BSBI NEWS

April 2020 144

Botanical Society of Britain & Ireland

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BSBI NEWS
April 2020 144
NEWSLETTER OF THE BOTANICAL SOCIETY OF BRITAIN AND IRELAND

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Cover: Creeping Buttercup (*Ranunculus repens*) in a wet meadow in Gosport, Hampshire. *John Norton* (*see Beginner's Corner, p. 48*)

Botanical Society of Britain & Ireland

Contributions for the next issue of *BSBI News* (no. 145) should be sent to the Editor, John Norton (*john.norton@bsbi.org*) by 25 July 2020.

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FROM THE PRESIDENT

I wrote this in late February, in time to meet the deadline, when we were still in the grip of numerous storms, with wet and windy conditions prevailing throughout Britain and Ireland. Ciara and Dennis have come and gone, and it was relatively mild, so I hope that by the time this April *News* reaches you, spring will have arrived. The plants in my garden and on the roadside verges are struggling into growth. Will it be a good year for aquatics?

So, I have been checking records, writing pieces and participating in the Resilience Strategy, planning field trips. I expect that many of you will have been occupied with something similar.

The winter does give us time to plan for the year ahead, and normally I would hope to see many of our members at forthcoming meetings. During the next two years, I still intend to visit Ireland, Scotland and Wales, and as I live in the north of England, participating in some of their activities too. I am also looking forward to visiting Guernsey for the Annual Summer Meeting in 2021, as that is new territory for me.

But things have changed considerably in the past few days as I update this in mid-March and you can find advice and information about all indoor and outdoor meetings on our website. But there are some of you who do not have e-mail, so April *News* may be the way you receive news.

In view of the coronavirus pandemic BSBI have decided that all BSBI events, whether indoor or outdoor meetings, will be cancelled until at least the end of May. This may need to be extended. We will review the government's ongoing advice and update this guidance regularly. For anyone booked on an event that is cancelled they will be refunded any fees paid to BSBI.

The weather patterns are definitely changing and the BSBI is evolving also. As mentioned in my short presidential address last November, we would like the Society to become more inclusive, influential, informative, interesting and especially enjoyable, so that you want to become involved in the many activities and roles in whichever way you prefer. You can be assured that we will still continue to be a science-based organisation with a passion for plants, learning and sharing with each other and from other, relevant groups.

Lynne Farrell
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EDITORIAL

Welcome to a bumper 84-page edition of *BSBI News*. With the coronavirus travel restrictions likely to be in force for some time to come, this is a perfect opportunity for us to get even better acquainted with our own neighbourhoods and look more closely at those 'pavement weeds' and the interesting vegetation that grows on the warm kerb edges of urban street verges during our daily exercise walks. I live on the corner of two roads and have about 30 metres of crevices around the base of my walls, with just enough soil and moisture to support a surprisingly rich plant community (about 50 species recorded, including some in my tiny garden). Bob Leaney's pictorial article on *Epilobium* (Willowherbs) in this issue will help with identification of some of the characteristic species of this habitat.

We may also be spending more time in our own gardens. As we go to press, I hear that BSBI is about to launch a Garden Wildflower Hunt, so check this page for details: *bsbi.org.garden-wildflower-hunt*. See also the Plant Alert article on p. 64.

John Norton
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BSBI New Year Plant Hunt 2020

LOUISE MARSH & KEVIN WALKER

BSBI's ninth New Year Plant Hunt (NYPH), held 1st–4th January 2020, attracted 1,714 volunteers who used smartphones and an online recording form to submit lists of native and non-native plants they found in flower in the wild during a three-hour walk at locations across Britain and Ireland. Since the first Hunt, the NYPH has gone from being a fun activity to encourage botanists to go out flower-hunting in mid-winter, to an increasingly important method of capturing both baseline information about 'normal' winter flowering patterns in the 21st century and also the response of plants to any 'unseasonal' weather conditions during the preceding months. NYPH data are therefore helping us improve our knowledge of how our wildlife is responding to rising temperatures and changing weather patterns. Through the use of new technology and social media, the NYPH is also raising the profile of the BSBI and introducing its work to new audiences.

A full analysis is available to download here: *www.bsbi.org/new-year-plant-hunt* where you will also find links to similar in-depth analyses from previous years, detailed instructions on how people took part, blogposts summarising results from each of the four days and the separate NYPH website showing all lists submitted across Britain & Ireland. Alternatively, you may wish to look at *BSBI News* 141 pp. 14–18 where you can read a full account of the methods and results from 2015–2019. Below we summarise how 2020's results differed from, or were similar to, those from previous years.

Similarities to previous years

The proportion of native to alien taxa was similar to previous years and identical to 2019: 52% of species recorded in 2020 were native and 64% of records submitted were of natives. As in previous years, the four most frequently-recorded species were Daisy (*Bellis perennis*), Groundsel (*Senecio vulgaris*), Annual Meadow-grass (*Poa annua*) and Dandelion (*Taraxacum* agg.) which all occurred in two-thirds or more of the lists submitted in 2015–2019.

Leif Bersweden and Sandy Knapp on the New Year Plant Hunt 2020. *Joanna Wright*

The proportions of species flowering early or late were very similar to previous years with 53% of species flowering late, 24% flowering early and 7% flowering as expected at New Year. Species flowering late included 'autumn stragglers' such as Yarrow (*Achillea millefolium*), Common Ragwort (*Jacobaea vulgaris*) and Common Hogweed (*Heracleum sphondylium*); early flowering plants included Primrose (*Primula vulgaris*) and Lesser Celandine (*Ficaria verna*); species expected to bloom at New Year included Winter Heliotrope (*Petasites pyrenaicus*).

What was different?

More people took part and 778 lists were submitted this year, an increase of 9% compared to 2019 (712 lists). A 16% increase in participation in NYPH 2020 (1,714 participants this year compared to 1,471 in 2019) and an increasing number of organised group Hunts, meant that often several Hunts were taking place in the same county. The friendly competition

between groups added to everyone's enjoyment of the NYPH but perhaps more interestingly, groups hunting in similar habitats recorded very similar lists. For example, two groups of botanists with similar skill levels hunted in Norfolk and each group recorded 50 taxa.

Media coverage this year included articles in *The Telegraph*, the *Irish Times*, regional newspapers and on local radio and television. The online recording form worked more smoothly this year! Tom Humphrey, BSBI Database Officer, did a superb job ironing out glitches and making it easier than ever for plant-hunters to record their finds.

The NYPH Support Team was bigger than ever, with seven members of BSBI's Events & Communications Committee working shifts over the four-day period to handle incoming data and enquiries and another three BSBI members checking identifications. We owe a huge debt of gratitude to these helpful and dedicated volunteers: Ryan Clark, Ian Denholm, Ciara Dwyer, George Garnett, Ellen Goddard, Jodey Peyton, Kylie Jones, Brian Laney, Moira O'Donnell and Cathy Wilson.

Key messages from NYPH 2020

As in previous years, NYPH results indicate how plants are responding to 'unseasonal' weather (Figure 1). 2020 appears to have been an average year in terms of winter flowering in comparison to previous years, with fewer species in flower than in 2015, 2016 and 2019 but more than in 2017 and 2018. The reason for this seems clear – temperatures in the two months preceding NYPH 2020 were only a degree above average, compared to 2015, 2016 and 2019 when the combined temperature anomalies (differences from the long term average) were much higher. This was largely due to the cold and wet conditions experienced across much of the country in late 2019, especially in November when the Midlands and Northern England experienced widespread flooding.

These results raise questions about the implications for plant performance: the premature spring growth of some arctic-alpine plants during warmer winters (as many gardeners will know)

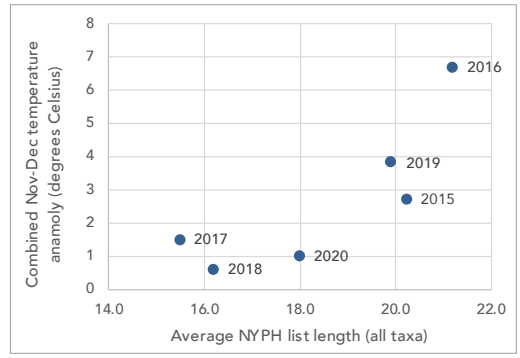

Figure 1. The combined UK mean temperature anomalies (differences from long term average) for November and December plotted against the average NYPH list lengths, 2015–2020. Temperature data from UK Met Office: *www.metoffice.gov.uk/research/climate/maps-and-data/uk-temperature-rainfall-and-sunshine-anomaly-graphs*.

can weaken some plants due to the depletion of carbohydrate reserves and damage tender parts of plants such as buds and flowers by snow and frost. Shifts in flowering time may also cause asynchrony between flowering and associated pollinators with potential knock-on effects for plant and insect productivity. Literature references and more details are available in the full analysis of results which you can view or download from the BSBI website.

We need to keep collecting data so we can build up a clearer picture. So if you were one of the 1,714 people who contributed to this year's NYPH we'd like to say a huge thank you. You are helping BSBI understand more about how our wild and naturalised plants are responding to changing weather patterns. We hope you'll take part in our tenth NYPH in 2021 – watch out for details on the BSBI website.

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Common problems with identification in *Epilobium* (willowherbs)

BOB LEANEY

Willowherbs (*Epilobium* spp.) cause frequent problems during field identification, partly because of great variation in leaf shape (which most botanists use as their first spotting feature) and partly because of difficulties with interpretation of standard identification characters such as stigma type, stem shape and stem indumentum.

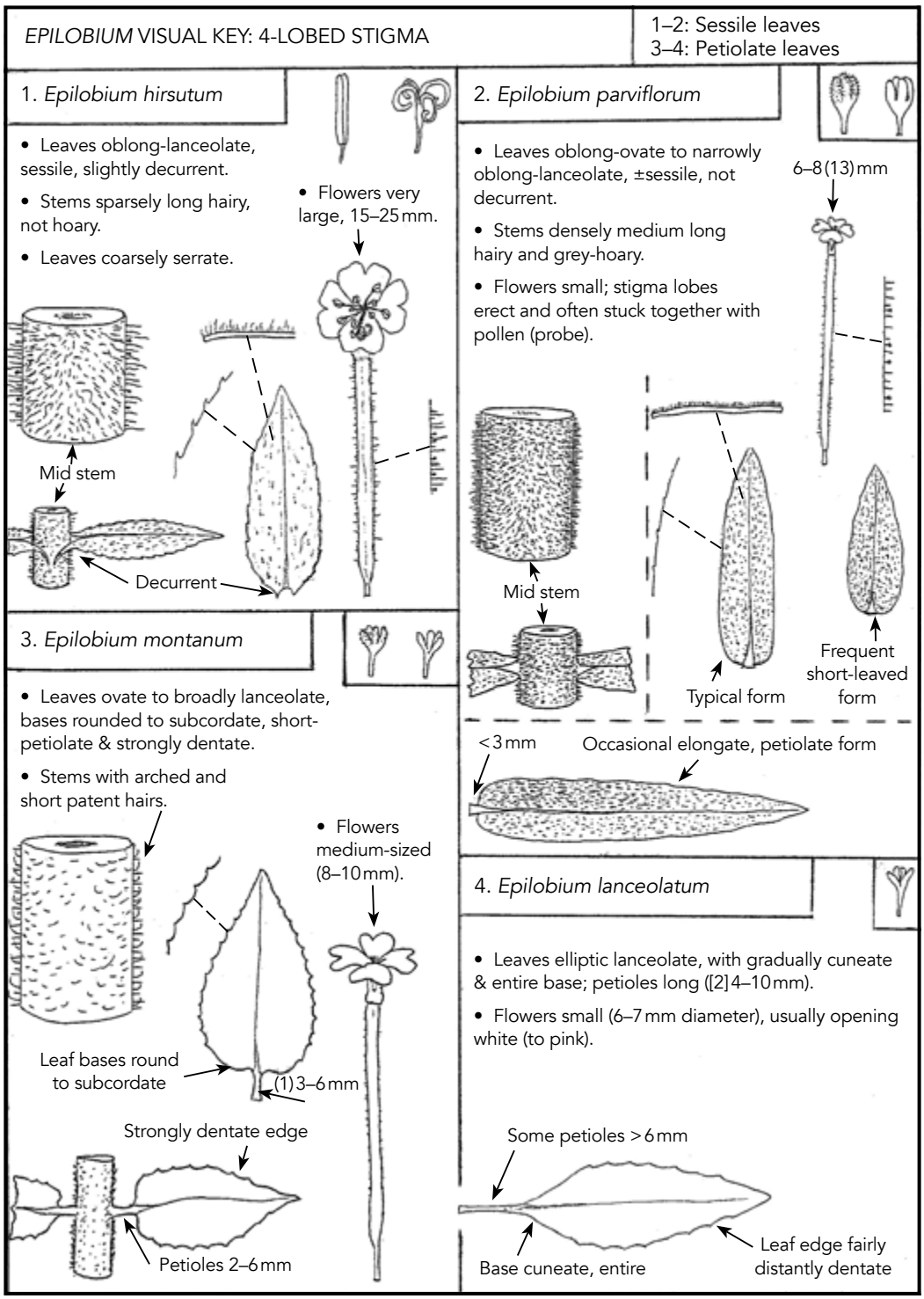
Over a period of about ten years I have kept problem plants found during recording for pressing or photocopying, drawing important identification characters on the same sheet. Especially crucial is stem indumentum, used in standard keys and descriptions (Clapham, Tutin and Moore, 1987; Sell and Murrell, 2009; Stace 2019), but which seems never to have been properly illustrated, at least in easily accessible publications. Findings are presented in this article in the form of a 'visual key', which is not designed to replace standard keys, but rather to aid in their interpretation. Hopefully the discussion and drawings will lead to more accurate recording and more appropriate decisions as to which specimens to send to the referee.

Epilobium palustre (Marsh Willowherb). *John Norton*

The species dealt with will be the usual eight native species found in southern Britain, with only passing reference to *E. lanceolatum* (sufficient to separate it from *E. roseum*). I have not dealt with the two alpine natives, or the mainly northern New Zealand aliens. However, the Norfolk Flora Group has several times found *Epilobium brachycarpum* in recent years, easily recognised by its panicled flowers with tiny, deeply bifid petals, minute linear leaves, short, slightly curved fruits and exceptionally fine, wiry stems.

I have said something about recognising possible hybrids, as hybrids between the usual native taxa are frequent (see Kitchener in *Plant Crib* [Rich & Jermy, 1998]; Stace et al., 2015).

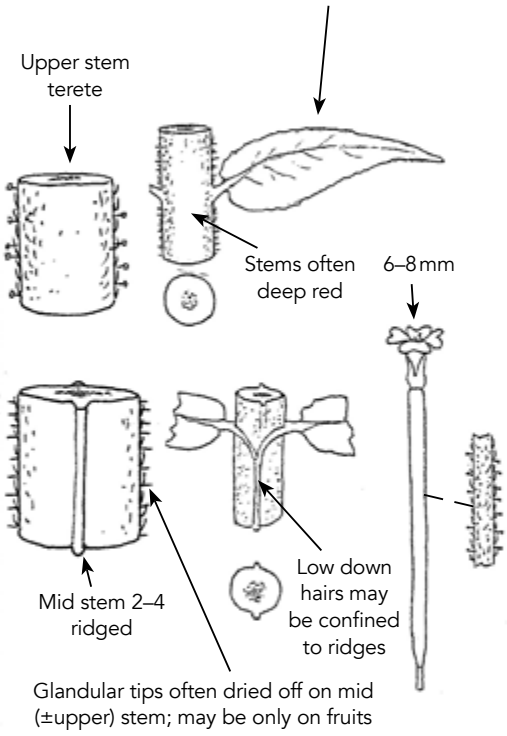
The discussion on *E. lamyi* (or *E. tetragonum* subsp. *lamyi*), which hardly seems to exist in its full blown form in Norfolk, is based mainly on the BSBI *Epilobium* workshop handout, available online (Kitchener, 2015).

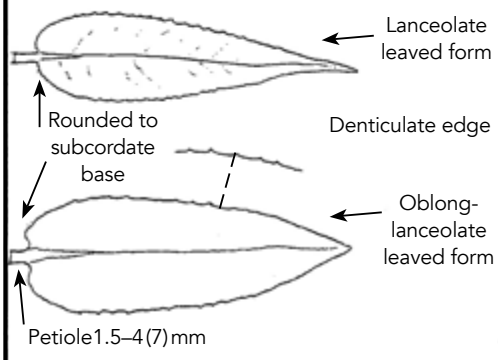

EPILOBIUM VISUAL KEY: 4-LOBED STIGMA
1–2: Sessile leaves
3–4: Petiolate leaves
1. *Epilobium hirsutum*
• Leaves oblong-lanceolate, sessile, slightly decurrent.
• Stems sparsely long hairy, not hoary.
• Leaves coarsely serrate.
• Flowers very large, 15–25 mm.
Mid stem
Decurrent
2. *Epilobium parviflorum*
• Leaves oblong-ovate to narrowly oblong-lanceolate, ±sessile, not decurrent.
• Stems densely medium long hairy and grey-hoary.
• Flowers small; stigma lobes erect and often stuck together with pollen (probe).
6–8(13) mm
Mid stem
Typical form
Frequent short-leaved form
< 3 mm
Occasional elongate, petiolate form
3. *Epilobium montanum*
• Leaves ovate to broadly lanceolate, bases rounded to subcordate, short-petiolate & strongly dentate.
• Stems with arched and short patent hairs.
• Flowers medium-sized (8–10 mm).
Leaf bases round to subcordate
(1)3–6 mm
Strongly dentate edge
Petioles 2–6 mm
4. *Epilobium lanceolatum*
• Leaves elliptic lanceolate, with gradually cuneate & entire base; petioles long ([2]4–10 mm).
• Flowers small (6–7 mm diameter), usually opening white (to pink).
Some petioles > 6 mm
Base cuneate, entire
Leaf edge fairly distantly dentate

EPILOBIUM VISUAL KEY: CLUBBED STIGMA | 1–2: Petiolate leaves

1. *Epilobium ciliatum*

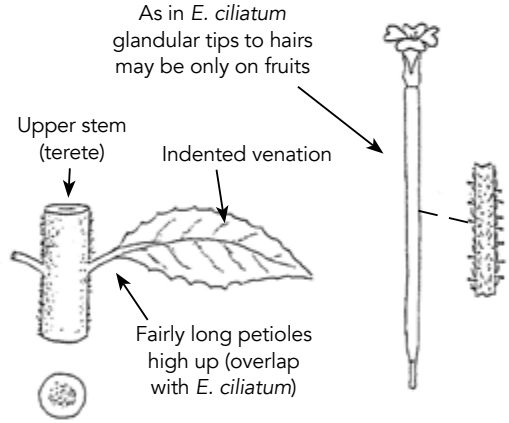
- Leaves lanceolate to oblong-lanceolate, base rounded to subcordate; edge (usually distantly) denticulate; petioles short (1.5–4[7]mm).
- Flowers occasionally open white (to pink).
- Stems often deep red; leaves reddish, shiny.

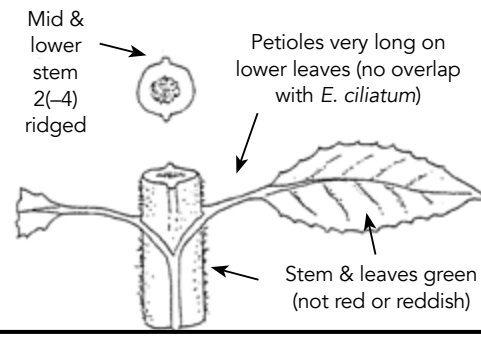




2. *Epilobium roseum*

- Leaves elliptic-lanceolate, base cuneate, edge closely denticulate.
- Petioles very long (4–15[20]mm), especially near base of plant.
- Flowers usually open white.
- Stem shape, ridging and indumentum much as in *E. ciliatum*.
- Stems and leaves not shiny red or reddish tinged.



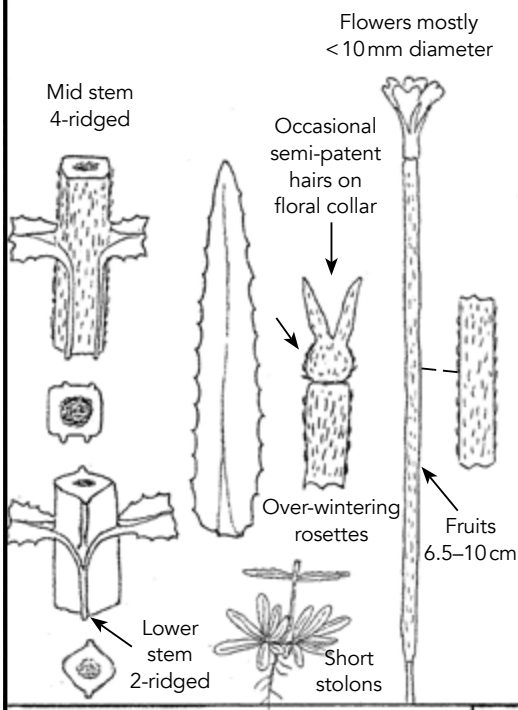


EPILOBIUM VISUAL KEY: CLUBBED STIGMA

3–6: (Sub) sessile leaves

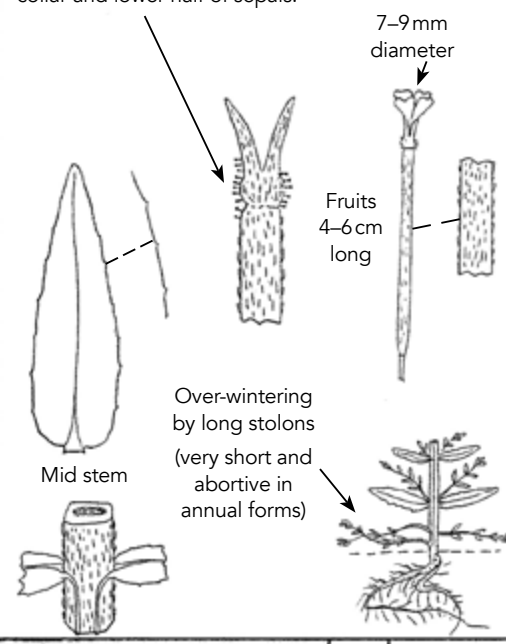
3. *Epilobium tetragonum* subsp. *tetragonum*

- Fruits very long (mostly > 7 cm).
- Leaves narrowly oblong to oblong-lanceolate, strongly dentate.
- Stems squarish and 2–4 ridged from base to mid-zone; terete above.
- All hairs strictly appressed eglandular.



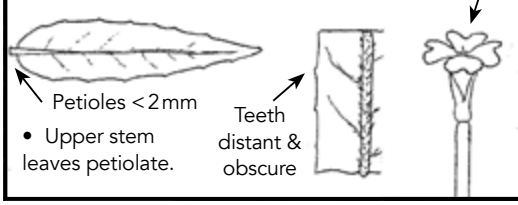
5. *Epilobium obscurum*

- Fruits very short.
- Leaves elliptic-lanceolate, obscurely and distantly dentate.
- Stems squarish and obscurely 2–4 ridged at base and mid-zone.
- Hairs on stems and fruits strictly appressed eglandular, like *E. tetragonum*, except for patent glandular hairs on floral collar and lower half of sepals.



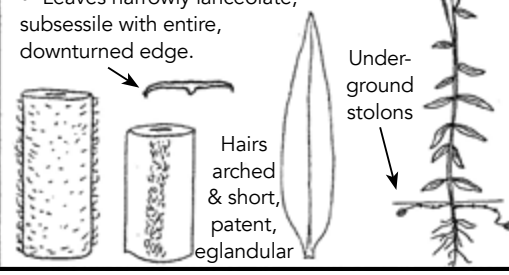
4. *Epilobium tetragonum* subsp. *lamyi*

- Flowers larger and rose (not flesh) pink.
- Leaves greyer green and more lanceolate.
- No decurrence of leaves onto stem.
- Stem shape and ridging as in *E. obscurum*.



6. *Epilobium palustre*

- Usually a slender, small-leaved plant with terete stems.
- Leaves narrowly lanceolate, subsessile with entire, downturned edge.



Vegetative identification

On the whole, one should not attempt a vegetative identification without considerable experience and even then many plants should be left unidentified, especially when they are only a few inches in height. At this stage the leaves are often very atypical and there is usually no stem indumentum, even in the hairiest taxa such as *E. hirsutum* and *E. parviflorum*.

E. hirsutum should be identifiable very early on because it has unique, coarsely serrate leaf margins and decurrent leaf bases – several other taxa have sessile leaves, but leaves are only clearly decurrent in *E. hirsutum*. With experience *E. parviflorum* may also be identifiable at the young vegetative stage from the combination of dense hoary stem hairiness and sub-entire leaf margin.

In my opinion *E. tetragonum* can also be identified very early on because it has very short stolons and thus produces very characteristic clusters of overwintering basal rosettes. The leaves of these overlapping rosettes tend to be narrowly elliptic or oblanceolate rather than strap-like and can still be found at a later stage when the typical stem leaves, stem indumentum and floral characters can be checked on.

Identification at the flowering and fruiting stage

Identification in the usual eight taxa encountered in southern Britain involves three or four stages: (i) stigma type: clubbed or 4-lobed; (ii) fruit length; (iii) leaf characters (overall shape, basal shape, leaf margin dissection, petiole length, type of leaf insertion into the stem); (iv) a final stage of checking the stem indumentum with a lens.

The first two stages are best accomplished by picking a fruit with a flower on and the third by downwardly stripping off a mid stem leaf. The fourth stage is often neglected because of reluctance to pick a whole plant, but since the characteristic stem hairs are to be found on the upper stem, picking a branch should suffice. The indumentum on the fruits may be a useful proxy for stem indumentum in this situation, but with some provisos (see illustrations).

Stigma type

Here the main problem is found in *E. montanum* and especially *E. parviflorum*, where the four short lobes are often stuck together by pollen in the vertical position to give the appearance of a club, albeit a rather broad one, more resembling the 'fist-shaped' stigma of hybrids between clubbed and 4-lobed taxa. If the stigma is truly 4-lobed it should be quite easy to probe apart the stuck together lobes with a thumbnail.

Fruit length

One common quandary is whether or not fruit length can be used at the flowering stage. On the whole this is an unfounded worry: for instance, at the flowering stage *E. tetragonum* should already have its characteristically long fruits, with some over 7 cm, and *E. obscurum* should have fruits only 3–5 (6.5) cm long. However, it is important to realise that very late flowering plants will often have atypically short fruits.

Leaf and petiole characters

If one strips a mid-stem leaf downwardly from the stem one will remove the whole petiole if present,

Epilobium tetragonum is recognised by its very long fruits and strap-shaped mid-stem leaves. *Bob Leaney*

or show the nature of the leaf insertion if the leaf is sessile. In *E. hirsutum* (or some of its hybrids) the leaf decurrence will be seen as two downwardly directed, shortly triangular strips of tissue, one from each leaf edge, with no petiole visible between. In *E. tetragonum* and *E. obscurum* the leaf base will usually be seen to be sessile and amplexicaul, without any decurrent segments on each side of any petiole, but occasionally the leaf base will be seen to be subsessile (i.e. very shortly petiolate) with a minute extension of the broad basal part of the midrib.

In *E. parviflorum* the leaf is usually also sessile or subsessile but I have found otherwise very typical examples of this taxon with well developed petioles up to 3mm long – usually this is in the long, strap-leaved forms rather than in forms with short elliptic-lanceolate leaves – the lengthening of the petiole being part of the leaf elongation. In these long petiolate plants there was no evidence of hybridity to suggest crossing with a petiolate taxon (see below).

Short petioles are characteristic of *E. montanum*, *E. ciliatum* and long petioles of *E. roseum* (also of *E. lanceolatum* in the south-west of the country). In *E. montanum* the petioles are c.2–6 mm long, with some overlap with the other two taxa, but the 4-lobed stigma and characteristic broadly ovate, regularly serrate and subcordate based leaves usually make the determination easy enough.

E. ciliatum and *E. roseum* both have clubbed stigmas, a not very distinctive and variable leaf shape, and identical stem indumentum. *E. ciliatum* is usually said to have petioles 2–4 mm long, but I have found individuals quite frequently with petioles 5–6 (–7) mm long, without obvious evidence of hybridity. Usually most petioles in *E. roseum* are longer at 4–15 (20) mm, but if one finds an awkward plant with all petioles 5–7mm long one should check the leaf base, which is always truncate-subcordate in *E. ciliatum* and broadly cuneate to rounded in *E. roseum*.

A few years ago we had a brief invasion of *E. roseum* in Norwich and then more occasionally in other towns nearby, lasting only for 2–3 years and probably arriving on vehicle wheels from London, where this taxon seems to be a frequent street weed. The white early flower colour was a very good spotting feature, together with a tendency to an elliptic rather than lanceolate leaf shape and a more indented leaf venation, when compared with *E. ciliatum*.

E. ciliatum (and *E. lanceolatum*) can also show a white early flower colour (Kitchener, 2015). However, in the Norwich population one found that white flowered plants with petioles 1–4(7) mm long, but no longer, had truncate to subcordate leaf bases (i.e. *E. ciliatum*), whereas plants with at least some longer petioles (7–10 (–20) mm), had broadly cuneate to rounded leaf bases (*E. roseum*).

Leaf base shape is therefore a very useful way of separating *E. roseum* from *E. ciliatum*. *E. lanceolatum* has a similar basal leaf shape to *E. roseum*, very long petioles and sometimes a white early flower colour, but is readily distinguished by its 4-lobed stigma.

When assessing petiole length it is important to look at the right level on the plant – it is the lower leaves that usually have the diagnostic long petioles. The first example of *E. roseum* I found in Norwich was a large population in a gravelly car park at a very early stage of growth, with only a short main stem and no branching at all. These plants had an extraordinarily non-*Epilobium* appearance, with broadly elliptic leaves and all petioles 10–15 mm or even up to 20 mm long. I grew one plant on and by the flowering stage the lowermost leaves left on the plant, on the bases of the main branches, had a more typical shape for *E. roseum*, with petioles c.5–10 mm long, more in the usually quoted range. The leaves higher up did not show petioles any longer than can occur in *E. ciliatum.*

Stem ridging

It is not usually realised that 2–4 stem ridges can occur in *E. ciliatum* and *E. roseum*, as well as in *E. tetragonum* and *E. obscurum* – in all four case the number of ridges will depend on the level of the stem and the upper stem will be terete. Stem ridging is best looked for just below a node. It should also be realised that in *E. ciliatum* the ridges may be surmounted, or replaced by, a line of hairs.

Stem indumentum

Here too it is important to look at the right level on the plant. The lower half or so of the main stem and the lower parts of the branches are usually glabrous or show only a sparse and atypical indumentum, so always examine the upper third of the plant. The fruits usually have the same indumentum as the upper stems but not always – for instance on the fruits of *E. hirsutum* and *E. parviflorum* the predominant hair type seen may be the very short glandular hairs that are obscured on the stems by the long and dense eglandular hairs.

The eight usual species one finds on recording sessions in the south divide nicely into four pairs as regards stem indumentum (see illustrations):

(i) Fine patent, eglandular hairs plus very short inconspicuous glandular hairs: *E. hirsutum*, *E. parviflorum.*

(ii) Strictly appressed hairs only: *E. tetragonum*, *E. obscurum* (glandular hairs on floral collar as well).

(iii) Semi-appressed eglandular hairs plus fairly long patent glandular hairs: *E. ciliatum*, *E. roseum*.

(iv) Curved or arched eglandular hairs and short patent hairs: *E. montanum*, *E. palustre*.

These stem indumentum pairings are easy to remember and should enable the great majority of flowering willowherbs to be reliably identified in the field, along with stigma type, fruit length and leaf characters.

In the case of *E. hirsutum* and *E. parviflorum* the fairly long, fine, eglandular stem hairs are surprisingly the same on examination with a lens, and it is mainly the denseness of the hairs in *E. parviflorum* which gives the diagnostic 'hoary' appearance.

E. tetragonum and *E. obscurum* have identical very closely appressed stem hairs, and exactly the same hairs are to be found on the fruits. In *E. obscurum* the diagnostic patent glandular hairs are always confined to the floral collar and lower third to lower half of the calyx lobes, with usually none on the fruits (occasionally on the uppermost few millimetres).

Our group has found two main problems with using stem indumentum in the field: in *E. montanum* and *E. palustre*, where we have had difficulties interpreting the usual descriptions; and the meaning of 'glandular hairs' in *E. ciliatum* and *E. roseum.* It is not uncommon to find suspected *E. montanum* at the pre-flowering stage with atypically narrow leaves, needing a check on the stem indumentum to separate it from *E. ciliatum*. In this situation the group has found it difficult to correlate what is actually seen in the field with the standard descriptions. To my mind the '± appressed' eglandular hairs (Stace, 2019) or 'short curved hairs' (Clapham, Tutin & Moore, 1987) of *E. montanum* are better described as 'arched', in that they emerge at right angles to the stem and have a straight, patent position before slowly curving to point in a direction either parallel to the stem or obliquely upwards. Moreover, the patent hairs mentioned also by Stace (but not by CTM) do not appear to me to be glandular, are no longer than the arched hairs and difficult to see. In *E. ciliatum* and *E. roseum* they are definitely glandular and protrude much beyond the semi-appressed hairs.

The stem indumentum in *E. palustre* is very similar to that in *E. montanum*, except that the arched hairs are rather lower arched. Moreover, the stems are so narrow and the hairs so short that they are very difficult to see in the field. I feel that the Norfolk Flora Group has under-recorded *E. palustre* until recently for this reason, there being very little otherwise to go on except for habit and leaf shape. *E. palustre*, at least the form that we have in Norfolk, more or less confined to fens, is a slender, virtually unbranched and delicate plant with narrowly lanceolate leaves with a downturned and entire edge (see illustration). With experience, this combination of characters, together with a mixture of arched and straight patent hairs, should clinch the determination even at the vegetative stage.

Glandular hairs in *Epilobium*

When examining the stem indumentum of a plant suspected to be *E. ciliatum* it is frequently found that some people can see glandular hairs and some not. This actually should make no difference to the determination because if one sees a mixture of semi-appressed eglandular hairs and fairly long, straight, patent hairs (with or without a glandular tip) this is enough for the identification. However, the fact

that standard descriptions talk of patent glandular hairs and that one often cannot see any glandular tips, can be off-putting. The glandular hairs in *Epilobium* are not like the usual glandular hairs encountered in, say, *Senecio*, *Cerastium* or *Geranium rotundifolium*. These have a separate, spherical cell (the gland) at the top of a single celled stalk. In *Epilobium* the patent hairs are unicellular, with no separate terminal gland cell, although the top of the hair cell is very slightly clubbed – examined under a microscope at 30–60× magnification one can see that there is definitely no cell wall at the base of this very slightly expanded terminal portion. Early on, a glistening drop of glandular secretion is produced around the tip of the hair, but this rapidly dries out. At around the flowering stage patent hairs near the top of the stem or on the fruits will still have drops of secretion and look glandular, whereas the older patent hairs further down will have dried out and look eglandular. At a later stage none will look glandular, for all will have dried out. To my knowledge glossaries never mention this type of glandular hair present in *Epilobium*. I would suggest that it be called a 'unicellular glandular hair'.

Under the microscope *E. roseum* can be seen to have slightly clubbed, blunt-tipped, unicellular glandular hairs on the stem, identical to those seen in *E. ciliatum*. I suspect that the floral collar stalked glands in *E. obscurum* are also of the same type, but the drops of secretion seem larger and do not seem to dry out. This could, however, just be because the floral collar glands are only present for a few days before the flowers drop off, so do not have time to dry out!

Epilobium obscurum

I used to think that *E. obscurum* was a very scarce plant in Norfolk and was therefore surprised to see the dozens of tetrad spots in *A Flora of Norfolk* (Beckett, Bull & Stevenson, 1999), mirrored roughly by the map in the New Atlas (Preston, Pearman & Dines, 2002). My habit prior to these publications was to look for the floral collar glands in *tetragonum* – like willowherbs with elliptic-lanceolate rather than strap-shaped leaves. I was also expecting to find clonal patches of plants connected by stolons, a character made much of in standard descriptions, but which is seldom seen in Norfolk.

In recent years I have begun to use short fruits as well as elliptic-lanceolate leaf shape as spotting features and have checked far more plants for floral collar glands. Doing this I have found many more examples and now realise that *E. obscurum* is quite a common plant, mainly on damp wasteland, shaded woodland rides and fen edge, but much less common in arable than *E. tetragonum*.

E. obscurum in our region tends to be a short, little-branched and delicate plant, usually with 2–4 tiny abortive stolons only a centimetre or less in length arising from just above ground level. Only on three occasions have I found a clone of plants connected by stolons and the taxon seems in our region to be behaving as an annual.

Another problem encountered while deciding between *E. tetragonum* and *E. obscurum* is that *tetragonum* can have one or two semi-patent hairs on the curved base of the floral collar, just above the pod, which can collect dew or rain on their tips and be taken for glands (see illustration). Water drops can also collect on these hairs from condensation if the specimen is taken home in a sealed polythene bag.

Hybrids

A hybrid may be suggested by an unusual combination of characters (especially a mismatch between leaf shape, petiole length and indumentum) or by intermediacy in characters. However, leaf shape and petiole length are so variable that in practice one usually needs to find a clenched fist stigma (in hybrids between clubbed and 4-lobed species), or one of the specific hybrid stigmata (see Kitchener in *Plant Crib*). Of those the most useful in my experience are a much branched candelabra shape, with an abnormally large number of short fruits, producing a preponderance of pale, translucent, sterile achenes.

One of the best ways to find *Epilobium* hybrids is to search for large areas of set aside, abandoned arable or land cleared for building, where very large populations of several species have been able to

grow together for a few years. I found one such site with large, intimately mixed populations of *E. tetragonum*, *E. parviflorum* and *E. ciliatum*, where one could quite easily define the parent species, with their little branched habit, from the hybrids with their broad, much branched candelabra shape. All three of the possible hybrids could be recognised by finding intermediacy in leaf shape and stem indumentum, and in the case of *E. parviflorum* hybrids, by the presence of a fist-shaped stigma and leaf hairiness.

In all the plants with a hybrid habit that had newly opened fruits, around 95% of the achenes still sitting in the fruits were about half-sized, near white and translucent, contrasting with one or two fertile achenes that were larger and an opaque dark brown colour. This would seem to be the most crucial evidence of hybridity.

Conclusions

The willowherbs always provide plenty of problems with identification in the field. The most frequent mistake is to jump to conclusions based on leaf shape, without a preliminary look at the stigma, for leaf shape is particularly variable and often misleading.

Another common mistake is to miss the presence of a short petiole. To check on this one must strip off a mid stem leaf. The basal leaf shape should also be checked at the same time.

Stem indumentum can be very useful in this situation and has not been well illustrated, so the accompanying illustrations should be helpful. I have also suggested some alternative descriptive terms for stem indumentum, for in my experience botanists find standard descriptions difficult to interpret, especially in *E. montanum* and *E. palustre*.

It seems not to be common knowledge that 2-4 stem ridges can occur in *E. ciliatum* and *E. roseum*, as well as in *E. tetragonum* and *E. obscurum*. Appreciation of this fact should prevent much confusion.

I hope my observations on petiole length will not cause confusion. Unexpectedly long petioles that don't fit with other characters should always make one expect hybridity – and hybrids are probably quite common. However, I feel it is worth recording that very typical examples of *E. ciliatum* and *E. parviflorum*, without any stigmata of hybridity, do quite frequently have petioles longer than stated in the usual descriptions. In the case of *E. ciliatum* this observation may help prevent misidentification as *E. roseum.*

Finally, the finding that the glandular hairs on the stems of *E. ciliatum* and *E. roseum* are unicellular and that the drop of glandular secretion at their tips is extracellular and dries out in older plants, should prevent pointless searches for glandular hairs in these taxa. It is the combination of semi-appressed hairs and blunt tipped patent hairs, with or without glandular secretions at their tips, that is diagnostic.

Acknowledgements

I would like to thank members of the Norfolk Flora Group for numerous discussions on *Epilobium* identification over the last decade or two and Geoffrey Kitchener (BSBI *Epilobium* referee) for his detailed comments on an earlier version of the visual key and painstaking help with the final draft; measurements are modified from Stace (2019) and Sell & Murrell (2009).

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My first year as a BSBI member

HOWARD BECK

Dryas octopetala (Mountain Avens) on the roadside near Durness.

Four years living in New Guinea in the 1970s drew my eye to botany, but it was not until around 2008 that interest finally gelled into something more attentive. Being a Yorkshireman with deep pockets and short arms there was much prevaricating, but with encouragement from others I finally joined the BSBI in October 2018. Apart from my antipodean days I have always lived within the shadow of the Pennines, with the Yorkshire Dales (v.c. 64) being my principal area of interest. This short article reflects on what proved a very rewarding first full botanical season as a BSBI member. *All photographs by the author.*

As with many others, 2019 saw me immersing myself wholeheartedly in recording for the 2020 Atlas. My season kicked off to a fine start in spring and grew steadily better as the year progressed. In May I took a three week solo sojourn in the Highlands, a trip largely inspired by reading Michael Scott's superb book *Mountain Flowers*. En route north I paid my second visit to the site of *Diapensia lapponica* (Diapensia) and on this occasion was fortunate to find the species just coming into bloom. I took this as a good omen. I was not disappointed. The Isle of Skye saw a racking up of an impressive species list on the Trotternish Ridge. Though I had failed to locate *Saxifraga cespitosa* (Tufted Saxifrage), I was descending into Coire Cuithir returning to my car, when I stumbled upon *Saxifraga tridactylites* (Rue-leaved Saxifrage), not as glamorous perhaps, but this was later confirmed as new to the Misty Isle.

Further north I legged it up one of my favourite mountains, Cul Mor, in Sutherland and was rewarded with lots of pink *Kalmia procumbens* (Trailing Azalea) smiling among the wind-scoured rocks, while a couple of days later the verges and limestone outcrops alongside the A838 south of Durness presented a magnificent spectacle of *Dryas octopetala* (Mountain Avens). East-bound beyond Loch Eribol, the 'Arctic Fringe' provided both high and low points. While attempting the close-up of

a water plant I slipped into what I believed was a pool no deeper than 15 cm and went in up to my waist! But compensations there were, when later I found *Oxytropis halleri* (Purple Oxytropis), *Botrychium lunaria* (Moonwort), *Scilla verna* (Spring Squill) and *Arctostaphylos alpinus* (Alpine Bearberry), all species new to me. Unfortunately I was too late for the delightful *Primula scotica* (Scottish Primrose).

This break also marked my first visit to the Orkneys, a place I always wished to see, not least for its magnificent archaeological remains. While awaiting the ferry at Gils Bay I found a lovely roadside colony of *Saxifraga* × *arendsii* a first for Caithness, while my week on the isles also produced *Saxifraga hirsuta* (Kidney Saxifrage) – new to Orkney. I was on a roll by the time I returned south of the border.

While cycling in Cumbria I chanced upon a solitary specimen of *Pyrus salicifolia* (Willow-leaved Pear) – a first record for the county – beside a beck near Stainton, then on my own stomping ground my luck continued with the discovery of the attractive *Cerinthe major* (Greater Honeywort) near Paythorne (reported by David Broughton in his June blog) and a fine stand of *Symphyotrichum novae-angliae* (Hairy Michaelmas-daisy) beside the River Wenning at Burton-in-Lonsdale (both firsts for v.c. 64).

Top: *Kalmia procumbens* (Trailing Azalea), on Cul Mor, Sutherland. Below: *Oxytropis halleri* (Purple Oxytropis) thriving on the 'Arctic Fringe'.

Saxifraga × *arendsii* spotted on a roadside verge in Caithness.

And so as an excellent season began winding down, an October walk with a friend along the Arnside foreshore revealed an interesting *Atriplex* (Orache) among shingle not far from the promenade. Having no clue as to species, I sent the record to Mike Porter and thanks to him and his co-recorders this was eventually identified as the rare hybrid *Atriplex prostrata* × *glabriuscula* (new to Cumbria).

Summer was rapidly drawing to a close when an opportunity presented itself to become a volunteer with Natural England based out of their Colt Park Barn office on the Ingleborough NNR. Subsequent and quite exciting work with *Gentianella campestris* (Field Gentian) surveys on the reserve revealed this species to be far more wide-ranging on Ingleborough than was hitherto suspected. I have my targets for later this season, when I hope to be able to report further successes.

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Calamagrostis purpurea (Scandinavian Small-reed) in Co. Meath (H22), first report from Ireland

MARGARET NORTON & JEREMY ROBERTS

Calamagrostis purpurea growing with *Phalaris arundinacea* in wet willow carr (Ervey Lough, July 2019). *Margaret Norton*

Calamagrostis purpurea (Scandinavian Small-reed) was first validly described by Trinius (1824) although he had previously recorded it from Siberia 'ad littora Baicalis' under the name *Arundo purpurea* (Trinius, 1820). It was more than a century later that genetic studies by Nygren (1946) indicated *C. purpurea* consisted of a complex of apomicts, which had evolved both by autoploidy of *C. canescens* (Purple Small-reed) and by hybridisation between *C. epigejos* (Wood Small-reed) and *C. canescens.* Nygren postulated that the harsh climatic conditions within the distributional range of *C. purpurea* had facilitated a number of such independent speciation events resulting in the morphological variation demonstrated by this species. This variation is illustrated by the recognition of four subspecies of *C. purpurea* in Flora Europaea (Clarke 1980).

Five species of *Calamagrostis* are currently known to occur in Britain of which only two are recorded from Ireland (Stace, 2019). The British list of species includes *C. purpurea*, first recognised in 1980 from Rescobie Loch, Angus by Stewart (1980, 1981*a*, 1981*b*) although it had been previously collected in 1941 from near Braemar, S. Aberdeen (Wiggington 1999). Stewart (1989) assigned British material to *C. purpurea* subsp. *phragmitoides* based on comparison with type material, including that of *C. purpurea* subsp. *purpurea* which was sent on loan from Leningrad to the British Museum. In Ireland the two *Calamagrostis* species hitherto recorded are *C. epigejos* from twelve vice-counties (BSBI, 2019) and *C. stricta* (Narrow Small-reed) from five vice-counties within which it is mainly restricted to the shores of Lough Neagh and Lough Beg (Harron 1986; BSBI, 2019).

An unfamiliar *Calamagrostis* was noted in August 1991 by MN at Ballyhoe Lough, Co. Meath (IGR N8495), but the condition of the late-season material collected precluded a satisfactory identification at that time. Ballyhoe Lough, depicted as a single lake until 1985 (Ordnance Survey Office, 1985), currently

exists as two smaller lakes (Ordnance Survey Ireland, 2011) separated by an area of wet carr periodically subject to both summer and winter flooding. It was within this carr, composed predominantly of *Salix cinerea* (Grey Willow) and *Alnus glutinosa* (Alder), that the population of *Calamagrostis* was first observed growing with *Phalaris arundinacea* (Reed Canary-grass) on slightly drier ground at the base of trees.

Further searches for the grass in subsequent years were hindered by high flooding levels, with sightings limited to 2002 and 2006. The sparse material available in these years did not conform to either of the two *Calamagrostis* species known to occur in Ireland. However, the exceptionally low water levels in September 2018 facilitated the discovery of four large clumps of the *Calamagrostis* within a c.5 m^2 clearing amongst the carr. This allowed sufficient material to be collected for the determination of the grass as *C. purpurea* by JR and Mike Porter. Associated species included *Ranunculus repens* (Creeping Buttercup), *Filipendula ulmaria* (Meadowsweet), *Lythrum salicaria* (Purple-loosestrife), *Galium palustre* (Common Marsh-bedstraw), *Myosotis scorpioides* (Water Forget-me-not), *Scutellaria galericulata* (Skullcap), *Lycopus europaeus* (Gypsywort), *Carex riparia* (Greater Pond-sedge), *C. vesicaria* (Bladder-sedge) and *P. arundinacea*. Further visits in June and July 2019 failed to reveal any *C. purpurea* within this same area, which had become dominated by *Urtica dioica* (Common Nettle) and *P. arundinacea*. However *C. purpurea*, a rhizomatous perennial, can be expected to persist in the adjacent area of carr, this being its preferred habitat, especially where subject to winter flooding (Cope & Gray 2009).

A second population of *C. purpurea* was discovered by MN in September 2018 and revisited in late June 2019, on the south-west shore of Ervey Lough, Co. Meath (IGR N7693), a site c.8.5 km due west of Ballyhoe Lough. The most extensive stands occurred within the narrow belt of wet carr by the lake shore, composed predominantly of *S. cinerea* interspersed by *A. glutinosa* with an understorey of *P. arundinacea*. It also grew in the more open vegetation at the margin of the carr where the presence of small boulders indicated a previously higher lake shore (Ordnance Survey Office, 1838). Its growth here was facilitated by the lack of grazing, as livestock were excluded by an electric fence. Associated species included *Equisetum fluviatile* (Water Horsetail), *Ranunculus flammula* (Lesser Spearwort), *Lotus pedunculatus* (Greater Bird's-foot-trefoil), *F. ulmaria, L. salicaria, G. palustre, Succisa pratensis* (Devil's-bit Scabious), *Angelica sylvestris* (Wild Angelica), *Juncus acutiflorus* (Sharp-flowered Rush), *J. effusus* (Soft-rush), *P. arundinacea, Deschampsia cespitosa* (Tufted Hair-grass) and *Agrostis stolonifera* (Creeping Bent). The most consistently associated herbaceous species in both

Top: fruiting panicles of *Calamagrostis purpurea* (Ballyhoe Lough, September 2018). Below: male-sterile flowers of *C. purpurea* with indehiscent anthers, the majority of which are non-exserted (Ervey Lough, June 2019). *Margaret Norton*

Co. Meath locations was *P. arundinacea*, a grass known to grow luxuriantly where the water table fluctuates (Preston & Croft 1997).

The determination of Co. Meath material as *C. purpurea* was based on fruiting material collected in September 2018 from both Ballyhoe Lough and Ervey Lough, in addition to flowering material collected in late June 2019 from the latter location. Detailed analysis of the specimens by JR is set out in Tables 1 and 2. The floral characteristics (including five-nerved lemmas with awns originating from the apical third), number of culm nodes (5–8) and ligule length (often to 10mm or more), in addition to the male sterility demonstrated by the indehiscent anthers, absence of pollen and the non-exserted nature of the majority of anthers, all validate the determination of this grass as *C. purpurea*.

The general robustness and size of the plants, with a very long ligule, are shared by *C. epigejos*. However, that species typically has fewer culm-nodes (2–4) and is a sexually-reproducing species having dehiscent anthers with viable pollen and three-nerved lemmas. *C. canescens* is a slighter plant, having usually rather fewer culm-nodes (3–5) and distinctly shorter ligules (only rarely as long as 6mm). This species is indicated as fertile by Stace (2019), but male-sterile forms can also occur (Cope & Gray 2009). The remaining two British species, *C. stricta* (Narrow Small-reed) and *C. scotica* (Scottish Small-reed), have consistently fewer culm-nodes and much shorter ligules, more condensed and narrow inflorescences, shorter and blunter glumes and awns originating below the midpoint of the lemmas.

British populations of *C. purpurea*, when determined to subspecies, have been assigned to subsp. *phragmitoides* following Stewart (1989). However, in the Irish plants examined, the rhachilla-extension and scabrosity of the glumes (the latter admittedly a qualitative assessment) conflict with a diagnosis as subsp. *phragmitoides*, whilst other characters such as the length of callus hairs do not allow a better fit in any of the other described subspecies (Clarke 1980).

The occurrence of *C. purpurea* in Ireland, a species of Eurosiberian Boreal-montane distribution (Preston & Hill 1997), is of phytogeographical significance. Within Britain it is recorded from only two English (69, 70) and six Scottish (88, 89, 90, 92, 96, 98) vice-counties (BSBI, 2019). Regarding its putative parents, all eight of these British vice-counties contain *C. epigejos.* However, *C. canescens*, whose distribution appears to be decreasing (Cope & Gray 2009), is recorded from only three of the aforementioned vice-counties (69, 70 and 88).

In Ireland, although the *C. epigejos* parent is known to occur, the second putative parent *C. canescens* is as yet unrecorded. This phenomenon whereby taxa, which have arisen by hybridisation, occur in the absence of one of the putative parents is illustrated within Ireland by *Equisetum* × *moorei* (Moore's Horsetail) (Moore & More 1866; Acock, 2015), *Ranunculus* × *levenensis* (Lough Leven Spearwort) (Gornall, 1987), *Circaea* × *intermedia* (Upland Enchanter's-nightshade) (Raven, 1963) and *Stuckenia* × *bottnica* (Bothnian Pondweed) (Preston et al., 1998). Of particular relevance is the observation by Crackles (1997) that specimens of *C. stricta* from Lough Neagh and Lough Beg demonstrate slight signs of introgression with *C. canescens* despite the apparent absence of the latter species. The distribution of such relic hybrids, or of species demonstrating introgression, may reflect the former distribution of the absent parent. Alternatively, the distribution of relic hybrids may result from long-distance dispersal of vegetative propagules or, where the hybrid is partially fertile, seeds.

A different scenario is presented by the male-sterile *C. purpurea* which, although derived by hybridisation, is an actual established species capable of seed production through apomixis. Therefore, rather than representing a relic taxon derived from in-situ hybridisation, it is more plausible that the presence of *C. purpurea* in Ireland is attributable to long-distance dispersal of seed. This provides a possible explanation for the non-sympatric distribution in Ireland of *C. purpurea* compared to that of its apparently absent *C. canescens* parent.

The discovery of *C. purpurea* in Co. Meath illustrates the need for further investigation of *Calamagrostis* in Ireland. It is possible that other

Table 1. Culm characteristics of *Calamagrostis purpurea* based on dried fruiting material from Ervey Lough (September 2018) and Ballyhoe Lough (September 2018). Sample sizes given as (*n*).

Character	Ervey Lough	Ballyhoe Lough
Culm-length (cm) [note 1]	(*n*=2) 147; 135	(*n*=1) 140+
Number of nodes per culm [note 1]	(*n*=2) 6; 7	(*n*=1) 5+
Leaf width (mm) [note 2]	(*n*=2) 4.3; 5.5	(*n*=3) 4.2; 5.5; 5.7
Lamina upper surface: bristle length (µm)	(*n*=20) scabrid, with bristles: mean 39; min 20; max 65	(*n*=20) scabrid with bristles; mean 56; min 23; max 124
Lamina upper surface: hair length (µm) [note 3]	(*n*=20) patchy distribution of pilose hairs: mean 620; min 480; max 790	(*n*=10) patchy distribution of pilose hairs; mean 540; min 413; max 700
Inflorescence: length (cm)	(*n*=4) 16; 17; 18; 20	(*n*=3) 18.5; 19.5; 21.5
Glume width (mm)	(*n*=25) mean 0.96; min 0.87; max 1.09	(*n*=32) mean 0.95; min 0.87; max 1.09
Glume length (mm) [note 4]	(*n*=25) mean 4.99; min 4.43; max 5.74	(*n*=32) mean 4.97; min 4.13; max 6.06
Glume scabrosity	(*n*=multiple) strongly scabrid with long bristles (to *c.*180 µm) along nerves and shorter bristles on dorsal face (to *c.*90 µm)	
Glume nerves	(*n*=multiple) lower 1; upper 3	(*n*=multiple) lower 1; upper 3
Lemma nerves	(*n*=multiple) 5	(*n*=multiple) 5
Lemma scabrosity	(*n*=multiple) a few short prickles on nerves; scattered papillae on dorsal face	
Lemma length (mm) [note 5]	(*n*=32) mean 3.22; min 2.77; max 3.47	(*n*=22) mean 3.39; min 2.75; max 3.81
Position of awns on lemmas [notes 6 & 7]	(*n*=22) within upper 30.8% of lemma mean 19.8%; min 6.3%; max 30.8%	(*n*=22) within upper 28.6% of lemma mean 18.9%; min 8.8%; max 28.6%
Distance awn tip extends beyond lemma tip (mm)	(*n*=multiple) min 0; max 0.75	(*n*=multiple) min 0.15; max 0.75
Anthers	(*n*=multiple) indehiscent; majority non-exserted; pollen not formed	
Callus-hairs [note 8]	(*n*=multiple) typically 15–30% longer than lemma	
Rhachilla-extension length (mm)	(*n*=4) mean 0.30; min 0.25; max 0.37	(*n*=7) mean 0.44; min 0.37; max 0.50

Notes on Table 1

1: Both culm-lengths and number of nodes are minima as the specimens examined did not include the lowermost portion of the culms.

2: Figures are for flattened leaf-blades, where necessary involving soaking prior to measuring.

3: The 'patchy' distribution of long pilose hairs on the upper surface may simply reflect uneven abrasion.

4: Lower glumes are c.10% longer than upper glumes.

5: Cope & Gray (2009) measure lemma-length (in *Calamagrostis*) as from the base of the lower glume. In these specimens the actual lemma length was measured, since at the late date of collection the florets were invariably loose within the spikelets, or already shed.

6: Position of awns on lemmas are provided for comparison with figures given by Stewart (1997).

7: Note that in these September collections, the thin tissue between the nerves at the apex of the lemma was disintegrating. As a consequence, in most cases it proved difficult to ascertain where the origin of the awn would have been had the material been fresh.

8: Comparative lengths of callus-hairs versus lemmas have here been estimated 'by eye'. The large variation in lengths exhibited by a single tuft of callus-hairs precludes any convenient way to measure accurately how their tips fall in relation to the lemma tip.

Table 2. Culm characteristics of *Calamagrostis purpurea* based on fresh flowering material from Ervey Lough (June 2019). Sample sizes given as (*n*).

Character	Ervey Lough
Number of nodes per culm [note 1]	(*n*=20) mean 6.4; min 5; max 8
First leaf from top of culm: width (mm)	(*n*=20) mean 4.8; min 3.2; max 6.5
Second leaf from top of culm: width (mm)	(*n*=20) mean 5.8; min 4.6; max 7.6
Third leaf from top of culm: width (mm)	(*n*=20) mean 5.9; min 4.2; max 7.4
Fourth leaf from top of culm: width (mm)	(*n*=20) mean 4.8; min 3.9; max 5.6
First leaf from top of culm: ligule length (mm) [note 2]	(*n*=20) mean 11.0; min 8.0; max 13.8
Second leaf from top of culm: ligule length (mm) [note 2]	(*n*=18) mean 8.1; min 7.6; max 12.7
Third leaf from top of culm: ligule length (mm) [note 2]	(*n*=5) mean 6.5; min 5.8; max 7.4
Fourth leaf from top of culm: ligule length (mm) [note 2]	(*n*=4) mean 7.8; min 6.3; max 8.5
Inflorescence: length (cm)	(*n*=20) mean 19.0; min 14; max 22
Anthers	(*n*=multiple) indehiscent; majority non-exserted; pollen not formed

Notes on Table 2

1: All culms examined were intact from the point of emergence at the rhizome.

2: Measurement of the fragile ligules is compromised by abrasion, especially on lower, older, leaves. Thus in the first leaves from top of culm eighteen of the twenty ligules examined were visibly complete, whereas in the fourth leaves from top of culm only four of the twenty ligules remained to be measured, all more-or-less fragmentary. Ligule lengths for lower leaves should therefore be regarded as minima. Ligule lengths from uppermost leaves are included for completeness. However, Cope & Gray (2009) consider that *'the ligules selected, unless otherwise required, should be on the second or third leaf from the top of the culm; that of the uppermost leaf is often at variance with the rest'*.

populations of *C. purpurea* exist in carr areas adjoining the abundant lakes in the drumlin belt within which Ballyhoe Lough and Ervey Lough are positioned. Additionally, there is a need for the reassessment of all *Calamagrostis* herbarium material, which may reveal as yet unrecognised specimens of *C. purpurea*. Detailed cytological analysis of the two Co. Meath populations of *C. purpurea* and of their affinities to populations in Britain and Europe is also required. Voucher specimens of flowering and fruiting material have been deposited in the National Herbarium, Glasnevin, Dublin (accession numbers DBN 104893, 104894 and 104895).

Acknowledgements

The authors wish to thank Mike Porter for his most valued help and advice in determination of specimens in addition to his constructive comments on the draft manuscript. Sincere thanks also to Nick Stewart for discussion regarding the late Olga Stewart's studies on *C. purpurea* in Britain, members of the Dublin Naturalists' Field Club for assistance in editing, Mike Wyse Jackson (National Parks and Wildlife Service) for clarification regarding records in the BSBI Distribution Database and Colin Kelleher (Keeper of the National Herbarium) for his help and guidance.

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New orchids and broomrapes – remarkable botanical finds in Berwickshire (v.c. 81) 2014–2019

MICHAEL BRAITHWAITE

When I started as vice-county recorder for Berwickshire (v.c. 81) and remarked on the lack of support that I could count on, I was told that the surest way to solicit new records was to publish a Flora. I can vouch for it, it works. I published a checklist in 1990, a rare plant register in 2004, a botanical site register in 2013 and a Flora in 2014: each led to productive correspondence. Much the most successful has been the site register. Botanists found they were armed with just the information they needed to prepare for a visit to a site – a map, detailed records of the scarce species and lists of other species of note. Robin Cowe, who is now to try his hand as my successor as vice-county recorder, has been inspired to carry out extensive fieldwork over the last six years. He has found additional species at the listed sites and has nosed out places that I had never visited – with productive results.

Robin has now worked with me to update the site register for the period 2014–2019. As recording for BSBI's Atlas 2020 is now complete, I have written this short review which I feel raises issues of more general application.

Coverage in the period 2014–2019 was concentrated on the coast, and inland in hectads NT75 and NT85, though a good scatter of recording was made elsewhere in Berwickshire, as shown in

the map below (Figure 1). The coverage resulted in many surprising finds in addition to those discussed in this article.

New species

A number of native species have been discovered new to Berwickshire (Table 1), together with the rediscovery of some species which had been feared extinct. The new finds include species that are native in northern England but not strictly native in Scotland.

It is remarkable that four of the eight species are orchids and two are broomrapes. One reason relates to Professor Richard Bateman's reclassification of the subspecies of *Gymnadenia conopsea* (Fragrant Orchid) as species. Many new records of this aggregate have been made in Berwickshire in the last six years, all by the coast, and every possible care has been taken with their determination, enabled by sample determinations by Prof. Bateman. Work to date supports the view that *Gymnadenia borealis* (Heath Fragrant-orchid) is a species of fairly dry calcareous soils and, on the Berwickshire coast, is mainly found high on the sea braes and in adjacent grassland. It flowers in June. In contrast *Gymnadenia densiflora* (Marsh Fragrant-orchid) is a species of flushed grassland and, on the Berwickshire coast, is typically found where there is water seepage midway down the sea braes. It flowers in July, two or three weeks later than *Gymnadenia borealis*. *Gymnadenia conopsea* (Chalk Fragrant-orchid) is known in Roxburghshire (v.c. 80) as a colonist of disused railway cuttings, probably introduced with railway ballast. No verified records have yet been made for Berwickshire.

The discovery of *Orobanche alba* (Thyme Broomrape) at Lumsdaine Dean, the upper section of Dowlaw Dean, is remarkable (Long, 2014). The site has a long history of botanical recording, but is very rugged and it seems that the *Orobanche* only flowers in some years and has thus escaped detection until now.

It is tempting to attribute the recent colonists to climate change and indeed that is the most likely reason behind the dramatic spread north of *Ophrys apifera* (Bee Orchid) in recent years, which has been much assisted by the long stretches of grassland on motorway embankments on the A1 trunk road. *Erigeron acris* (Blue Fleabane) is associated with the disturbance that comes with man-made habitats and *Orobanche minor* (Common Broomrape) is really just a chance impurity with amenity sowings that will not necessarily form a permanent colony; though climate change may have increased its chances of survival. The fact that all three of these incomers have been found in ruderal habitats rather than natural grassland is seen as very significant. It limits the likelihood that any of them will become part of the vegetation of any of the botanically-rich sites in Berwickshire, though some might colonise cuttings on the A1 trunk road.

In contrast, the rediscovery of *Epipactis helleborine* (Broad-leaved Helleborine) and *Neottia nidus-avis* (Bird's-nest Orchid) reflects visits to their former woodland sites and nearby woodland at the

Table 1. New and rediscovered species in Berwickshire (v.c. 81) 2014–2019

Species	Comment
Epipactis helleborine (Broad-leaved Helleborine)	Last previous record 1982
Erigeron acris (Blue Fleabane)	Recent colonist, a southern species spreading north
Gymnadenia densiflora (Marsh Fragrant-orchid)	Last previous record 1960
Neottia nidus-avis (Bird's-nest Orchid)	Last previous record 1985
Ophrys apifera (Bee Orchid)	Recent colonist, a southern species spreading north
Orobanche alba (Thyme Broomrape)	Very rare on the east coast of Britain, more frequent in the west
Orobanche minor (Common Broomrape)	Recent colonist, a southern species often introduced with amenity sowings
Salsola kali subsp. *kali* (Prickly Saltwort)	Last previous record 1960, only present as a coastal casual

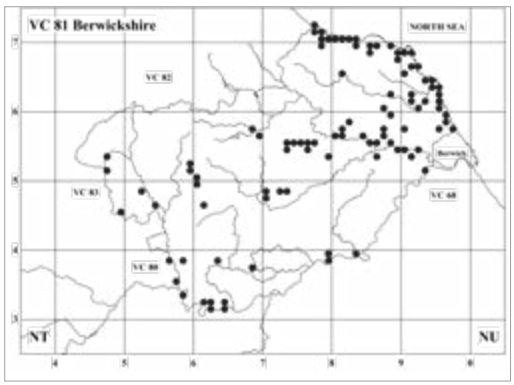

Figure 1. Rare or scarce localities added 2014–2019.

appropriate time of year. The rediscoveries are a useful reminder of how incomplete recent sample surveys of Berwickshire have been.

Increasing native species

Carex pendula (Pendulous Sedge) was formerly confined to two localities in Berwickshire, though it is plentiful where it occurs. The localities are the coastal undercliff immediately north of the English Border and Dunglass Dean, which runs right to the coast. However, it is frequently grown in gardens, from which it may escape and is sometimes planted in policy woodland, where it may naturalise. Recently *Carex pendula* has been spread along the Blackadder and Whiteadder Waters by floods, colonising woodland on the floodplain. No equivalent colonisation has been found along the River Tweed, perhaps because of the scarcity of woodland on the floodplain.

Carex pendula (Pendulous Sedge) in woodland by the Blackadder Water (NT85). *Michael Braithwaite*

Lythrum salicaria (Purple-loosestrife), extinct in Berwickshire as a native species, was found naturalised in tall riparian vegetation by the River Tweed below Dryburgh in 2007, presumably from a garden escape. It was found again far downstream near the Union Bridge in 2018, where it may or may not be an unrelated introduction. It has been introduced elsewhere, but it remains unclear whether it will naturalise widely.

Malva moschata (Musk Mallow) is treated as a scarce species in Berwickshire on the strength of a few colonies on dry, eroding slopes where it may be an archaeophyte or even native. However, most occurrences are of clumps apparently established from garden throw-outs. A number of additional sites have been found in the last six years, all likely throw-outs.

These three native species highlight the difficulty of interpreting distribution maps showing increasing ranges. There is a need to burrow down to the underlying records, if indeed they have the necessary detail, to understand the processes taking place. We justifiably like to distinguish between deliberate introductions and other dispersal events, even if they involve humans unwittingly. I enjoy thinking of introductions by humans as experiments, testing out whether or not the natural distribution of a species has encompassed the whole of its potential range in today's climatic conditions. In this respect the only one of these three species to be clearly spreading to fill its potential range in Berwickshire is *Carex pendula*.

Potentially intrusive neophytes

A Short Flora of Berwickshire (2014) singled out certain neophytes as being intrusive, in the sense that they disturb the balance of the native vegetation. One of these has increased and two more have come to notice. *Glyceria maxima* (Reed Sweet-grass) is, somewhat surprisingly, technically a neophyte in Berwickshire that can dominate muddy river margins to the detriment of other species. It was thus treated as an intrusive neophyte in the *Flora* though it is native in much of England. This species

is continuing to spread and is now reported from the lower reaches of the Eye Water, across a watershed from the River Tweed.

Acaena novae-zelandiae (Pirri-pirri-bur) is a problem species on Lindisfarne, North Northumberland (v.c. 68), but has yet to prove a problem in Berwickshire. However it was found in grassland near Mire Loch at St Abbs Head NNR in 2016 and, although removed by the ranger, could reappear from seed.

Allium triquetrum (Three-cornered Garlic) is a problem species in the south of England, where it is now very widespread, in much the same way as *Allium paradoxum* (Few-flowered Garlic) is in Berwickshire. It was found in 2019 in Eyemouth near a caravan park, from where it may or may not spread.

New neophytes

In addition to those already mentioned, fifteen new neophyte species have been recorded. Most are garden escapes found singly or in small numbers on road verges, waste ground or at watersides and require no further comment. Two have been deliberately sown: *Trifolium incarnatum* (Crimson Clover) was sown as a crop near Lauder, while *Poterium sanguisorba* subsp. *balearicum* (Fodder Burnet) was included in an amenity sowing at Gunsgreen, presumably in ignorance that it differs from the native *Poterium sanguisorba* subsp. *sanguisorba* (Salad Burnet). It might become established there.

Only one of the fifteen can be said to have naturalised, *Crocus nudiflorus* (Autumn Crocus). This has formed a good patch under trees beside the Hill Burn, Coldingham. The colony is particularly interesting because this Crocus has now been found in a series of similar sites beside the rivers Teviot and Tweed to the west of Berwickshire. In each case the colony is under trees in light soil on the flood plain. After an initial corm has been washed up by chance, it can be deduced to have multiplied by sending out rhizomes that run for as much as 20 cm, just under the surface of the soil, before forming a new corm. In this way *Crocus nudiflorus*, unlike other garden

Crocus nudiflorus (Autumn Crocus) growing under trees at Coldingham. *Robin Cowe*

Crocuses, can naturalise effectively without reliance on setting seed. Some colonies are 30m across.

Site boundary revisions

The Berwickshire BSBI Botanical Site Register (2013) attempted to define all botanically-rich sites in the county. The fieldwork carried out during 2014–2019 has also been useful in suggesting some revisions to these.

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[Note: pdf versions of the above three publications are available on the BSBI website at *bsbi.org/berwickshire*.]

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Lesser Meadow-rue *Thalictrum minus* L. (Ranunculaceae) should be treated as a single variable species in Britain and Ireland

HILARY PERRY

In 1753, Linnaeus described 13 species of *Thalictrum*, one of which he called *T. minus* (Lesser Meadow-rue). It is widespread across Europe and extremely variable. This has always caused difficulty with its taxonomy and only 132 years later Lecover (1885) listed over 200 synonyms in his monograph of the genus.

Thalictrum minus has also been variably treated in Britain and Ireland by different authors who frequently expressed dissatisfaction at their own treatments (e.g. Clapham et al.,1962). Most recently, Sell & Murrell (2018) divided it into nine taxa (similar to the classification of Butcher 1934 but at species rank), whilst Stace (2019) included them in one variable species.

For my DPhil at the University of Oxford, I made a detailed study of *Thalictrum minus* in Britain and Ireland and tested the validity of Butcher's (1934) three subspecies: subsp. *minus*, subsp. *arenarium* (Butcher) Clapham and subsp. *majus* (Butcher) Clapham. In this note I summarise my results; full details are given in my thesis (Perry, 1974) and voucher material which are deposited in the Welsh National Herbarium (NMW, accession number NMW.86.67).

Thalictrum minus is widespread, although not common and is found almost throughout the Britain and Ireland, but is noticeably absent from apparently suitable habitats in South-east England. Plants were collected from as many different types of habitat as possible throughout the range, except for the west of Scotland, to obtain a morphologically and physiologically representative sample (Figure 1). Some of these plants were cultivated under uniform conditions and used for character analysis, cytological investigation and breeding experiments; the aerial parts of others were pressed and dried and used for an analysis of morphological characters as expressed in the wild. At each site a soil sample was taken and vegetation and other environmental data recorded.

Morphological variation

Measurements on cultivated and wild samples showed a wide variation both between and within populations in a large number of morphological and a few phenological characters. Some of these characters were correlated and while some were controlled by the environment (e.g. plant height and leaf size), others appear to be genetically determined

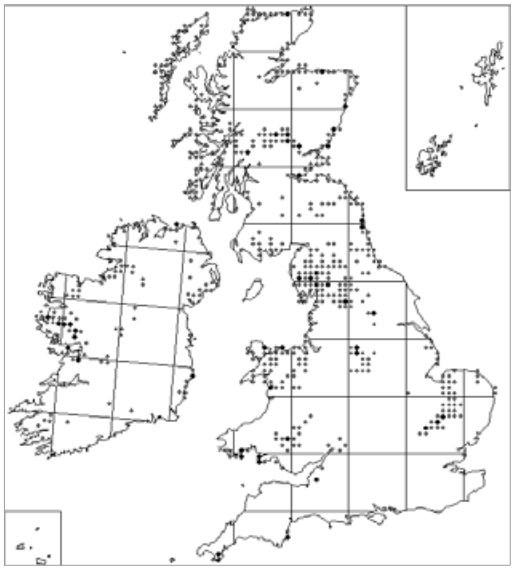

Figure 1. Native distribution of *Thalictrum minus* (grey dots) and locations from where plants were sampled (black dots). Map produced using DMAPW by Alan Morton, including summary data from the BSBI Distribution Database.

(e.g. glandulosity and achene shape). A Principal Components Analysis was carried out to reveal the main lines of variation within the species, but no well-defined groups of individuals or populations emerged that could form the basis of a revised classification. In cultivation little support was given to the recognition of the three subspecies, indicating that differences between populations were largely determined by the habitat.

Cytology

Chromosome counts were made on 187 plants from 54 populations and all were found to be hexaploid 2n = 6× = 42. The only previous published count of possible British material was 2n = 14 made on material of unknown origin growing at Royal Botanic Garden Edinburgh. Counts made outside Britain and Ireland by other workers indicated 2×, 4×, l0× and possibly other ploidy levels in addition to hexaploid plants, which, however, were the most common. Satellite number was found to be an unreliable character, since it sometimes varied within a single root-tip; the maximum number of satellites found in a cell was six. The chromosomes were uniformly small, measuring 1.3–1.7 µm in length, with median, submedian or subterminal centromeres. Chromosome behaviour at microsprogenesis, as measured by the normality of the pollen tetrads and the assumed fertility of the pollen grains, varied not only between and within populations but also between years in the same plant. In all cases where associations of chromosomes at Meiosis I were examined, 21 bivalents were found. The results of the cytological study provides no basis for subdivision of *T. minus*.

Reproductive biology

The reproductive behaviour of *T. minus* was examined in the wild. Reproduction occurred by both seed and rhizomatous spread, the relative importance of each being determined by the local conditions (e.g. substratum and grazing). The inflorescences showed numerous features associated with anemophily (wind pollination) but some more likely to be found in entomophilous (insect-pollinated) species; limited observations in the wild found no evidence of insect pollination. A comparison of the percentages of full achenes found in the wild with those resulting from pollination experiments showed that under natural conditions the importance of self-pollination or cross-pollination varies in different populations. In the wild, flowering takes place from the middle of June to the middle of August, with achenes ripening and falling from August to September. By experiment, the flowers were found to be strongly protogynous, although the path of the pollen grains to the stigmas was effectively blocked by the perianth segments and the androecium until the filaments are about equal to the anthers in length. The stigmas remained receptive until after the anthers of the same flower have dehisced. Thus in the wild a mixture of self-pollination and cross-pollination on the same plant was feasible.

Breeding experiments were conducted on a wide sample of *T. minus* plants collected from wild populations grown under uniform conditions. From a study of microsporogenesis (pollen formation) and from breeding experiments, it was possible to rule out the occurrence of non-pseudogamous apomixis only, but there was also little indication of the operation of pseudogamy. The percentage of successful self-pollinations (i.e. those resulting in at least one full achene) was 50% and for these the number of full achenes per pollination ranged from 2–100% with an average of 22%. Cross-pollinations were much more successful on average (98%) than self-pollinations and these successful cross-pollinations resulted in 4–100% full achenes with an average of 75%. Inter-population crosses produced significantly more full achenes than intra-population crosses; this could partly be accounted for if some crosses were actually self-pollinations from a single vegetative clone. There were no barriers to artificial cross-pollination between populations of *T. minus*.

Since germination of achenes under a wide variety of conditions in the laboratory was poor, the full achenes harvested after the breeding experiments were sown in seed-compost and left outside over winter in a cold-frame, resulting in 52% germination. A detailed study of the germination of

the achenes and of the morphology of the seedlings revealed that inter-population cross-pollinations produced full achenes which had the highest chance of germinating and which grew into the most vigorous seedlings. Achenes resulting from intra-population cross-pollinations were the next most vigorous. The achenes from self-pollinations were the poorest. Great variation in achene germination and seedling characters was shown within subsp. *minus* and subsp. *arenarium* but there was insufficient data to include subsp. *majus* in the comparisons. Germination characters do not support taxonomic subdivision of *T. minus*.

Ecology

The ecology of *T. minus* was investigated at 44 localities using soil and vegetation data, both singly and in combination. The sites did not fall readily into groups and the conditions under which the plant is able to grow in the wild are much wider than implied in the literature.

Correlations between the morphological variation of the populations and the ecological variation of the sites using characters and Principal Components Analysis of both systems were carried out to determine how much of the inter-population variation of the species was phenotypic and how much was genetic. The results were not conclusive; wild populations showed few correlations with habitat data suggesting that other unmeasured environmental factors were more important. Many correlations were found between the cultivated population data and the habitat data, but this does not prove genetic control and so further crossing experiments are needed. However, from the data it was apparent that any ecotypic variation would form a mosaic, making it impossible to recognise the groups taxonomically and again no support was given to subdivision into subspecies.

Conclusion

The evidence combined from many sources, through both observation and experiment, leads to the conclusion that British and Irish *Thalictrum minus* ought to be treated as a single, very variable species. There is no basis for the acceptance and recognition of any of the taxa into which it has been subdivided in Britain and Ireland.

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Thalictrum minus (Lesser Meadow-rue), Colonsay. *Pete Stroh*

Stipules: a brief introduction

JOHN POLAND

This is a much-delayed (due to controversy surrounding the topic) continuation of a run of articles between 2005 and 2008 describing plant morphology used in vegetative ID. Stipules (from Latin *stipula* meaning straw, stalk) are found in perhaps up to a third of our British and Irish flora depending on how you count. Their presence isn't diagnostic alone but the type of stipule and its position can tell you a lot about a genus or family.

What are stipules?

Stipules are a pair of scale or leaf-like appendages (rarely united to form one organ), spines or glands at or near the base of a petiole. They are attached to either the stem or petiole and are often small or easily missed. They can be caducous (soon falling), even on herbs, leaving a discrete scar. Spotting stipules often demands careful observation – a good hand lens is essential. Young leaves in leaf axils may occasionally be mistaken for stipules so observers beware.

What is the function of stipules?

Primarily, plant defence. Stipules normally exist only to protect the young unfurling leaf so are soon redundant and have usually dropped by mid-summer or even before the leaf is fully expanded. In some trees and shrubs stipules may also be unrecognisable as modified bud scales protecting the bud, although they are particularly obvious in *Liriodendron tulipifera* (Tulip-tree).

Stipules may be reduced to glands or extra-floral nectaries which secrete nectar to attract ants to defend the plant (a topic worthy of a future article). They can also be used in photosynthesis, such as in the leaf-like stipules of *Lathyrus aphaca* (Yellow Vetchling) which replace the true leaves, and in the pseudostipules of *Delairea odorata* (German-ivy).

Types of stipule

Stipules generally take one of the below forms but more than one form can be found on some species. You don't have to travel far to see stipules; a quick look in your garden, driveway or windowbox should give you a few examples.

1. 'Typical' paired stipules

The standard one pair of stipules per leaf. Frequently encountered but highly variable in size, texture and shape; they can be leaf-like as in *Crataegus monogyna* (Hawthorn) or linear as in many *Rubus* (Brambles) or *Melilotus* (Melilots). They can also be minute, such as in *Ilex aquifolium* (Holly), contrary to what is written in our standard Floras which say absent from the family!

Typical paired stipules of *Rubus fruticosus* agg. and *Crataegus monogyna*

2. Interpetiolar stipules

Located on the stem between a pair of opposite leaves, they are formed from the fusion of two stipules – one from each of the pair of opposite leaves. Examples include *Buddleja davidii* (Butterfly-bush), *Coprosma repens* (Tree Bedstraw) and *Spergularia* (Spurries). The stipules of *Fuchsia magellanica* (Fuchsia) are occasionally fused and interpetiolar. The increasing *Euphorbia serpens*, see Essex Botany 10: 12-18 (2019), has interpetiolar stipules unlike the

Examples of interpetiolar stipules: *Buddleja davidii* and *Coprosma repens*

free (or absent) stipules of other prostrate spurges (all our erect spurges have no stipules).

3. Ochrea

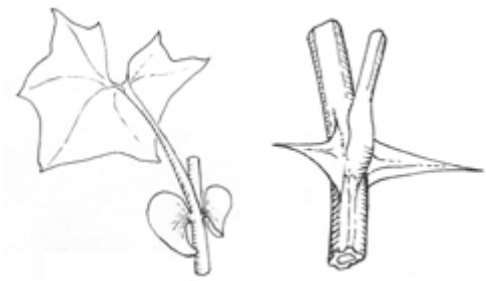
These are from a pair of stipules fused around the stem and a well-known feature of all Polygonaceae (Dock family), but are also found in *Hydrocotyle* (Pennyworts), *Platanus* (Planes), *Magnolia* (Magnolias), *Ricinus communis* (Castor-oil-plant) and debatably(!)

Persicaria hydropiper with ochrea, characteristic of Polygonaceae

Potamogeton (Pondweeds). Lubbock (1908, p.33) provides a line drawing of *P. lucens* (Shining Pondweed) showing what he calls 'intrapetiolar stipules'.

4. Pseudostipules

These are not true stipules and they enlarge as the leaf matures. They are often found as an odd exception to otherwise stipule-free families, e.g. *Delairea odorata* in Asteraceae, *Solanum tuberosum* (Potato) in Solanaceae. The compound leaves of *Lotus corniculatus* (Common Bird's-foot-trefoil) are composed of five leaflets (not three as 'trefoil' suggests) but the lowest two are in the stipular position and thus can be considered as pseudostipules. *Lotus* does have true stipules but these tiny brown appendages are caducous and easily missed by even the most careful observer.



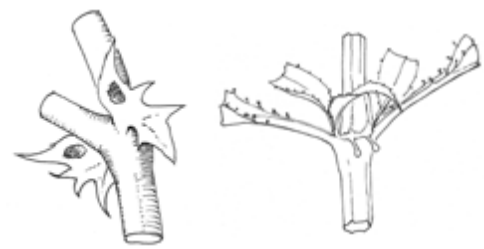
Delairea odorata (pseudostipules) and *Robinia pseudoacacia* (stipules modified into spines)

5. Spines

Stipules are modified into spines in *Robinia pseudoacacia* (False-acacia).

6. Glands/extra-floral nectaries

Perhaps the most obvious ones are found in some *Vicia* (Vetches) as dark purple blotches in the centre of otherwise green stipules. They also occur as protruding glands in *Sambucus nigra* (Elder), *Impatiens glandulifera* (Himalayan Balsam) and *Reseda* (Mignonette, Weld).

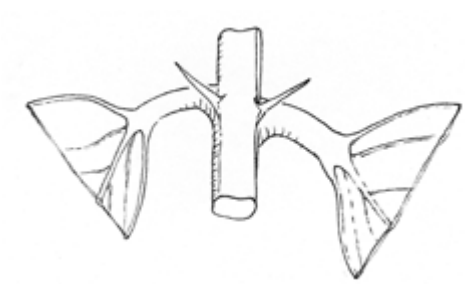


Stipules with glands: *Vicia sativa* and *Impatiens glandulifera*

7. Stipels

Not strictly stipules but stipule-like outgrowths at the base of leaflets (or on rachis) of a compound leaf, often in addition to true stipules at the base of the

petiole. They are occasionally found in the following: *Conium maculatum* (Hemlock) in Apiaceae (doesn't have stipules), *Phaseolus* (Beans), *Robinia pseudoacacia*, *Sambucus nigra*, *Staphylea pinnata* (Bladdernut), *Thalictrum* (Meadow-rues) and *Wisteria* (Wisterias).



Robinia pseudoacacia showing stipels

Which plant families have stipules?

Space doesn't permit me to list all British and Irish plants with stipules but below are a few honourable mentions at a family level (see box).

Stipules are not always family (or even genus) specific. Euphorbiaceae (Spurge family) has already been mentioned but Caryophyllaceae (Pink family) and Lythraceae (Loosestrife family) also have a mixture of genera and species with and without stipules. Even in Rosaceae there are surprising differences, e.g. *Helianthemum nummularium* (Common Rock-rose) has stipules, while *H. oelandicum* (Hoary Rock-rose) does not. *Spiraea* as a genus lacks stipules – one of the reasons *S. opulifolia* was renamed as *Physocarpus opulifolius* (Ninebark) (DNA concurs!). In *Salix*, the stipules of the early leaves are much reduced compared to those of the later leaves; a fact rarely considered when recorders look for large or persistent stipules mentioned in textbook descriptions. Some *Salix* spp lack stipules altogether, e.g. *S. purpurea* (Purple Willow).

Urtica dioica (Common Nettle) and *U. urens* (Small Nettle) have two pairs of stipules at each node (one pair for each of the opposite leaves) but the much rarer *U. membranacea* (Mediterranean Nettle) only has one pair per node (since the stipules are fused).

In herbs, stipules may be different on basal leaves and stem leaves, for example *Alchemilla* (Lady's-mantles), *Filipendula* (Meadowsweets) and *Geum* (Avens) have much greater developed stipules on the stem. All *Galium* and allies (Bedstraws) in Rubiaceae have stipules but they are often impossible to distinguish from the true leaves. However, in *Asperula cynanchica* (Squinancywort), the stipules are distinctly shorter than the leaves, especially on the upper stem.

Stipules are arguably present in some Ranunculacae, particularly *Caltha palustrus* (Marsh-marigold) and *Ranunculus* subgenus *Batrachium* (Water-crowfoots) which have closed ochrea-like stipules.

Uniquely, stipules are modified into tendrils in *Smilax* (Smilacaceae) but this genus is not (yet) established in the UK.

Want to learn more?

The best way to learn about stipules is to look for them. For those who want to study more about the form and function of stipules, as well as identification, see the titles below. For interest, Lubbock [Sir John

Notable families with stipules	Notable families without stipules
Betulaceae – Birch family	(plus all monocots except, arguably, Potamogetonaceae)
Fabaceae – Pea family	Amaranthaceae – Goosefoot family
Fagaceae – Beech or Oak family	Apiaceae – Carrot family
Geraniaceae – Geranium family	Asteraceae – Daisy family (except *Delairea odorata*)
Malvaceae – Mallow family	Boraginaceae – Borage family
Polygonaceae – Dock family	Brassicaceae – Cabbage family
Potamogetonaceae – Pondweed family	Ericaceae – Heath family
Rosaceae – Rose family	Lamiaceae – Deadnettle or Mint family
Salicaceae – Willow family	Scrophulariaceae – Figwort family
Violaceae – Violet family	Solanaceae (except *Solanum tuberosum*) – Nightshade family

Lubbock FRS, The Rt. Hon. Lord Avebury] was also responsible for introducing the Bank Holidays Act 1871 so you have an opportune day coming up at the perfect time of year to observe them!

Acknowledgements

I would like to thank Robin Walls for kindly illustrating the article and Eric Clement for constructive debate on stipules.

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A visit to my local herbarium

CAROL WILSON

Following the report in a recent *BSBI News* that some herbarium collections had been destroyed for want of use I decided to find out where our nearest collection is housed and to arrange for members of the local botany class to visit.

This resulted in a handful of us driving to Whitby on the Yorkshire coast to visit the museum in Pannett Park. The Whitby Museum is one of those 'love it or hate it' collections. Not interactive, full of fossils and stuffed birds along with dolls' houses, costumes and similar artefacts as well as a library. And a collection of 10,000, rarely seen, herbarium specimens. Their curator, Tamsyn Naylor was very knowledgeable and enthusiastic about the collection, having been involved in its care since a schoolgirl. She willingly showed us where they were all stored as well as giving us details of the compilers of the collection and then let us spend as long as we wanted poring over the sheets of pressed specimens. It was encouraging to know that this particular herbarium is in such safe hands.

The Whitby herbarium is largely the work of three botanists, although some of them in their turn took on the collections of earlier plant collectors. The specimens are dated from the 1600s to the mid-1930s. Some are better catalogued than others with the best recording the name of the collector, the common and botanical name of the species, the date and place where the specimen was found, as well as its particular habitat. Others simply have the Latin name of the plant scribbled in pencil alongside. A salutary lesson for those of us who are compiling a herbarium.

But what impressed us all was the meticulous way in which the plants had been pressed and

Botany class at the Whitby Museum. *Carol Wilson*

displayed. Of course most of the work was done in the days before radio and television, to say nothing of electronic gadgets, had taken over modern life so people had time to give to these things. Many of them were works of art in themselves with leaves and petals splayed to facilitate an understanding of the structure of the plant. Most of them were very faded of course as it is impossible to preserve the colour; but occasionally a pale pink or yellow could be seen.

There were a few surprises too. Some of the common names were different from those we use now, such as 'Upright Meadow Crowfoot' instead of Meadow Buttercup for *Ranunculus acris* and 'Creeping Crowfoot' instead of Creeping Buttercup for *R. repens.* There were also one or two particularly interesting finds relating to the plants themselves. For instance a specimen of Common Vetch (*Vicia sativa*) collected in the nineteenth century had leaves much larger than any we had seen and a specimen of Shepherd's-purse (*Capsella bursa-pastoris*) collected at a similar time seemed to be an unusually robust plant. Studying these could reveal some interesting changes over time. As one of the ladies remarked 'there must be a PhD here somewhere.'

We will certainly be going back. Next time armed with hand lenses, a magnifying glass, notebook and pencils as well as a camera. I would encourage others to find out where their local herbarium is stored and go and take a look. It is an interesting way to spend a wintry afternoon.

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Sheets of *Ranunculus acris* 'Upright Meadow Crowfoot' (Meadow Buttercup) (left) and *Capsella bursa-pastoris* (Shepherd's-purse) (above) at Whitby Museum herbarium. *Carol Wilson*

Recording elms (*Ulmus* spp.) in Britain and Ireland

BRIAN EVERSHAM & EDWARD PRATT

The study of elms received a new impetus for us and maybe some others, following the publication of 'Sell & Murrell' Volume 1 (2018), with its 62 species of *Ulmus*. Some botanists are unhappy with their description of every taxon as a species, rather than using the ranks of subspecies, variety and cultivated variety. We agree that arranging them in linear fashion from the smallest to the largest-leaved is not the best way of relating them to each other. However, while DNA studies may hopefully resolve this problem in the long run, we think Sell & & Murrell's 62 'species' can be a useful way of distinguishing taxa, pending the arrival of a better system. Clive Stace writes in his *New Flora* 4th edition 'Despite its shortcomings, the system of Armstrong & Sell provides a valuable analysis of the variation in our smooth-leaved Elms.' (Stace, 2019).

Sell & Murrell relied much on the studies of Jayne Armstrong and her 1992 PhD thesis. Most of Sell and Armstrong's descriptions are of taxa in East Anglia, Essex and the East Midlands. One of us (BE) has located 48 of the 'species' in their type localities or other sites named in the volume. The other of us (EP) has located 17 of the 62 'species' in Purbeck, a small area in Dorset, which Armstrong evidently did not visit, which also contains a few apparently undescribed taxa unknown to her.

We suggest it would be useful if botanists in other parts of Britain and Ireland who have access to Sell & Murrell Volume 1 could see what they can find in their areas. There are almost certainly more taxa awaiting discovery, especially in the South-East, the South, the West Midlands and Wales. The only counties which seem to have been well covered to date are Cornwall, Essex, Hertfordshire, Suffolk, Norfolk, Cambridgeshire, Huntingdonshire and Leicestershire.

One of us (BE) has written a short survey of study of elms in the British Isles and is developing an improved version of the key in Sell & Murrell. Please email him for this.

As the literature makes clear, the important leaves to collect and study are *short shoots in full sun*, collected from June onwards, especially the terminal and first lateral leaves on short side-stems off branches, *not* leaves off leading twigs, nor off twigs sprouting out of trunks or large branches, nor off suckers, nor off trees which have been recently cut back. It is best to take half a dozen short shoots per tree and to study the variation in the leaf shapes and collect leaves through the range of variation, noting the commonest shapes and sizes.

If the tree is large enough to have several branches, it would be good to sketch the outline of the tree if it is not too congested to have developed one and show in which direction(s) the branches grow. One of us (BE) would be interested to know what you find and may be able to assist in applying Sell & Murrell names to them.

The joy of studying elms is that this can be done in October, after the main botanical season is over, though leaves from trees in windy situations are best collected somewhat earlier.

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Artificial Intelligence for plant identification on smartphones and tablets

HAMLYN JONES

In recent years there has been an explosion in the availability of apps for smartphones that can be used to help with plant identification in the field. There are a number of approaches available, ranging from those apps that identify plants automatically based on the use of Artificial Intelligence (AI) and automated Image Recognition, through those that require the user to use traditional dichotomous keys or multi-access keys, to those that may only have a range of images without a clear system for identification of any species of interest. *All photographs by the author.*

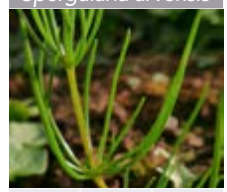
Here I concentrate only on those free apps that are available to identify plants automatically from uploaded images, with at most the need for only minor decisions by users (listed in Table 1). I first confirmed that the apps all behaved similarly when using either a live image in the field or the later testing of that image when displayed on a computer monitor and photographed by the smartphone. The performance of the ten free automatic plant identification (id) apps that I found was then tested on 38 contrasting plant images of wild and naturalised British species (including grasses, sedges, herbs and woody plants as well as on images of flowers, leaves, fruits or whole plants), largely selected from my own visual-flora website (*visual-flora.org.uk*). The samples included a number of common species, some garden escapes and several less common or even rare species (e.g. *Cyperus fuscus*). Each image was tested five times with each app because many apps gave surprisingly variable identifications even when using exactly the same image. All tests were conducted in October or November 2019, but many of the apps are continually improving.

A selection of the 38 images tested are shown in Figure 1, including some which were successfully identified by all apps through to some that were only rarely, if at all, identified correctly. For each image the success of the different apps at identifying to family, genus or species is shown. Several of the sample images were successfully identified to species by all apps, while a few were not identified by any app. In practice, I found it very difficult to predict in advance of tests which images were or were not going to be identified successfully. As an example, the picture of Marsh St John's-wort (*Hypericum elodes*) apparently had all the requisite features but was not generally recognised (though interestingly some more recent repeats of the original tests have led to greater success with this image). In contrast, even the very 'messy' picture of whole plants of Angelica (*Angelica sylvestris*) was almost universally identified correctly.

Summary results for the top five apps across all 38 images are presented in Table 2. This shows that over one third of all identifications were correct to species (more than half for the best app), rising to more than 65% correct to at least family (with nearly 75% for the best app). There were only minor differences in ranking of the apps when studying herbaceous plants, woody plants or monocots; similarly, there were no consistent differences when the test images were classified in terms of flowers, leaves, fruits, or images of the whole plant. The final column of Table 2 gives a very important metric on the error rate for each of the apps, here defined as the percentage of ids that are wrong (i.e. incorrect genus or family). The results with the different apps are discussed below.

Figure 1 (opposite). Sixteen sample images selected from the full 38 test images to illustrate the range of images used. For each app the number of replicate attempts (out of five) that was correct to species, genus or family is shown.

	Angelica sylvestris			*Angelica sylvestris*			*Malva moschata*			*Erodium maritimum*		
												
	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.
Flora Incognita	5	5	5	4	4	4	2	4	5	0	0	0
Google Lens	4	5	5	5	5	5	5	5	5	0	0	1
Plant.id	5	5	5	5	5	5	5	5	5	0	0	0
PlantNet	5	5	5	3	4	4	5	5	5	0	0	0
Seek	5	5	5	5	5	5	5	5	5	0	0	0

	Spergularia arvensis			*Spergularia arvensis*			*Geranium purpureum*			*Silene coronaria*		
												
	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.
Flora Incognita	3	3	4	1	1	1	0	2	2	0	0	0
Google Lens	5	5	5	5	5	5	3	3	3	0	0	0
Plant.id	5	5	5	5	5	5	0	5	5	4	4	4
PlantNet	4	4	4	2	2	2	0	5	5	0	0	0
Seek	5	5	5	3	4	5	1	1	5	0	0	1

	Carex remota			*Carex remota*			*Cyperus fuscus*			*Anthriscus caucalis*		
												
	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.
Flora Incognita	5	5	5	0	0	1	4	5	5	2	2	2
Google Lens	0	3	3	0	0	0	5	5	5	0	0	3
Plant.id	3	5	5	0	2	2	5	5	5	5	5	5
PlantNet	5	5	5	0	0	0	1	1	1	1	1	2
Seek	0	4	5	0	0	0	0	0	3	0	5	5

	Hypericum elodes			*Acer pseudoplatanus*			*Empetrum nigrum*			*Quercus robur*		
												
	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.	sp.	gen.	fam.
Flora Incognita	0	0	2	4	5	5	3	3	3	0	0	0
Google Lens	0	0	0	5	5	5	5	5	5	2	2	2
Plant.id	1	1	1	3	5	5	5	5	5	0	3	3
PlantNet	0	0	0	5	5	5	4	4	4	0	0	0
Seek	0	0	0	5	5	5	0	0	0	0	0	0

Comments on individual apps

Plant.id

I have included Plant.id among the apps tested here, even though it is different from the others as it is available through a website rather than as a downloaded app and users are allowed only a very limited number of ids (5 per week). It is, however, of particular interest to any software developers who might be developing natural history apps, as it is

Table 1. The automatic plant identification apps tested in this study. (In addition, Plant-ID (*play.google.com/store/apps/details?id=rakta.plant.identification&hl=en_GB*) was also tested but failed to identify a useful number of plants so has been omitted.)

App (web address)	Operating system	Allows expert or community id	Needs internet	Confidence in id	Comments
Plant.id (*plant.id*)	web	Can feedback your id or get Expert id (via Flowerchecker, paid)	Yes	Yes	Can use several images; limited free IDs available (3/week); can be supplied as API for developers
Google Lens (*lens.google.com*)	Android/iOS	No	Yes	Has a simple hierarchy	Very fast
Seek (*www.inaturalist.org/pages/seek_app*)	Android/iOS	Can add observations to iNaturalist database	No	Rarely over-identifies	Adjusts result continuously and may take a little time to settle; very conservative, making the fewest errors
Flora Incognita (*floraincognita.com*)	Android/iOS	Can feedback your id or get expert id	Yes	Yes	User defines plant type; can use several images
PlantNet (*identify.plantnet.org*)	Android/iOS/web	Can feedback your id	Yes	Yes	Requires user to define image type; can use several images
Candide (*candidegardening.com*)	Android/iOS	Can get community id	Yes	Has a hierarchy	Camera subject to moire patterning when photographing a screen
Bing (*www.bing.com*)	Android/iOS/web	No	Yes	No	Rather slow, often wrong
PlantSnap (*www.plantsnap.com*)	Android/iOS	Can feedback your id or get community id	Yes	Has a hierarchy	The free version limited to 10 id/day, has adverts
iPlant Plant identifier (*apps.apple.com/gb/app/iplant-plant-identifier/id1372113110*)	iOS	No	Yes	No	Generally gives one answer

Table 2. Results of testing each of the apps five times on each of the 38 sample images from the British flora, showing the percentage of attempts that were correct to species, genus or family, classified as to whether samples were herbaceous dicots (H), monocots (M), woody plants (W) or all 38 samples (All). Results are shown for the top or first suggestion only. The final column shows the percentage of incorrect identifications defined as incorrect genus or family (or a totally 'mad' suggestion) for the first identification.

	% correct to species				% correct to genus				% correct to family				% wrong
	H	M	W	All	H	M	W	All	H	M	W	All	
Plant.id	53	46	80	**57**	63	67	94	**70**	68	69	94	**73**	**29**
Google Lens	42	31	69	**45**	44	71	83	**56**	66	71	86	**71**	**33**
Seek	40	14	37	**35**	57	37	66	**55**	73	51	71	**68**	**12**
Flora Incognita	42	54	51	**46**	48	57	63	**52**	58	63	63	**60**	**19**
PlantNet	38	29	51	**39**	44	49	66	**49**	53	51	56	**55**	**48**
Average				**44**				**56**				**65**	**28**

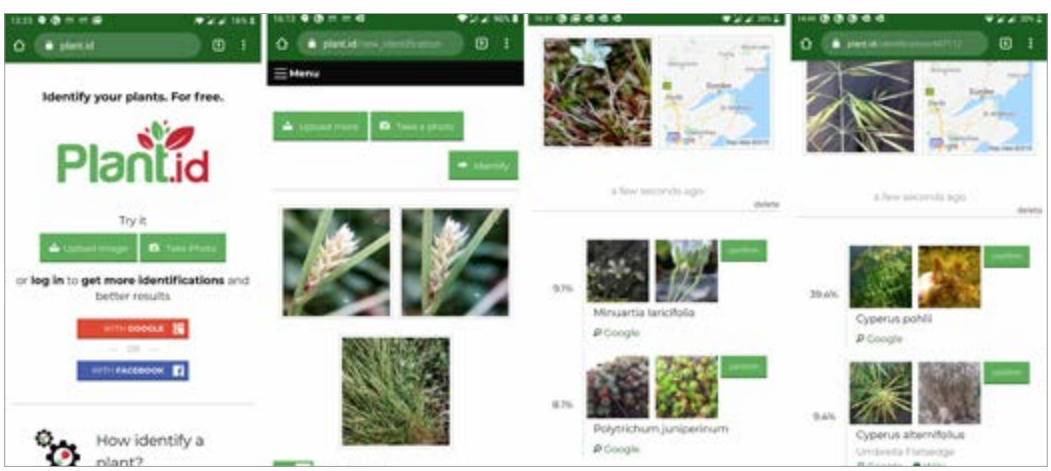
available as an Application Programming Interface (API) for incorporation of plant identification into other software. This app is easy to use: users can either use the camera to photograph an unknown plant and submit for automatic identification, or else they can upload a stored photograph. Several photographs can be submitted if required. Overall this app performed best on our image set when assessed in terms of the percentage of ids correct to species, genus and family; however, it had a higher rate of erroneous ids than both Flora Incognita and especially Seek. Important advantages of this app include the fact that it allows the user to provide more than one image for any sample to improve precision and that it gives a ranked list of possible suggestions, each with a level of confidence in all its identification. All except two of the ids for this app that had a confidence greater than 50% were correct to species, with almost all erroneous ids having lower levels of confidence. I am grateful to Ondřej Vild for providing access to additional ids for testing.

Google Lens

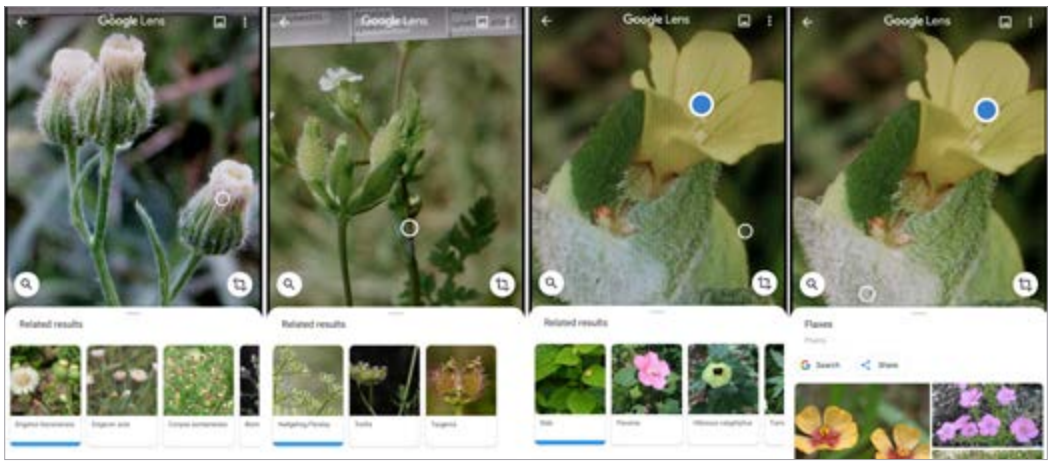
This app is widely available both for Android (from Play Store) or as a component of Google photos for iOS. Overall it is much more wide-ranging than a plant identification app, as it will attempt to identify almost anything. Nevertheless, it performed extremely well on our test set of plant images though with a tendency to identify plants as North American species rather than the correct British species; this led to it only ranking third in terms of the percentage ids correct to species, though it was second-best in the ids correct to genus and to family. Disadvantages of Google Lens are that there is no option for feedback to correct errors and it only gives a broad hierarchy of confidence levels in any identifications.

Seek

This app uses the iNaturalist database and is very different from the others tested; all the user needs to do is point the camera at the object plant and the app performs a real-time evaluation from the live video feed, often rapidly improving through class, order, family, genus and even to species as the view is changed. Secondly, and critically, it is the only app that does not require internet access to operate. Although this was the weakest app for monocots in this test, it was only just beaten by Google Lens in terms of the overall percentage of ids correct to family or genus, while it was outstanding in the fact that it was very conservative and made by far the fewest wrong ids of any app tested (where wrong ids were assessed as the wrong genus or family).



Plant.id: (a) The app's front screen, followed by (b) an example where three images have been uploaded for identification and (c) an example of a close id for Spring Sandwort (*Sabulina verna*) with a poor second choice and (d) rather poor guesses for Great Brome (*Anisantha diandra*) where even the family was incorrect.



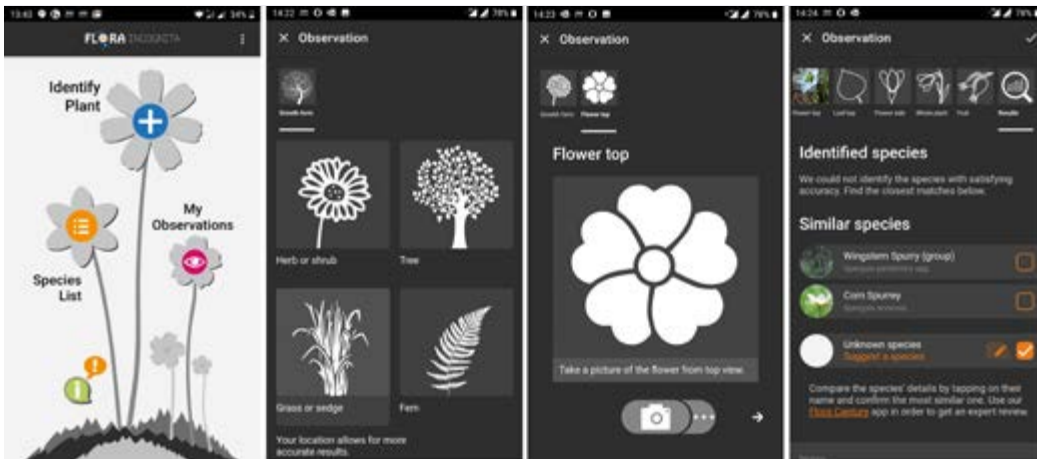
Google Lens: Various examples of the use of Google lens, showing (a) a surprisingly accurate id for Argentine Fleabane (*Erigeron bonariensis*), (b) a close guess for Bur Chervil (*Anthriscus caucalis*), though it is not certain what species is meant by Hedgehog Parsley, (c) and (d) two poor attempts at Marsh St John's-wort (*Hypericum elodes*) with suggestions from *Sida* or *Pavonia* to 'Flaxes'.

Seek: (a) The initial page of the Seek app, (b) and (c) improving precision of id for Pot Marigold (*Calendula officinalis*) and (d) further detail available when clicking on the camera symbol in (c).

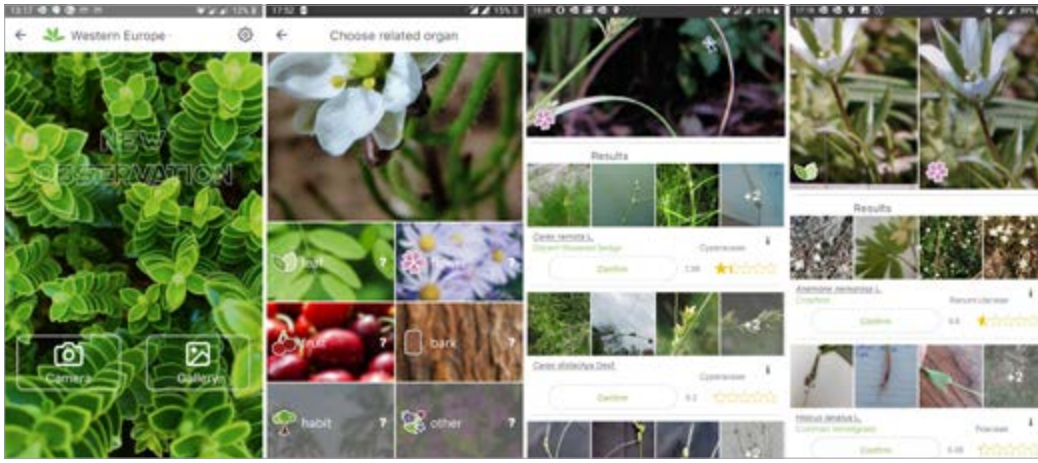
Although it only reports English names on the front screen, if you take a photograph it then provides further information, including the Latin name.

Flora Incognita

This was also an impressive app, achieving the second highest rate of identification to species level of all apps tested and good rates of identification to genus and to family. To use this app the user first needs to make an initial identification to herb/shrub, tree, grass/sedge or fern. The app then gives the user options of taking photos of leaves, flowers, fruits or the whole plant. The app then provides an identification when it has enough information. For the present tests, to allow direct comparability with the other apps, only a single image was provided each time. It is likely that the use of additional photos would improve the accuracy of this app further.



Flora Incognita: (a) The front page of Flora Incognita, (b) the next page where one selects the group of plants, followed by (c) the next page requesting a flower photo and (d) suggested identifications (admittedly without any confidence) for Corn Spurrey (*Spergula arvensis*) where the correct answer was the second suggestion.



PlantNet: (a) The front screen of the app, (b) after taking a photo one chooses the type of image from a choice of four, (c) an example of a correct identification for Remote Sedge (*Carex remota*) and (d) an example where the app failed, suggesting Wood Anemone (*Anemone nemorosa*) for Upright Chickweed (*Moenchia erecta*).

Flora Incognita was found to be another rather conservative app that made few wrong or misleading ids, usually returning only one or two suggested ids. This is another app that gives a level of confidence for any ids proposed, which is a useful feature.

PlantNet

Although overall this was the fifth best performing app of the ten tested, it still identified very nearly 50% of attempts correctly to genus. This is another app that requires some user input, where the user has to decide whether an image should be classified as: leaf, flower, fruit, bark, habit or other. PlantNet generally lists a number of suggested ids, each of which is assigned a confidence level on a scale of 0–5. It comes with specific datasets for different world regions; for the present tests we used the Western European database.

Other apps

Results for the five other free apps tested (Table 1) were omitted as they did not match those in Table 2. Even the best of them, PlantSnap, identified fewer than 50% of samples correctly to family, but more seriously, 61% of its first suggestions were the wrong genus or family. I therefore doubt that this would be very useful for beginners. Candide is aimed at gardeners and although not good on the set of images used here (which were primarily wild species), it may be a good choice for identification of garden plants and other aliens.

Discussion

Success with any app depends on the quality of the image provided. Many of the apps give specific recommendations as to how photographs should be selected for that app; however, in general it is important to avoid any confusing background in the images – which can be rather difficult in the field, especially for grasses and sedges. All the apps tested appear to be able to handle photos of flowers, leaves or of whole plants; these photos can always be stored for uploading and identifying at home.

The accuracy of the apps and the users' confidence in the identifications provided are important criteria determining their usefulness to different types of user. For serious botanical and ecological surveys, it is important that results are accurate to species, but none of the apps can yet accurately identify all plants. Indeed, one would not expect such perfection as several species can only be discriminated using very specific microscopic or other features that may not available in photographs without specific guidance as to what is required. It is notable that Seek, although it does not have a particularly high rate of identification to species level, is among the best at identifying to genus and to family, but more importantly it is generally conservative, only making an identification to a level with which it is confident, so that it has the lowest error rate of all apps tested.

The apps tested here provide a valuable addition to the armoury of identification tools available to field botanists, but are probably of most use to amateurs and beginners as they provide a good shortcut to the approximate identification of plants when out for walks in the countryside. Wider use of such apps has great potential for stimulating greater interest in plant identification. In most cases, however, the user still needs to use a traditional flora or another identification app to validate the suggested id (for the UK these might include: MAKAQueS *www.makaques.com*, BotanicalKeys *www.botanicalkeys.co.uk/flora* or Visual-flora *visual-flora.org.uk*). My main concern is that the ease of use of automatic apps might lead to many people becoming lazy and just accepting the given identifications without further questioning, thereby missing out on the development of botanical skills required to distinguish critical or rare species, especially those where identification depends on subtle or cryptic characters. One question that remains, however, is whether these apps can be expected in the longer term actually to replace trained botanists involved in biodiversity studies or ecological surveys. At their present state of development this is clearly not possible, though in one study, PlantNet has already been used to provide a tentative distribution map of plants in London based on images uploaded to Flickr (August et al. 2019). With the additional incorporation of a confidence threshold one could envisage that such an approach could provide helpful information, at least for commoner species.

Reference

August. T.A., Affouard, A., Bystriakova, N., Fox, N., Marlowe, C., Millard, J.W., Sanderson, R., Shayle, E. & Bonnet, P. 2019. AI validated plant observations from social media: Flickr images from central London 2011–2019 (Version 1.1) [Dataset].

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INTRODUCING MY VICE-COUNTY

Ayrshire (v.c. 75)

Recorders: Gill Smart, Dave Lang & Carol Crawford

CAROL CRAWFORD

Ayrshire, (v.c. 75), is in SW Scotland. You may have heard of its agriculture – Ayrshire brown and white dairy cows, or early 'tatties' – its British Open golf courses at Troon and Turnberry – or Robert Burns living much of his short life here. You may not have heard that Ayrshire is also a great area for botanising. Diverse topography, geology/soils and land-use give a wide array of habitats and many botanical hotspots. *All photographs by the author.*

It is one of the larger vice-counties, almost 100 km long from south of Ballantrae to north of Largs and almost 50 km where widest, with 47 hectads wholly or partly inside. Ayrshire has three local authority areas: North, East and South, each with its own character. Note: Arran comes under North Ayrshire Council but is within the Clyde Islands (v.c. 100). A small group botanises with the three vice-county recorders between April and September.

Scilla verna (Spring Squill) and *Ranunculus bulbosus* (Bulbous Buttercup) at Bennane Head, with view of Ailsa Craig.

Landforms, geology and habitats

Ayrshire's major landforms are coast, hills (Southern Uplands at the south and Clyde-Muirshiel uplands at the north) and the Midland Valley. River valleys run from hill to coast where some settlements have river names: Irvine, Ayr, Doon(foot) and Girvan.

Ayrshire is mostly underlain by sedimentary rocks, with volcanic intrusions such as Loudon Hill in the Irvine valley. *Carex paniculata* (Greater Tussock-sedge), *Ceratocapnos claviculata* (Climbing Corydalis) and *Salix myrsinifolia* (Dark-leaved willow) live in open woodland there.

The most famous outcrop is Alisa Craig, offshore. Its rock (the granite used for curling stones) is acidic and the flora less rich than in many coastal areas. By

its shores *Malva arborea* (Tree Mallow), *M. moschata* (Musk Mallow), *Asplenium marinum* (Sea Spleenwort) and *Spergularia rupicola* (Rock sea-spurrey) are notable.

The mainland coast has sandstone and igneous rock exposures, with beaches of sand and/or shingle between. The Red Data List *Mertensia maritima* (Oysterplant) is found on three shingle beaches, the best population at Ballantrae. Other typical coastal habitats are dunes and cliffs. Notable mobile dune plants include *Salsola kali* (Saltwort), *Calystegia soldanella* (Sea Bindweed) and *Coincya monensis* (Isle of Man Cabbage). The last can be seen at Stevenston Dunes Local Nature Reserve, while fixed dune grassland and wetlands are found at Gailes Marsh Scottish Wildlife Trust (SWT) Reserve, both in North Ayrshire. Cliffs often support woods, scrub or fern communities. Our only record for *Polypodium cambricum* (Southern Polypody) is at the Heads of Ayr cliffs. Colourful coastal grasslands and heaths are found atop volcanic cliffs, particularly in South Ayrshire, with species such as *Scilla verna* (Spring Squill), *Dactylorhiza incarnata* (Heath Spotted-orchid), *Helianthemum nummularium* (Common Rock-rose) and *Rosa spinosissima* (Burnet Rose or the 'White Rose of Scotland'). The shores are pretty exposed, making saltmarsh uncommon except in sheltered edges of North Ayrshire. Our most recent record of *Centaurium littorale* (Seaside Centaury) is in saltmarsh beside Hunterston Nuclear Power Station!

Top: *Mertensia maritima* (Oysterplant) on the shingle at Ballantrae with intensive farm behind and Southern Uplands in the distance. Bottom: Ashgrove Loch near Stevenston, in North Ayrshire, with water-lilies and *Lythrum salicaria* (Purple Loosestrife) in foreground. Typical Midland Valley landscape in background.

The Midland Valley is overlain with boulder clay, left by retreating glaciers after the last ice age, resulting in gently rolling landforms with imperfectly drained neutral soils. Many raised bogs and lochs which formed there have been drained and the best remnants are designated SSSI, e.g. Dalmellington Moss SWT reserve which supports *Drosera anglica* (Great Sundew), *D. intermedia* (Oblong-leaved Sundew), *Andromeda polifolia* (Bog Rosemary) and *Rhynchospora alba* (White Beak-sedge) and Martnaham Loch, near Ayr, circled by reedswamp, fen and carr with *Persicaria minor* (Small Water-pepper) and *Bidens tripartita* (Trifid Bur-marigold) on its muddy margins. Ashgrove Loch SSSI near Stevenston is our only site for *Lysimachia thyrsiflora* (Tufted Loosestrife), one of the few for *Cicuta virosa* (Cowbane) and has both White and Yellow Water-lilies (*Nymphaea alba* and *Nuphar lutea*). In North Ayrshire, Bankhead Moss is a Special Area of Conservation (SAC) as is Aird's Moss in East Ayrshire, both extensive bogs.

Rivers and burns cut gorges through the Midland Valley, exposing sedimentary layers below the clay, often sandstone, sometimes coal and occasionally limestone. They often have rich ancient woodlands alongside with notable plants such as *Paris quadrifolia*

Species rich marshy grassland on the upland fringes near the beautiful village of Barr in South Ayrshire. Broadleaved woodland, often ancient, is found by the River Stinchar and its tributaries in the glens, while conifer forestry clothes distant hills. Inset: *Gymnadenia borealis* (Heath Fragrant-orchid) on bog nearby.

(Herb-Paris) by the Cessnock Water, *Gagea lutea* (Yellow Star-of-Bethlehem) by the Water of Girvan and *Equisetum hyemale* (Rough Horsetail) at Ayr Gorge SWT reserve.

The uplands are mostly formed of acidic rock and clothed with blanket bog, heath and acid grassland. Around the summits are plants such as *Salix herbacea* (Dwarf Willow), *Rubus chamaemorus* (Cloudberry), *Saxifraga stellaris* (Starry Saxifrage) and *Neottia cordata* (Lesser Twayblade). Larger water bodies, with some species rich margins, are found among these hills, such as Loch Doon.

There are base-rich wetlands and grasslands within the uplands where volcanic rocks intrude. The hills between Girvan and Ballantrae, particularly Bennane Head, are so-formed. Bennane supports the only Scottish population of *Anacamptis morio* (Green-winged Orchid), plus *Dactylorhiza incarnata* (Early Marsh-orchid) and Red Data List *Gentianella campestris* (Field Gentian).This geology continues inland to the Lendalfoot Uplands SAC, over four groups of hills, including Grey Hills SWT Reserve. It is rich in unusual habitats such as base-rich mires and Calaminarian grassland/heath. Uncommon plants include Red Data List *Minuartia verna* (Spring Sandwort) and several sedges. It has maritime influence with species such as *Plantago maritima* (Sea Plantain) and *Anthyllis vulneraria* (Kidney Vetch) in inland grasslands. Grey Hills Reserve is one of the few places in Ayrshire where *Juniperus communis* (Juniper) grows naturally.

Land-use and its impacts on habitats

Agriculture remains the predominant land-use in Ayrshire. Near the coast of South Ayrshire, a band of sandy soils supports most of the arable ground: early tatties (often now grown under plastic), wheat, oats and recently maize, among intensive stock-rearing. In the Midland Valley stock-rearing predominates – dairy, beef or mixed cattle and sheep – on improved grasslands. Here the main botanical interest is on riparian margins and road verges and usually comprises common species. Some areas revert to rushy grassland and these become more species rich as the uplands are approached. Upland habitats are mostly sheep-grazed, with some hill cattle and are more semi-natural.

Over the last 70 years extensive areas of upland have been afforested with conifers, largely Sitka Spruce (*Picea sitchensis*), particularly in South and East Ayrshire. There, state forestry continues into the Galloway Forest Park. Patches of habitat remain, e.g. by rides and in areas unsuitable for planting, such as peatlands and sometimes support notable species.

Windfarms have been arriving on the uplands for the last 25 years. Their roading takes out strips of semi-natural habitat and affects bog hydrology, but can improve access for recording.

The coast from Ayr northwards is the most urbanised part of the vice-county, with a succession of towns linked by dual carriageway. There are interesting habitats between or within, particularly at the shore and in links golf courses formed on dune grassland and coastal heath. The roughs and out-of-play areas are often species rich, e.g. Belleisle GC in Ayr has a significant population of *Platanthera chlorantha* (Greater Butterfly-orchid). Golf course dumps can spring surprises too! Irvine new town has extensive areas of habitat among built-up areas, the best of which are SWT reserves. There are areas of rich post-industrial habitat too, notably the Ardeer peninsula, north of Irvine, with bunkers where Alfred Nobel tested his explosives.

Inland, extensive areas of 19th-century coal mining and iron-working near Dalmellington and Muirkirk in East Ayrshire now support interesting habitats and uncommon species. Early smaller-scale lime workings, such as around old lime-kilns on Auchalton Meadows SWT reserve in South Ayrshire, are now species rich with many orchids, including *Gymnadenia borealis* (Heath Fragrant-orchid) and *Ophioglossum vulgatum* (Adder's-tongue).

Deep mining continued in East Ayrshire until 1989, when the last colliery at Barony closed. Thirty years on it is one of our richest areas. The first Ayrshire *Ophrys apifera* (Bee Orchid) was recorded there in 2003; some live beside the retained 'A frame' pithead. Barony has several other orchids and species with fungal dependencies, such as *Pyrola minor* (Common Wintergreen) and the first Ayrshire populations of *Hypopitys monotropa* (Yellow Bird's-nest).

Ophioglossum vulgatum (Adder's-tongue) at Auchalton Meadows SWT reserve on 19th-century lime workings.

Hypopitys monotropa (Yellow Bird's-nest), with last year's stems, in young birch-willow wood at the Barony colliery site. Inset: unfurled plant.

Knockshinnoch Lagoons SWT reserve, by New Cumnock, is also on an old colliery and botanically rich, supporting large populations of *Plantanthera bifolia* (Lesser Butterfly-orchid).

Opencast coal mining, which succeeded deep mining in East Ayrshire, has virtually ceased, since the collapse of the two major operators in 2013. It left extensive areas of bare ground, deep voids and a shortfall of restoration bonds. Some of these areas will also develop interesting habitats over time, if left to nature.

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Visiting Ayrshire

The Ayrshire Coastal Path runs along the whole coast, with high tide alternatives. It is looked after by The Rotary Club of Ayr: ayrshirecoastalpath.org.

Landing on Ailsa Craig is restricted, but boat trips round it can be booked from Girvan Harbour.

The River Ayr Way follows this iconic watercourse from its source at Glenbuck Loch to the sea at Ayr. See: *eastayrshireleisure.com/countryside-outdoor/the-river-ayr-way*.

More about the SWT Reserves in the vice-county can be found at: *scottishwildlifetrust.org.uk/things-to-do/visit-our-reserves-and-visitor-centres*.

The National Trust for Scotland (NTS) property at Culzean has coastal heath, woodland and the Swan Pond with rich margins. See: *www.nts.org.uk/visit/places/culzean*. NTS also look after Burns Cottage and the Robert Burns Museum in Alloway, Ayr.

Recording in v.c. 75

If you would like to botanise with the Ayrshire BSBI group please email *carol@carolcrawford.plus.com* for details of the year's outings.

Records should be sent to *Dave.Lang@naturescot* or Flat 0/1, 5 Millbrae Crescent, Langside, Glasgow G42 9UW.

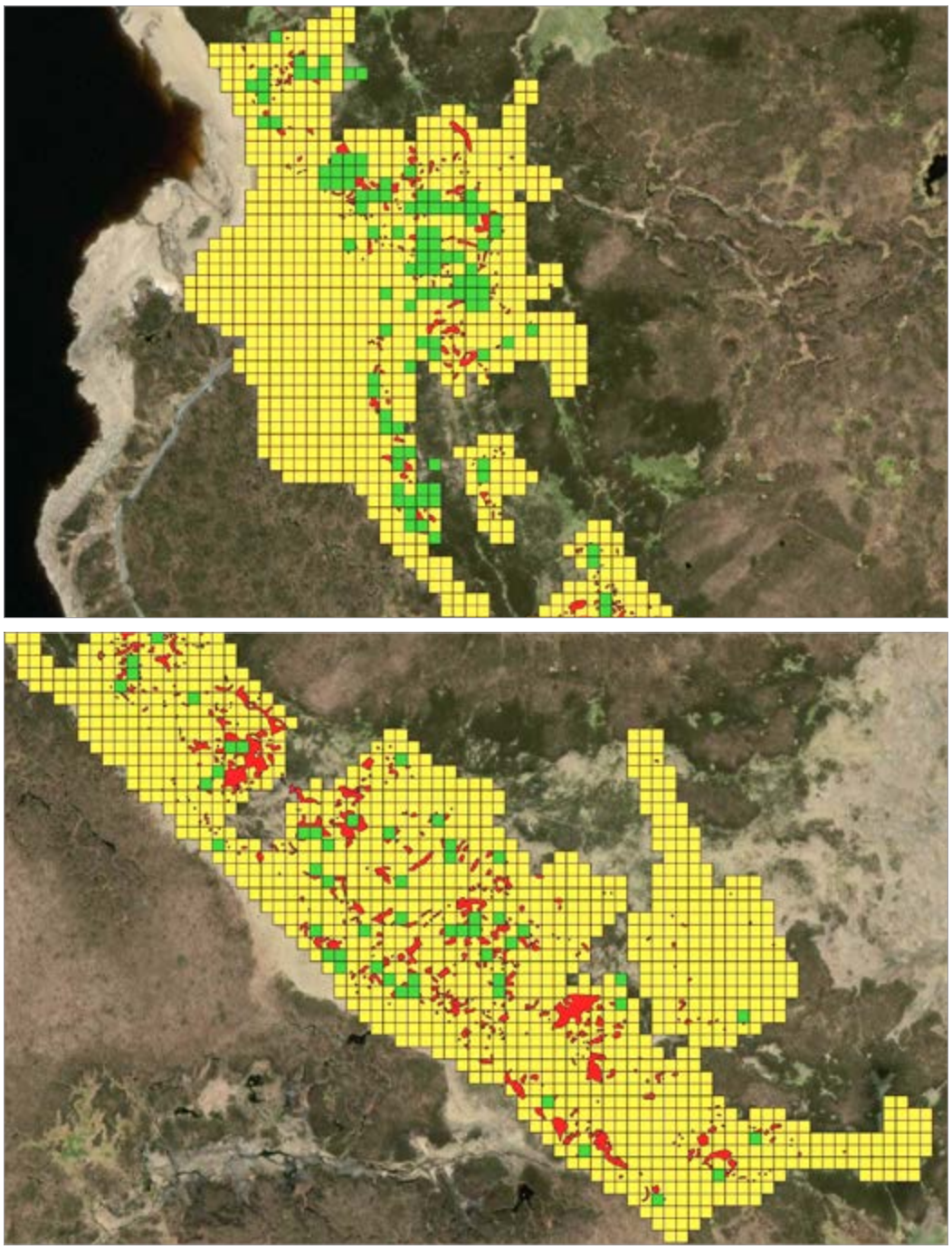
Teesdale and its flora: a climate change laboratory

MARGARET BRADSHAW & JOHN O'REILLY

At the time when one of us (MEB) joined the BSBI in 1951 every member knew of Teesdale and even more so in 1968 at the time of the Cow Green controversy; most had made the pilgrimage to see the national rarities – *Gentiana verna* (Spring Gentian), *Primula farinosa* (Bird's-eye Primrose), *Viola rupestris* (Teesdale Violet) and others.

Upper Teesdale is a National Nature Reserve and one of the top five Important Plants Areas, a very special place for plants, supporting an unusually large number of rare species. This Teesdale Assemblage includes a unique mixture of northern species such as *Gentiana verna* (Spring Gentian) and *Sabulina (Minuartia) stricta* (Teesdale Sandwort), with southern species such as *Helianthemun oelandicum* subsp. *levigatum* (Hoary Rockrose) and *Polygala amarella* (Dwarf Milkwort).

MEB has studied the special flora in Upper Teesdale since the 1950s. She was awarded an MBE for Services to Conservation in 1977. Three years ago, conscious that several of the rare species were declining and frustrated by the low focus and action on their conservation, she created the Upper Teesdale Special Flora Research and Conservation Trust. The two main aims of the project were to map the distributions of roughly 100 rare species in detail and to alert Natural England where any conservation action was needed. The project area includes the whole of Teesdale west of the Balder and Eggleston Burn.



Teesdale Red Sike survey area (north and south) showing results for *Antennaria dioica* (an 81% decline in extent between the two surveys). Yellow squares = area searched; green squares = 2017–19 records; red polygons = 1968–75 records (visible red polygons = lost plants). *John O'Reilly*

In the first three years we concentrated much of our survey effort on Widdybank Fell. We have completed the survey in 24 of 41 sites on the fell and made additional records from over 80 other sites in Teesdale. We have made over twelve thousand botanical records.

We have substantially increased the number of records for many of the rare species. For instance, *Carex* (*Kobresia) simplisiuscula* (False Sedge) from 200 records prior to the survey to 2,419 now and *Juncus alpinoarticulatus* (Alpine Rush) from 46 to 1,000 now. We can now map the extent of the populations more thoroughly and accurately than before.

In the 1970s MEB and volunteers mapped the populations of over 20 of the special plants in detail on Widdybank Fell. By comparing those maps with our recent results we can quantify how much change has occurred. Sadly, all of the special plants have declined. On average, they have gone from over half of the areas they grew in 45 years ago. *Antennaria dioica* (Mountain Everlasting) (Figure 1) and *Juncus triglumis* (Three-flowered Rush) have decreased by over 80% and the iconic *Gentiana verna* by 45%.

So far, the project has been entirely privately funded by MEB, but this funding is now exhausted. The initial findings emphasise how vital ongoing survey work is to discover what is happening to the special flora in all parts of Upper Teesdale. We estimate that it will take another five years of similar survey effort to cover all of the most important areas. In the next phase, we aim to survey a further 12,500 10m × 10m squares in the most important areas. We estimate that it will take another five years of similar survey effort to complete this. We need a professional botanist to work for 120 days per year to complete the scheduled tasks. Around £25,000 is needed each year from 2020 to 2024; a total of £125,000. This works out at £10 per square surveyed and will support field work, data entry and analysis, dissemination of results and training volunteers.

Donations may be made to: Geoff Herbert, South View, Church Bank, Eggleston DL12 0AH (cheque payable to Dr. M.E. Bradshaw's Teesdale S.F.R.& C.Trust) or via our website *www.teesdalespecialflora.uk* or Facebook page (use link on website or search for 'Teesdale special flora'). Our Charity number is 5156099. Please indicate if you are UK tax payer and can Gift Aid.

Margaret ascending Cronkley on four-legs of a Dales pony. *Martin Rogers*

Margaret leading a BSBI *Alchemilla* spp. ID weekend. *John O'Reilly*

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BEGINNER'S CORNER

Starting with buttercups

HAZEL METHERELL

Buttercups, unsurprisingly fall within the Buttercup Family (*Ranunculaceae*). However not all *Ranunculaceae* are Buttercups. In addition to the familiar yellow flowers there are the white-flowered Water-crowfoots. These, as their name implies grow either in or near water. They have the reputation of being difficult to separate at species level. We shall ignore them for the moment!

There are, however, three common yellow buttercups. Bulbous Buttercup (*Ranunculus bulbosus*), Creeping Buttercup (*R. repens*) and Meadow Buttercup (*R. acris*). With a little practice these are easy to tell apart, which is useful as they often grow side by side. And you don't even need a hand lens!

A useful trick with buttercups is to turn the flower over and look at the underside where the petals join the flower stalk (the *peduncle*). You will see that the flower is made of two concentric circles of structures – the five yellow *petals* and underneath them five smaller *sepals* (the *calyx*). Telling the difference between a petal and a sepal is often the key to identifying a lot of plants and is not always straightforwad – notice that the sepals of buttercups are sometimes coloured yellow like the petals (*see photos*). Now you have the sepals in sight, look to see whether they are folded backwards (*reflexed*) down the peduncle, or whether they are extended outwards, perpendicularly (*patent*). If they're *reflexed* your problem is over. You have Bulbous Buttercup!

If the sepals are patent you next need to look at the peduncle. Roll it between your fingers. Is it smooth or does it have vertical ridges running up and down it with furrows between? If it is smooth then you have Meadow Buttercup. If ridged you have Creeping Buttercup (but note that Bulbous Buttercup also has ridged peduncles).

There are other differences too of course. If you dig around at the base of the plant, Bulbous Buttercup (as its name implies) has a swollen stem and Creeping Buttercup has obvious creeping runners. Meadow Buttercup has neither of these features. With practice, plants not in flower can be fairly easily identified by looking at the leaves – some pointers are given in the captions to the photographs, opposite.

You will sometimes find these plants growing in reasonably close proximity but that does not mean that they do not have habitat preferences, just that they're not always to be found in their favourite place. Creeping Buttercup is most commonly found in wet grassland, in marshland or wet dune slacks and really doesn't mind heavy clay soils. Meadow Buttercup prefers rather drier (but still damp) areas, again in grassland. Both are very common in grazed pastures. Bulbous Buttercup likes the driest conditions of the three and is the most likely to be found on well-drained sunny banks. If you live in an area where there are the remains of ridge and furrow fields it can be interesting to walk across them, at right angles to the ridges, and look to see which buttercups are growing where. Normally there will be far more Creeping Buttercups in the dips and more Bulbous Buttercups on the tops of the ridges.

Hazel Metherell
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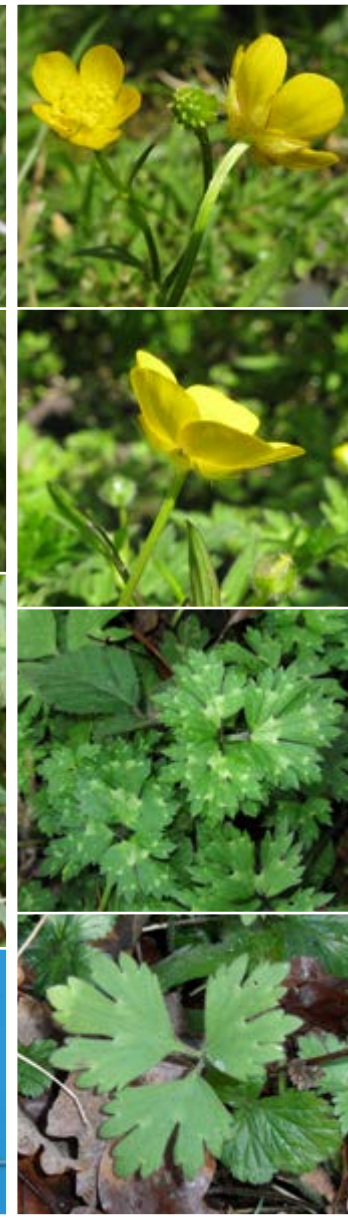
Opposite: Comparison of flowers and leaves of the three common buttercup species in Britain and Ireland. Captions read from top to bottom. *Photographs by Debbie Allan and John Norton.*

Meadow Buttercup (*Ranunculus acris*)	Bulbous Buttercup (*Ranunculus bulbosus*)	Creeping Buttercup (*Ranunculus repens*)
		
Underside of flowers showing green or yellow patent sepals (often quite small in this species) and smooth peduncle. Leaves are sharply toothed and the lobes are unstalked.	Flowers with recurved sepals (often long) and a ridged peduncle. Leaf with blunt teeth and stalked middle lobe. Young seedling with 'bulb'. This species is often hairier than the other two.	Flowers with patent sepals and a ridged peduncle; leaves are slightly hairy with a long-stalked middle lobe and side lobes often short-stalked; note the characteristic pale blotches.

ADVENTIVES AND ALIENS

Adventives and Aliens News 20

COMPILED BY MATTHEW BERRY

The only botanical news I have to report, other than members' records of course, is the publication of what should prove to be a very comprehensive list of Niger bird-seed aliens – the result of Gordon Hanson's meticulous cultivation experiments at Ware (Herts). His paper, entitled 'Birdseed aliens originating from Niger (*Guizotia abyssinica*) wild bird food', is published in *British & Irish Botany* Vol. 1, No. 4 and can be downloaded from the BSBI website (*britishandirishbotany.org/index.php/bib/issue/view/6*). Two of the species included in Gordon's paper, *Erucastrum abyssinicum* and *Pennisetum petiolare*, appear in the compilation which follows (see v.c. 21). It is a list which should give rise to a wealth of interesting new records and I look forward to hearing about them in the coming months!

V.c.6 (N. Somerset)

Geranium yeoi (formerly *G. rubescens*) (Greater Herb-Robert). Weston-super-Mare (ST35216304), 24/1/2019, H. Crouch & F. Rumsey (comm. H. Crouch): three plants, one in flower, at edge of alley between Pilgrims Way and Tormynton Road, Worle. New for Somerset. Outside Scilly, Man and the Channel Islands, there are very few scattered records for this rare garden plant, native to Madeira. Stace (2019): 372.

Nothoscordum borbonicum (Honeybells). Bath (ST752657), 13/9/2019, R. Randall (comm. H. Crouch): one plant in Pennant paving below railings, Walcot Parade. New for Somerset. There are scattered records for Britain and Ireland, with concentrations for the London area, Scilly and Channel Islands. A garden plant (Amaryllidaceae), native to S. America. Stace (2019): 948.

V.c.12 (N. Hants)

Saururus cernuus L. (Lizard's-tail). Overton (SU5152550288), 4/11/2019, S. Bell & S. White (conf. & comm. A. Mundell): near monoculture in boggy ground by pond under trees beside a track. Refound after having first been detected but not identified on 11/8/2015. It has increased significantly at its other v.c. 12 site at Liphook since Tony Mundell wrote it up in 2000 (*BSBI News* 83: 40–41, where the plant is also described and illustrated). A rhizomatous native of North America (Saururaceae), the English and scientific names refer to the plant's long, narrow, often arching inflorescences. There are a few other records in the DDb for v.cc. 2, 17, 38, 40 and 63. It is potentially invasive.

Eruca vesicaria (Garden Rocket). Ashley Warren (SU4862154845), 21/5/2019, D. Pearson (conf. & comm. A. Mundell): several plants on a road verge outside a cottage, near to Hare Warren Farm. Clement et al. (2005): 117.

Allium nigrum (Broad-leaved Leek). Bordon (SU78353505), 18/5/2019, HFG (comm. A. Mundell): one flowering plant by boundary fence of the caravan park off Mornington Road.

V.c.14 (E. Sussex)

Koelreuteria paniculata (Pride-of-India). Seaford (TV5005499291), 28/8/2019, J. Reynolds (det. M. Berry): seedlings on verge, junction of A259 and Chyngton Gardens. This seems to be the first East Sussex record. Seedlings were observed by Judy Wilson in Chichester (v.c. 13) in 1997. Stace (2019): 394.

Isotoma axillaris Lindl. (Rock Isotome). Brighton Marina (TQ3397803150 etc.), 1/10/2019, A. Spiers: non-flowering plants in south-facing brick

paving of sheltered inner harbour, self-sown from concrete planters. The seeds are numerous, tiny and get blown about in the wind (A. Spiers, pers. comm.). See Adventives & Aliens News 19, v.c. 9.

Eragrostis curvula (African Love-grass). Eastbourne (TV6091798728), 17/9/2019, M. Berry (conf. E.J. Clement): tufts in gutter and pavement cracks, Furness Road, clearly self-sown from a garden specimen. Plants that are in cultivation drop a lot of seed and if the species were more widely grown in southern England, it might become almost as fast-spreading as *Nassella tenuissima* (Argentine Needle-grass) and *Anemanthele lessoniana* (Pheasant's-tail). It was also recorded as a pavement weed in Brighton (A. Spiers, 2012). See Adventives & Aliens News 19, v.c. 15.

V.c.15 (E. Kent)

Allium carinatum (Keeled Garlic). Faversham (TR01006116), 27/6/2019, L. Rooney: about 50 plants on a rough grassy bank along South Road, 'seemed well naturalised'. It is probably the first v.c. 15 record. A late-flowering (August) garden plant (Amaryllidaceae), native to Europe and Turkey which can spread by bulbs, bulbils and seed. It has the capacity to become as dominant as *A. triquetrum* (Three-cornered Garlic) and *A. paradoxum* (Few-flowered Garlic). Widespread but still rare in south-east England. It is somewhat similar to *A. vineale* (Wild Onion) and even more so to *A. oleraceum* (Field Garlic) – bifacial leaves distinguish it from the former and exserted stamens from the latter. See p. 10, *Kent Botany* 2019.

V.c.17 (Surrey)

Oenothera rosea (Rosy Evening-primrose). Sutton Community Farm (TQ28646193), 28/9/2019, LNHS & SLBI: a few plants established on rough ground in derelict nursery. 'A persistent grain alien' Clement & Foster (1994), it might also be a very rare garden plant. Widespread as a naturalised introduction in mainland Europe, its superficial resemblance to an *Epilobium* has been much remarked upon. A native of south-western US and northern Mexico. Stace (2019): 388.

Oenothera rosea, Sutton, Surrey (v.c. 17). *George Hounsome*

Oenanthe javanica (Blume) DC. (Java Water-dropwort). Newdigate (TQ21194296), 18/9/2019, G. Hounsome (conf. E.J. Clement): a large patch along the road edge of a small pond on the east side of Partridge Lane. From the description in the e*Flora of China*, the salient characteristics would seem to be the decumbent stem rooting at the nodes, the 1- to 2-pinnate leaves with serrate, ovate-rhombic ultimate segments (up to 50 × 20mm but often smaller) and the 6–16 rayed umbels of 3–5 cm diameter. The umbels usually lack bracts or sometimes have just one, while the 2–4mm linear bracteoles equal the pedicels in length. It is between 10 to 80 cm in height. Native to East Asia and Australia, it is sold as an aquatic-marginal plant for garden ponds and artificial lakes, etc. The popular cultivar 'Flamingo' has leaves with pink-edged or cream-edged segments. The second British record? Stace (2019): 853.

Libertia peregrinans Cockayne & Allan (Wandering Iris). Rowly (TQ04384064), 25/1/2017, E.J. Clement & G. Hounsome: a small patch well-established in a ditch at the edge of a garden on the south side of the lane, Rowly Drive. The white-flowered inflorescences appear in June–July and are very like those of *L. formosa* (Chilean-iris). It is probably valued as much for its tufts of persistent orangey-yellow leaves. The plant is rhizomatous and this would explain the English name and the specific epithet, as well as its inclusion in a recent article on potentially invasive garden plants (see *BSBI News* 139: 51–52). A native of New Zealand (Iridaceae).

V.c.19 (N. Essex)

Aegonychon purpureocaeruleum (Purple Gromwell). Great Henny (TL868378), 23/4/2019, B. Fisher & T. Fisher (comm. B. Fisher): several plants in a group along northern edge of churchyard. It seems to be the first v.c. record.

V.c.21 (Middlesex)

Trigonella esculenta (formerly *Trigonella corniculata*) (Sickle-fruited Fenugreek). Hounslow (TQ12807950), 24/9/2017, LNHS (comm. G. Hounsome): a few plants in Hortus Cemetery. It can be distinguished from *Medicago sativa* subsp. *falcata* (Sickle Medick) by its annual habit and the fact that it is coumarin-scented; and from *Melilotus* spp. (Melilot spp.) by the longer fruits containing more than two seeds. The former wool alien *T. maritima* is similar – it has a fewer-flowered raceme (3–10 vs 8–20), shorter fruiting peduncles (up to 2 cm vs up to 6 cm) and calyces with equal teeth (unequal in *T. esculenta*). A native of the Mediterranean, it is a spice and bird-seed alien in this country, Clement & Foster (1994).

Trigonella esculenta, Hounslow, Middlesex (v.c. 21). *George Hounsome*

Erucastrum abyssinicum (A. Rich.) O.E. Schulz (Abyssinian Hairy-rocket). Ickenham (TQ07418658), 9/8/2019, G. Tranter (det. E.J. Clement): five plants growing in garden near where Niger-seed feeders had been hanging. Flower buds were still visible in mid-December. There are no other records in the DDb. It is very similar to *E. gallicum* (Hairy Rocket) but appears to be leafier, generally more robust and to have flowers with longer (?) darker yellow petals.

Erucastrum abyssinicum, Ickenham (v.c. 21). *Gordon Tranter*

Ammobium alatum R.Br. (Winged Everlasting). Stoke Newington area (TQ32708768), 24/11/2019, J. Lyon, T. Lyon & K. Chuang (det. F. Watkins & S. Harris, comm. J. Lyon): by the footpath around Woodberry reservoirs, adjacent to or possibly within Woodberry Wetlands which is managed by the London Wildlife Trust. Plants can be greenish to white-woolly but the 'wool' tends to be shed. It has branching winged stems arising from a dense basal rosette. The solitary capitula consist of a yellow disc surrounded by pearly-white petaloid phyllaries with

thickened greenish bases. A perennial composite native to eastern Australia which is grown from seed as an annual garden plant. Two earlier records for this site have now appeared in the DDb, both for 2019 and credited to A. Fordham and P. Charman. There is also a 2009 record for Kew Gardens (v.c. 17) in the DDb. It was recorded from Skipwith Common (v.c. 61) in 1991 (*Wild Flower Magazine* 425: 7). Are there any other records?

Pennisetum petiolare (Hochst.) Chiov. Ickenham (TQ07418658), 3/10/2019, G. Tranter (det. E.J. Clement): three plants in garden near where a Niger-seed feeder had been hanging. Plants were first noticed in early October and killed by frosts before the end of the month. An annual bird-seed and grain alien native to E. Africa for which there are no other records in the DDb, but see Adventives & Aliens News 6 for details of a v.c. 36 record. There might be an understandable reluctance to submit or enter records of bird-seed aliens found in gardens. The other *Pennisetum* species recorded in Britain and Ireland tend to be perennial garden escapes.

V.c.29 (Cambs)

Cicer arietinum (Chick Pea). Cambridge (TL45205724), 19/6/2019, A.C. Leslie & C.G. Easy (comm. J. Shanklin): one plant at edge of pavement near garden wall of 3 Belvoir Terrace, Trumpington Road. It seems to be new to the county. A food refuse, grain and bird-seed alien. There have been far fewer records in recent times, with most pre-1930 or for the period 1970–1986. For an instructive drawing, see p. 1 of *BSBI News* 34.

Pennisetum petiolare, showing cordate-pseudopetiolate leaf blade, Ickenham (v.c. 21). *Gordon Tranter*

Solanum chenopodioides (Tall Nightshade). Six Mile Bottom (TL57355724), 30/8/2019, P. Stanley (conf. A.C. Leslie, comm. J. Shanklin): numerous plants along central reservation of A11 just where this goes over the Little Wilbraham/Brinkley Road. Two plants were later found on the west side of the road by C.G. Easy (19/9/2019). New to the county. See Adventives & Aliens News 19, v.c. 28.

V.c.58 (Cheshire)

Caltha palustris L. subsp. *polypetala* (Hochst. ex Lorent) Velen. (Giant Kingcup). Ellesmere Port (SJ47D), 29/4/2017, Cheshire Recording Group: established on edge of canal, the first v.c. record; Crew (SJ6855), 24/8/2019, CRG: established on edge of lake, Queen's Park, 'still in full bloom'. A garden plant native to Bulgaria and S.W. Asia. There has been some controversy over the correct subspecific/varietal name for this variant of *C. palustris*.

Cerinthe major (Greater Honeywort). Port Sunlight (SJ3485), 24/4/2019, A. Litherland (det. & comm. G.M. Kay): in Riverside Park, the first v.c. record. A garden escape (Boraginaceae), native to southern Europe. *C. glabra* Mill. (Smooth Honeywort) and *C. minor* L. (Lesser Honeywort) have been recorded in the past (the latter as recently as 2012). They are much less likely as garden plants due to their smaller flowers (1–1.5 cm long vs 2–3 cm); they are also biennial or perennial, whereas *C. major* is annual. Stace (2019): 586.

Iris versicolor (Purple Iris). Port Sunlight (SJ352782), 31/5/2019, S.J. Hinsley (comm. G.M. Kay): by Fisherman's Pond. A garden escape native to eastern N. America, its rhizomatous growth means it can often become established in suitably wet places, such as at lake or pond margins and in reed swamps. There are over 200 records in the DDb. Clement et al. (2005): 436. Stace (2019): 929.

V.c.64 (Mid-W. Yorks)

Sisyrinchium californicum (Yellow-eyed-grass). Aberford (SE43253709), 26/7/2018, M. Wilcox: in School

Lane. Mike has also seen it with B.A. Tregale as a pavement weed in Bradford (v.c. 63) in 2009 and on a rubbly mound at Middleton Reserve (v.c. 60) in 2019. Records of this western N. American native (Iridaceae) are fairly evenly if thinly scattered across Britain and Ireland, with hotspots for south-west England and the Channel Islands and an apparent preference for more coastal tetrads.

V.c.66 (Co. Durham)

Salix irrorata Andersson (Blue-stem Willow). Cowpen Marsh area, Billingham, Middlesborough (NZ5100425676), 22/7/2015, M. Wilcox (conf. I. Belyaeva, comm. M. Wilcox): in hedgerow at edge of track off main road, above brine pools. Mike thinks it was quite likely to have been introduced originally. It was still present in 2019. It is probably planted for the ornamental appeal of its violet shoots and bare white-pruinose branches in winter. A 2–7m deciduous shrub native to south-western US. The Scandinavian native *S. daphnoides* (Violet Willow) is similar, but it has longer male catkins (30–47mm vs 15–34mm). The leaf shape is also different, those of *S. irrorata* usually being a greater number of times longer than wide, more (ob)lanceolate than elliptic.

V.c.69 (Westmorland)

Senecio inaequidens (Narrow-leaved Ragwort). Kendal (SD525907), 2019, A. Boucher: on roadside, junction of Oxenholme Road (B6254) and Kendal Parks Road. Clement et al. (2005): 337.

Briza maxima (Greater Quaking-grass). Milnthorpe (SD498814), 2019, A. Boucher: pavement Market Square, seed spread from neighbouring garden. Both this species and the previous one are still relatively rare in the far north-west of England. Clement et al. (2005): 389.

V.c.83 (Midlothian)

Lactuca serriola (Prickly Lettuce). Edinburgh (NT26807711), 10/8/2015, M. Beard (det. G. Kay, T. Rich & C. Brooks): a few plants around drain and manhole cover, Ocean Point car park. On 29/8/2016 plants were seen at the waterside entrance to this car park (NT26807712) and in the same year it was also noted at Prince of Wales Dock, Leith (NT27107688). The first v.c. 83 record was made in 1910 and the 2015 record was the first since then (B. Sumner, pers. comm.). It is a frequent archaeophyte through much of its English range.

Salix irrorata, Cowpen Marsh, Middlesborough (v.c. 66). *Mike Wilcox*

Senecio inaequidens (Narrow-leaved Ragwort). Edinburgh (NT26327483), 20/8/2010, B. & D. Wright: on the site where J. Hope's Botanic Cottage was demolished, Haddington Place, Leith Walk, the first v.c. record; RBGE Plant Nursery (NT24457593), 6/11/2010, H.S. McHaffie: plants among stones transported from site of demolished Botanic Cottage. It has continued to spread through

the city, reaching Ratho by 2012 and the Heriot railway and verge of the A7 (NT4054) by 2017 (M. Harding, det. M. Harding & P. Sansum). On 15/10/2017 it was recorded by B.E.H. Sumner from the most south-easterly point of the vice-county at Bowlands (NT4553440170), 'on a verge near railway property' (B. Sumner, pers. comm.).

Eryngium agavifolium Griseb. (Agave-leaved Sea-holly). Edinburgh (NT2576874494), 6/6/2009, D. Merrick (det. M.J. Crawley, comm. B. Sumner): growing wild in car park, 44 Albany Street, the first record for Scotland. One of a number of robust Central/South American species with variously toothed and spinose linear leaves growing in a basal tuft, two further examples being *E. pandanifolium* Cham. & Schltdl. and *E. bromeliifolium* F. Delaroche. According to the key in *The European Garden Flora* its leaves are usually much wider than those of its close allies (5–25 cm vs ≤5 cm). This particular species is hardier than some of the others, so is more likely to be cultivated successfully (and escape) in northern vice-counties. The Eastbourne record in *The Flora of Sussex* (SBRS, 2018) was an error.

Ruscus hypoglossum (Spineless Butcher's-broom). Craigmillar Castle Woods (NT286706), 6/5/2019, R. Milne: first recorded at this site in 1946 (the first v.c. record); it was recorded on and off until a long gap from 1978–2009, when refound by R. Milne (B. Sumner, pers. comm.). It differs from *R. aculeatus* (Butcher's-broom) in its larger spineless cladodes, far larger 'bracts' and obviously stalked flowers (subsessile in *R. aculeatus*). This European native is used for ground cover in the shaded parts of gardens.

Polypogon viridis (Water Bent). Edinburgh (NT243739), 16/8/2007, H. Noltie: on Dean Bridge. The first v.c. record was for Musselburgh in 1913. It was then recorded by Mary McCallum-Webster at Braehead Quarry Tip (NT1773) in 1978. Then from 1993 to 2007, three western city sites culminating in the Dean Bridge record detailed above. From 2012 to the present it has been found in c.13 sites from central and southern parts of the city. There has only been one record from outside the city to date: Ratho (NT1401671051), 4/7/2018, D.Merrick: by the fence of a housing development, Freelands Way (B. Sumner, pers. comm.).

V.c.92 (S. Aberdeen)

Erythronium americanum Ker Gawl. (Yellow Trout-lily). Cults (NJ891044), 18/4/2019, C. Blow (det. M.J. Crawley, comm. I. Francis): several plants growing along the path from the car park on Craigton Road leading through Den Woods to Hazelhead Park. Bulbous perennials (Liliaceae) from Eurasia and North America with paired basal leaves and slender scapes bearing tulip-like flowers with obvious styles and (usually) recurved tepals. M.J. Crawley picked out the following as being particularly useful in the recognition of *E. americanum*: golden yellow (not pale yellow) flowers, brownish basal blotches on the upper surfaces of the tepals, mottled leaves, yellow (not white) anthers and short, squat stigmatic lobes. It could further be added that it has 1-flowered, nodding inflorescences (multi-flowered/flowers erect or held horizontally in some species) and that the inner tepals have small basal auricles (absent in some species). It is one of at least six yellow-flowered species in the N. American flora, some others of which are also available for the garden in this country. See Stace (2019): 900 for details of the Eurasian *E. dens-canis* (Dog's-tooth-violet) and the N. American *E. californicum*. New to Britain and Ireland.

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Persicaria glabra – a potentially overlooked birdseed alien

HELENA CROUCH & JOHN AKEROYD

Prior Park Landscape Garden in Bath was acquired by the National Trust in 1993, after decades of neglect. The mansion of Prior Park was completed in 1742 as the home of 18th-century philanthropist Ralph Allen and is now a college. The naturalistic landscape which was created in the valley below the mansion presented a vista of lakes, a Palladian bridge, and views of the city of Bath beyond. The bridge and dams had fallen into disrepair when the National Trust took over the landscape garden and a programme of restoration has been ongoing: during 2019 the middle and lower dams were being repaired. In advance of the arrival of contractors, the old tea shed by the lakes was closed and a new one opened at the top end of the garden.

Persicaria glabra at Prior Park, Bath (v.c. 6). *Helena Crouch*

In August 2019, HJC spent a day recording with Dave Green at Prior Park and in the surrounding wider estate owned by the National Trust. The area beside the former tea shed was overgrown and supported numerous interesting aliens. A gardener explained that there were formerly bird-feeders in this area, which almost certainly explains why we found *Panicum miliaceum* (Common Millet), *Setaria pumila* (Yellow Bristle-grass), *Setaria viridis* (Green Bristle-grass), *Echinochloa crus-galli* (Cockspur), *Ambrosia artemisiifolia* (Ragweed) and *Amaranthus retroflexus* (Common Amaranth). On a later visit *Sorghum halepense* (Johnson-grass) was also recorded here. In this abandoned area, destined to become the contractors' yard during restoration of the lower dam, we noticed some very large *Persicaria* plants. HJC might have over-looked them as large *P. maculosa* (Redshank), but her more astute companion collected a specimen and using the BSBI Handbook (Akeroyd, 2014) found that it keyed out to *Persicaria glabra* (Willd.) M. Gómez. The specimen was sent to JRA, who confirmed Dave's identification. A return visit was made to collect a larger herbarium specimen with permission from the gardeners.

Persicaria glabra (Hairless Persicaria or Denseflower Knotweed; syn. *P. densiflora* (Meisn.) Moldenke) is an annual in Britain, but perennial in warmer climates, growing up to 1 metre tall, with long-acuminate lanceolate leaves. These are glabrous apart from a neat row of short yellowish spiny bristles along the margin, which distinguish it from other species of *Persicaria*. The underside of the leaf is dotted with flat

yellow glands. Across its range it is variably glabrous or bristly-scabrid on the margins and veins of the lower leaf surface and our British plants appear to be *P. glabra* var. *scabrinervis* (Hook. f.) H. Hara. The nodes are usually swollen and reddish and the ochreae lack cilia on the margin. The inflorescences are dense and erect or slightly nodding; the perianth-segments are usually pink. The species, described originally from India, is a widely distributed native of wet places in the tropical regions of Asia north to Pakistan, East Africa, the North Pacific and the Americas north to the south-eastern USA.

There are no records for this species on the DDb and it is not mentioned in Stace (2019); however, it is included by Sell & Murrell (2018) as *Amblygonon glabrum* (Willd.) P.D. Sell. Although Lousley & Kent (1981) stated that this species occurred as a casual introduced with wool shoddy into S. Devon (v.c. 3), and this statement is repeated by later authors, there is no mention of the record in Keble Martin & Fraser (1939) or in the recent *New Flora of Devon* (Smith, Hodgson & Ison, 2016). Clement & Foster (1994) only cite two records, both made in 1984 and reported in *BSBI News* by Mullin & Latham (1985) with a detailed illustration. J.M. Mullin found plentiful plants near Speakers Corner, Hyde Park, London, where he suggested it was a birdseed alien, whilst J.B. Latham found it sparingly on Greenhithe tip, NW Kent.

The eight plants recorded at Prior Park were new to Somerset, but only of casual occurrence. They are likely to have arrived as birdseed aliens. It is suggested that this species might be expected to appear elsewhere.

Flowers of *Persicaria glabra*. *Helena Crouch*

Acknowledgement

We are grateful to Dave Green for his observational skills and for comments on this note.

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Pilea microphylla, an under-recorded neophyte of 'tropical' environments in Ireland and Britain?

ALEXIS FITZGERALD

Pilea microphylla (L.) Liebm. (syn. *Parietaria microphylla* L.) (Rockweed, Artillery Weed) is a small herbaceous annual to (short-lived) perennial plant of ruderal habitats in the Urticaceae family, native from Mexico, across Central America, south to Brazil (Flora of North America Editorial Committee 1993+, Missouri Botanic Gardens 2019, Natural Resources Conservation Service 2019). It occurs in ruderal habitats in the more tropical climes of North America, particularly in Florida and New Orleans, including on waste ground, walls and other masonry, cultivation plots and also in rocky woods and 'hammocks' (particularly in the Everglades region of Florida) (Flora of North America Editorial Committee 1993+). It is used as a garden border plant in southern North America (and as a houseplant in the north) and it is also known as a weed of glasshouses in various parts of the continent (Flora of North America Editorial Committee 1993+). It also occurs as an introduction in the Pacific islands and in various parts of Asia (being commonly naturalised in South China) (eFloras 2019, Flora of North America Editorial Committee 1993+) and more rarely in Europe (mostly in tropical greenhouses).

There is only one record of *P. microphylla* on the BSBI Distribution Database (DDb), from Winterbourne Botanic Gardens, Warwickshire (v.c. 38) (BSBI, 2019). Furthermore, the plant does not feature in Stace (2019), nor in Sell & Murrell (1996-2018), nor in Reynolds (2002). Therefore it is perhaps notable to report that *P. microphylla* was found by AF on 11 October 2019 as a weed/contaminant with a large potted palm plant in the office building of Scott Cawley (ecological consultancy), Rock Road, Blackrock, Dublin (v.c. H21) (Irish Grid reference O20673.30004; latitude 53.306798, longitude −6.1902090). It very likely arrived with

Pilea microphylla as a weed/contaminant with a potted palm plant, Dublin (v.c. H21), 11 October 2019. *Alexis FitzGerald*

the rootstock of the palm from a garden centre source. A voucher specimen from this population will be donated to the National Herbarium, National Botanic Gardens, Glasnevin (DBN).

Furthermore, Sam Thomas (pers. comm.) has conducted wild plant recording work in various botanic gardens in Britain and Ireland in (and after) 2013 and has found *P. microphylla* in a number of tropical greenhouses across both Ireland and Britain, albeit never being found to establish itself outside in our natural climate. All of these records for *P. microphylla* are presented in Table 1 (with the permission of Sam Thomas, 24 November 2019).

Notably, the species has been recorded from both of the major botanic gardens in Ireland (namely the National Botanic Gardens, Glasnevin, Dublin and Belfast Botanic Gardens), as well as in botanic gardens in Wales, Scotland and England. Therefore, I would encourage botanical recorders to search for this distinctive species in their local botanic gardens, particularly in warm tropical greenhouses (and indeed in any other suitably warm, humid environs beyond) and submit the records to the BSBI DDb, such that we can develop a more detailed understanding of the frequency and distribution of this species in these islands. *P. microphylla* is very unlikely to establish itself in the wild in the near future in Ireland or Britain, however, in the most warm, humid and subtropical climates of Europe, this may be a more conceivable prospect.

Table 1. Records of *Pilea microphylla* from tropical greenhouses in Britain and Ireland.

Date	Site	Grid reference
31/03/2013	Belfast Botanic Gardens	NW 45925 28043
31/03/2013	Belfast Botanic Gardens	NW 45940 28050
31/03/2013	Belfast Botanic Gardens	NW 45909 28059
31/03/2013	Belfast Botanic Gardens	NW 45892 28051
04/04/2013	National Botanic Gardens, Glasnevin	SG 16013 94416
01/05/2013	Royal Botanic Gardens Edinburgh	NT 24781 75598
01/05/2013	Royal Botanic Gardens Edinburgh	NT 24779 75608
01/05/2013	Royal Botanic Gardens Edinburgh	NT 24750 75587
22/04/2013	RHS Wisley	TQ 06079 58383
10/12/2015	National Botanic Gardens of Wales	SN 5194 1812

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British records of *Cardamine occulta* Hornem. (Brassicaceae) in 2019

MICK CRAWLEY

The nomenclature of Eastern Asian populations traditionally assigned to *Cardamine flexuosa* (Wavy Bitter-cress) has remained unresolved since 2006, when they were found to be distinct from the European species. Detailed chromosomal and molecular work showed that the informal designation 'Asian *Cardamine flexuosa*' was *Cardamine occulta* Hornem. (Marhold et al., 2016). It was clear that it had passed unnoticed for decades as a result of confusion with native *C. flexuosa*.

Its presence in Europe was first formally detected from the banks of Lake Constance in southern Germany in 2004, based on molecular evidence (Bleeker et al., 2008). From subsequent herbarium study, however, we now know that *C. occulta* was present in Belgium as early as 1968 and from Spain and Russia in 1993. In Europe, it grows in highly anthropogenic habitats: as weed in plant nurseries, in plant-pots in garden centres, on pavements in cities, etc. (Tison & de Foucault, 2014).

In 2017, Elizabeth Cooke and Steven Heathcote drew the attention of British botanists to the existence of this plant in their article in *BSBI News* (Cooke & Heathcote, 2017), including a useful table of identification tips. Like *C. flexuosa*, it has six stamens and lacks a basal leaf rosette. It is distinguished by its more straggling growth form, terminal leaflets with three more or less distinct terminal lobes and a hairless upper leaf surface (Šlenker et al., 2018).

The first British record away from a garden centre was by Alan Leslie at Ely Station in Cambridgeshire on 17 March 2019. I found it in London in Vincent Square SW1 on 21 March and Smith Terrace SW3 on 22 March 2019. There followed a wide geographic spread of records in April 2019 from Mick Lacey in Chesterfield, Paul Green in County Wexford, Fred Rumsey in North Somerset and Jonathan Shanklin in Cambridge. In May, Ian Green extended the northern range as far as Elgin in Moray. It's clear that the plant is all over the place, just waiting to be discovered.

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Cardamine occulta, Switzerland, 15 September 2017, *@Feldbotanik*

Caylusea abyssinica, a birdseed casual, in Surrey (v.c. 17)

GEORGE HOUNSOME

The London Natural History Society holds occasional indoor identification meetings to which the members can bring plants of interest or ones they need naming. At the meeting in September 2019 Irene Kettle, a long-standing and enthusiastic member of the society, produced from near the bird feeders in her garden in Raynes Park a plant that said nothing to me at first glance. It was branched, about 60 cm tall with broadly lanceolate, entire leaves and a narrow dense raceme of very small flowers. Close inspection of these showed five petals, two deeply dissected and the other three much less so, suggestive of the *Resedaceae*. A journey through the keys in Stace Ed. 4 gave the same result but the plant matched none of the taxa listed. The petals were not obvious in the open flowers but the orange anthers were prominent. Each flower had ten stamens surrounding an open-topped, stalked ovary about 2mm tall. Following a conversation with Eric Clement it occurred to me that there might not be too many genera in the *Resedaceae* and so it proved – somewhere between three and twelve depending on your taxonomic standpoint. I looked up each one on the web and found a match under *Caylusea abyssinica*, a plant from East Africa that occurs rarely in Northern Europe in birdseed, from which it has been grown (Hanson & Mason, 1985). I read somewhere, but I can't remember where, that it occurs as a contaminant of Niger *Guizotia abyssinica* seed and Irene had indeed had some in a bird feeder.

There were two plants, one of which she had brought *in toto* to the id meeting. The other remained in her garden and she kindly showed it to me. It was suffering from the removal of its terminal spike but the lateral ones had grown up and were flowering on 23 October. It is unlikely to set seed in a clammy British autumn, or, as an annual, to survive a British winter, but time and a little frost protection will tell. As far as I can tell there have been no casual occurrences in Britain before 2019 but since Irene's

Caylusea abyssinica in a Surrey (v.c. 17) garden and close-up of flowers, 23 October 2019. *George Hounsome*

record it has been found in a garden at Bembridge on the Isle of Wight (Clement, E.J., pers. comm.). It has been recorded rarely in Northern Europe (Verloove, 2019). The only other British record for the genus is a pre-1930 one for *C. hexagyna* (Clement & Foster, 1994).

It was interesting and educational to see it even though the plant is currently insignificant in terms of the British flora; this may change as the globe warms. I would like to thank Irene Kettle for bringing the plant to my attention and inviting me to photograph it and Eric Clement for his very useful help with identification.

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Cortaderia richardii (Early Pampas-grass) – a different view of its distribution in Britain and Ireland

DAVID PEARMAN

Whilst reviewing captions for the forthcoming Atlas 2020 I noticed that the 2002 Atlas gave a total of 22 hectads for this species, all on the north and west coasts of Great Britain, with the exception of four in Dorset, and none in Ireland. However the draft totals for the new Atlas gave 311 hectads in Great Britain, post 2000, and 53 in Ireland – in all an astonishing 17-fold increase.

My first thought was that there had been a coding error, but it quickly became obvious that the records were real – correspondence with many vice-county recorders in the north and west confirmed the records.

Eric Clement wrote a most interesting and relevant note (Clement, 1999), contrasting this species and the common 'Pampas Grass', *C. selloana*, giving what seems to be an excellent differentiating feature of the leaves, as well as useful comments on the flowering and growth of the two species. These are summarised below, together with information from a further note by Mike Wilcox (2007) (Table 1). Eric cast doubt on the Dorset records, noting that subsequent searches for them had only produced *C. selloana*. He also cited an account from Roy Lancaster in the *Garden*, where he notes that *C. richardii* prefers milder wetter conditions and is less drought-tolerant.

Looking at the maps of the two (see below), a number of comments come to mind:

Are all the records of *C. selloana* from the north and west of Britain and Ireland really correct? Are the inland records for *C. richardii* correct?

Table 1. Distinguishing characteristics of *Cortaderia selloana* and *C. richardii*.

Feature	*C. selloana*	*C. richardii*
Flowering time	October/ November	Late June-July
Flowering habit	upright	Nodding to one side
Leaf strands	All strands equal	Every 4th–8th strand larger, with a wide centre
Desiccated leaves	Leaves folded, scabrid edge showing	Leaves rolled, no scabrid edge
Leaf structure	Leaves easily torn off (sideways)	Leaves not tearable

And is *C. richardii* just better recorded or is it really expanding fast? We know that inclusion in a keyed Flora encourages recognition; it was not included in Stace's 1st edition (1991) and though it was in the 2nd edition (1997) that might have been too late for the bulk of the Atlas records. I strongly suspect that this is possibly the main reason for the extra records.

There is no doubt that both species seed, though *C. richardii*, flowering earlier, seems much more successful, at least in Britain and Ireland. Looking at the *RHS Plantfinder*, there are many more nurseries selling *C. selloana*, and that species also has many different cultivars. However I note that the excellent recent *La Flore de Finistère* (Quéré et al., 2008) recounts (I paraphrase) that it is classified as invasive there, and though it is still absent from a large part of the department, it seems to be advancing inexorably. It is already in 47% of the 10 km squares there. Is that spread just because Finistère is that much further south, or could there be any confusion with *C. richardii*?

Just to add to the fun, Clement and others note that *C. richardii* has been confused with another large New Zealand grass, *Chionochloa conspicua*, though having grown both I find that difficult to believe. And, further, there are four other 'Toetoe' grasses in New Zealand, including *C. toetoe*, and we *assume* all of our records of *C. richardii* are actually that species. Alison Rutherford, too, wonders if there other species around (Rutherford, 2016).

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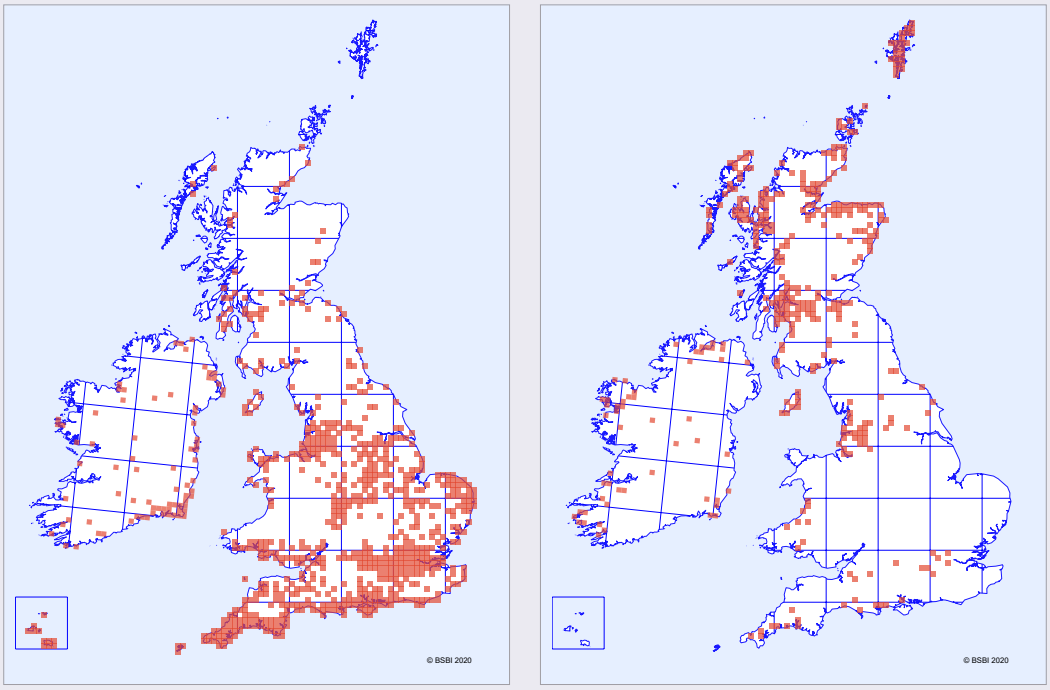

All records of *Cortaderia selloana* (left) and *C. richardii* (right) plotted by 10 km squares. *BSBI Distribution Maps (date of access: 17/3/2020).*

PLANT ALERT

Launched in July 2019, Plant Alert (*www.plantalert.org*) is a citizen science collaboration between the BSBI and Coventry University designed to monitor future invasions of ornamental plants. In contrast to the usual BSBI recording, Plant Alert is a survey of horticultural taxa proliferating in gardens. The aim is to identify potentially invasive plants before they become a problem in the wider environment. The project is based upon a pilot study conducted with support from the BSBI in 2016 (Conroy & Dehnen-Schmutz, 2018).

There are often long delays, sometimes more than 100 years, from the introduction of species in gardens to the recognition of a problematic plant in the wild, making effective prevention strategies very difficult. Large numbers of species introduced into gardens over the last century have therefore created an 'invasion debt' of alien species that are already introduced and present in gardens. Furthermore, the invasion risk of these species could potentially be accelerated by climate change, resulting in plants previously not considered fully hardy to establish and spread. The challenge is to identify the potential future problematic plants out of this ever-increasing pool of about 70,000 ornamental plants available to gardeners.

The keen horticulturalists amongst us will know that gardeners strive to provide the best achievable growing conditions for their plants and also control those that may otherwise dominate. Therefore, gardeners are among the first to notice traits that have also been recognised to contribute to successful invasions, such as vigorous growth, earlier germination, better survival of seedlings and longer flowering periods. Similarly, problems with removing plants no longer wanted could indicate potential control problems in cases where such plants establish outside gardens.

Plant Alert strives to engage gardeners to report plants in their own gardens or those of others, showing signs of invasiveness. In doing so people are contributing to the essential data required to understand and manage future invasive ornamental plants before they can cause negative impacts. With the 2020 gardening season starting now, we hope to increase the number of records received so far. BSBI members can play a crucial role in using and promoting the new recording tool.

Data collected from Plant Alert will be used in risk assessments of species as well as to provide gardeners, nurseries and land managers with advice on which plants could become difficult to manage. A key feature of Plant Alert is that it has been designed to be a permanent feature of BSBI recording efforts, with all records going into the BSBI database (labelled as Plant Alert records) where they will also be verified. For more information, to contribute records and view results, please go to *www.plantalert.org*. We also have a twitter feed where you can keep track of the activities of the project, latest news and potential species to look out for and report on: @Plant_Alert.

Reference

Conroy, J. & Dehnen-Schmutz, K. 2018. Can gardeners help identify ornamental plants at risk of becoming invasive? *BSBI News* 139: 51–52.

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Top ten recorded species (February 2020)

Pentaglottis sempervirens	Green Alkanet
Erigeron karvinskianus	Mexican Fleabane
Leycesteria formosa	Himalayan Honeysuckle
Rubus spectabilis	Salmonberry
Anemanthele lessoniana	Pheasants-tail
Allium triquetrum	Three-cornered Garlic
Sasa palmata	Broad-leaved Bamboo
Fallopia japonica	Japanese Knotweed
Lysichiton americanus	American Skunk-cabbage
Symphoricarpos albus	Snowberry

Akebia quinata (Chocolate Vine) – one of our recent records. *April Webb*

BSBI NOTICES

BRITISH & IRISH BOTANY 2:1 PUBLISHED

The first issue of the 2020 volume of British & Irish Botany, BSBI's open access, online scientific journal was published in February (see table of contents opposite). You can view or download all these papers free of charge here: *britishandirishbotany.org/index.php/bib/issue/view/7*.

Previous issues are available to view or download in the British & Irish Botany archive: *britishandirishbotany.org/index.php/bib/issue/archive*.

We hope you will consider publishing in, as well reading, British & Irish Botany. Submission guidelines are available here: *britishandirishbotany.org/index.php/bib/about/submissions*, or send your manuscript to the Editorial Office at the email address below and we'll do it all for you.

Louise Marsh & Ian Denholm
bib@bsbi.org

British & Irish Botany Vol. 2 No. 1 (2020)

The phenology of an urban street flora: a transect study – *Chris Preston*

Hybridisation and introgression in British *Heloscia dium* (Apiaceae) – *Stuart D. Desjardins, Andrew G. Shaw, Judith A. Webb*

Cotula alpina (Asteraceae) naturalised in the British Isles – *Kevin J. Walker, Linda Robinson, Duncan Donald*

Three new species of hawkweed (*Hieracium*: Asteraceae) from northern England – *D.J. McCosh, D. Barlow, B. Burrow, T.C.G. Rich*

Mentha cervina (Lamiaceae), an emergent aquatic alien species naturalising at South Gare, North-East Yorkshire – *Ambroise Baker*

Lectotypification and neotypification of some names in British *Hieracium* section Foliosa (Asteraceae) – *T.C.G. Rich*

Taraxacum pseudomarklundii, a south-western European species, native in South Devon (v.c. 3) – *John J. Day, A. John Richards*

BRITISH & IRISH BOTANY (B&IB) – PRINTED COPIES

Now that B&IB has been running for a whole year and we are confident that it will remain a successful and vibrant online publication we have investigated the feasibility of producing printed copies for those that would like one. Given that the intention for B&IB was for an online publication, the software it uses doesn't produce pdfs that are optimised for printing. However, on researching options available to us we have found a way of producing full-colour prints of the pdfs available on the B&IB website and these seem to be, if not perfect, of acceptable quality.

We can make available reprints of Year 1 (2019), which will consist of the papers for each of the four issues, each part perfect bound into a cover, for a total sum of £25 for the year, BUT only if over 100 members request this.

To express an interest, please contact Gwynn Ellis either by email *gwynn.ellis@bsbi.org* or by post to Gwynn Ellis (B&IB), 41 Marlborough Road, Roath, Cardiff CF23 5BU. No postal acknowledgements will be sent unless an SAE is provided.

PANEL OF VICE-COUNTY RECORDERS

A couple of changes to report, most notably in Scotland where, after 42 years in post, Alan Silverside has retired as VCR for Wigtownshire (v.c. 74). Alan will be best known to BSBI members as an expert on Eyebrights, of course, as well as *Mimulus* and other tricky taxa, and when I was living in Edinburgh *A checklist of the flowering plants and ferns of East Lothian*, co-edited by Alan and E. Helen Jackson, was very useful indeed, but he has many other strings to his botanical bow, including as a mycologist contributing to the recognition and conservation of grasslands of exceptional importance for fungi in Scotland and as a first-rate lichenologist (see *www.*

lichens.lastdragon.org). Above all else, as Mike Scott noted in his book *Mountain Flowers*, Alan is highly regarded as a patient and inspiring teacher with a fine eye for detail. Many thanks to Alan for over four decades of service, although as all naturalists know, 'retirement' is a relative term.

In Wales, David Barden and Karen Williamson have joined Julian Woodman as joint-VCRs for the east of Glamorganshire (v.c. 41). David was previously based in Cambridge and came to Glamorgan with work in 2011. Karen originates from Glamorgan and works as a monitoring ecologist. Both are excellent botanists, co-lead the Glamorgan Botany Group with Julian, and are fantastic additions to the VCR network.

There are VCR vacancies for eleven vice-counties: Argyll (alongside Gordon Rothero), Banffshire, Clare; Dorset (alongside Robin Walls); Dunbartonshire; Co. Longford; South Hampshire (alongside Martin Rand); East Sussex; West Sussex; Waterford; Wigtownshire. If you are interested in becoming a VCR and want more details about what is involved, please do get in touch with the relevant Country Officer.

Pete Stroh
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BSBI COMMITTEES – WHAT DO THEY DO?

At its November 2019 meeting BSBI Council asked committee chairs to write a few sentences outlining their committee's role to go into this edition of *BSBI News*. The four standing committees and four country committees meet twice a year, liaise electronically and work closely with staff and officers. Chairs attend twice-yearly meetings of BSBI Council.

If any member would like to get more involved in BSBI's work or think they might have something useful to offer, please contact the relevant committee chairperson, whose contact details are given below.

Further information on the governance of the BSBI along with summaries of each committee's remit and make-up of the various committees is given on the BSBI website at *bsbi.org/governance*.

Records and Research Committee (R&R)

The Committee is tasked with maintaining a network of active Vice-county Recorders who will collect records, encourage others to do the same, assist in national surveys and projects and ensure the accuracy of the records collected.

The Committee maintains a panel of referees and maintains the Distribution Database where botanical records are stored and from where they can be accessed.

We also assist in the design of projects on the flora of Britain and Ireland by members of the BSBI, and each year arrange a series of field meetings and taxonomic workshops.

BSBI Council agreed that after Atlas 2020 recording concludes, the BSBI's priority should be to focus on nationally and internationally rare species. R&R will be considering how best to take this forward on a national basis whilst allowing maximum local flexibility at its next meeting.

Robert Northridge
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Training and Education Committee (T&E)

A significant amount of our efforts are focused on the administration of two BSBI grants: training grants to enable people to attend short courses and plant study grants to support research projects.

We are keen to ensure that there are high quality botanical training opportunities and training materials (hard copy and online) available for all botanists at all levels of expertise. This sometimes involves directly developing these, but also means identifying gaps and encouraging others or working with partners to meet these needs. We work with the BSBI Communications Officer to promote awareness of these opportunities and to encourage the sharing of training materials and good practice. Overseeing botanical training resources also includes developing and running the BSBI Library. We work to promote an interest in botany at both recreational and professional levels.

T&E is developing an Annual Audit of Provision of Training and Educational Resources to promote a diverse range of training opportunities. We would welcome information to help about botanical training activities that are occurring to help us complete this task.

John Warren
johnmwarren@hotmail.co.uk

Events & Communications Committee (E&C)

The newly renamed Events & Communications Committee (formerly Meetings & Communications Committee) is the main mechanism through which BSBI members come together to share the incredible expertise and enthusiasm they have for the botanical world. E&C works closely with staff, officers and other standing and country committees to organise the Annual Exhibition Meeting, Annual Summer Meeting, Recorders' Conferences and outreach events such as the New Year Plant Hunt. We also support, arrange and promote a programme of field meetings across Britain and Ireland. We strive to support and encourage both existing and new members and build networks across the botanical community. On a more formal note, we also maintain guidance and codes of safety for organisers of, and participants on, our field meetings – ensuring that we stay safe while we are having fun!

We are always keen to hear from anyone with ideas for events and opportunities for greater communication – so please get in touch with us.

Jodey Peyton
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Publications Committee

Before the rise of social media, BSBI publications were the most obvious public face of the society. The Publications Committee has oversight of BSBI's portfolio of publications and periodicals, helping to disseminate and communicate our members' outstanding botanical achievements.

We liaise with and support the editors of *BSBI News* and our new online journal *British & Irish Botany*. We oversee the series of influential BSBI Handbooks and other stand-alone titles, working with authors, editors, staff and officers to support the process from inception to publication and promotion. Find out more about BSBI publications here: *bsbi.org/publications*.

The committee also awards small grants aimed at making county & local Floras more financially viable. A list of more than 500 county Floras has been prepared for the committee by David Pearman, one of our corresponding members who augment the committee and add greatly to its outputs. Find out about county Floras here: *bsbi.org/county-floras*.

Without the ongoing support of all our volunteers, whether as committee members, as authors or as editors, none of this work would be possible. We are always keen to hear from anyone who feels they have the necessary skills to contribute to the work of BSBI's Publications Committee.

Jerry Clough
publications@bsbi.org

BSBI POST-ATLAS 2020 PROJECTS

In October 2017, BSBI Council set up a small committee to survey BSBI vice-county recorders and ordinary members to find out what projects they would be interested in pursuing after Atlas 2020 came to an end in December 2019. Following extensive consultations, the committee drew up a list of options which were initially presented to Council in July 2019. At its November 2019 meeting, Council considered the suggestions made and prioritised them for consideration as part of the Resilience Project's discussions and decision-making process in the spring of 2020.

The resourcing of major projects will be part of these discussions, as will the extent of the involvement of BSBI's scientific staff who will be dealing with the analysis of Atlas 2020 data over the next two years. Major projects will require a considerable time to set up, so will not be ready to be started until after 2020.

Council felt that the two most worthwhile projects were the long-term monitoring of internationally and nationally important vascular plant species across Britain and Ireland and sample-based surveys such as the already tested Local Change/Monitoring Scheme.

Council also noted that the National Plant Monitoring Scheme (NPMS) is already up and running and is a key project for the BSBI.

As well as projects undertaken over the whole of GB and Ireland (see p.71), there was, in the post-Atlas 2020 project survey, considerable support for projects to be undertaken at the level of each of the four countries or more locally. Accordingly, some options which country committees and VCRs could consider for starting in 2020 will include:

- Production of a register of key sites for each vice-county, including SSSIs, Local Nature

Reserves and sites with no designation, listing Priority Habitats and Species (nationally rare/scarce, conservation priority, etc.) for each site.

- Recording the flora of mountain summits (within 10 m altitude of highest point) using standard methodology developed as part of the GLORIA pan-European project: *gloria.ac.at/scope/history#history-gloriaeurope*.
- Conducting targeted habitat/species surveys, concentrating for example on:
  - Aquatics, orchids;
  - Saltmarshes and other coastal habitats;
  - Roadside verges;
  - Urban floras.

Country committees submitted a list of possible projects to the Records and Research Committee prior to their meeting on 28 January and these committees will be in touch with their VCRs and members about their plans.

The survey showed that Education and Training should be given a high priority in the post 2020 period, so it is hoped that country committees will keep this in mind when planning activities for the coming year.

It is also recognised that some VCRs may wish to spend 2020 in writing a County Flora, Rare Plants Register, or a similar publication, analysing the data collected for Atlas 2020.

Finally thank you for your input into determining what activities we might focus on. As projects at all levels are developed, we think you'll agree that there are plenty of options and something to tempt all.

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BSBI RESEARCH GRANTS

BSBI's Science & Research Committee runs a small grants scheme to support research aimed at enhancing our knowledge of the British and Irish flora. Science & Research Grants are aimed at PhD students and academic or amateur researchers. Applications are assessed by a small panel of academics including several BSBI trustees and BSBI's Head of Science. Amounts awarded vary, up to a maximum of £1000, and a budget is submitted as part of the application. The work should be capable of resulting in a scientific publication and successful applicants are also requested to provide a short report for publication on the BSBI News & Views blog.

Applications open in January each year and forms can be downloaded here: *bsbi.org/grants*. You do not have to be a BSBI member to apply for a SRC grant but BSBI members may be favoured in years where competition for grants is particularly high.

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BSBI ENGLAND COMMITTEE & FUTURE EVENTS

The first England Annual Meeting took place at the Natural History Museum on February 1. The relatively small number that attended enjoyed the first England AGM, a tour of the Garden, a talk from Fred Rumsey, a series of illustrated discussions and a workshop on alien species to look out for. There will be a report in the England Newsletter, which I hope will come out in electronic form in May. The meeting was advertised on the new look 'Field Meetings and Indoor Events' web page: *bsbi.org/field-meetings-and-indoor-events*, which gives updates for advertised field meetings and indoor events and also news of other meetings that don't make the Yearbook. Next year we will give more notice of the England meeting, but do have a look at the new page and let us have feedback. There were a lot of meetings this year and they covered the full range from absolute beginners to detailed study of difficult taxa. The meetings are always enjoyable (maybe less so in torrential rain!) and often produce interesting new records as well as inspiring new botanists. Do join one if you can when they resume after the coronavirus restrictions end.

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THE NATIONAL PLANT MONITORING SCHEME: WHAT'S IN IT FOR BSBI MEMBERS?

The National Plant Monitoring Scheme (NPMS) was launched in 2015 and aims to provide us with a way of improving our understanding of how environmental change is impacting on our wild plants and amassing a body of data which can be used to inform government policy. Registered participants measure changes in our flora by monitoring species' abundance within small plots located in semi-natural habitat types. The scheme is run as a partnership between BSBI, Plantlife, the UK Centre for Ecology & Hydrology and Northern Ireland Environment Agency (NIEA) and is funded by the Joint Nature Conservation Committee; it covers the UK but not (at present) the Republic of Ireland.

Now that Atlas 2020 recording has ended, this seems an opportune time for us to summarise how the scheme works and encourage BSBI members, whether beginners or more experienced botanists, to consider taking part in what is now the UK's main plant monitoring scheme.

Robert Northridge, Chair of BSBI Records & Research Committee, said 'The NPMS is a really great way for everyone interested in plants to get involved in a country-wide, structured scheme to track the changes in plant communities over time; this is important as the data collected will be used to inform policy-makers'. Robert is right to stress that the NPMS method is 'structured' – this reduces bias and makes sampling repeatable with a high degree of accuracy, so we can be confident that any observed changes are real and not an artefact of how the data were gathered.

Jodey Peyton, Chair of BSBI Events & Communications Committee said: 'There are some really helpful videos for NPMS surveyors, guiding you through the different habitats you'll need to monitor – you can view an example here: *www.youtube.com/watch?v=y-foQ4TJhu8&list=PLdau3Elomlis22jD4cjotYZDoydm-uINC*. There's also one by my CEH colleague Oli Pescott about the citizen science aspect of the scheme: *www.youtube.com/watch?v=wkLDfzgtCNg&list=PLxBmLvubPKVWCizFC0CSP1_0X3RARA4LB&index=6&t=0s*. And once you register for the NPMS there's a network of mentors on hand to support you – so you never need to struggle on your own!'

Ciara Dwyer, Secretary of BSBI Publications Committee, said: 'There's a 168-page full colour species identification book that is sent free of charge to everyone who registers for the scheme. Kevin Walker, BSBI's Head of Science, wrote many of the descriptions. The book is clear and easy to understand (no fancy botanical/plant words), so it's great if you're a beginner and want to learn more about wild flowers'.

If you're new to the NPMS, there is a description of how to take part here: *www.npms.org.uk/content/how-get-involved* and you may also want to attend one of the many training courses that take place each year.

Barbara Brown, BSBI Wales Officer, said: 'I'm looking forward to running NPMS training days in Mid Wales in late April and early May. Anyone who has already registered for the NPMS can attend these training sessions free of charge, details here: *www.npms.org.uk/content/training-and-events*. As well helping all new surveyors, they

NPMS training session in Snowdownia. *Louise Marsh*

will prepare you to survey in the more remote parts of Wales' beautiful landscape, where there are still unallocated squares'. There are also parts of Scotland (especially the south-west and the Cairngorms) with unallocated squares. Find out if there is a square near you by visiting this page: *www.npms.org.uk/square-near-me-public*.

The 1 km squares are randomly selected but weighted towards squares with a high proportion of semi-natural habitats. Once a square has been allocated to you, you'll be sent some guidance on how to find up to five plot locations within your square which correspond with 11 broad target habitats such as lowland grassland, broadleaved woodland and arable field margins. Then you just need to pick one of three levels at which to record: at Wildflower Level, you're looking for around 200 easily identifiable species in total, but once you've identified your habitat (with the help of one of those videos we mentioned above) things get much simpler and you're looking at a much shorter species list; at Indicator Level, there are around twice as many species to search for; and at Inventory Level you're recording everything. So whatever your experience and skill level, you'll be able to take part in the NPMS. Ideally you'll make two visits to your plot each year, although if you've taken on a square in one of those remote locations in Snowdonia or the Cairngorms, once a year is okay!

New this year is a NPMS recording app, so you can head out with your smartphone to monitor your plot. It has never been easier to take part in the scheme. To summarise, as Barbara Brown says 'The NPMS is a great way for anyone with an interest in citizen science to contribute to an important scientific project and collect valuable information about the changes which are happening across our countryside. This information collected via the NPMS is much more amenable to statistical analysis than that of most citizen science surveys, so the data you collect will be really useful'.

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MEMBER NOTICES

POTENTILLA PROJECT – REQUEST FOR MATERIAL

(a) *Potentilla reptans*, *P. anglica*, *P. erecta* and the hybrids

Previous studies (Matfield et al., 1972) showed that phenotypic variation is very wide in two of the hybrids *P.* × *mixta* and *P.* × *suberecta*. These studies also showed pollen/achene fertility is a good indicator in determining these taxa and only one wild hybrid *P.* × *italica* has been determined based on a chromosome count. It is suggested that assessing ploidy level based on the size of stomata may be of use. This study aims to use the size of stomata and fertility to suggest a ploidy level and determination for each specimen to possibly detect putative *P.* × *italica*. Specimens are welcome (fresh is best but pressed would be okay, preferably with some ± unopened flower buds). If *P.* × *italica* is suspected, a live (rooting) bit would be most useful. Please include full details.

(b) *Potentilla erecta* subsp. *erecta* and subsp. *strictissima*

As a subgroup of the above I would welcome any specimens of these two subspecies. If you have some good subsp. *strictissima* (for example in Scotland) I would welcome a rooting bit.

Reference

Matfield, B., Jones, J.K. & Ellis, J.R. 1970. Natural and experimental hybridization in *Potentilla*. *New Phytologist* 69: 171–186.

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COUNTRY ROUNDUPS

ENGLAND

There aren't many exciting plant finds to report, as you might expect at this time of the year, but the lack of quantity is more than made up for in quality. Tony Mundell and Fred Rumsey have told me about the discovery by June Chatfield of the very lovely *Phelipanche purpurea* (Yarrow Broomrape) on the A31 Alton bypass last July, certainly up there with the most exciting finds in North Hampshire this century. It is an extremely rare plant in the county, with only two known historical sites and may now only be present at the site that June discovered. Tony has contacted the county council to ask for some protection from mowing activities in June and July, although it is perhaps the Broomrape's bad luck that it decided to settle very close to numerous road signs and a roundabout where vegetation is cut regularly. I hope that a small area can be spared at flowering time so that this beautiful species, threatened throughout much of its northern European range, can persist.

Najas marina (Holly-leaved Naiad) is a nationally rare species, restricted to the Norfolk Broads where it was first discovered in 1883, rather late in the day, by Arthur Bennett. Globally it is widespread, with its distribution encompassing Europe, Asia, Africa, Australia, the Americas and many oceanic islands, although it appears to have a very specific environmental niche (e.g. brackish, highly alkaline waters) and so is rare or endangered in many regions where it is present (Kennison in Wigginton, 1999). Following hot on the heels of its discovery in West Sussex at the Arundel Wetland Centre in 2015, the first record outside of the Broads, it has now been found in East Sussex at Darwell Reservoir during an EA survey last year for the non-native freshwater shrimp (which, by the way, can apparently be distinguished from the native shrimp – *Gammarus pulex* – by watching it walk over a stone: the native species moves on its side, but the alien – *Crangonyx pseudogracilis* – walks upright). At both sites, *N. marina* is present in some considerable quantity, but how it arrived in Sussex is a mystery. Did fragments get tangled in the propeller of a boat that was previously used on the Broads? Or via migratory birds?

Holly-leaved Naiad is eaten by waterfowl, and Agami & Waisel (1986) found that its seeds readily germinate after digestion, leading to the postulation by the authors that ducks may be a major factor in long range dispersal of *N. marina* in North America. Has a small, hitherto undetected population benefited from more conducive conditions (climatic, water quality?) and flourished to the extent that it is now noticed? It almost certainly wasn't an intentional introduction – the cynic in me says that it's been far too successful for that possibility.

Finally, for those who have been waiting for a mention of rare hybrid sedges, your wait is over. In August last year, Steve Woodward spotted an odd-looking sedge on the bank of a farm ditch in the parish of Burton & Dalby, Leicestershire. Steve keyed it to *Carex* × *haussknechii* (*Carex otrubae* × *C. spicata*), and the specimen was later confirmed as such by Mike Foley. This is only the second national record, the other being a specimen from a lane near Whitchurch, North Somerset, in 1925. An excellent find.

There were to be numerous field meetings taking place this spring and summer all over England, but with restrictions for the coronavirus pandemic likely to still be in force when this newsletter is published it would be wise to check information on websites before attending any meeting. Meetings are often advertised on the county pages of the BSBI website, but information about many of the more 'informal' meetings requires a bit more digging, and it's definitely worth getting in touch with your local Flora Group and/or VCR for a list of meeting dates and locations.

It is also worth mentioning that many counties produce wonderful newsletters, which I do try and mention from time to time. As an example, the Hampshire Flora Group newsletter (edited by John Norton) can be found here: *www.hantsplants.org.uk/floragroupnl.php* and contains a wealth of information. As usual, if you do spot a particularly notable plant on your travels in England this year, please do let me know.

Reference

Agami, M. & Waisel, Y. 1986. The role of mallard ducks (*Anas platyrhynchos*) in distribution

and germination of seeds of the submersed hydrophyte *Najas marina*. *Oecologia* 68: 473-475.

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WALES – CYMRU

The last few months of the 2020 Atlas season have seen many Wales vice-county recorders searching out datasets of plant records for inclusion in the Atlas. Of particular note are the records Glamorgan (v.c. 41) have obtained from SEWBREC (the record centre for South East Wales) and the digitisation of over 100,000 records on old recording cards from Arthur Chater by WWBIC (the West Wales record centre). This represented a huge commitment by WWBIC and we very much appreciate the time and effort involved. Radnorshire (v.c. 43) have also obtained records from BIS (the Mid Wales record centre) as well as interesting recordsets from local recorders. Meanwhile Flintshire (v.c. 51) has received a significant dataset from Cofnod (the North Wales centre) and Anglesey (v.c. 52) has received large datasets from Debbie Evans and John Barton. This has all contributed to a massive 588,000 records being added for Wales since January 2019! A huge thanks to everyone involved with this. Forty-three New Year Plant Hunts were held across Wales between 1st and 4th of January this year; the results reflecting the relatively warm and wet winter with a slight majority of late flowering plants seen. The Glamorgan Botany group found 78 species, making the top five of list lengths. Much further north, Martyn Stead and team found 38 flowering plants at Barsham near Wrexham, whilst the Monmouth (v.c. 35) team found 56 plants at Caerdeon and added Shaggy-soldier (*Galinsoga quadriradiata*) to the square. The Brecknock (v.c. 42) team carried out their hunt across two monads at Hirwaun – this was a challenge as much of the area is over 200m in altitude and so much colder than average. However, they found 19 species and celebrated with excellent local fish and chips!

Admiring the Purple Saxifrage on Cadair Idris with the students from Aberhike. *Barbara Brown*

Brecknock have also held five monthly informal training sessions over the winter. These have featured making herbaria, a visit to the herbarium at the National Museum of Wales in Cardiff and a focus on sedges, grasses and rushes.

The Wales Officer created a poster about the 2019 Wales recording effort and training for the Annual Exhibition Meeting in November and Robbie Blackhall-Miles produced a striking poster summarising the recording on Anglesey.

The Wales Officer has been working on a few Rare Plant Registers and has also arranged student visits to notable sites to see early spring flora. She has also given a talk on 19th-century Radnorshire Botany to a local history group. In mid February, the Aberystwyth University Conservation group visited Stanner Rocks to see the Radnor Lily (*Gagea bohemica*). Andy Shaw gave us an enthusiastic tour of the site and found a few late lily flowers. Thanks to Andy for his energy and time! A similar trip was made to see the Purple Saxifrage (*Saxifraga oppositifolia*) on Cadair Idris.

Owing to the coronavirus pandemic, the BSBI have cancelled all centrally organised events until at least the end of May and many local groups have followed suit. Please look at the website to see updated information on this.

The Wales Officer would like to take this opportunity to thank all the vice-county recorders, staff and members of the BSBI who have helped her in her role which ended on 31 March.

Finally, a correction from the last Wales roundup (*BSBI News* 143. p.50). For Caernarfonshire (v.c. 49) the record of *Calamagrostis stricta* (Narrow Small-Reed) should have read *Calamagrostis epigejos* (Wood Small-reed), which is very uncommon in the vice-county.

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SCOTLAND

Last year, botanists across Scotland (as elsewhere) made a final recording effort for Atlas 2020, with many interesting finds. Some of these were reported in this column during 2019, but a few more highlights are given below, mostly derived from the annual vice-county reports, which will be available in the spring 2020 Scottish Newsletter.

In Wigtownshire, the first record since 1882 for *Hammarbya paludosa* (Bog-orchid) was made at Loch Derry by Jim McCleary. In Lanarkshire the local botany group recorded more than 1,000 distinct taxa in 2019, a remarkable achievement. This included the first county record for *Ophrys apifera* (Bee Orchid) at Broomhall, east of Glasgow. Widespread elsewhere in Britain and Ireland, the apparent spread of this charismatic plant in Scotland since its discovery in Ayrshire in 2003 will no doubt feature in Atlas 2020. Another find for this species last summer, on the airfield at Machrihanish near Campbeltown, was the first record for Kintyre. This extended the known range significantly and brought the number of recent 1 km square records in Scotland to twelve.

Malcolm Ogilvie continued his monitoring of orchid populations on Islay, where a count of 224 flowering spikes of *Epipactis palustris* (Marsh Helleborine) at its main site was one of the highest counts in the last 30 years. On Coll, *Asplenium ceterach* (Rustyback Fern) was discovered on a cottage wall at Gortan, a first for this island. On Skye Stephen Bungard looked at the problem of *Agrimonia* species and found that all specimens he examined closely in fruit were *A. procera* (Fragrant Agrimony). This follows decades of confusion where the same populations have been recorded as both *A. eupatoria* and *A. procera* by different recorders. He concludes that vegetative characters currently used in keys are not reliable.

It is always a delight to find *Pinguicula lusitanica* (Pale Butterwort) in flower. In Caithness, Francis and Margaret Higgins discovered two new localities near Reay for this delicate oceanic species, which has not been seen in the county since 1956. Reay is now the easternmost known site in Scotland. They also turned up *Cyperus longus* (Galingale) in an old flooded quarry near Lybster. This is the first record for the north of Scotland, far beyond its native distribution in south-west Britain. It has been widely planted in ponds in England and occasionally further north.

Also in Caithness, in July I carried out a survey for SNH of the endemic *Calamagrostis scotica* (Scottish Small-reed) at its only known locality, Loch of Durran SSSI near Thurso (*see inside back cover*). The original loch was drained in the 19th century but the small-reed persisted and the site now comprises a large area of basin fen in the bed of the former loch. A survey in 2013 found 550 flowering culms across the SSSI, but in 2019 we found nearly 4,000 culms, including some in apparently new areas of the SSSI. This is encouraging news, although further work is needed to determine the most favourable management for this rare plant.

The status of *C. scotica* has been the subject of debate. A genetic study (Foley & Porter, 2006) indicated that it lies within the range of variation of *C. stricta* (Narrow Small-reed). The latest 2019 edition of Stace's *New Flora of the British Isles* still lists it as a separate species, while suggesting that it is perhaps a variety or an 'introgressed variant' of *C. stricta*. It reproduces vegetatively by rhizomes but is also capable of reproduction by seed.

Finally, Mike Wilcox managed to find two closely related species, both new for mid-Perthshire, on the same day: *Juncus gerardii* (Saltmarsh Rush) on a road verge near Killin and *J. compressus* (Round-fruited Rush) beside the A82 near Crianlarich. The first of these is common on the coast but rare inland in Scotland. *Juncus compressus* is very scarce in Scotland as a whole, with only a scattering of records, restricted to the south; this is now the most northerly record in recent times. One to look out for on verges elsewhere I suspect.

Reference

Foley, M.J.Y. & Porter, M.S. 2006. *Calamagrostis scotica* – A Red Data Book Plant. *Watsonia* 26: 51–55.

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IRELAND

Winter can be a quiet time for botanists, but we've been quite active in Ireland. On top of the enormous efforts by our fantastic county recorders to validate records for Atlas 2020, we've been busy with projects, planning and training.

First, Ireland was well-represented in the New Year Plant Hunt. 90 different plant lists from around Ireland were submitted during the four days of the hunt. The largest group reported was 20 botanists who gathered at Glengarriff Woods, West Cork for a hunt hosted by Clare Heardman on New Year's Day. They recorded a fantastic 51 species in flower! While that is impressive, Paul Green managed to top them with an incredible 85 flowering species at Taulaght, Wexford. Meanwhile the largest list from Northern Ireland was 42 species in flower in Newry, recorded by John and Gillian Faulkner.

While things may be slightly slower to bloom in the North, we made sure NI botanists had plenty to keep them busy. We kicked the year off with a series of training courses, thanks to funding from CEDaR. Following on from last year's Aquatic Plant Project, Nick Stewart came back for a week of work in the Ulster Museum Herbarium in February, where he worked through their collection of aquatic plant specimens and provided small group mentoring to a small number of experienced botanists and recorders. This was followed by an aquatic plant identification workshop at Lough Neagh Discovery Centre, Oxford Island Co. Armagh. While February might not seem like the ideal time to study aquatics, 16 people came along for an interesting and informative day, which provided excellent preparation for a summer of recording!

Ireland conifer workshop with Matt Parratt. *John Faulkner*

A less surprising topic of study for winter is conifers, which were covered in two days of identification workshops led by Matt Parratt at Castlewellan Forest Park, Co. Down in early March. 19 people came along, and with feedback using superlatives such as 'amazing', 'fantastic' and 'astonishing', it was clearly an exceptional experience which encouraged those involved to look more closely at this often-ignored group.

Training in 2020 isn't limited to the North, or to those who are already experienced recorders. We've teamed up with the National Biodiversity Data Centre to offer three beginner- and improver-focused sessions over the next few months: *Introduction to plant families* on 9 May in Roscommon, *Introduction to botanical keys* on 6 June in Galway and *Introduction to grass identification* on 13 June in Waterford. More details on all of these are available on the NBDC website (biodiversityireland.org). Clare Heardman and I are also planning to deliver an *Introduction to botanical recording* workshop at Glengarriff Woods, West Cork in August as part of the Ellen Hutchins Festival. Keep an eye out for details at bsbi.org/Ireland and check out the rest of the festival at ellenhutchins.com.

We have also been in planning mode, making sure there are plenty of options for getting involved with Irish botany in the post-Atlas period. We are working with former BSBI Ireland Officer Maria Long to develop an Irish Semi-natural Grasslands Project (#IrishGrasslandsProject). This should mean at least two workshops on vegetative identification of grasses this summer and work to help create an inventory of where good quality grassland sites exist across Ireland. We are also applying for funding to continue our work on aquatic plants. Of course, we also have a good schedule of field meetings and our local groups are as active as ever, so there will be lots of opportunities to get involved! You can keep up-to-date on all this and more by checking the BSBI Ireland webpage, following us on social media, or reading our occasional Irish members email newsletter – just contact me to sign up!

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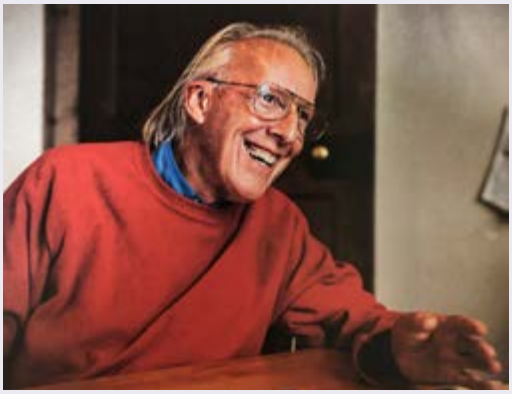
OBITUARIES

ROBERT EDWIN CHRISTOPHER (CHRIS) FERREIRA (1931–2019)



Tall, blonde, wearing a denim jacket and with a small shoulder bag, an athletic build and a hushed, yet excited voice, my first impressions were that this man was going to be different. I was working for the Nature Conservancy Council and my colleagues and I were meeting Chris Ferreira to survey peatland in what had become known as the 'Flow Country'. For my colleagues and I this was work. For Chris, that hushed excitement anticipated something more than work. I think that whenever plants were involved work was a privilege for Chris, even when he was elderly and liver problems were wearing him down. There was often that hushed excitement in his voice. An excitement when talking about his friends, both in the UK and South Africa, about commercial ships passing the coast of Caithness and of course about plants.

Dr Chris Ferreira, who has died aged 87, was uniquely skilled and versatile as a botanist and geologist and was also a philanthropist. Yet few beyond his immediate circle of friends and colleagues appreciated the impact and reach of his work. He was born on 30 August 1931 in the Lake District, where his parents, Edwin and Jessica (née Robinson), owned St Catherine's estate, north of Windermere. In 1987, after the death of his mother, Chris gifted the estate to the National Trust.

Chris went to school at Charterhouse and then studied botany at Exeter University. A year after taking his PhD in 1958 at the University of Aberdeen he produced one of the first papers on 'Scottish mountain vegetation in relation to geology' in the *Transactions of the Botanical Society of Edinburgh* (37: 229–250). This is a classic study of geobotany, for it describes the key importance of calcium availability and release in the soil as a significant determinant of the richness of plants in the uplands. As part of his doctoral research Chris explored the western outcrops of Ben Hope, the most northerly 'Munro' in Scotland. Despite a self-confessed fear of heights Chris relocated *Salix reticulata*, widely recognised today as being a calcicole, but in 1957 the study of geobotany was still in its infancy.

Chris's first professional post came in 1960, with the Nature Conservancy, as an upland botanist. In 1970 he produced the first detailed vegetation map of the Isle of Rum National Nature Reserve, a map which is still used today as a baseline for monitoring. Chris went on to develop expertise in the distribution of birch woodland and associated plant communities.

Whilst studying in the wilds of Scotland, Chris determined to devote much of his energy to support the developing nations in Africa. He worked initially

Photo of Chris Ferreira: *Alastair Burn-Murdoch*
Above: *Salix reticulata* on Ben Lawers. *Lorne Gill/SNH*

with VSO (Voluntary Service Overseas, to whom he left most of his estate) and eventually secured employment assisting with agricultural development, initially in Zambia. This sparked a love of Africa and its people, which developed into a life-long interest in supporting many emerging nations – especially children through formal education. Unfortunately, his time in Africa was cut short by liver problems and medical advice to leave the tropical environment. However, he maintained his interests and contacts with Africa and its political leaders and formed a close association and friendship with Nelson Mandela ('Madiba') and family and helped fund various enterprises. Chris was extremely modest about his work in Africa, yet he must have made a positive difference. Once when I asked about his work, he stood up and in that soft voice he produced both a letter and a watch presented to him by Madiba as a gift.

On recovering his health back in the UK and eager to use his botanical expertise and experience, Chris approached the Nature Conservancy Council's North West Regional HQ in Inverness, with the offer of carrying out botanical survey work. With his well-established reputation, this was gratefully accepted. There followed annual, piecemeal contracts for thirteen years, resulting in reports identifying individual sites in the NW Highlands with detailed botanical and ecological descriptions. Such was the rigour of this work that sites were readily evaluated for protection as national and international sites of conservation importance. That is how I first came to meet Chris. His maps and species records identified the core areas and were a focus of our conservation effort in the Flow Country.

Field work continued until 1990, with final reports, produced in 1995, giving rise to a remarkable treatise on the vegetation and soils which contained an exceptional body of work on geobotany – which to this day is quarried frequently for data and insight. Chris found many interesting species, sometimes in the company of friends such as Grant Roger, sometimes alone, miles from the nearest public road. Numerous county firsts over a fifty-year period include *Dactylorhiza fuchsii* subsp. *hebridensis* in East Cornwall, *Equisetum* × *trachyodon* in north-west Sutherland and, whilst in the company of his friend Alex Scott, *Linnaea borealis* unexpectedly growing in birch-dominated boulder scree in north-west Sutherland.

Shipping was a great passion and Chris always chose to live by the sea, whether in Falmouth, Caithness or Kyle of Lochalsh. He would expound enthusiastically on all aspects of commercial shipping, as well as his wider interests in politics, classical music and Scottish Country Dance bands.

Chris spent his last years in the Wick Care Home and remained mentally sharp. It was a shock that he suffered a heart attack and died on 2 August 2019, only four weeks before his 88th birthday. A pioneering geobotanist and generous philanthropist with a breadth and depth of knowledge across many areas, Chris is missed by friends and neighbours who knew him; yet many more would acknowledge their debt to him had they appreciated the depth and range of his work.

This obituary is based upon an earlier obituary published in *The Guardian* and written by Peter Tilbrook, Terry Keatinge, Stewart Angus and Alex Scott.

Iain Macdonald

OBITUARY NOTES

Since we compiled the last Obituary Notes, news has reached us of the death of the following members or former members. We send our sympathy to all their families and friends.

Dr James ('Jim') Adams of Cartmel, a BSBI member between 1980 and 2018 and formerly a very active member of the Flora of Cumbria Recording Group. In addition to his field recording,

Geoffrey Halliday described him in *A Flora of Cumbria* (1997) as 'a constant source of help dealing with the innumerable chores involved with the final editing and the preparation of the Index'. He was also a keen bryophyte recorder.

Dr G. Appleyard of Salisbury, a member for 16 years.

Mr A. Bamforth of Manchester, a member for 39 years.

Mr M.G. Bell of Newcastle upon Tyne, a member for 8 years.

Mrs Gigi Crompton of Swaffham Bulbeck, an honorary member of the BSBI (which she joined in 1956) and V.c. Recorder for Cambridgeshire between 1974 and 2001. An obituary by Kirsty Findlay is available on *The Guardian* website (17 February 2020) and we hope to include one in a future issue of *BSBI News*.

Mr P. Dahl of Oban, a member for 6 years.

Mr J.C.L. Phillips of Newtownards, a member for 39 years.

Mr N.A. Thompson of Middlesbrough, a member for 29 years.

Mr J.M. Westgate of Cheltenham, a member for 15 years.

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REVIEWS

Flora of Cambridgeshire
Alan Leslie
Royal Horticultural Society, Wisley, 2019; pp. 912, 88 illustrations, 12 maps; hbk, £70.00.
ISBN 9781907057991

As Newton wrote, 'we see farther by standing on the shoulders of giants.' This gigantic volume is supported by an impressive cast of giants; there are at least eight floras of the county to draw upon: Ray (1660), Martyn (1763), Relhan (1785), Babington (1860), Evans (1939), Perring et al. (1964), Crompton & Whitehouse (1983), Crompton (2001–2004).

Charles Raven, in the Foreword to Perring et al.'s Flora said 'To produce a new Flora of Cambridgeshire is to be responsible for accepting a great tradition and adding to what may well claim to be the most famous sequence of local taxonomic records in the world.' That tradition continues with this new Flora of one of the most intensively studied counties.

An attractive Cambridge blue cover and endpapers enclose 3.3 kg of scholarly text. Superb paintings by Isobel Bartholomew illustrate taxa that Leslie has found and described: X *Beruladium procurrens*, *Solanum* × *procurrens*, *Rubus cantabrigiensis* and *Ranunculus cantabrigiensis*. Illustrated introductory chapters cover the usual topography, geology, climate, etc. and a review of gains and losses of species provides context and discussion on drivers of change.

A generous chapter on the history of plant recorders is a roll call of some of Britain's most illustrious botanists. Many are shown with photographs (twice as many pictures of botanists as there are of plants!); this is a fascinating overview of Cambridge botany right up to the present day.

A section describing selected sites of botanical interest like the Devil's Ditch, Wicken and Chippenham Fens, Cherry Hinton chalk pits, Ouse washes and the urban flora of Cambridge will be particularly useful for visitors.

There is no coverage map, but by far the greatest effort has been on Cambridge itself. It feels as if there is no pavement weed, tree seedling, garden escape or temporary denizen of its walls that has escaped the scrutiny of the urban plant hunters.

The taxonomy used is already out-of-date. Species names follow Stace Ed. 3 (2010) – it was too late for the changes in Stace's 4th edition (2019) to be incorporated. Oddly, Leslie has chosen not to adopt the sequence and family names used by Stace (2010) but has stuck to the pre-APG (Cronquist) order of Stace Ed. 2 (1997). This mix of two different taxonomic approaches will not affect the user locating a species account by using the extensive index, but it is a rather uncomfortable 'hybrid' that could have been avoided.

The main body of 683 pages of species accounts is solid text. I was initially surprised by the lack of maps and plant illustrations that are the staple ingredients of most modern Floras. [Cartophiles will not have long to wait: Graham & Mountford's forthcoming Fenland Flora will cover at least the northern half of Cambs]. But Leslie has a lot more to say than most Floras. Even with common plants like *Arabidopsis thaliana*, where most Floras might get away with 'common everywhere', Leslie carefully lists the range of sites and shows through careful analysis of historical records how it has increased via the rail network and as an urban and garden weed.

There are even longer accounts of the native specialities (*Pulsatilla*, *Selinum*, etc.), but Leslie has interesting things to say about virtually every species; this explains the lack of maps and photos – there simply isn't room for them! The discussion of variation is outstanding. Leslie is able to draw on Peter Sell's studies for the *Flora of Great Britain and Ireland*, much of it focused on Cambs. He adds his own extensive knowledge of species like *Ranunculus auricomus* (his PhD subject) and 'difficult' groups like *Rubus* and *Hieracium*.

It includes many 'one-off' garden (and Botanic Garden) weeds, escapes, temporary seedlings and plants on walls, but this is not surprising in a city with many eagle-eyed botanists scouring the pavements. Leslie's horticultural expertise is evident in

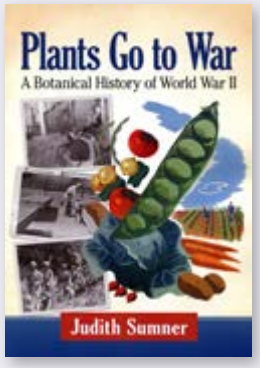
the way these are described and classified. It covers 2,330 species and hybrids, more than twice the number in Perring et al.'s Flora.

A useful bullet point at the end of each species account provides a brief comment on British distribution.

I struggled to find any typos; despite the length, it has obviously been very carefully edited and proof-read. The cover claims 'this work sets a new standard in county Floras'; this is certainly true in terms of the sheer volume of material presented in an accessible format. It will not win prizes for prettiness or attract many new recruits to botany, but Cambridgeshire botanists are serious scientists.

This is a book for serious botanists with strong arms and deep pockets. It is a masterful tour-de-force produced by a publisher with resources to give the author free rein.

Martin Sanford



Plants Go to War. A Botanical History of World War II
Judith Sumner
McFarland & Company, Jefferson, North Carolina, 2019; pp. vi +360, 101 illustrations; softback, £52.95.
ISBN 9781476676128

'An army marches on its stomach' is an aphorism attributed to various military leaders; to which can be added 'and much materiel', which in WW2, before much synthetic chemistry, greatly depended on the botanical world. In today's western world of plenty, consumerism and wanton waste, *Plants Go to War* is a reminder of how mankind still depends on the natural world – being only a harvest away from global starvation.

Sumner's book is an encyclopaedic synthesis of the role of botanical products in WW2, which could only have been written by a polymath. Topics include military, civilian and social history; botanical, agricultural, nutritional, chemical and medical sciences; horticulture; strategic planning, logistics; urgent research; through to history and military engineering.

This is the first botanical history of WW2, which will interest botanists, military historians and the general reader. Its twelve chapters range from 'Victory Gardens' (USA); 'Dig for Victory' (UK) to diet; food preservation; military cookery; military and civilian agriculture; medicinal plants; fibres; forestry, timber; oils, resins, rubber; survival and camouflage; to wartime botanical gardens, herbaria and plant science.

Written from an American perspective we get insights and comparisons into the use of plants in the USA, Great Britain, Japan, the Pacific, Germany, Europe and elsewhere. As the generation who experienced the war dwindle and fade, the memory of wartime hardships of rationing (surprisingly, even throughout the USA), severe austerity, evacuation, bombing, plus colossal death and destruction, is in danger of being lost.

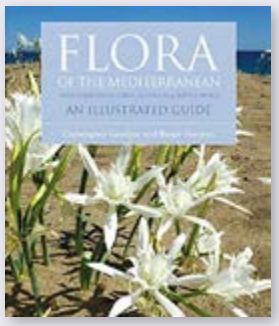
Sumner garners often obscure facts. Whilst it is well known that food was a weapon – Germany attempted to starve out Great Britain – who now knows that a British gardener could be fined for growing cucumbers because of their low nutritional value? Or that Japanese schoolgirls made 9,300 mulberry-paper balloons (each 19,000 cu ft), to fly 6,200 miles at 30,000 ft in 3 days to incendiary-bomb California – matched by the Women's Royal Naval Service who launched 99,000 natural rubber balloons at 1,000 a day from Felixstowe, to firebomb Germany? Many such well-referenced facts, often with explanations of related biochemistry, are presented, the obtaining of which can only have been gained by actually reading the 500-plus bibliographical entries which supplement chapter notes.

Chapters are self-contained, but reading cover to cover, some harder editing was required to eliminate some irritating repetitions; e.g. we are repeatedly informed that coal is remnants of Carboniferous Era plants (surely common knowledge?). Most curiously, tobacco, in constant demand by soldiers, is never mentioned. However, in such an encyclopaedic tome, only a couple of errors are apparent; firstly, a candle consumes oxygen rather than carbon dioxide (p.46); secondly, Sumner repeats the absurd modern myth that the German 1938/39 'Schaefer Expedition to Tibet' was organised by the SS and was searching for racially 'pure' plants and remnants of mystical Aryans

(pp. 159–160), with no reference. [Schaefer's Tibetan research is well known to the reviewer].

To conclude, *Plants Go to War* compares favourably with Dorothy Hartley's magnificent *Food in England* (1954) in both scope and detail.

Roger Croston



Flora of the Mediterranean with California, Chile, Australia & South Africa – An Illustrated Guide
Christopher Gardner and Başak Gardner
Bloomsbury Wildlife, London, 2019; pp. x + 422, over 800 illustrations and maps; hbk, £40.
ISBN 9781472970268

The European Mediterranean is a popular destination for many, whether they are in search of beaches and sun, or orchids, cyclamens, other bulbous plants and a wonderful array of colourful herbs and attractive shrubs. What many visitors may not realise is that its pleasant climate (relatively mild, wet winters with an average temperature above 0°C and below 18°C and dry, warm summer droughts) is not unique to the European Mediterranean basin but also occurs in coastal California, central Chile, western and southern Australia and the western Cape of South Africa.

This large-sized (and heavy) coffee-table volume illustrates with over 800 superb photographs and accompanying text some of the plants in the five areas with a Mediterranean climate. There are also excellent concise sections on climate, shared plants between areas, floral communities and adaptations, geophytes and annuals, pollination, importance of fire and human impact, invasive species and photographing plants in the field.

The European Mediterranean covers 60% of the total Mediterranean climate globally and it naturally receives greatest attention with 145 pages, followed by South Africa (69 pages), California (63), Chile (61) and Australia (53). The photographs are consistently outstanding and a very pleasing and balanced mix of landscapes, plants in landscape, plant portraits and plant close-ups. Many beautiful species are illustrated, probably for the first time, especially from California, Chile, South Africa and Australia. These include botanical 'gems' such as *Calochortus tiburonensis*, *Kopsiopis hookeri*, *Fritillaria pluriflora* and *Hesperoyucca whipplei* (all in California); *Puya chilensis*, *P. venusta*, *P. bertroniana*, *Aristolochia chilensis*, *Chloraea longipetala* and *Viola skottsbergiana* (Chile); *Caladenia chapmanii*, *C. longicauda* and *Verticordia huegelii* (Australia) and *Crassula coccinea*, *Serruria elongata*, *Disa atricapilla*, *Bartholina burmanniana*, *Orbea variegata* and *Geissorhiza darlingensis* (South Africa).

There is nothing comparable to this tour de force. The only book I know that discusses the same topic is the slender volume by Peter Dallman (1998) *Plant Life in the World's Mediterranean Climates*, which is more a textbook than a richly illustrated coffee table volume.

Christopher and Başak Gardner have produced a truly superb and unique book that any plant-lover interested in Mediterranean plants will enjoy, admire and treasure. It is a real masterpiece.

H. John B. Birks

British Forests: The Forestry Commission 1919–2019
Edited by Ian Gambles
Profile Editions, London, 2019; pp. 272, 8 colour plates, 15 black & white photographs, 5 maps; hbk, £25.00.
ISBN 9781788163132

Since 2014 we have commemorated the events of the First Word War, one hundred years after they took place. Now begin the centenaries of some of the War's more tangible consequences. In 2019 these have included the establishment in Britain of the Forestry Commission (FC), a state forestry organisation set up with the ultimate objective of establishing 'reserves of standing timber sufficient to meet the essential requirements of the nation over a limited period of three years in time of war or national emergency'.

British Forests is an account of the activities of the FC since 1919, 'written entirely by the past and present staff' and edited by its current Chief Executive Officer. The first section (96 pp.) outlines the story chronologically. In the second (102 pp.), five topics, silviculture, habitats (in effect, nature conservation), forest science, forest hazards (such as drought, wind, pests and diseases), commissioned artworks and 'urban forests' are treated thematically. These five topics have a similar allocation of pages, which is rather generous to the last two. In the final section (41 pp.), 52 of 'the nations' forests' are described briefly; these range in size from the 75,000 ha Galloway Forest Park to the 33 ha Flashdown Wood, Devon, where the FC's first trees were planted and which 'quietly weathers the decades, keeping safe the heart of the FC's legacy'. There is no bibliography.

In assessing this book it is important to realise what it is and (more importantly) what it is not. It is the story of the FC as its own staff perceive its history, from the heroic early years up to and beyond the dismemberment of the organisation on the altar of devolution. There is little point complaining that it is not an 'objective' account written by historians deeply versed in the primary sources. Better to read it for its intrinsic interest in revealing how foresters see themselves.

The first question that many botanists will ask is how the authors deal with the criticisms of the FC by environmentalists. The answer is revealing. The work of the two great woodland ecologists George Peterken and Oliver Rackham is praised and there is no doubt that the FC is now genuinely committed to maintaining the ancient woods and PAWS (Plantations on Ancient Woodland Sites) in their care. However, Derek Ratcliffe, perhaps the most radical and remorseless of the FC's environmental critics, is nowhere mentioned – presumably because his fundamental objections to afforesting the uplands cannot be assimilated into the FC's remit. The broader criticism of the aesthetic effects of blanket afforestation (which was vehemently expressed as early as the 1930s) is mentioned but downplayed. No-one would guess from these pages that the word 'conifer' conjures up in most British minds an image of dreariness and gloom, and that J.R.R. Tolkein suggested that it was unfair to compare the Commission to Sauron, the Dark Lord, only because it was possible that the Commission might repent of its sins. Also downplayed to the point of invisibility is any consideration of the economics of forestry – indeed the unease of authors in dealing with this question on those occasions when they have to touch upon it is almost palpable.

British Forests is well-written and readable, but the paucity of illustrations is disappointing. The 15 black & white photos illustrating the first section are excellent, but all show details of forestry operations – there are no landscape photos and no local or national maps to show the extent of planting or to summarise statistics from the National Forest Inventory. The second section has just eight colour drawings of trees at Bedgebury Pinetum; though very attractive, these are only marginally relevant (they include species which are not mentioned elsewhere in the book). Five maps show the locations of the forests described in the final section.

I think that those interested in forestry will enjoy reading this book. Others might like to wait in the hope that a history of the FC is eventually written by an environmental historian. Such a book would provide fascinating insights into changing environmental attitudes in the century since 1919.

C.D. Preston

The North Face Survey. Discovering the Hidden Side of Ben Nevis
Iona Skyring (ed.)
The Nevis Partnership, Fort William, 2019; pp. 60, with many illustrations; pbk, £12.00.
ISBN 9781527237094

A long-standing problem afflicting botanical works has often been the publication of seemingly 'new' findings without sufficient consultation with experts, or a lack of research into earlier literature. None of these common failings is apparent in *The North Face Survey*, the result of meticulous pre-planning and cooperation between numerous highly-skilled participants of a project supported by the Nevis Landscape Partnership.

The purpose of this survey was to explore the previously inaccessible upper north side of Ben Nevis which, at 1344m, is Britain's highest mountain. Since the first recorded ascent, in 1771, Ben Nevis has been regarded as botanically interesting; more recently it was designated as an SSSI and European Special Area of Conservation. This ambitious project has successfully recorded the rare plants in an area hitherto inaccessible.

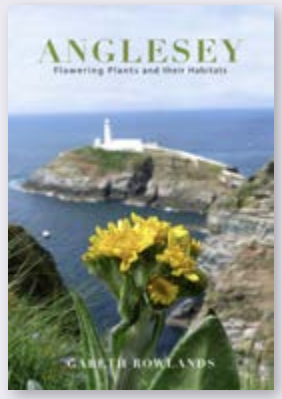
The northern face boasts Britain's highest cliffs and many near-vertical gullies; consequently, the area was unexplored botanically, until now. This project was only possible, therefore, by combining the skills of expert botanists with those of experienced mountaineers and geologists. The whole venture involved some forty participants from different disciplines: a truly commendable example of collaboration and skill-sharing.

Sixteen of Scotland's rare, or nationally scarce, arctic-alpine species were selected, then targeted in situ, to establish their distribution and abundance – it might have been useful to record other rare plants. The SSSI is rich in alpine hawkweeds, four being endangered or threatened, some of which occur around the north face. No hybrids are listed, yet a *Cerastium nigrescens* hybrid has been recorded and the very rare *Carex saxatilis* hybrid (*C.* × *grahamii*) is present nearby. The rare *Salix* × *sadleri* (*S. lanata* × *S. herbacea*) formerly occurred within the SSSI.

A remarkable new theory concerning the geological origins of the upper rocks is given, which in part explains the plant diversity there. The book is enlivened by vivid personal accounts, giving impressions of the hardships faced, and the text is accompanied by evocative photographs. The combined skills of botany, geology and mountaineering have proved fruitful, as proven by the numerous new botanical records given and the aforementioned geological discovery concerning the very origins of the Ben Nevis itself.

I strongly recommend the book to everyone, amateur or professional, who shares a love of mountains in all their diversity, be that for their botany, geology, scenery or, especially, conservation of the part of our native flora which is the most vulnerable to climate change.

David J. Tennant



Anglesey Flowering Plants and their Habitats
Gareth Rowlands
Self-published, 2018; pp. 128, c.150 illustrations; softback, £12.95.
ISBN 9781527225787

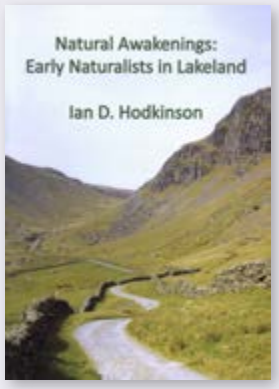
The convenient slim, attractive format of this booklet has wide appeal and its coastal focus should appeal to the increasing number of visitors who enjoy Anglesey's comprehensive Coast Path. It covers fundamentals of plant form and function, taxonomy and ecology before dealing with c.150 of the island's plant species, most of them with an accompanying, small but attractive image, those by local botanist Hugh Knott being particularly pleasing. Information on medicinal and culinary uses as well as relevant ecological notes accompany most species. The species are arranged in habitats with complementary ecological explanation. Almost 50% of the book is devoted to the coast and 20% to wetlands. Woodlands and grasslands are not considered. Calcifuge and calcicole plants are explained in a separate section. There are no identification keys or glossary. The selection of species is generally well considered but there are some puzzling omissions such as *Viola canina*, which is such a distinctive violet of the dunes, and *Centaurium erythraea*, despite its frequency in dune grasslands and other coastal habitats. There is a handful of typos, confusing use of the vernacular 'samphire' in the text on p.83 and the assertion that *Gentiana pneumonanthe* is a characteristic sand-dune species on Anglesey and host plant of the Alcon Blue butterfly, when in fact it is restricted to acid heathlands and predated by that butterfly only on the Continent.

In 2019 the author published *A Pocket Guide to Anglesey Coastal Flowering Plants*, a pocket-sized version of the 2018 booklet covering c.100 maritime species, but unfortunately some errors have been introduced. The images of *Limbarda* and *Crithmum* have been switched and *Potentilla erecta* is wrongly illustrated. *Scandix pecten-veneris*

is featured even though it has not been recorded on Anglesey since 1895 and additionally, the image is wrongly attributed. Recommendations for the best sites to see *Tephroseris integrifolia* subsp. *maritima* fail to direct the reader to the best and safest sites on Penrhyn Mawr, south of South Stack. And finally there is a misleading image on the front cover which depicts a fine coastal scene but certainly not on Anglesey.

Despite their shortcomings these little books are useful sources of information and embrace a conservation message throughout. They should inspire beginner botanists and the general nature lover to look more closely and with greater insight.

Nigel Brown



Natural Awakenings: Early Naturalists in Lakeland
Ian D. Hodkinson
Cumberland and Westmorland Antiquarian and Archaeological Society, Kendal, 2019; pp. xii + 249, c.30 illustrations; softback, £20.00 incl. p&p. ISBN 9781873124833

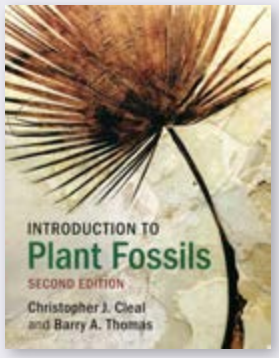
Before Coleridge and Wordsworth and the Romantic Age in English Literature, Lakeland was for the most part considered to be a remote and forbidding part of England, with the central mountains essentially a no-go area. To some extent this latter point emerges throughout the lives of the eleven naturalists covered by this book who, between them, lived from the early 17th to the early 19th centuries. However, Ian Hodkinson demonstrates that, even as early as the 17th century, the Lakeland naturalists were well connected with developments in botany and zoology in other parts of the country. Partly, but by no means entirely, this was the result of the Church of England placing 'a good man in every parish'. These clerics, largely trained in Cambridge or Oxford, brought with them their networks of contacts in other parts of the country. To some extent the Society of Friends played a similar role, but as the author demonstrates, essentially self-taught natural historians from relatively humble backgrounds also made significant contributions.

Eleven naturalists are covered, the earliest, Thomas Lawson was born in 1630 and the latest, John Gough in 1757. The book consists of introductory and concluding chapters interspersed with chapters devoted to each natural historian in the form of short biographies in chronological order. Most of these individuals will be little known to botanists today, the exception perhaps being Thomas Lawson who was the subject of a biography by E.J. Whittaker in 1981. The contribution of others, for example William Nicholson, are briefly recorded in Geoffrey Halliday's *Flora of Cumbria* (1997). Few today will know of the importance of contributions by Lawson and John Robinson, the subject of another chapter, in supplying plants and records to John Ray, the outstanding botanist of their age. Fewer still, perhaps will be familiar with the Kendal shoemaker, John Wilson, who published *A Synopsis of British Plants in Mr. Ray's Method* in 1744. Although most of the naturalists covered here lived in or near Lakeland for most of their lives, William Hudson, Kendal born apothecary, later became demonstrator in botany at the Chelsea Physic Garden. He was in contact with, and supplied plants to, Linnaeus. Hudson's *Flora Anglica* (1762) was the first attempt to use the Linnaean system of classification to describe the British flora. But perhaps the most remarkable of Hodkinson's subjects is John Gough, blinded by smallpox before he was three, but able to describe and identify plants by touch, often using his upper lip. He is possibly best known as John Dalton's tutor but, as well as his achievements in the physical sciences, he described seed banks in soils, experimented with plants and identified the process of hydroseral succession.

There is much more than just of botanical interest in these accounts. The text is extensively referenced. This is both a strength and a weakness. It allows the reader to follow up his or her particular interests, although not very easily in some cases. A weakness is that the extensive referencing in places reduces the readability of the accounts. There is also some limited repetition of information between chapters. This will not worry the reader interested in one of these naturalists in particular, or perhaps

just the botanical achievements of all of them, but might sometimes irk those wishing to read the book from cover to cover. Those readers not intimately acquainted with Lakeland might also find that they don't really need all the details of the naturalists' families and dwellings, but these will of course appeal to local historians. However, it is very hard for an author to write a book, as this is, to appeal to both historians and naturalists, as well as the general reader. Despite the minor criticisms above, I judge that Ian Hodkinson has made an excellent attempt at this and he should be congratulated in bringing the notable achievements of some remarkable men to our attention.

John Lee



Introduction to Plant Fossils (Second Edition)
Christopher J. Cleal & Barry A. Thomas
Cambridge University Press, Cambridge, 2019; pp. ix + 246, c.200 illustrations; pbk, £38.99.
ISBN 9781108705028

The study of plants can be conducted in 'real-time' (today and the very recent past of the last 50–100 years), 'Quaternary-time' (Q-time; the last 2.6 million years) and 'Deep-time' (greater than 2.6 million years). This book is almost entirely about plants in Deep-time. It covers two major aspects of Deep-time botany – how to sample, study and interpret plant fossils and the evolutionary history of plants and vegetation over the last 500 million years. It is written primarily for undergraduates reading palaeobotany or evolutionary botany but also for amateurs interested in studying and understanding fossil plants.

After whetting the reader's interest in palaeobotany by outlining some of the highlights in palaeobotanical studies and describing how to study plant fossils (all pre-Quaternary fossils), there are seven excellent and up-to-date chapters on the known evolutionary history of early land plants; Lycophytes; Sphenopsida (e.g. today's *Equisetum*); ferns; early gymnosperms; modern gymnosperms; and angiosperms. The book concludes with a brief chapter on the history of land vegetation where there is one page about the floristic and vegetational history in the Quaternary and the impact of ice-ages and of human impact on plants.

A strength of several of the chapters about different plant groups like modern gymnosperms is the figures summarising what is known about the stratigraphical range of the main orders within a major group. There are many illustrations (about 15–20 per chapter and eight pages of colour drawings) and each chapter concludes with about 20 references of recommended reading. To me, as a Quaternary botanist, the book's major omission is the absence of any discussion about Quaternary plant fossils and a more detailed account of plant responses to Quaternary ice-ages and of drivers of plant evolution.

I wish this book had been available when I was an undergraduate in 1963–66 when I was taught much Deep-time botany (as well as much Q-time and real-time botany)! Cleal & Thomas would have been an invaluable and very readable text in contrast to the rather dry and dull texts there were then available. I do wonder, however, if Deep-time palaeobotany is taught anywhere today in British universities: it is certainly not taught today in Norway.

It is inevitable to make comparisons with Kathy Willis and Jennifer McElwain's *The Evolution of Plants* (second edition, 2014, Oxford University Press) which approaches Deep-time and Q-time botany from evolutionary and ecological perspectives and explores not only the evolutionary patterns but also the causes of the observed changes. I would suggest to someone interested in the history and evolution of plants to read both books, starting with Cleal & Thomas that provides a very readable and well-illustrated introduction to Deep-time palaeobotany and then read Willis & McElwain about plant evolution in both Q-time and Deep-time. These two books capture the excitement and challenges of understanding the history of plant life on Planet Earth today.

H. John B. Birks

Above: Paul Gladding and BSBI President Lynne Farrell on the New Year Plant Hunt 2020 (*see p. 3*). *Ro Scott*
Below: Alister Clunas helping with survey of *Calamagrostis scotica* (Scottish Small-reed) at Loch of Durran, near Thurso (*see p. 73*). *Ian Strachan*