c.f. Agrimony *Agrimonia eupatoria*
Guelder-rose *Viburnum opulus*
c.f. roses *Rosa* spp.
Sea-holly *Eryngium maritimum*
c.f. Holly *Ilex aquifolium*
Greater Burnet-saxifrage *Pimpinella major* and Pepper-saxifrage *Silaum silaus*
c.f. saxifrages *Saxifraga* spp.
Fool's-water-cress *Apium nodiflorum*
c.f. Water-cress *Nasturtium officinale*
Ground-elder *Aegopodium podagaria*
c.f. Elder *Sambucus nigra*
Water-plantain *Alisma plantago-aquatica*
c.f. plantains *Plantago* spp.
Flowering-rush *Butomus umbellatus*
c.f. rushes *Juncus* spp.

Examples of the correct use of hyphens (especially to make a phrase, and where not obviously a plant):
Adder's-tongue *Ophioglossum vulgatum*
Monk's-hood *Aconitum napellus*
Traveller's-joy *Clematis vitalba*
Pheasant's-eye *Adonis annua*

Pirri-pirri-bur *Acaena novae-zelandiae*
Pellitory-of-the-wall *Parietaria judaica*
Mind-your-own-business *Soleirolia soleirolii*
Grass-of-Parnassus *Parnassia palustris*
Shepherd's-purse *Capsella bursa-pastoris*
Snow-in-summer *Cerastium tomentosum*
Coral-necklace *Illecebrum verticillatum*
Good-King-Henry *Chenopodium bonus-henricus*
Jacob's-ladder *Polemonium caeruleum*
Yellow Bird's-nest *Hypopitys monotropa*
Hound's-tongue *Cynoglossum officinale*
Weasel's-snout *Misopates orontium*
Mare's-tail *Hippuris vulgaris*
Venus's-looking-glass *Legousia hybrida*
Sheep's-bit *Jasione montana*
Cat's-ear *Hypochaeris radicata*
Goat's-beard *Tragopogon pratensis*
Fox-and-cubs *Pilosella aurantiaca*
Leopard's-bane *Doronicum pardalianches*
Colt's-foot *Tussilago farfara*
Ploughman's-spikenard *Inula conyzae*
Shepherd's-needle *Scandix pecten-veneris*
Slender Hare's-ear *Bupleurum tenuissimum*
Lords-and-ladies *Arum maculatum*
Yellow Star-of-Bethlehem *Gagea lutea*
Lily-of-the-valley *Convallaria majalis*
Solomon's-seal *Polygonatum multiflorum*
Star-of-Bethlehem *Ornithogalum umbellatum*
Butcher's-broom *Ruscus aculeatus*

Blinks (*Montia fontana*) (subspecies)

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Montia fontana (Blinks) can be a frequent plant in many kinds of damp places throughout the British Isles, (Stace, 2010). In the UK it is split into four subspecies: ssp. *fontana*, ssp. *chondrosperma*, ssp. *variabilis* and ssp. *amporitana* (see the excellent plates in Stace (2010): 506). The BSBI maps show very scattered records of the subspecies, in very varied date-classes. It is easy to record Blinks as the nominate species, as it is often seen without mature seeds, and often we do not have the time to go back to check for ripe seeds, which may have gone anyway, but they are required to identify the subspecies.

I would like to encourage the recording of the subspecies and would be interested in receiving Blinks with ripe seeds (either just the seeds or some of the plant with ripe/ripening seeds). If it is not fruiting at all then please send a bit of a live plant with roots in a small plastic bag. Plants can then be kept in a small tub of water (*e.g.* a yoghurt pot) for some time. I will grow these on to see what seed type they have (using Stace). If you already record the subspecies I would still be pleased to receive some named voucher material with seeds for each subspecies noted. Location, grid reference, date, vice county and recorder/s please (any other info welcome). This is mainly for non-fruiting plants to grow on and to get a better idea of the distributions of the subspecies. Like many other plants, these plants would benefit from molecular studies and if anyone knows of anyone doing this I would be interested in any information. The rank of subspecies is and will remain disputed, until such time as genetic studies can be carried out (Blinks is treated at different levels elsewhere). I look forward to hearing from you.

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Reversion in Elder flowers

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Ἐν δὲ τοῖς ἑπετείοις σχεδὸν τά γε πλείω τοιαῦτα καί δίχροα καί διανθῆ. Λέγω δὲ διανθὲς ὅτι ἕτερον ἄνθος ἐν τῷ ἄνθει ἔχει κατὰ μέσον, ὥσπερ τὸ ῥόδον καὶ τὸ ἴον τὸ μέλαν. (Theophrastus)

Translation: "By two-fold I mean that the plant has another flower inside the flower, in the middle, the same with rose, lily, violet".

Mutations, for whatever reason, have held interest for botanists, and arguably people in general since history began. Theophrastus mentions double roses ('monstrosities') (flowers containing many more than the normal number of petals) in his *Enquiry into plants* (EP XIII, 2), written prior to 286 B.C. Indeed, many notes and papers in *BSBI News* down the years have kept my own interest in the field of plant teratology well-honed. The degree of attentiveness to mutations or monstrosities indicates a counter-intuitive quality to such phenotypes. Meyerowitz, Smith & Bowman (1989) provide a useful review of the history of investigation of 'abnormal' flowers.

The consensus seems to be that the flower in general is the result of a series of mutations of leaves, and, as Darwin (1859) pointed out, reversion will indicate previous conditions. In the example described in this note, a mature Elder *Sambucus nigra* in Newbridge Desmesne, Co. Dublin (v.c.H21) (53°29'10.27"N, 6°10'1.79"W) exhibited a dramatic form of reversion (see photo, Inside Front Cover).

The normal inflorescence consists of corymbs of white flowers (*K5C5A5G1) with yellowish anthers and a characteristic almond-like scent, developing to red-black globose berries. In the specimen here, the floral stems produced whorls of leaves rather than floral parts. To make matters more complex, all the 'corymbs' on the tree exhibited the reversion excepting a number of single flowers, between one and five per corymb, which produced fruits. It remains to be seen whether the seeds within the fruits were viable (see photo, inside front cover). The 'whorls' of leaves produced in the place of floral parts consisted of between one and four leaves.

The fact that this condition was produced on all of its branches implies that the mutation could have happened at the meiotic level or fertilisation level prior to the formation of the seed. The mutation may be a disruption of the usual ABC and E genes according to the ABC model of floral development (Haughn & Somerville, 1988). Other specimens of *Sambucus nigra* L. in the vicinity showed no such mutation.

Samples of the material will be collected at different times in this current year and more detailed photographs and drawings will be done. It may be the case that these floral leaves develop from any of the floral whorls and that other floral whorls develop (whether viable or not). Therefore, an intensive study will be undertaken in Spring to Summer of 2012 to examine the floral development of the tree in question. It is also hoped to conduct a genetic investigation to determine the type of mutation and confirm/reject the proceeding speculations.

Acknowledgement:
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Ophrys apifera variants with sepaloid petals in Britain

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Introduction

Ophrys apifera (Bee Orchid) is the most common British *Ophrys*. In its nominate form ('var. *apifera*'), the lip is convexly globular and tri-lobed in shape ('normal shape'), with a yellow appendage at its tip. The colour is dark or reddish-brown marked with a pattern in the form of a narrow horseshoe-shaped speculum surrounded by a yellow or yellowish-white border, with two yellowish spots or streaks below ('normal pattern'). The sepals are ovate to linear-ovate, pink, marked with green veins. The petals are small, triangular or narrowly oblong in shape, green or pink in colour.

O. apifera is self-pollinating and many variants have been recorded, some of which have been formally named. These variants include forms with 'sepaloid' petals, *i.e.* large linear ovate petals shaped and coloured like the sepals, although rather smaller (typically $^2/_3$ as long and $^1/_2$ as wide).

The purpose of this article is to review the nomenclature and identification of the forms of *O. apifera* with sepaloid petals and their occurrence in Britain. While many such plants have the normal shape and normal pattern described above, some have a flatter lip and/or an abnormal colour and pattern, with the appendage often vestigial or missing.

Nomenclature and identification

The name *O. apifera* Huds. ssp. *jurana* Ruppert, published in Zimmermann (1911), covers all forms of *O. apifera* with sepaloid petals, irrespective of the shape and colour of the lip. At a lower rank, the epithets *friburgensis*, *botteronii, jurana* and *saraepontana* have all been used by various authorities to denote a particular form of lip.

a. *Ophrys apifera* Huds. var. *friburgensis* Freyhold (syn. *O. apifera* var. *botteronii* (Chodat) Brand)

The first described form of *O. apifera* with sepaloid petals was *O. apifera* Huds. var. *friburgensis* Freyhold (1879) from Mount Schönberg in Breisgau, Germany. In addition to its petals, the lip of this variety was also very different from that of var. *apifera*. Instead of being convexly globular with a distinct appendage, the lip was almost flat, only weakly convex, with gently curved concave sides and a scarcely developed appendage. In addition, instead of being reddish-brown with a normal pattern, the lip was yellow with darker, velvety brown patches.

As reported by Baumann (2005: 544-545), this description of *O. apifera* var. *friburgensis* is sufficiently broad to encompass *Ophrys botteronii* ("*botteroni*") which was described by Chodat (1889) from near Bienne, Switzerland. Accordingly, *O. botteronii*, *O. apifera* var. *botteronii* (Chodat) Brand and other names containing the epithet *botteronii* are later synonyms of *O. apifera* var. *friburgensis* Freyhold.

b. *Ophrys apifera* Huds. var. *badensis* L. Lewis & Kreutz

The form of *O. apifera* with sepaloid petals but a normal shaped lip and normal pattern was described by Zimmermann (1911) under the name *O. apifera* Huds. subsp. *jurana* Ruppert var. *friburgensis* based on the (incorrect) assumption that var. *friburgensis* as described by Freyhold (1879) was that form (Zimmermann expressly states that he had not read Freyhold's paper). Zimmermann also re-named *O. botteronii as O. apifera* Huds. subsp. *jurana* Ruppert var. *botteronii* ("*botteroni*") to cover the forms with an abnormal lip shape/pattern.

Based on Zimmermann's nomenclature, the epithet "*friburgensis*" has been widely used for nearly a century for the form with a normal

shaped lip and normal pattern and "*botteronii*" for the form with an abnormal lip – see, for example, Delforge (2006: 448). However, as Freyhold (1879) described it, the lip of var. *friburgensis* was almost flat, weakly convex, with gently curved concave sides and coloured yellow with darker, velvety brown patches. Accordingly, the use of the epithet *friburgensis* for a different form with a normal shaped lip and normal pattern is incorrect. Baumann (2005: 545) listed the latter form under the name *O. apifera* Huds. var. *jurana* (Neuberger) Schuster, but this name was not actually published for that form. Following consultation with Dr Kanchi Gandhi of the International Plant Names Index at Harvard University and Member of the Committee for Vascular Plants of the International Botanical Congress (pers. comm.: 2011, 2012) and other experts, this form is now being named *O. apifera* var. *badensis* in the *Journal Europäischer Orchideen* (Lewis & Kreutz 2012, awaiting publication).

c. *Ophrys apifera* var. *saraepontana*

A third form with sepaloid petals was reported from Saarbrücken, Germany by Ruppert (1924), which he named *Ophrys saraepontana*. The fully opened flowers had a more or less flat lip with five slightly reflexed lobes, a rudimentary appendage, and a pattern in the form of yellow stripes containing island-like yellow-brown patches. It was re-named *O. apifera* var. *saraepontana* (Ruppert) Soó (in Keller et al., 1931: 69) and, much more recently, *O. apifera* Huds. var. *saraepontana* (Ruppert) H. Baumgartner & Kreutz (in Kreutz, 2010) (although the 1931 Soó name has priority at this rank unless invalid). As described and illustrated by Kreutz (2010), var. *saraepontana* has a pattern similar to var. *friburgensis*. The lip is almost flat, although slightly curved, with turned up or very slightly turned back side edges. In most specimens, the slight curvature results in a shallow spoon-shaped lip, but sometimes the lip is extended, reminiscent of *O. apifera* var. *trollii* (Wasp Orchid).

Although this rare form was described by both Ruppert and Kreutz as intermediate between the other two named varieties, it could be considered an extreme form of var. friburgensis.

Records of these various forms from Britain

1. Suffolk

The first record of *O. apifera* with sepaloid petals in Britain was a single plant with a normal lip found by F. Simpson on 24th June 1983 at Dallinghoo, E. Suffolk (v.c.25). It was described by Hyde & Simpson (1984) as follows: "an unusual variety with the two inner perianth segments not small and velvety, but developed to about half the size and colour of the other segments (sepals), very similar to ssp. *jurana* Ruppert, 24/6/1983. This was the only specimen among a colony of twenty flowering spikes."

2. Wiltshire

A single plant discovered at an undisclosed site on the Wiltshire downs (v.c.8) in 1984 was reported by Laurence (1986) as *O. apifera* Huds. ssp. *jurana* Ruppert. It was described as follows: "The labellum pattern differed from that of the normal variant of *O. apifera*. The typical U-shaped pattern was missing and, halfway down the labellum, an irregular yellow bar stretched across the entire breadth."

Until now this plant was generally considered to be the first U.K. record of *O. apifera* with sepaloid petals. It was subsequently re-named *O. apifera* f. *botteronii* (Chodat) P.D. Sell (Sell & Murrell, 1996: 365) but illustrated by Lang (2004: 152) under the name *O. apifera* var. *friburgensis*. However, as the lip has a normal shape, it is not var. *friburgensis* Freyhold (syn. var. *botteronii*) nor var. *saraepontana*. Since the lip has an abnormal pattern, it is also not var. *badensis*. It is therefore a form of ssp. *jurana* Ruppert which is unnamed at lower rank.

3. Somerset

The greatest number of *O. apifera* with sepaloid petals has been found in N. Somerset (v.c.6), where it has been recorded in several locations.

a. Mendip Hills
In 1991 Mrs V.M. Cornell found a number of plants with sepaloid petals in a population of *O. apifera* at a nature reserve on the Mendip Hills (Green *et al*., 1997). Two of the plants from June 1993 are illustrated by Ettlinger (1998: 196 - 197), and another from 1996 by Foley and Clarke (2005: 306) under the name *O. apifera* var. *friburgensis*. However, as the lip shape and pattern are essentially normal, these plants are in fact var. *badensis*. Plants with sepaloid petals have been found most years since in varying numbers (the site is large and the plants appear in different spots each year). Most of these had an essentially normal lip shape and pattern and were thus also *O. apifera* var. *badensis*. An example is illustrated in Fig. 1 under that name. (See photos inside Back Cover for Figs. 1–6)

However, in recent years a few plants have possessed an abnormal lip similar to the line drawing illustrations of var. *botteronii* in Zimmerman (1911). These were therefore reported in the *Journal of the Hardy Orchid Society* ('*JHOS*') as the first U.K. records of *O. apifera* var. *botteronii* (Mackie *et al*., 2011) (As explained in the *JHOS* article: " … the epithet *friburgensis* has been widely used for at least a century to denote the form with a normal lip. So to use it now to denote instead the form with an abnormal lip (syn. *botteronii*) is potentially confusing. Accordingly, the unambiguous synonym *Ophrys apifera* var. *botteronii* has been retained for the purposes of the present [*JHOS*] article."). One of these plants is now re-illustrated in Fig. 2 under the correct name *O. apifera* var. *friburgensis* Freyhold. A further example was found in 2011 (Fig. 3).

C.A.J. Kreutz (pers. comm.: 2011) subsequently advised that a further plant illustrated in the *JHOS* article as var. *botteronii* was in fact the first British record of var. *saraepontana*. This is now re-illustrated under that name in Fig. 4.

A few other plants have had a globular lip with an irregular pattern and/or an elongated lip but do not precisely fit any of the named forms - one example is illustrated in Fig. 5. In 2011 one plant even had one flower with sepaloid petals and another flower with normal petals (Mielcarek, 2012).

b. Rodney Stoke
In 1991 Mrs V.M. Cornell also found another plant with sepaloid petals at a site adjacent to a nature reserve on the southern edge of the Mendips (Green *et al*., 1997) but no further details are known.

c. Near Ubley
In 1992, 13 plants with sepaloid petals were found by R.M. Andrews within a population of *O. apifera* growing on private land north of the Mendip Hills near Ubley, with six further plants being recorded in 1993 and two in 1994 but not subsequently (pers. comm., 2012). Photographs taken in 1992 show that the lip was normal in shape and pattern so these were *O. apifera* var. *badensis*.

d. Near Portishead
In 1998 and 1999, a small population of *O. apifera,* including a single plant with sepaloid petals and a normal lip, was found by H. Parsons at a nature reserve near Portishead (Green *et al.*, 2000). In 2005, another small population of *O. apifera,* which included six plants with sepaloid petals, was found nearby, this time growing on private land. These plants all had normal lips and were therefore *O. apifera* var. *badensis* (Fig. 6). This second population is still extant, with numbers varying each year.

e. Blue Anchor
In 2009 a single specimen of *O. apifera* var. *badensis* was found by C. Gladman (pers. comm., 2012) in a large population of Bee Orchids growing in a meadow at Blue Anchor. It is no longer extant, after the meadow was mowed in 2010, just as the orchids were coming into flower.

4. Dorset
In 2005 three plants with sepaloid petals were found by L. Edwards (pers. comm., 2005) amongst a colony of *O. apifera* near Fontmell, Dorset (v.c.9). The three plants re-appeared in 2006 and again in 2007 but there has been no further sign since, despite searching. These all

had a normal lip shape and pattern and were thus also *O. apifera* var. *badensis*.

5. Other records

A peloric specimen with a sepaloid lip as well as sepaloid petals was found at Oxwich Dunes, W. Glamorgan (v.c. 41) in 1990 and again in 1993 (Lang, 2004: 152). A similar plant was reported from Belhus Woods Country Park, near Aveley, South Essex (v.c.18) (Smith, 2010). In addition, Ettlinger (1997) reported that "plants with sepaloid petals have also been found rarely" in Sussex and Hampshire. However, as it has not been possible to confirm these reports, no further details are known.

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What can a vice-county recorder expect to learn from the study of herbaria?

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Introduction

Herbaria sheets are usually filed systematically by species with no accompanying catalogue. Thus a vice-county recorder who wishes to search one of the national herbaria for all records of interest in a particular vice-county, rather than for records of a particular species, has a problem. It is a serious amount of work. The computerised scans of 'Herbaria at Home' available on the web, after being documented by volunteers at home, is a potential solution, and an amazing 97,100 sheets (at 15th March 2012) have already been documented in this way in just six years, though this is but a tiny sample of the several million sheets available.

I was faced with a similar problem with the British herbarium of Commander Francis Martin Norman (1833-1918) for the period 1872-1916, which had been left to the Berwickshire High School at Duns and came into my custody in 1993. The sheets related to many parts of Britain and I felt they were of a high enough quality to be worth sharing with the vice-counties involved. I chose to catalogue the whole herbarium, as I could not easily assess which records would be of particular interest, and ended up with 1,162 records in Excel relating to 42 v.cc. It was a big exercise, which I have only now completed.

I adopted a different approach with the Berwick Grammar School Herbarium, which was transferred to the Borough Museum in 2009. It is of lower quality and mainly local to Berwick-upon-Tweed. After an initial assessment, I spent one day studying it in detail and making a species index of the 404 sheets. For 75 of the more interesting sheets I copied full details to input to a spreadsheet at home.

My recent search of 'Herbaria at Home' was rapid. It yielded 141 sheets relating to Berwickshire. This was quite gratifying, as Berwickshire was an unlikely hunting ground for most of the predominantly south-country collectors represented.

At Edinburgh, I was interested in assessing what was held in E for Berwickshire, so I searched a sample of species folders. I recently managed 53 folders in a day, with a lot of climbing and carrying, before my head started to swim and my legs to wobble. That is a smallish sample. It yielded 31 relevant sheets.

So what, I ask myself, have I found that has scientific or historical value and has it been worth the effort?

Voucher specimens

Part of the rationale for a herbarium is to hold voucher specimens for records that might be queried. I am incredible lucky with Berwickshire in that so much of the historical recording was carried out by very competent botanists, or reviewed by them. So there are remarkably few dubious records. Those that are problematic mostly relate either to the critical genera (which I will ignore in this article) or to species-groups where there have been taxonomic advances. I have had some modest joy from Norman's herbarium in resolving such issues. Here are the main ones, as examples of what can be learned from a single herbarium.

Norman's herbarium has a specimen of *Fumaria capreolata* (White Ramping-fumitory) which, in view of taxonomic issues, was the sole verified record for Berwickshire until I found the species a few years ago. *Polygonatum multiflora* (Solomon's-seal) is also there, masquerading as *P. odoratum* (Angular Solomon's-seal) at a Berwickshire site with a series of problematic records of the latter. The specimen of *Symphytum officinale* (Common Comfrey) is in fact *Symphytum ×uplandicum* (Russian Comfrey). This specimen is valuable evidence to support the contention by Dr Roderick Corner and myself that many of the early records for *Symphytum officinale* from

the Scottish Borders are errors for the hybrid. Similarly, the specimen for *Scrophularia umbrosa* (Green Figwort) is useful evidence that the early records of *Scrophularia auriculata* (Water Figwort) from the river Tweed are indeed errors for *S. umbrosa*. Then it is satisfactory that the Roxburghshire specimen of *Lepidium campestre* (Field Pepperwort) is indeed that, rather than *L. heterophyllum* (Smith's Pepperwort), with which it has been much confused.

There is particular fascination in *Ranunculus ×kelchoensis (R. fluitans × peltatus)* from the river Tweed, the earliest record for North Northumberland. The hybrid had not then been described, but Norman, though naming it *Ranunculus aquatilis* var. *fluitans*, acutely observes: "n.b. in HA. & Hay no mention of the 2 sorts of L. in this sp". The references are to Hooker & Arnott *The British flora* and Hayward's *The botanist's pocket book*. The hybrid is characterised by the presence of floating leaves that are intermediate between laminar (flat) and capillary (thread-like), as well as by submerged capillary leaves.

Historical botanical locality records

Herbaria in general are frustrating for the botanist who is searching for additional historical botanical locality records, as they were just not collected for that purpose. Historical books and journals are much more productive. Most of the specimens of the scarcer species tend to have been collected from classic sites that are already well documented. It follows that meagre pickings are all that can be expected, with just the chance of a few gems. That has been my experience: indeed the limited output from a lot of work is just what I am seeking to highlight in this article.

I have analysed at 1km scale what herbaria have contributed to our knowledge of County Rare Plant Register species in Berwickshire up to 1930 (those that are at least locally rare or scarce). Less than 5% of the known populations have been gleaned from herbaria. The rest have been gleaned from the literature of the day. Only 17% of pre-1930 CRPR populations at 1km scale have been refound since 1986.

A – All localised pre-1930 CRPR populations		
B – Of which added by my work 2009-2011		
Source	**A**	**B**
BM	8	
E	16	5
F M Norman	11	11
HatH	11	11
HAMU	3	
K	1	
Herbaria only	**50**	**27**
Literature	1,074	
All populations	**1,124**	**27**

Previous to my recent work, a significant contribution came from work by J.E. Dandy and Sir George Taylor on *Potamogeton*, which identified six populations, including three of hybrids, which would neither have been known about nor accepted without herbarium evidence. Records of five further CRPR populations from a variety of sources were recovered out of the VPDB during the Atlas 2000 verification process.

Botanical records from Norman's Herbarium

Despite their limitations, I have found valuable records by working with herbaria for Berwickshire, as have some of the vice-county recorders with whom I have shared records. Here are the highlights from Norman's herbarium:

Under *Carex limosa* "probably *var. irrigua*" I found *Carex magellanica* (Tall Bog-sedge), sent in by Revd. J.J.M.L. Aiken. This is the only record for Berwickshire. Then there is a record of George Bolam and Norman pottering together by the river Tweed on 26th July 1904, when they came across "one or two plants only" of *Glyceria maxima* (Reed Sweet-grass). This is the earliest record for the species by the Tweed. It is now locally abundant there, so such clear evidence of colonisation is of particular interest, especially at a locality where Norman had collected many times over the years, it being within walking distance of his home.

In East Sussex *Gentiana pneumonanthe* (Marsh Gentian) was collected in September 1875 from "Little Common, Bexhill, in a moist sloping field between Church & Jas. Simpson's". Paul Harmes notes that this species is not recorded in Roper's *Flora of Eastbourne*, 1875. Mark and Clare Kitchen report that in East Gloucestershire there are new historical localities for *Ranunculus arvensis* (Corn Buttercup), *Colchicum autumnale* (Meadow Saffron), *Hydrocharis morsus-ranae* (Frogbit) and *Vicia parviflora* (Slender Tare). *Arabis turrita* (Tower Cress) was collected in June 1877 from "Boynton nr Bridlington, E R. Yorkshire, by bridge, on either side, in Boynton Park, *? [possibly introduced]". Richard Middleton advises that this is new to South-east Yorkshire and may explain an unsubstantiated record for the similar *Arabis glabra* (Tower Mustard) in the *Vice-county Census Catalogue*. In North Northumberland, *Carex maritima* (Curved Sedge) was found at "Holy Island, bed of old sea-arm". This appears to be a different locality from other records from Holy Island, suggesting a mobile population there. In East Lothian, *Elodea canadensis* (Canadian Waterweed) was recorded from Presmannan Lake in 1873, where it must have become a nuisance, as Norman notes that "the 'American Weed' had been raked ashore". This was just about the time it was being first recorded in a number of Scottish counties, spreading dramatically, after being first found by George Johnston as a mysterious introduction in the Hen Poo at Duns Castle in 1842. In Westerness, Norman collected *Veronica alpina* (Alpine Speedwell) in 1888 from "Stob Choire Clarigh, Inv'sh, 3858ft, day I got lost on top". Ian Strachan reports that this is a new locality. Norman stayed at Kinlochspelve on the Isle of Mull in 1876. Lynne Farrell reports that his collections of *Cephalanthera longifolia* (Narrow-leaved Helleborine), *Cystopteris fragilis* (Brittle Bladder-fern) from a sea cave, *Mertensia maritima* (Oysterplant) and *Pseudorchis albida* (Small-white Orchid) are all at new localities.

Most of the interesting records have not come from botanical hotspots; rather they have come from more or less casual botanising, assisted maybe by local knowledge from acquaintances.

The history of natural history

Biographical studies have unexpectedly proved much the most satisfying outcome from my research. This has been particularly so with Norman. There are just enough random annotations to the herbarium sheets for a story to emerge. A strong network of fellow naturalists here in the Scottish Borders is observed at work outwith the formal meetings of the Berwickshire Naturalists' Club, whose reports are otherwise just about the only available evidence of their activities. These were Andrew Brotherston, Revd Marshall Aiken and William Shaw, who were excellent botanists, while James Hardy and Arthur Evans were expert all-round naturalists. George Bolam was a prominent ornithologist, while the Very Revd Dr David Paul FLS, a leading figure in the Church of Scotland, was a mycologist and a botanist with a special interest in ferns and the genus *Primula* in Europe. These naturalists did not just go out together in the Scottish Borders, they visited the Highlands too, and Norman regularly stayed with Evans at Cambridge. There is fascination in the detail of these personalities and their trips.

I have been helped by Richard Middleton who kindly prepared Norman's family tree, gleaned from the Web, which showed that his mother had come from the wealthy Martin family of Martins Bank. Some of his trips south are explained as visits to family members.

The Berwick Grammar School Herbarium led me to biographical research on the two main collectors, John Bishop Duncan at Moffat and Frank Brady at Berwick.

Through 'Herbaria at Home' I learned that the arch-collector Charles Bailey had made a short visit to Berwickshire in 1900 and had made some very carefully annotated collections of locally scarce species from new local-

ities. These included *Dianthus deltoides* (Maiden Pink).

The tale from Edinburgh was a sad one. Two herbaria had been transferred to E from the Scottish Borders. While part of a modest one from Berwick Museum has survived, the larger one from Kelso Museum appears to have perished.

While my studies have produced results, they are not quite what I had expected at the outset. I had not expected so much biographical interest, and that, rather than the botanical records, has proved the main justification of my labours.

I have written a longer article on Norman's herbarium. This is available free as a PDF on application to me at the email address above.

Francis Martin Norman (1833-1918) - a Berwickshire botanist. Photo comm. M. Braithwaite

Loft clearance in Cheshire reveals century-old specimens, and a local 'first'

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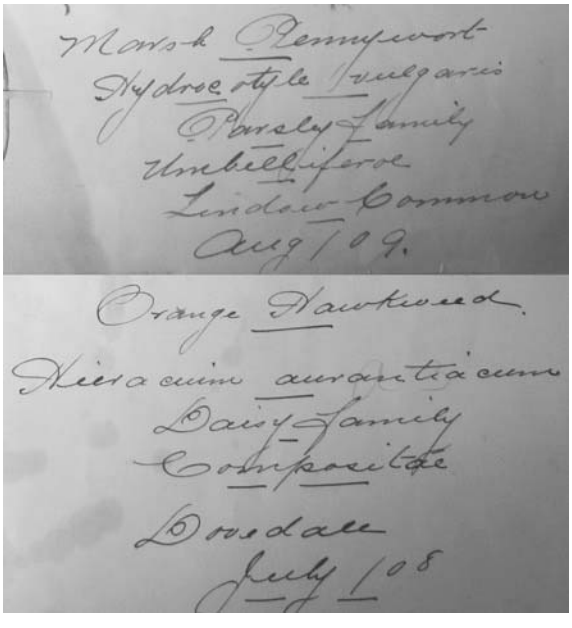
A recent enquiry from Stockport resulted in an offer of several herbarium specimens which had been collected between 1907 and 1911 in the counties of Derbyshire (v.c.57) and Cheshire (v.c.58). Although the sheets had been damaged severely by water during decades of unsuitable storage, the specimens remained in surprisingly good condition. Now, with the specimens re-mounted, and following discussions with the county recorders and consultation of relevant literature, I have found that amongst the (at first sight rather unremarkable) collections, is a first local record of the non-native species *Pilosella aurantiaca* (Fox-and-cubs) in Dovedale, Derbyshire, and an early record, if not the first, of *Lamiastrum galeobdolon* (Yellow Archangel) in Woodbank, Cheshire.

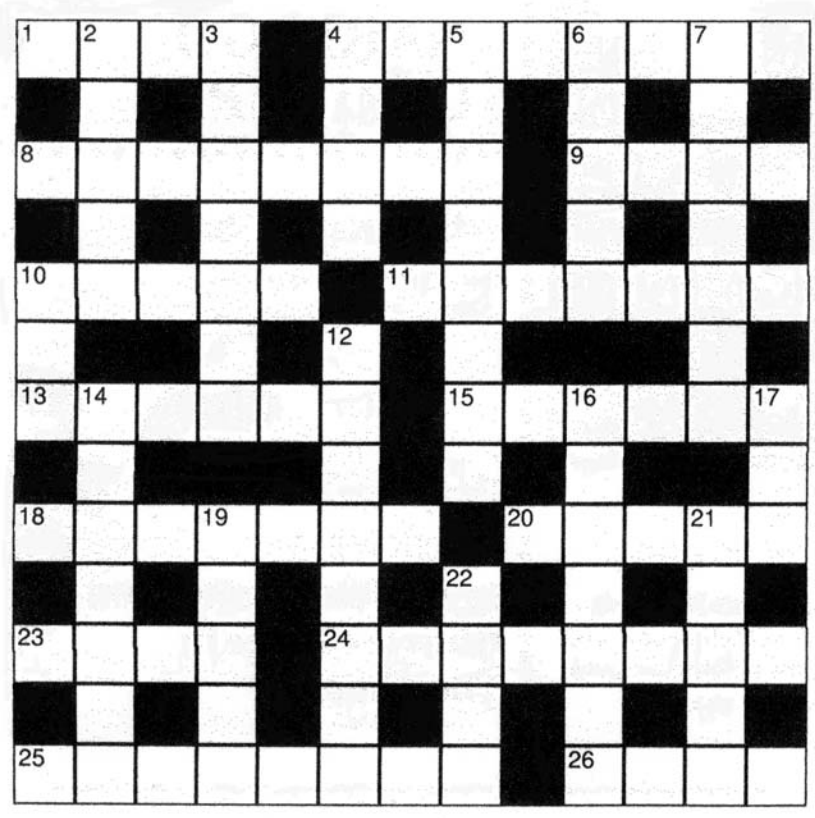
The material is part of a larger set (the highest sheet number is 462) and the collector is currently unknown. Therefore, I would be very grateful for any information regarding the rest of this set. The present sub-set was given previously to a Mr Granville Commins on the retirement of Mr Hancock, then Headmaster of Hazel Grove Council School (now Hazel Grove Primary School) in Stockport (c.1954), amongst other documentation, which, unfortunately, was destroyed at the time. Then they passed to Mr Commins' son John, in whose loft they have resided ever since. It is not known whether the plants were gathered by Mr Hancock (who would have been about 20 years old at the time of collection) or given to him by a better known botanist/institution for teaching purposes. It is doubtful that Mr Hancock had in his possession any more of the sheets because the ones that he had were passed to Granville Commins, who retained them. Therefore, I think the external source scenario is more likely.

I include with this note a sample of the handwriting (see figure below) in the hope that it may be recognised. Of the well-known botanists who collected in v.c.57 and/or v.c.58, the labels perhaps bear most similarity to the flowing hand of James Wheldon (1862-1924), though the distinctive capital 'P's and 'D's of the unknown collector set the two apart.



Botanical Crossword 18

by *Cruciada*



Across

1. Prevent plant containers being turned upside down (4)
4. Saw tepee constructed from Mediterranean Lathyrus (5,3)
8. Protection for tips growing wild in star co-op (8)
9. Autumn pitch (4)
10. Lots of birds said to favour this garden bloomer (5)
11. Beginnings of dawn – rosy - arose in play of sundew (7)
13. A soft fruit may be in evidence (6)
15. Aquatic plant that's a poem at heart of the Spanish article (6)
18. Stamp on underside of some plants affected by this in winter (7)
20. A grain or nut (5)
23. Reported to regret vernacular name of this plant (4)
24. Follow bicycle not cow by fruit of e.g. Aquilegia (8)
25. Peas rust out in meadows (8)
26. Pouches primarily space and cavity stuffing (4)

Down

2. Sound horn hard when seeing projection (5)
3. Polite arrangement before English term used for stalk (7)
4. Mark's carved integrally on stem after 9 (4)
5. Applied to put bend in, as stamens may be (8)
6. Expresses disapproval about hard clumps (5)
7. Prepare to learn, e.g., how to grow (7)
10. Price on application for this grass (3)
12. Was Simon of Cyrene such a cabbage? (8)
14. Cheeseplant (7)
16. Monkey, spider, frog - or noisy children! (7)
17. Bristle component of straw, naturally (3)
19. Underwear caught down? Replace with some kind of leaf (5)
21. Species from an earlier environment cut short is treasured memento (5)
22. Trim top off trees as gifts for the needy (4)

SMALL PROJECT GRANT REPORTS

Using BSBI data for plant distribution change studies: what influences plant distribution changes and what changes are occurring?

ALEXANDRA BELL, *Department of Biology, University of York, Heslington, York, YO10 5DD*; (akb506@york.ac.uk)

It is important to determine where species distribution changes are occurring and what is causing the changes. This can be used to determine how and where to conserve species, habitats and ecosystems. Data for animal species have been used to provide the evidence needed to see that changes are occurring in the distributions, both in latitudinal and altitudinal range extents, as a result of climatic changes. Studies on plants are mainly limited to altitudinal changes and small scale studies of change in distribution. Thanks to the efforts over the past 60 years of a large number of dedicated enthusiasts, county recorders and those responsible for maintaining the BSBI database, it is now possible try and answer important questions about how some plant species are changing their distributions in Britain. Through the support of the BSBI and NERC my PhD aims to tackle some of the questions about plant distribution and climate change using these data.

One of the clearest indications that climate is changing species distributions has been the northward shift in the northern range margin of many animal species (e.g. Chen *et al*., 2011; Hickling *et al.*, 2006). This phenomenon, however, has not been investigated for plant species. One of the main aims of my PhD is to assess if the northern range margins of southerly distributed plant taxa in Britain are shifting further north. This would be expected in a warming climate, as the habitat becomes more favourable in cooler, generally more northern areas. To do this, the northern range margin of southerly distributed species in the period up to 1969 will be compared with the same data for the period 1984 and 1999.

Clearly, climate change is not the only driver to have affected species over these two time periods. Fragmentation and degradation of the habitat will limit species' ability to spread, as areas of land that would have been suitable for colonisation may now no longer be suitable, owing to agricultural intensification. Also, some areas that were originally available for colonisation have now been developed, and so the impact of urbanisation of the landscape may prevent some of the spread. There are also important differences in the dispersal abilities of plants and animals, which may restrict the movement of plants more than animals. Plant propagules are dispersed by a number of methods, some of which disperse further than others. However, the propagule is unable to dictate were it will ultimately land and so if it lands in unsuitable habitat then it will fail to establish at the site. Animals, however, are far more mobile and therefore are able to physically shift to a more favourable site. During this part of the PhD study it is aimed to try to ascertain if species are moving north and what effect other factors have had on the shift.

Shifts in the core of a species' range, rather than at the margins, may also be visible using high resolution data. Some plant species and regions receive a higher level of interest than others and are therefore recorded at a higher resolution than other areas or species. The Bee Orchid *Ophrys apifera* is often well recorded wherever it occurs and will therefore be used as a 'model' species to study whether climate change may be affecting the habitat preferences of species as formerly unsuitable habitats become more suitable under a warmer climate. One of the reasons for choosing this species is that BSBI recorders have observed a shift in the habitat preference of this species for heavier clay soils in the southern half of the

U.K. (*e.g.* Bedfordshire, Hertfordshire). As orchids in general are of high interest both to the public and plant enthusiasts alike the presence of Bee Orchids is recorded far better and at a higher resolution than many non-orchid taxa. As such it makes it an ideal study species. The research will be carried out both using the BSBI data to look at overall distributions in relation to habitat and field work, which is aimed to complement the research using BSBI data to find sites. Last summer, field work was carried out in sites across Hertfordshire and Bedfordshire, looking at historic populations (pre-1980) and populations that appear to have arisen from colonisation events in the last 20 years. Unfortunately 2011 proved a bad summer for Bee Orchids, and on many sites no spikes were found. It is hoped that this summer more old and recent sites can be located and more data collected to add to this year's data. If any recorders can help me locate sites that have held Bee Orchids for at least 30 years or where they have 'appeared' in the last 20 years I would be keen to hear from you.

Acknowledgements:
If it were not for all the people involved in collecting and compiling data for the BSBI this research would not be possible, so thank you to all those who have collected and input the data. Also I would like to thank Prof Chris Thomas and Dr Kevin Walker, my supervisors for my PhD, Dr. Olivier Missa and Prof. Alastair Fitter for their input into my project, and to Trevor James, Chris Boon and David Pearman for all the advice on the data I have been using.

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ALIENS

Nuts on the streets of London

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In September 2006 Nick Bertrand led a London Natural History Society meeting in London, in v.c.17, just south of the Thames, to look at the botanical street-life of Southwark, described by him as "Alien aliens and alien natives … the waifs and strays from the modern breed of gardener, landscraper and habitat creator". One of the objects was to use the pooled expertise of the participants to attempt to put names to some of the plants which he had been unable to identify. One of these was growing with several smaller versions under railings in front of a block of flats in Porlock Street, and was thought by Nick to be "probably Fabaceous". Inspection showed a bushy plant less than a foot tall, the leaves of which were alternate and paripinnate with no tendril. Each had two pairs of rather leathery, broadly ovate, glabrous (but with ciliate margins), entire, rounded leaflets to 2×4 cm. The stipules were 10-15mm long, very narrow and acute. Although the plant was distinctive no-one could produce a name at the time, although it was thought to be "probably a food plant". John Swindells and I visited the site again a couple of days later and were able to spend a bit longer looking at it. Lifting up the leaves to look under the plant revealed a group of stalks going into the ground from the lower nodes. This rang a bell, and, on gently pulling on one, a peanut, albeit a small one, popped out of the ground - the plant was a Ground Nut *Arachis hypogaea* (see Back Cover).

To develop properly Ground Nuts need long, hot summers and adequate rainfall, so they rarely flower in this country, which says something for the heat of urban London in 2006. Non-flowering plants do crop up regularly though, as in South Hants., reported by Eric Clement in *BSBI News* 97. It will come as no surprise to hear that the London plants did not survive the ensuing winter.

Peanuts were derived in ancient times from the wild *Arachis monticola* of South America, and there are now thousands of cultivars, with one or the other of two growth habits: 'runner', trailing along the ground, and 'bunch', which are upright, to which the plant Nick found presumably belongs, although that is far from certain, as it was well out of its preferred global range and probably stunted. Wikipedia tells me that China produces about 40% of the world's annual peanut crop, followed by India at 18% and the U.S.A. at 7%.

The streets of urban London can be very productive, if they have not been sprayed with noxious chemicals, and this meeting was particularly fruitful, with a host of escaped, self-sown and naturalised aliens. Other plants, of varying desirability, seen on the day included: *Achillea filipendulina* (Fern-leaf Yarrow), *Amaranthus retroflexus* (Common Amaranth), *Cannabis sativa* (Hemp), *Chenopodium murale* (Nettle-leaved Goosefoot), *Cyrtomium falcatum* (House Holly-fern), *Datura stramonium* (Thorn-apple), *Digitaria sanguinalis* (Hairy Finger-grass), *Eryngium planum* (Blue Eryngo), *Galinsoga parviflora* (Gallant-soldier), *Geranium macrorrhizum* (Rock Crane's-bill), *Isotoma axillaris* (Laurentia), *Juglans nigra* (Black Walnut), *Juglans regia* (Walnut), *Morus alba* (White Mulberry), *Nicandra physalodes* (Apple-of-Peru), *Nicotiana sylvestris* (Woodland Tobacco), *Passiflora caerulea* (Passion-flower), *Pelargonium peltatum* (Ivy-leaved Geranium), *Persicaria capitata* (Pink-headed Persicaria), *Platanus* × *hispanica* (London Plane), *Portulaca grandiflora* (Moss Rose), *Pseudofumaria alba* (Pale Corydalis), *Pteris nipponica* (Japanese Brake-fern), *Rosmarinus officinalis* (Rosemary), *Solanum chenopodioides* (Tall Nightshade), *Solanum diflorum* (Winter-cherry) and *Verbena bonariensis* (Argentinian Vervain).

Finally, I apologise for the late submission of this note – I wrote most of it five years ago then forgot about it as it was in darkness under a heap of clutter at the bottom of my mind until a chance conversation with Eric Clement returned it to the light of day.

Reference:

CLEMENT, E.J. (1997) 'Peanuts!' *BSBI News* **97**: 48.

Cardamine quinquefolia – a persistent and spreading garden weed

JOHN PRESLAND, *175c Ashley Lane, Winsley, Bradford-on-Avon, Wiltshire, BA15 2HR*; (johnpresland2@tiscali.co.uk)

Cardamine quinquefolia (Whorled Coralroot) is described in Stace 3 as "Intrd-natd; banks of ditches and streams; Mons since 2005". It is an attractive eastern European plant with purple flowers 14-18 mm long and with a single whorl of leaves with 5-7 serrate leaflets on each of its short aerial stems. It spreads extensively by rhizomes, as one of the photographs, (see Colour Section, plate 4) taken in my garden in the Wiltshire village of Winsley illustrates. I suppose I must have introduced it some years ago, but I can't remember doing so. However, as well as the vegetative growth, it has also appeared in two different places in the garden and also in the garden next door, so is probably reproducing from seed. It has also been seen in a garden in Bradford-on-Avon a mile or so away, where it is probably of separate origin. It appears to have all that is necessary to become widespread. It is not currently eligible for BSBI recording, but seems a good candidate for inclusion.

Some interesting alien plant records from East Sussex (v.c.14)

MATTHEW BERRY, *Flat 2, 11 Southfields Road, Eastbourne, East Sussex, BN21 1BU*

Not too long ago, in these pages, a botanist from Kent gave an account of alien plant species he had recorded while in Eastbourne, visiting a relative (Nicolle, 2008). I thought it might be interesting to present a selection of alien records from this area (enlarged somewhat to take in Bexhill), made since the appearance of that article. The records are nearly all from 2011, and of various origins.

In early May 2011, I found what I thought was very likely to be *Cymbalaria pallida* (Italian Toadflax) (later confirmed by E.J. Clement), growing on a low wall facing the B2182 in Bexhill (TQ7378807041) – an unusual alien in south-east England, preferring the cooler, damper conditions further north. There does not seem to be anything special about the wall or its position, so it could be that the species is a little under-recorded. The large flowers are eye-catching, but in the vegetative state it could be mistaken for the pubescent subspecies *visianii* of *Cymbalaria muralis* (Ivy-leaved Toadflax). As a postscript, I must add that this wall has since been 'tidied up', and the last time I looked there was no sign of *C. pallida*. Is it too much to hope that this has been happening for some years, without detrimental effect on the plants?

Not far away, and still on the B2182, patches of an alien *Erodium* (stork's-bill) species dotted the 'concrete garden' of some flats; characterised by simple leaves, with shallowly-lobed margins, and relatively large, pink flowers, marked with darker pink veins. There were additionally at least two patches where it had escaped into an adjacent side street (TQ7403507172). This was identified by EJC as *Erodium* ×*variabile*, a garden plant, supposedly sterile, but in this instance spreading itself about as if producing viable seed. For the most part it formed loose patches, but in one or two choice spots made surprisingly dense cushions. It is a hybrid of two Mediterranean species: *E. reichardii* and *E. corsicum*, and easier to grow than either parent.

In late July 2011, I found about a dozen plants of *Urtica membranacea* (Membranous Nettle), another Mediterranean species, growing against opposing walls by the marina of Eastbourne's Sovereign Harbour (TQ6401301839). The first records for Sussex were made earlier in the year, Tony Spiers and Paul Harmes having found it in the Brighton and Lewes areas respectively. These records (along with those from other counties) suggest evidence of spread, due to favourable climatic changes. Nearby, *Euphorbia maculata* (Spotted Spurge), coming to us from North America via southern Europe, is flourishing between paving slabs close to flats within the harbour development (TQ6392901565). Presumably it is an escape from plant containers. Both this and the previous species are mentioned in Clement (2010), where *Urtica dubia* Forskål (*nom. illegit.*) should be replaced by *U. membranacea*.

Another infiltrator of pavement cracks at Sovereign Harbour is *Polycarpon tetraphyllum* (Four-leaved Allseed), which continues to thrive after Roy Wells discovered it, several years ago. Although native in the Scillies and south-west England, it may well be of Mediterranean origin (via plant containers) here and elsewhere in south-east England (pers. comm.: E.J. Clement).

Cotoneaster species excepted, I do not particularly associate the chalk area of the downs with alien plants, but in late June 2011, in just such habitat, I found an unfamiliar *Ornithogalum* (star-of-Bethlehem) species, with racemose inflorescences. There were several strong patches in long grass by a bridleway, close to the Downside district of Eastbourne (TQ5856500567). EJC determined it provisionally as '*Ornithogalum hajastanicum*'. Further research has shown that the correct name is *O. hajastanum* Agapova, 1966 (*O. ponticum* Zahar ssp.

obconicum Zahar in earlier literature). This can be separated from its closest relative *O. ponticum* by the narrower green veins on the backs of the otherwise white tepals, and its liking for a drier habitat. It is a native of the Transcaucasus region, being found, for example, on dry, stony slopes in Armenia (Gabrielian & Fragman-Sapir, 2008, which contains a colour plate of *O. hajastanum*; but the book mis-spells its name as '*O. hajastanicum*'). As luck would have it, our v.c.14 Recorder, Paul Harmes, had recently returned from leading a field trip to Armenia, where he had photographed what seems to be the same *Ornithogalum*. He was able to match his images with named material in a national collection, thus adding further weight to the determination.

Ornithogalum L. is a puzzling genus of *c.*200 European, west Asian and African species. Some recent accounts limit it to *c.*50 European and west Asian species, and even then it includes up to 17 different chromosome numbers. About 32 species are presently sold as garden plants, but not, it seems, *O. hajastanum*. Is it being sold under a different name?

Acknowledgement:
I would like to thank Eric Clement for encouraging me to write this note, reading an earlier draft of it, and suggesting improvements; and both EJC and Paul Harmes for determining the *Ornithogalum*.

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GABRIELAN, E. & FRAGMAN-SAPIR, O. (2008). *Flowers of the Transcaucasus and adjacent areas: including Armenia, eastern Turkey, southern Georgia, Azerbaidjan and northern Iran*. A.R. Gantner Verlag, Ruggell, Liechtenstein.

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REQUESTS

Typha and *Spartina* – wanted for study

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Typha (Bulrushes) are fairly widespread but often scattered in the U.K. There are two known taxa, both native: *Typha latifolia* (Bulrush) and *T. angustifolia* (Lesser Bulrush), with a mostly sterile hybrid between the two, *T.* ×*glauca*. With the introduction of Bulrushes at pond edges and elsewhere, it might be worth looking for any other taxa that might have arrived in the U.K. To this end I would be interested in receiving Bulrushes (particularly *T. angustifolia*) for further study. The plant should have the head/s intact (not needing the main stem) and the lower part to include leaf sheath and at least one leaf blade attached.

Spartina ×*townsendii* (Townsend's Cord-grass), *S. alterniflora* (Smooth Cord-grass), *S. maritima* (Small Cord-grass) and to a lesser extent *S. anglica* (Common Cord-grass) are wanted for study of vegetative characters. Any material of the other two species listed in Stace (2010) would be useful too. I would be interested particularly in the first three of these taxa, especially where confirmed, and at the flowering stage for further confirmation.

The flowering phenology of *Tilia cordata* (Small-leaved Lime) – can you help?

CLARE BUGG, *Department of Natural & Geographical Sciences, Edge Hill University, St Helens Road, Ormskirk, Lancashire, L39 4QP*; (Clare.Bugg@edgehill.ac.uk)

I am currently conducting a PhD study into the relationship between climate and the UK distribution of *Tilia cordata*, in particular looking at what affects its fertility and development, to predict the likely implications of climate change for this species.

You may well have read my request for help collecting seeds in October's issue of *BSBI News* and on the website, and I was extremely grateful for the help and interest that came from BSBI members. I was also really pleased to meet a lot of you at the annual exhibition in London and was thrilled by the interest that people had in my project.

Following on from the work on seed fertility, this spring/summer I am hoping to gather some data on the flowering phenology of *T. cordata*. Being an insect-pollinated plant, the timing of flowering to coincide with pollinator abundance is critical to successful fertilisation. Much current research has documented the effects of climate change on the phenology of both plants and animals and I am interested to find out about any variations in the flowering of this species across the country and any relationships with temperature.

This information will be extremely interesting and the more data I can generate from around the country, the more valuable the results will be. I am therefore again looking for interested volunteers to get involved in the research.

You don't need any special skills or experience to take part, just a commitment to visit a *T. cordata* woodland local to you three to five times over the flowering period (June to August). The data collection is very simple and involves counting buds, flowers and fruits on a tree branch and classifying what stage of flowering they are at. It should only take an hour or so of your time.

If you are interested in participating in this research you can download a volunteer pack with the full details and instructions from: www.edgehill.ac.uk/ngas/research, or by contacting me at the above address. The seed fertility study will be running again next autumn too and volunteer packs with details on this are available from the same link.

Where was Westchester?

DAVID PEARMAN, *'Algiers', Feock, Truro, Cornwall, TR3 6RA*; (dpearman4@aol.com)

In the revised first volume of Turner's Herbal (1568: 90) he records "Scurby Wede…sene it in England at Westchester, at Portlande and at Porbeke [Purbeck]". This was traditionally identified as *Cochlearia officinalis* (Common Scurvy-grass), but Raven (1947:102) convincingly proved that Turner had realised his earlier error and that the plant was in fact *Calystegia soldanella* (Sea Bindweed).

Gerard (1597: 1029) records "*Trifolium Cochleatum marinum* … Medick fodder of the sea … sea side about Westchester, and upon the mediterranean sea coast". The text ("leaves … covered over with a flockie hoarinesse like *Gnaphalium*"), and the picture look very like *Medicago marina* (Sea Medick), and indeed John Harvey, in his 1981 Service Index to Gerard, identifies it as such. There is the small matter that there is no record of this in Britain other than as a transient casual.

Hanbury & Marshall (1899: 87) refer Merrett's (1666: 76) "*Medica marina Trifolium cochleatum marinum*. Sea-medick. At Rumney, betwixt the Town and Cony-Warren" to *Medicago polymorpha* (Toothed Medick), though of course that species is completely glabrous. Apart from that, the distribution makes it more likely though there are no records from Turner, or for that matter Gerard, from that part of England.

But where was Westchester? I can find no trace in any work, though Nelson (1959) states that Westchester was probably Whitchester, near Heddon-on-the-Wall, v.c.67. Well, I suppose

Turner came from Northumberland, but Heddon is some way inland. Wikipedia tells me that Chester, in Cheshire, was was commonly also known as Westchester and that that name was used by Celia Fiennes when she visited the city in 1698.

And what was '*Trifolium Cochleatum marinum*'?

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OFFERS

Plants of Peeblesshire – the first checklist for the county

DAVID J. MCCOSH, *Baconsthorpe Old Rectory, Holt, Norfolk, NR25 6LU*; (dj.mccosh@virgin.net)

Since I became BSBI Recorder for Peeblesshire (v.c.78), I have been compiling records of its wild flowers and ferns and have now published an annotated checklist. This is the first readily available and comprehensive list for the vice-county, which has been collated from historical sources as well as fieldwork. Localities are given for the scarcer species and historical records which are certainly or probably erroneous are listed. Unusually for a checklist, it gives full coverage to the hawkweeds (*Hieracium*), dandelions (*Taraxacum*) and brambles (*Rubus*).

The checklist is A5 in size, softback, with a coloured cover and frontispiece, and has 106 pages. In addition to the checklist, there is a sketch map showing the main geographical features and the introductory text includes a summary of recording history, the main physical features, the characteristics of the flora and a list of the main historical sources.

The book is offered to BSBI members until June 2012 at the special pre-publication price of £6.00 (inclusive of p&p). Please order direct from me at the address above and make cheques payable to D. McCosh.

Military and Lizard Orchid information

LYNNE FARRELL, *41 High Street, Hemingford Grey, Cambs., PE28 9BJ*; (lynneonmull@btinternet.com)

A complete set of notes, field records, photographs maps and references for all my research on *Orchis militaris* (Military Orchid) have been deposited with the librarian at the Centre for Ecology and Hydrology at Wallingford as from January 2012.

Also deposited are notes, detailed population studies, individual plant studies, maps, photographs and references for *Himantoglossum hircinum* (Lizard Orchid), mainly from Gigi Crompton's work in Cambridgeshire, but also from other sites in England and France. Additional and complementary work by myself and Peter Carey are also included in this data set.

Both these data sets provided the background knowledge for the production of the Biological Floras on these two species.

This note is to alert any botanists who wish to work on these species and would find the information useful, that it is now to be found at CEH, Wallingford.

Flora of Leicestershire and Rutland: checklist and rare plant register

This new work is the first complete published listing of those flowering plants, ferns, clubmosses and horsetails recorded growing wild in the combined counties of Leicestershire and Rutland (v.c.55) since 1933.

The book is an A5 sized softback, with 144 pages. There are four pages of colour plates, an introduction addressing issues such as the conservation of the flora, a bibliography, gazetteer and index of English names. The main text consists of an alphabetical list of plants, with concise details of status, habitat and frequency. Rare Plant Register species are highlighted, with more detail on localities where they occur and those plants considered to be indicators of good habitat (axiophytes) are also noted.

The author is Michael Jeeves, Head of Conservation with the Leicestershire and Rutland Wildlife Trust and the BSBI Recorder for v.c.55.

The book is available at a cost of £7.50 (plus £1.50 p&p if ordered by post) from Leicestershire and Rutland Wildlife Trust, Brocks Hill Country Park, Washbrook Lane, Oadby, Leicester LE2 5JJ. Please make cheques payable to LRWT.

Wiltshire Botany 13 and Wiltshire protected verges

Issue No. 13 of this journal is now published. It features an account of the rare *Campanula patula* (Spreading Bellflower) at Westonbirt Arboretum and estate; an article on Wiltshire's 50 protected road verges; a follow-up to the previous issue's account of trees in the old Savernake Forest area, which focuses on threats to their survival; a key to identifying *Callitriche* species (water-starworts); a report on notable finds in the county in 2010; the usual annual selection of records (for 2010) and summaries of articles relevant to botany in Wiltshire in publications other than those of Wiltshire Botanical Society.

Contributions to the journal are welcome on any aspect of Wiltshire botany. Articles should be submitted to John Presland, 175c Ashley Lane, Winsley, Bradford-on-Avon, BA15 2HR, who will also be pleased to discuss proposed articles informally (Tel: 01225 865125). A leaflet is also available offering guidance to authors on the most helpful forms in which to submit articles.

Copies of No. 13 and some earlier issues are available from:

Rosemary Duckett, 50A The Butts, Westbury, Wiltshire, BA13 3EX (Tel.: 01373 858296) (rosemary.duckett@btinternet.com).

The cost is £5.00 post free. Cheques should be made out to Wiltshire Botanical Society. However, all articles in all issues are available free online via www.wiltsbotsoc.co.uk.

Further information on the survey of protected verges may be of interest. The article provides an outline of the scheme, descriptions and original purposes of the verges, key communities and species, and information on present status from visits to and enquiries about 12 individual verges. To summarise, the verges range in length from approximately 20m to approximately 1440m, and the total length covered is 19.825km. There are 21 verges with calcareous grassland, five with apparently neutral grassland, and three others with grassland less clearly identified. Seven have important hedgerows and seven with woodland. Three have a wetland habitat noted. Seven plant species on the verges are U.K. Biodiversity Action Plan species, seven are nationally scarce, eight are protected under European Community or International schemes and 13 others are rare or scarce in one or both Wiltshire botanical vice-counties. In addition, four verges have been designated because of plants not identified as above but ecologically important or long-established rare plants which have arrived in this country relatively recently.

New plant identification course

BRENDA HAROLD, *'Farthings', The Green, Sarratt, Rickmansworth, Herts., WD3 6BP*; (brendaharold@btinternet.com)

Do you belong to a group in which volunteers participate in plant recording? If so, do you have a need to train beginners? At Herts and Middlesex Wildlife Trust we have plenty of volunteers who would like to join our team of County Wildlife Site Surveyors, but very few of them have the necessary skills. Many of them simply drop out because the challenge is too great, our experienced surveyors do not have enough time to train them and we cannot risk inaccurate records.

To help solve this problem I have written a course comprising 15 units delivered electronically throughout the season, with practical exercises at the end of each unit. The aims are to develop basic knowledge, a critical approach and confidence in using a flora. The course is not intended to replace the more specialised training provided, for example, by some of our field meetings or by the Field Studies Council, but to give a proper foundation for these.

The first three units cover botanical theory (terminology, keys, *etc*.) whilst the others deal with the most important plant families. The units are delivered in the order of the families' peak flowering times and not in taxonomic sequence (so the Brassicaceae comes first, in March, and the Asteraceae in August). The exercises require the participants to find common species and examine them in detail. Often they simply have to find the plant and give the date, location and a list of diagnostic features. Other questions are more varied, for example, counting the number of males and females in a sample of ten *Silene dioica* (Red Campion) plants, or constructing a mini-key to five species of *Veronica*. The answers receive correction and comments but no numerical mark. There is a time limit of two years and a certificate of completion is awarded.

The course is now in its second year after a successful pilot in 2011 and it is planned to make it available to other interested groups in 2013. This obviously depends on the availability of tutors to check the answers. Tutors do not need to be national experts because the questions involve only common species but they must be sufficiently experienced to spot and correct errors and a supportive attitude towards beginners is essential. They will probably be established members of the same local group although, as this is a distance-learning course, they do not have to be geographically close. Nor does the tutor have to do any fieldwork so this role may be of interest to experienced botanists who are no longer very active in the field.

If you might like to take advantage of this resource, starting in February 2013, please get in touch with me (contact details above). You can see a sample of the course material and register an interest in attending the training session for prospective tutors that the BSBI Training and Education Committee intends to hold this autumn.

BSBI Journals for disposal

STEVE RENVOIZE, stevecarole.renvoize@btinternet.com

Since retiring 6 years ago I have tried to steadily reduce my library. I have now decided that I must dispose of my BSBI publications, which start from the beginning of my membership in 1963. I will be happy to pass them on for free to anyone who would like to have them. Anyone interested can contact me at the above e-mail or by phone – 01794 368 766.

NOTICES

Appointment of a BSBI Irish Officer

BRIAN S. RUSHTON, Chair, Committee for Ireland

Nearly 50 years ago, the BSBI established a regional committee (now the Committee for Ireland, CFI) to oversee its work within the island of Ireland and to help deliver the Society's objectives. This has proved a daunting task and a few statistics will demonstrate the problems faced by the CFI in trying to record the Irish flora and deliver on key BSBI objectives.

The most telling statistic of all is the number of BSBI members in each vice-county. In the island of Ireland, this is roughly 3.3 members per vice-county; combining England, Scotland and Wales (including, you will note, Scotland, which, in many respects, has problems similar to those in Ireland) the figure is 22.3 members per vice-county. In England alone, there are over ten times the number of BSBI members per vice-county (34.6) compared with Ireland (3.3). Population density is so much lower too, with there being approximately 76 people per km^2 in Ireland and over three times as many in England, Scotland and Wales combined (258 people per km^2). And, finally, the area of land in England, Scotland and Wales combined is 91 km^2 per BSBI member whilst in Ireland it is nearly seven times as large (626 km^2 per member). The distribution of the population, and thus membership, is largely concentrated along the east coast with Belfast, Dublin and Cork major centres of population and, additionally, much of the countryside is remote and not easily reached.

It was clear to Council that one of its priorities must be to try to support the botanical effort in Ireland in order to ensure that it keeps pace with England, Scotland and Wales. The appointment of a Scottish Officer has changed the BSBI's work in Scotland and a similar, recent appointment in Wales should do the same there. Council felt that supporting the work of the CFI was essential and, therefore, at its meeting in March agreed to fund a two-day a week part-time appointment for two years, the BSBI Irish Officer post. The appointee will be working with the CFI and the Plant Unit to support the vice-county recorder network in Ireland, to support national projects, to organise educational field meetings and workshops and to generally raise the profile of botany and the BSBI in Ireland. It is hoped to have a person in place by 1st July 2012 in time for the Irish AGM in mid-August in Dublin, which this year will be taking as its general theme botanical recording. If members of the BSBI not resident in Ireland would like information of this meeting please contact me and I will ensure that details and a booking form are sent out in late June. Ireland is a marvellous place to do botanical field work and you will be guaranteed a welcome.

OBITUARY NOTES

CHRIS LIFFEN, *3 Grangecliff Gardens, LONDON, SE25 6SY*; (c.liffen@btinternet.com))

Since the publication of *BSBI News* **119**, we regret to report that the news of the deaths of the following members has reached us:

Mrs U Doyle, Flat 8 Ladyplace Court, Market Square, Alton, Hampshire, GU34 1HD. She joined the BSBI in 1973.

Mr A.B. Gardner, Kinloch Steadings, Pennyghael, Isle of Mull, PA70 6HB. He joined the BSBI in 1988.

Mr D J Preen, 4 The Close, Warren Lane, East Dean, Eastbourne, East Sussex, BN20 OHB. He joined the BSBI in 1984.

Mr M.G.H. Battershall, 15 Rhodfa'r Grug, Upper Colwyn Bay, Clwyd, LL29 6DJ. He joined the BSBI in 1979 and was vice-county recorder for v.c.49 from 1996-2003.

We are grateful to Ian Bonner for the following note.:

Geoff joined the BSBI in 1979 and served for many years as vice-county recorder for Caernarvonshire (v.c.49), putting a huge effort into preparing the records for the *New atlas*.

Geoff retired as Vice-county Recorder in late 2003, but he continued to be generous with his time and knowledge, helping others to enjoy and learn about the flora of North Wales.

A fuller appreciation will appear in due course.

John K. Morton (1928-2011)

John Morton grew up in Yorkshire and joined the BSBI in 1948. He received his B.Sc (1949), Ph.D (1953) and D.Sc (1987) from the King's College, Durham, now the University of Newcastle. His early career was spent in West Africa, first as Lecturer (1951–58) then Senior Lecturer (1958–61) in the Botany Department of the University of Ghana. In the early 1960s, he held a post at Birkbeck College, London, before moving to the University of Sierra Leone as Professor and Head of Botany. In 1968, he moved to Canada as Professor in the Department of Biology at the University of Waterloo, Ontario. He held this position until his retirement in 1994.

He had two main research interests. One was the taxonomy of the Caryophyllaceae – particularly the genera *Cerastium*, *Stellaria* and *Silene*; plus an interest in mints (Lamiaceae). The other was floristics and phytogeography – particularly of N.W. Africa.

He also worked extensively on the flora of the Ontario area (often with Joan Venn), producing "*A checklist of the flora of Ontario, vascular plants*", and floras of the various islands of Lake Huron and Georgian Bay. He was a keen conservationist and worked with recovery teams for threatened species.

During the course of his career, he produced some 140 publications. In his retirement, he returned to one of his early interests – entomology, and completed a detailed survey of the moths of Manitoulin Island – donating some 10,000 specimens to the National Collection in Ottawa and some to the Natural History Museum, London.

Professor Morton maintained his membership of the BSBI throughout his career and retirement – despite being geographically removed from us.

Thanks to the Canadian Botanical Association for permission to use material from their article on John Morton that appeared in the *CBA/ABC Bulletin* – written by Paul Catling and Joan Venn.

Miss Mary Anderson Grierson VMM, VMH (1912-2012)

ARTHUR CHATER, *Windover, Penyrangor, Aberystwyth, Dyfed, SY23 1BJ*

Although she never joined the Society, Mary Grierson will have been known to many members as one of the finest botanical artists of her time. Brought up in Bangor, she later studied painting with John Nash. During the Second World War she was in the WAAF interpreting military aerial photos, and then worked for Hunting Surveys Ltd. From 1960 till 1972 she worked as official artist at Kew, after which she became freelance. Among the books she illustrated were *Mountain flowers* by A. Huxley, *Orchidaceae* and *The Country Life book of orchids* by P.F. Hunt, *An English florilegium* with W.T. Stearn and C. Brickell, *A Hawaiian florilegium* with P.S. Green, *Hellebores* by B. Mathew and *The genus Cyclamen* by C. Grey-Wilson. She did numerous paintings for *Curtis's Botanical Magazine* and other journals, and designed the 'British Flora' set of stamps in 1967. Failing eyesight in later years led her to take up illustrative embroidery, for which she again became famous. She died on 30th January 2012, aged 99.

RECORDERS AND RECORDING

Panel of Referees and Specialists

MARY CLARE SHEAHAN, *61 Westmoreland Road, Barnes, London, SW13 9RZ*; (m.sheahan@kew.org)

We have a new Referee for some Brassicaceae: Martin Godfrey is willing to identify species of *Cardamine*, *Arabis* and *Draba*. His contact details are: – 6 Darnford Close, Parkside, Stafford ST16 1LR; email: martinandrosie@aol.com.

He says that for reliable identification he needs a basal rosette, flowers and fruits.

Panel of Vice-county Recorders

DAVID PEARMAN, *'Algiers', Feock, Truro, Cornwall, TR3 6RA*; (dpearman4@aol.com)

New recorders and changes:

v.c.5. S. Somerset: Simon Leach to be joint recorder. Correspondence to Steve Parker as before.

v.c.46. Cardigan: Steve Chambers to be joint recorder. Correspondence to Arthur Chater as before.

v.c.53. S. Lincs: Sarah Lambert to be joint recorder and lead contact. Correspondence to 21 Grafton Avenue, Peterborough, PE3 9PD.

v.c.86. Stirling: Philip Sansum to be joint recorder. Correspondence to Edna Stewart as before.

v.c.H2. N. Kerry: Caroline Mhic Daeid & Rory Hodd to be joint recorders. Correspondence to Avondale, Moynalty, Kells, Co. Meath, Ireland.

v.c.H29. Leitrim: Michael Archer to replace Don Cotton as recorder. Correspondence to Main St., Boyle, Co. Roscommon, Ireland.

Changes of address:

Due to a misunderstanding between Gwynn and myself, the old addresses for several v.c. Recorders were published in the *Yearbook*. We do apologise, and the correct addresses are given below:

v.c.07 & v.c.08. N. & S. Wilts: Ms S.L. Pilkington, 66 Newtown, Westbury, Wilts., BA13 3EF; (*sharon.pilkington1@btinternet.com*).

v.c.15 & v.c.16. E. & W. Kent: Mr G.D. Kitchener, Cromlix, Otford Lane, Halstead, Sevenoaks, Kent, TN14 7EB.

v.c.73. Kirkcudbrights: Mr D.M. Hawker, Windywalls, Gatehouse of Fleet, Castle Douglas, DG7 2DE. (*hawker398@btinternet.com*)

v.c.H12. Co. Wexford: Mr P.R. Green, Yoletown, Ballycullane, Co. Wexford, Ireland.

v.c.H20. Co. Wicklow: Ms C. Brady, 74 Station Court, The Avenue, Gorey, Wicklow, Ireland.

We regret to note the death of Geoff Battershall, our recorder for Caernarvonshire from 1996 to 2004, who did so much to help cover that county for the *Atlas*.

A website for spike-rushes (*Eleocharis*) and deergrasses (*Trichophorum*)

JEREMY ROBERTS (referee for *Eleocharis)*, *Eden Croft, 2 Wetheral Pasture, Carlisle, Cumbria, CA4 8HU*; (fjr@edencroft2.demon.co.uk)

Having been encouraged by the positive response to my website on deergrasses, I have been emboldened to extend the site with a new section on spike-rushes. I have also updated parts of the deergrass section.

The new section has a page for each spike-rush species, and pages dealing with the separation of similar pairs of species. I have yet to source any photos of *E. acicularis,* and any of flowering or fruiting *E. parvula,* or showing its tubers. I would be very grateful to receive photos which show these plants in a similar fashion to the way I have displayed other species, or specimens that I could prepare and photograph myself.

The website is at:
www.edencroft2.demon.co.uk/

It is, of course, a 'work-in-progress'! There is a contact page on the site for feedback, which will be greatly welcomed. There is also a section on the filmy-ferns of the Bewcastle Fells in Cumbria, including the newly described hybrid, *Hymenophyllum ×scopulorum* (see *New Journal of Botany* **1(2)**: 93-7). This gives a link to an album of pictures of the plants and locations.

NOTES FROM THE OFFICERS

From the Hon General Secretary – *LYNNE FARRELL*

41 High Street, Hemingford Grey, Cambs., PE28 9BJ
(01480 462728) (farrell104@btinternet.com)

Committee changes

1. Meetings, Science & Research, Training & Education Committees remain with the same composition.
2. Publications Committee. Retiring: Mary Briggs, David Pearman. New members: Chris Liffen (Obituaries), Louise Marsh.
3. Records Committee. Retiring: Chris Boon, Gwynn Ellis. New members: Helena Crouch, Quentin Groom, Robert Northridge, Paul Smith.

From the Hon. Treasurer – *ANTONY TIMMINS*

154A Warley Hill, Brentwood, Essex, CM14 5HF; (Tel.: 01277202 545)
(antony.timmins@hotmail.co.uk)

The Society's Treasurer has not recently had a column in the *BSBI News* section, *Notes from the Officers*. I am the chap who stood up and answered a financial question from the floor at last year's AGM. That may have been less than wise, from a personal point of view, but here we are. I said at the time it is clear that Terry Swainbank did a great job. Clive Lovatt and I are following on from where he left off and there are further changes afoot to modernise systems and reduce costs. Here are the latest:

Online banking

The BSBI now prefers to make online payments and will only write cheques in exceptional circumstances. Online payments are much more efficient: the new financial team had found ourselves batching documents and instructions in Wales, writing cheques in Essex, getting a second signatory in London, and posting cheques out from Essex again.

We have opened PayPal accounts (Sterling and €uro) to facilitate receipt of subscriptions and payments for conferences through the BSBI website. This is primarily for members who may also prefer not to write cheques or who are outside the U.K. You do not need a Paypal account to use this facility, only a normal credit or debit card. Unsurprisingly perhaps, the website is fertile ground for drawing in new members. However, there are transaction costs and additional administrative tasks, and it is not intended to make this a replacement for the current processes so ably

managed by our Membership Secretary. We can also, of course, provide banking details for our own account for direct deposits.

Reimbursement of expenses

Claims for reimbursement of travel expenses incurred in attending business meetings of the BSBI should be sent to the Administrative Officer, Clive Lovatt, and not to the Treasurer. Scanned documentation (*e.g.* rail tickets) is normally sufficient, and forwarded online booking information is helpful. Email delivery to accounts@bsbi.org.uk is preferred. For online reimbursement we will need your bank details (sort code and account number) and providing these by phone or in separate emails is suggested.

Legacies and other donations

We are always delighted when donations and legacies arrive. A glance at the accounts shows how the unbudgeted receipts can make all the difference between Dickensian 'happiness' and 'misery'. In February 2012, we gratefully received £5,000 from the estate of the late Dr Larch Garrad of the Isle of Man. It is generally best if legacies and donations are relatively unrestricted, or the Society is given discretion how to apply the particular wishes of the donor. Anyone contemplating a legacy or significant donation should contact me.

From the acting Scottish Officer – *ANGUS HANNAH*

Glenmore, Rothesay, Isle of Bute, PA20 0QU;
(Tel.: 01700 503879; butesedge@yahoo.co.uk)

Scottish Annual Meeting

A very successful Scottish Annual Meeting took place at RBGE in November (jointly, as usual with the Botanical Society of Scotland), one innovation being a photographic competition organised by Ruth McGuire. Many thanks to Martin Robinson for organising the day.

Two Conferences

The Global Strategy for Plant Conservation conference took place at Royal Botanic Gardens Edinburgh on January 20th, and was attended by a number of BSBI members (including myself). It provided a useful opportunity to meet members of our partner organisations, hear a variety of interesting speakers and take part in stimulating discussions.

A Conference on 9th March, also at RBGE, brought together members of the British Ecological Society and the British Society of Soil Science, under the title 'Challenges for Scotland's biodiversity conservation: from the soils to the skies', and again enabled the BSBI representatives to set our enthusiasms in a broader context.

Submission on forest expansion

In December, after consultation with vice-county recorders, BSBI Scotland submitted our views to the Scottish Government on its proposed expansion of forest area. Particular attention was drawn to the need for a robust process to flag up sites of botanical significance that would be detrimentally affected by planting, especially in the case of smaller private plantations. A more general view was also expressed that there was already too much forestry in most areas, and that open habitats should be preserved where possible. Several members subsequently attended consultation meetings around the country.

Site condition monitoring

Reports for the sites which BSBI surveyed in 2011 are now with Scottish Natural Heritage. A new cycle of site condition monitoring begins this year, and I am currently in discussion with SNH about sites which BSBI will monitor over the next two years.

Fifth day programme

As I am only employed for four days, some additional funding has become available, for what is known as my fifth day programme.

The first project I organised for this was a contract for Andy Amphlett to produce a checklist and outline rare plant register (RPR) for the Cairngorm National Park. The checklist has now been prepared, and it is very impressively comprehensive, with over 1700 taxa (including aggregates and segregates) and a great amount of distributional data. It will be

available very shortly for download as a PDF. Andy is now proceeding to the second stage of the project, extracting records for an RPR.

Secondly, on the RPR theme, I contracted Chris Metherell to lead a project with Scottish VCRs to encourage and assist them in the production of rare plant registers. A target of 12 new RPRs in the next three years is one of the grant aims which SNH would especially like to see delivered, and of course it is something which the BSBI recording strategy includes among its principal ambitions.

Scottish recorders' weekend

The recent Kindrogan weekend for Scottish recorders was also subsidised from this programme, and it included a number of valuable sessions on different aspects of recording and data handling. The BSBI recording strategy, as set out in the booklet *Recording the British and Irish flora 2010 – 2020* was discussed in the opening session, and remained a key point of reference throughout. Next morning we had a demonstration and workshop by Tom Humphrey about accessing and using the BSBI Distribution Database and another by Graham French on using the NBN data validation tool, which can help to cut down on erroneous records and so maintain the high standards of BSBI data.

A brief outdoor session, led by Martin Robinson and Richard Pankhurst, was devoted to practising tree (mainly conifer) identification using keys, and involving much discussion about various fruity scents, allegedly useful characters about which little agreement could be reached, possibly on account of the cold and damp conditions prevailing.

Chris Metherell next presented his plans for helping with rare plant registers. Having recently published his own RPR for v.c.68, he is well placed to provide detailed templates for other vice-counties, and will follow this up with one-to-one assistance where needed to keep VCRs on track. His subsequent workshop attracted a lot of interest, and we look forward to seeing a number of new Scottish productions before too long.

After dinner, I gave a short presentation on recording status, highlighting some of the problems which recorders have encountered, particularly in respect of the range of terms offered by MapMate in this field..

The following day began with a discussion among VCRs and others present on public access to their records and their use by commercial organisations. This produced many interesting and potentially useful suggestions covering subjects including data ownership/custodianship, copyright law, intellectual property, read only access/download access, educational implications of charitable status, reasons for sensitivity, financial implications, etc.

There followed an interesting presentation by Richard Pankhurst on recording critical groups. He outlined the different nature and associated problems of the various groups from Fumitories and Eyebrights to Hawkweeds and Brambles, concluding with a more detailed look at Dandelions. After lunch, the final session was a demonstration of Richard's computer programme Pankey, using in this case the associated *Taraxacum* character set. This has many advantages over standard keys, as it can make use of the computer's ability to sort and assess characters and taxa, and move freely back or forward, allowing a determination to be reached more easily and convincingly than otherwise. The only drawback is that, since the programme was written many years ago and runs in DOS, it cannot be used on modern Windows systems. It was suggested that an updated 'smartphone' version would be very useful!

Many thanks to all who took part in the weekend.

VCRs and recording

In March, the Scottish Committee proposed Theo Loizou and Robin Payne as joint recorders in v.c.90 (Angus), in place of Barbara Hogarth who is retiring, and Helen Crossley to be joint with Ken Butler in v.c.109 (Caithness). Thanks to Barbara for her hard work over a number of years.

Diary for 2012

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5 May	Scottish Committee	10 Oct.	Records Committee, London
12–13 May	AGM, Reading	11 Oct.	Publications Committee, London
12 May	Council, Reading	16 Oct.	Training & Education Committee
20–22 June	Welsh AGM, Llangollen	31 Oct.	Executive Committee, Linnean Society, London
20 June	Welsh Committee, Llangollen		
18 July	Executive Committee, Linnean Society, London	3 Nov.	Scottish Annual Meeting & AGM, Battleby, Perth
18–19 Aug.	Irish AGM and Recorders' Meeting, Glasnevin, Dublin	21 Nov.	Council, Linnean Society, London
12 Sep.	Meetings Committee, Natural History Museum, London	23 Nov.	Flora of Cold Regions, British Antarctic Survey, Cambridge
20–21 Sep.	Biological distribution mapping Conference, with Royal Botanic Gardens, Edinburgh	24 Nov.	Annual Exhibition Meeting & Special General Meeting, British Antarctic Survey, Cambridge
22 Sep.	Scottish Committee		

Solution to Crossword 18

Across

1. STOP; 4. SWEET PEA; 8. ROOTCAPS; 9. FALL; 10. PHLOX; 11. DROSERA; 13. APPEAR; 15. ELODEA; 18. DIEBACK; 20. ACORN; 23. RUTA; 24. FOLLICLE; 25. PASTURES; 26. SACS

Down

2. TOOTH; 3. PETIOLE; 4. SCAR; 5. EXSERTED; 6. TUFTS; 7. ENLARGE; 10. POA; 12. CRUCIFER; 14. PRIMULA; 16. ORCHIDS; 17. AWN; 19. BRACT; 21. RELIC; 22. ALMS

Crib

Across

1. reverse POTS; 4. anagram SAW TEPEE; 8. anag STAR CO-OP; 9. double definition; 10. sounds like 'flocks'; 11. D(awn) R(osy) + anag AROSE; 13. A/P/PEAR; 15. EL<ODE>A; 18. Charade; 20. A/CORN; 23. rue; 24. omit letters of COW BY from FOLLOW BICYCLE; 25. anag PEAS RUST; 26. Space And Cavity Stuffing

Down

2. TOOT/H; 3. anag POLITE + E; 4. markS CARved, on stem after 9 = FALL (& lit); 5. EX<S>ERTED; 6. TU<F>TS; 7. anag LEARN EG; 10. Price On Application; 12. According to the bible, Simon bore cross; 14. pun; 16. sounds like 'or kids'; 17. strAW Naturally; 19. BRA/CT (nothing to do with fig leaves!); 21. RELIC(T); 22. (P)ALMS

CONTRIBUTIONS INTENDED FOR *BSBI NEWS* 121 should reach the Receiving Editor before August 1st

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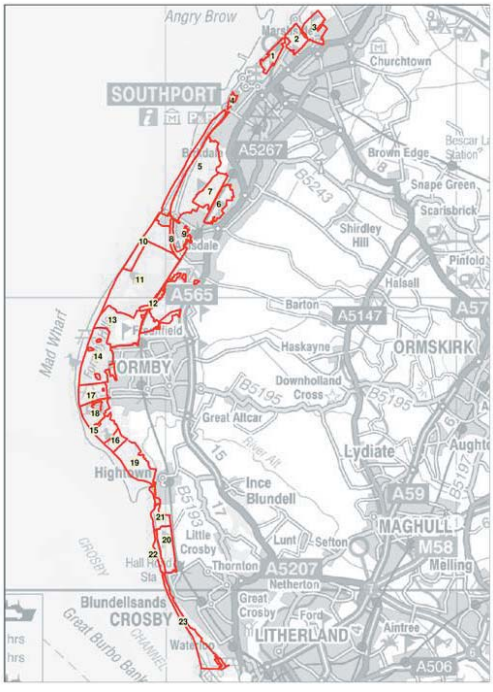


Fig. 1. Boundaries and numbers of 2008-2009 survey sites

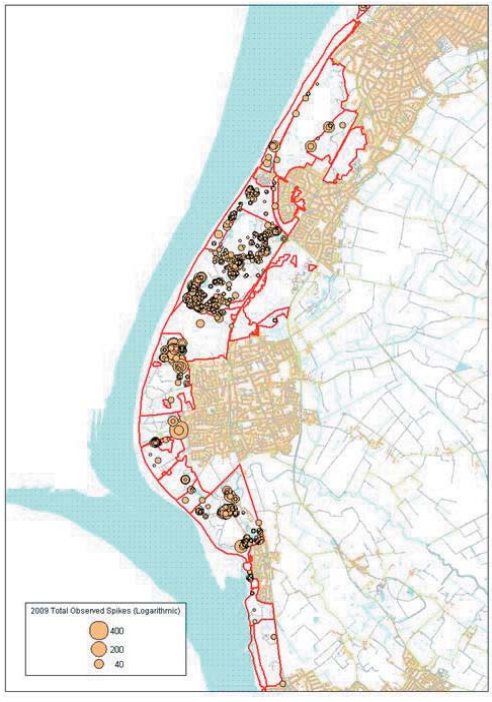


Fig. 2. Relative patch sizes according to number of *Epipactis* individuals counted

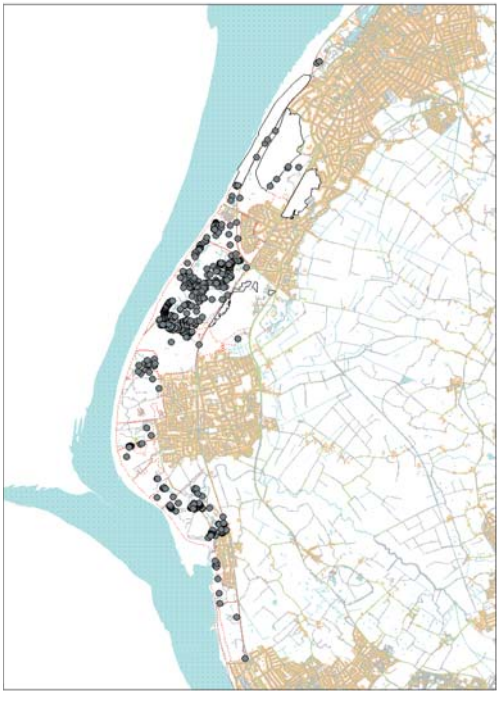


Fig. 3. Distribution map of *Epipactis dunensis* recorded during 2008 and 2009

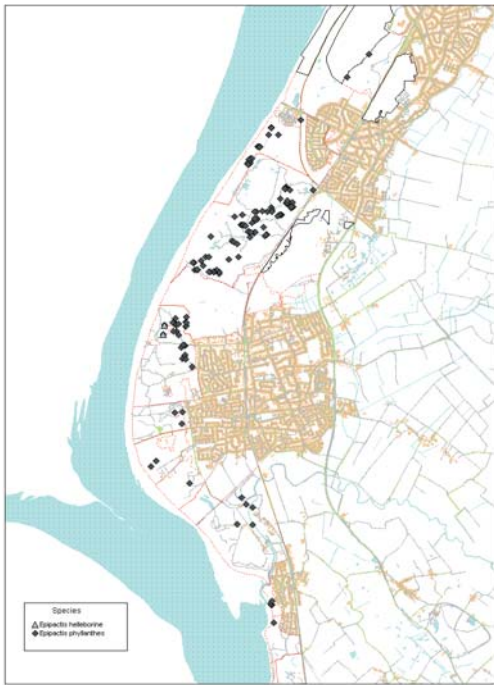


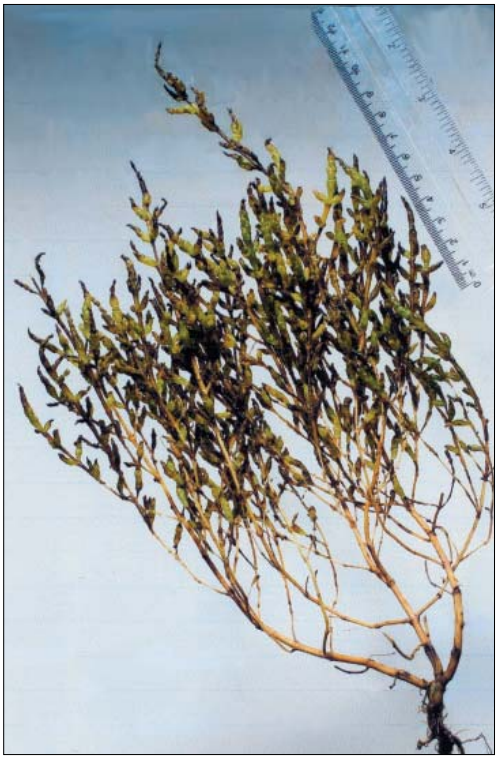
Fig 4. Distribution map of *Epipactis phyllanthes* and *E. helleborine* recorded during 2008 and 2009

(see p. 6)

1. Left: *S. procumbens* agg. – damaged Long-spiked Glasswort (*Salicornia dolichostachya*). Centre: Yellow Glasswort (*S. fragilis*). Right: *S. europaea* agg. – Purple Glasswort (*S. ramosissima*)

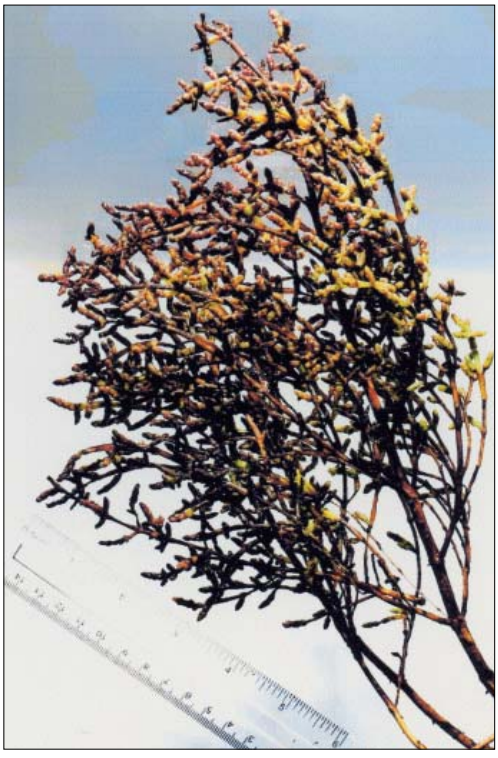
2. A stunted, decumbent, deep purple Purple Glasswort (*S. ramosissima*) specimen from above MHW, fruiting

3. A luxuriant specimen *c.f. S. ramosissima* from a creekside, fruiting (purple colour evident)



4. *Salicornia europaea* agg. plant c.f. *S. europaea*, wilting, but near fruiting, with no red /purple pigmentation evident. (Compare with Photo. 5)

All *Salicornia* photos © D.J. Hambler (see p. 24)



5. Well-developed *Salicornia europaea* agg. plant *c.f. S. ramosissima,* fruiting (red to purple colour evident).
(Compare with Photo. 4.)

6. Flowering branches of *Salicornia europaea* agg. Left: *c.f. S. europaea* (with no sign of red pigment). Right: *c.f. S. ramosissima*, with red flowers and segment edges

7. Fruiting plants of *Salicornia procumbens* agg. Left: *S. fragilis.* Right: *S. dolichostachya*

8. Green seeds, characteristically visible in *Salicornia procumbens* agg., within the senescent flower spike of *S. fragilis.* Max. width of spike = 3.0 mm

All *Salicornia* photos © D.J. Hambler (see p. 24)

Cardamine quinquefolia naturalised and self sown in garden Bradford-on-Avon above (© 2011) with detail of flowers below (© 2012). Both photos J. Presland (see p. 58)