



BSS News

The Newsletter of the
Botanical Society of Scotland

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The Botanical Society of Scotland is a Scottish Charitable Incorporated Organisation (SCIO) (No. SC016283)

Front cover pictures

Outside *Sibbaldia procumbens* (Sibbaldia), Beinn Ghlas. Photo by Chris Jeffree

Inside

Top left: Looking for lichens at Dudhope Park. Photo by Brian Ballinger. See article on page 12.

Top right: Recording for the Urban Flora at Blairgowrie. Photo by Brian Ballinger. See article on page 11.

Centre left and right: Recording urban bryophytes at Perth. Photo by Brian Ballinger. See article on page 8.

Bottom left and right: Joint BSS Urban Flora/BSBI Atlas2020 meeting at Dingwall. Photo by Mary Dean. See article on page 14.

Author's clarification, BSS News 106, March 2016

Article on page 15: How variable are Scottish Bluebells? On page 16, the Figure 1 caption should read: Formation of a polyploid: here a diploid cell with 2 sets of 3 distinct chromosomes undergoes failed meiosis to produce diploid (instead of haploid) gametes, which fuse to produce a tetraploid zygote with 4 sets of 3 chromosomes. If a diploid gamete fused with a haploid gamete, a triploid zygote with 3 sets of 3 chromosomes would be produced. Julia Wilson

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Website: <http://www.botanical-society-scotland.org.uk>

You can follow the BSS on Facebook and Twitter via the website.

Founded in 1836 as the Botanical Society of Edinburgh, the Society became the Botanical Society of Scotland in 1991. Meetings are held in Edinburgh, Glasgow, Aberdeen, Dundee, St. Andrews and Inverness. The Society encourages the study of flowering and non-flowering plants. Activities of the Society include lectures, field meetings, symposia, surveys, and an annual exhibition meeting for the exchange of information on all aspects of Scottish botany. All botanical enthusiasts are welcome to be members of the Society, including gardeners, professional plant scientists, amateur field botanists and students. All members receive information about the events of the Society, including programmes of lectures and field meetings, as well as a twice-yearly newsletter, *BSS News*. Standard membership also includes the scientific journal: *Plant Ecology & Diversity*, published by Taylor & Francis on behalf of the Botanical Society of Scotland.

Applications for membership of the Botanical Society of Scotland should be made to the Hon. General Secretary at the address at the top of this page. Please ask for a Banker's Order form if required.

Subscriptions fall due on 1st October each year:

Standard rate (with the Journal <i>Plant Ecology and Diversity</i>)	£40.00
Standard rate for undergraduate students (with the journal)	£30.00
Basic rate (without the journal)	£20.00
Basic undergraduate student rate (without the journal)	£5.00

Subscriptions can be paid by cash, cheque (payable to the Botanical Society of Scotland), or Banker's Order. Alternatively, you can pay by PayPal via the BSS website membership page:

<http://www.botanical-society-scotland.org.uk/content/bss-membership>

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Botanical Society of Scotland

EDITORIAL

Thank you to everyone who sent articles for this edition of the Botanical Society newsletter. You will see several field meeting reports, which we hope will inspire you to take part. It would be especially helpful if members become involved in the Urban Flora project and contribute data (see the BSS Website for details).

Please note that, because of pressure on the lecture theatre and prior bookings, this year's lectures are not always in the same week each month, so please check the calendar carefully.

Wishing a warm welcome to new members who joined last year. We would especially like to hear from you, with suggestions for speakers, field meetings and to send articles for this newsletter (please use the template on the Botanical Society website: <http://www.botanical-society-scotland.org.uk/content/bss-news-newsletter-botanical-society-scotland>).

Congratulations to our BSS Journal Plant Ecology and Diversity, which has increased its impact factor and its position in the rank of ecology journals. Special thanks to the editor Lazslo Nagy and the international editorial team. This is a very competitive time with rapidly increasing numbers of journals to choose from for publication of your research. Please continue to support your society's journal.

Many congratulations also to Andrew Maclaren who gained a first degree from Edinburgh University with the help of the videos and website he created for the BSS's School Flora project – see his article on page 18. We wish Andrew all the best for the future and hope that he will have the time to add more videos to the website.

The Treasurer's report for 2015-16 and the minutes of the 2015-16 AGM will be included in the next edition of the BSS News prior to the next AGM in 2017. A summary of the president's report to the 2016 AGM is included in this issue on the following page.

Jill Thompson and Jane MacKintosh

PRESIDENT'S REPORT FOR 2015 - 16

We have had a successful year, consolidating our membership and adding 28 new members to take the total to 257. Most members, over 80 per cent, live in Scotland, and 40 per cent take our journal *Plant Ecology and Diversity*. We do have some overseas members, both in other EU countries and in the rest of the world. However, one-third of the total members have no known email address, a feature that makes communication quite difficult. If you have an email address, please consider sending it to our Secretary (email at the end of this report¹) to receive news and reminders about lectures and field excursions. On a brighter note, 117 of the UK members have gift-aided us. Many thanks for your generosity.

We had a particularly successful lecture programme, thanks to the efforts of Maria Chamberlain, and these were well attended. We made more use of social media to advertise events. The nine lectures included several 'star' speakers and were pitched to appeal to botanists of all persuasions. At the time of writing this, the 2016-17 programme is shaping up well: please don't hesitate to bring friends, neighbours and classmates along. You do not have to be a member to attend a lecture, but of course we encourage everyone to join the society.

Our field excursion programme had 11 main events, and there were several ad hoc additions. Some aimed to support the urban flora project, which made steady progress with several new vice county records. We have worked in collaboration with other societies and have held joint lectures with the Dundee Naturalists' Society and the Perthshire Society of Natural Science, Botanical Section (PSNS). There have also been joint field meetings with the Dundee Naturalists' and PSNS, contributing to the urban flora project. Locations have included Dundee Riverside Nature Park, Perth city centre, Dundee Western Cemetery and Dundee Stannergate. A joint display with the Dundee Naturalists' was held at the Dundee Food and Flower Festival. Was it my imagination or were there really more flowers this year? After a slow cold spring, Scotland was in bloom.

We also held workshops, and we would like to extend these further to include courses for teachers. We are still thinking about the best way to do that.

We began a schools' outreach programme with a Wildflower Watch for Edinburgh schools and some elementary plant identification for

Primary Schools, helped by the skill and enthusiasm of Andrew Maclaren, an undergraduate student at the University of Edinburgh. Andrew's videos can be seen here: <http://s1208685.wixsite.com/urbanfloraschools>. We also organized a flower photographic competition for older students.

Our international journal, *Plant Ecology and Diversity* has seen an increase in its Impact Factor from 1.77 to 2.35. It has also moved up in the rankings, and is now 54/209 in the Plant Sciences category (previously 76/204). This result is due to the hard work of our editor Laszlo Nagy, who these days works in a Brazilian university. Many thanks, Laszlo.

Finally, I would like to thank all the Board members who have worked so hard to ensure smooth running of the BSS, especially retiring members Richard Ennos and Derek Christie.

John Grace, August 2016

Please send your email address to the BSS Secretary at: 1membership.secretary@botanical-society-scotland.org.uk and keep in touch with activities via the Botanical Society of Scotland Web page.

MEMBERSHIP MATTERS

Subscriptions and Gift Aid

Thank you for your continued support of the BSS. Payment of annual membership subscriptions is due on 1st October for all members except those who have joined us since 30th April 2016.

If you already pay by Banker's Order, membership should renew automatically (but please check that you are paying at the correct rate). If you pay by Paypal, please renew your membership online at <http://www.botanical-society-scotland.org.uk/content/bss-membership>. If you prefer to pay by cheque, please make the cheque payable to the Botanical Society of Scotland. Banker's Order and cheque payment forms are enclosed with this News.

Membership rates remain unchanged, at £40 standard and £20 basic rate. Students pay reduced rates of £30 standard and £5 basic rate. All members receive the BSS News and copies of our lecture and field programmes. Standard members also receive hard copies of our

journal Plant Ecology & Diversity and can also access the online archives of previous volumes of Plant Ecology & Diversity (2008 – current), the Botanical Journal of Scotland (1991 – 2007) and Transactions of the Botanical Society of Edinburgh (1844 – 1990).

If you pay UK tax, it helps the BSS if you 'Gift Aid' your subscription. This enables us to reclaim 25p tax for each £1 of your subscription. If you have completed a gift aid form in the past, you do not need to do so again, but if you have never done so, please complete the one enclosed with this News, and send it to the Treasurer.

Some subscriptions are paid from Bank Accounts which do not match the names of any of our members. We have to play detective to work out who they are. If this applies to you, please inform the Treasurer.

Finally, if you decide not to renew your membership, please tell us. However, if we do not receive your subscription by Feb 1st 2017, your membership will lapse.

Your Contact Details

Please check that your postal and email addresses are up to date. An email address allows us to communicate quickly with you (e.g. to tell you about the next lecture, or a change in the lecture programme, an additional field meeting, or in connection with AGM elections). We NEVER pass these details on to others.

You can edit your membership details online, by logging into our website, otherwise please contact the membership secretary who will make the changes for you.

Julia Wilson – Membership Secretary
membership.secretary@botanical-society-scotland.org.uk

David Chamberlain – Treasurer
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BSBI / BSS SCOTTISH ANNUAL MEETING 2016

The 2016 BSBI / BSS Scottish Annual Meeting will be held on Saturday the 4th of November 2016 at the SNH Battleby Conference Centre, Perth. This is a lovely venue in beautiful Perthshire countryside, just off the A9 and with easy parking. It is also only a 5 mile taxi ride from Perth's bus and railway stations. Around the comfortable main auditorium, there is lots of circulation space that is ideally suited to displaying botanical exhibits and there are a number of small break-out rooms where we plan to hold a series of mini-workshops.

There will be the usual varied program of interesting short talks. Also, following on from Ken Thompson's excellent main talk on Aliens in the British Flora in 2015, we will have another great speaker, Professor Mick Crawley, to give a very different talk on the same subject. Put the date in your diary now!

Jim McIntosh
Jim McIntosh@bsbi.org

FIELD REPORT - PERTH URBAN HABITATS AROUND THE RIVER TAY

BSS/PSNS Saturday, 19th March

Within the first minute of Brian Ballinger and I meeting David Chamberlain at Perth Bus Station, David identified our first moss: *Syntrichia ruralis* (Great Hairy Screw-moss), which had tumbled out of a gutter onto the pavement below. David had arrived from Edinburgh to identify bryophytes for us as part of the BSS Urban Flora of Scotland project.

Thirteen of us gathered in the South Inch Car Park, where we soon got to work on a fine sunny day. In a neglected bed we saw a spreading mat of *Funaria hygrometrica* (Common Cord-moss) with a mass of capsules and compact tufts of silvery shoots of the aptly named *Bryum argenteum* (Silver-moss).

Venturing a little further we found *Syntrichia ruralis* in a situation similar to the bus station. Perhaps they had been turned out by blackbirds or members of the crow family in search of food or lining for

nests. Bare soil, grass and the base of a tree at the edge of the car park provided a number of common acrocarps and pleurocarps.

The cope of the wall leading to the railway bridge at the River Tay provided a number of interesting colonisers on the damper section. This provided three species of *Orthotrichum* and two species of *Didymodon*; *O. cupulatum* (Hooded Bristle-moss), *O. anomalum* (Anomalous Bristle-moss), *O. affine* (Wood Bristle-moss), *D. insulanus* (Cylindric Beard-moss) and *D. tophaceus* (Olive Beard-moss). *O. anomalum* was easier to separate from its relatives by the longer setae, which hold the capsules clear of the leaves. David said that it is found on the mortar of walls and not on acid rock.

Also present on the wall were *Schistidium crassipilum* (Thickpoint Grimmia) and the common, but beautiful golden locks of *Homalothecium sericeum* (Silky Wall Feather-moss).

We ventured behind the wall and on to a viewing area and then down to a sandy bank carpeted by bryophytes. David was very impressed by this habitat and we found a number of unusual species. Shoots of *Climacium dendroides* (Tree-moss) punctuated the wet sand above the water, and in the damp sand above were: *Homalia trichomanoides* (Blunt Feather-moss), *Rhizomnium punctatum* (Dotted Thyme-moss), mats of *Plagiomnium elatum* (Tall Thyme-moss), *P. rostratum* (Long-beaked Thyme-moss), *Thamnobryum alopecurum* (Fox-tail Feather-moss), *Oxyrrhynchium hians* (Swartz's Feather-moss) and the liverworts *Chiloscyphus polyanthus* (St. Winifrid's Moss), *Lunularia cruciata* (Crescent-cup Liverwort) and *Pellia endiviifolia* (Endive Pellia). Growing in the shallows were *Brachythecium rivulare* (River Feather-moss), *Cinclidotus fontinaloides* (Smaller Lattice-moss) *Fontinalis antipyretica* (Greater Water-moss) and *Dichodontium pellucidum* (Transparent Fork-moss).

Orthotrichum rivulare (River Bristle-moss) was abundant on the bole and main branches of a tree at the edge of the river and *Anomodon viticulosus* (Rambling Tail-moss) was growing on the river side of the wall, which is part of Perth's flood defence.

We headed a little further along to a slipway that provides access for craft to the river. We were looking at bryophytes on a damp wall and in wet sand when our activity attracted the attention of a watchful lady. She was in a party that was waiting for the river level to rise with the tide and offered to remove moss from the bridge piers for our identification

with their jet-ski. Our activity attracted friendly attention throughout the day and we politely declined this kind offer.

Growing among the cobbles of the slipway was *Pseudocrossidium hornschuchianum* (Hornschuch's Beard-moss) a somewhat daunting pronunciation for the student of bryology.

On entering Greyfriars' Cemetery we saw *Marchantia polymorpha* subsp. *ruderalis* (Common Liverwort) at the base of a wall. The female receptacles, which had borne the sporophylls, had withered and their remains were like the spokes of tiny umbrellas sticking out above the broad, thallose mats of the plants. On separate plants, the male receptacles were starting to mature, which were like little green studs on stalks.

The bryophyte cover was generally poor with commoner species we had already seen, such as *Bryum dichotomum* (Bicoloured Bryum) in the soil, but we added a few more species to our list; *Bryum sardoa* (Bird's-claw Beard-moss), *Didymodon rigidulus* (Rigid Beard-moss), *Plagiomnium undulatum* (Hart's-tongue Thyme-moss) and *Lophocolea bidentata* (Bifid Crestwort).

Our next stop was Moncreiffe Island and we added more to our list, the most interesting being tree epiphytes, either on branches over the water or on roots or the base of trees at water-level. Additions were; *Leskea polycarpa* (Many-fruited Leskea), *Schistidium rivulare* (River Grimmia), *Metzgeria violacea* (Bluish Veilwort), *Cirriphyllum piliferum* (Hair-pointed Feather-moss), *Orthotrichum pulchellum* (Elegant Bristle-moss) and *Ulota crispa* (Crisped Pincushion).

Our exploration of the island was broken by lunch, which was preceded by the most widely animated discussion of the day; not on identification, but where to sit and have lunch, and so our party broke in diverging ambulatory exploration for repose and repast.

We completed our exploration on the east bank of the Tay, which proved to be as interesting as the west bank. Added to our list were the following; *Scapania undulata* (Water Earwort), *Platyhypnidium riparioides* (Long-beaked Water Feather-moss), the more thread like *Thamnobryum alopecurum* (Fox-tail Feather-moss) growing next to the already seen *Isothecium alopecuroides* (Larger Mouse-tail Moss), *Fissidens taxifolius* (Common Pocket-moss), *F. bryoides* (Lesser Pocket-moss) and *Orthotrichum lyellii* (Lyell's Bristle-moss) covered in gemmae.

The fine shoots of *Eurhynchium pumilum* were spotted growing over damp, fine calcareous soil under trees. On a sycamore by the river were two uncommon species; *Orthotrichum tenellum* (Slender Bristle-moss) and *Syntrichia papillosa* (Marble Screw-moss) with gemmae on the midline of the leaves below revolute margins, the nerve of the leaf excurrent as a straightish tip. The find of the day, *Myrinia pulvinata* (Flood-moss), was discovered on the silted bole of an adjacent tree, a species that was recorded 55 years ago, 1 mile South of Perth on the East Perthshire bank of the River Tay. This record is thus useful confirmation that the species is still present.

We could not have asked for a better day and our knowledge of bryophytes and habitats was enhanced considerably by David's expertise. For the Urban Flora project, the silt-laden margins of Perth's River Tay have considerable value.

Alistair Godfrey & David Chamberlain

REPORT OF AN URBAN FLORA FIELD MEETING: BLAIRGOWRIE, 15th JUNE 2016

**Joint with the Botanical Section of the Perthshire Society of
Natural Science (PSNS)**

Ten of us assembled in the car park on a very rainy and somewhat 'muggy' day. The aniseed smell of *Myrrhis odorata* hung rather heavily in the air as we walked down to parkland on the south side of the Ericht, just upstream from the main bridge that carries the A93, and in clear sight of the weir. This section of the river provided water-power for the 'lint mills' of the 19th century but we had little time to delve into the industrial archaeology on this occasion. We set about botanizing straight away. We rattled through about 20 very common species before noting the less common Common Fiddleneck *Amsinkia micrantha* in full flower and the Common Blue Sow Thistle *Cicerbita macrophylla*.

We walked upstream on the footpath, riparian vegetation to our right, mixed woodland to our left. On the river bank we found Globeflower, *Trollius europaeus* and we pondered over several grass species including *Festuca gigantea*. Our attention was caught by the bright leaves of *Lamium galeobdolon* ssp. *argentatum*, a garden escape first recorded in the wild in 1974, and now increasing rapidly.

Further on we entered the woodland, finding a pretty patch of *Claytonia perfoliata* as well as a good representation of woodland flora. We crossed the river at the derelict Oakbank Mill and began to explore the opposite bank, but not before eating our lunch in the pouring rain, sitting on rocks by the side of the river. After lunch we were treated to the sight of the majestic *Lilium martagon*, about 20 individuals. We could see none of this lily in the garden of the nearby big house, and the nearest record is Dunkeld. Some people say the bulbs are spread by jays. We also recorded a good colony of *Doronicum pardalianches*, growing nearby.

We made our way back towards town, coming across a miserable specimen of Northern Marsh Orchid, *Dactylorhiza purpurella* looking distinctly uncomfortable on a piece of mown grass. The walls and pavements along Riverside Road carried rather little of interest, but we did see Rustyback fern *Ceterach officinale*, clinging to the limey mortar. It has rarely been recorded this far north.

The survey produced 171 records of 139 species. It was an enjoyable day's work.

Thanks are due to the expertise of members of the Perthshire Society of Natural Science (PSNS) and to Perth & Kinross Council for their recent good work on the riverside path, washed away three years ago and now safely restored.

Professor John Grace

DUDHOPE PARK, DUNDEE, 10th MAY 2016
DUNDEE NATURALISTS' SOCIETY AND BOTANICAL
SOCIETY OF SCOTLAND
Led by Richard Brinklow and Brian Ballinger

This was a joint outing between the Dundee Naturalists' Society (DNS) and the Botanical Society of Scotland (BSS) to Dudhope Park near the centre of Dundee. The meeting was intended to contribute to the BSS Urban Flora project, and also to survey the wildlife of the park.

DNS member Richard Brinklow, the Curator of the British Lichen Society, led us along a line of trees in the park, demonstrating the nature of the urban lichen flora. Lichens in cities have made a considerable comeback with the improvement of the air quality, although

they still are sometimes less vigorous in their growth than rural specimens

We saw a selection of foliose, fruticose and crustose lichen species typically found on trees in this habitat. Twenty-four species were noted in all, including *Usnea subfloridana*, *Evernia prunastri*, *Parmelia sulcata*, *Hypogymnia physoides* and *Xanthoria parietina*.

On the damper northern aspects of some trees, algal *Pleurococcus* species predominated.

Other members of the party, including Jim Cook, noted the vascular plants. *Veronica filiformis* (slender speedwell) was remarkably common in the grassy areas and we were surprised to find a *Ranunculus bulbosus* (bulbous buttercup) plant.

Anne Reid and Barry Caudwell set off on a finally successful hunt for two small ladybirds seen earlier in the day, one being a 2-spot and the other causing identification problems with the invader, harlequin ladybird, being suspected. All heaved a sigh of relief when careful examination revealed one of the forms of the native 10-spot ladybird.

Bird life was consistent with a tidy town park with only ten species recorded, including woodpigeon and herring gull. The most interesting sightings were of a great spotted woodpecker and a female blackbird with a beak-full of large worms destined for well-grown nestlings.

The weather was fine and warm all evening and this proved to be a very successful outing.

Brian Ballinger

BROUGHTY FERRY, DUNDEE, JUNE 14th

Led by Brian Ballinger and Lorna Ward

This was a joint meeting of the Dundee Naturalists' Society and the Botanical Society of Scotland (BSS). The outing was part of the BSS Urban Flora of Scotland project but we also set out to look for other urban wildlife.

Ten dedicated members gathered on the front at Broughty Ferry on a very damp evening. Wellies and waterproof notebooks were the order of the day.

We walked slowly through the Shiel Street local reserve from west to east. The trees echoed with birdsong and there were also noisy interruptions from the adjacent railway line.

The flowers were at their best and there was a good display of Meadow Saxifrage (*Saxifraga granulata*). The dune origin of the grassland here was demonstrated by the presence of Sand Sedge (*Carex arenaria*), and Restharrow (*Ononis repens*) was also present.

The small pond was full of tadpoles, which were still rather small given the time of year.

At the east end of the reserve we walked through the rock garden, looking at the plants that were invading the nearby railway line.

Further on we entered another tetrad (2x2km square for plant recording purposes) and proceeded down to the shore. Plants here included Fiddleneck (*Amsinckia micrantha*), although the shore defences have not helped biodiversity at the present time.

In all we made 95 botanical records. Meantime other members of the group had noted a rather surprising 20 bird species (considering the weather) including singing blackcap, chiffchaff and song thrush and a number of noisy, juvenile great tits. Out towards the shore we also saw a pied wagtail and a pair of linnets.

Given the weather, no butterflies were seen, but several silver-ground carpet moths were present. The raspberry (*Rubus idaeus*) flowers also proved irresistible to a surprising number of bumblebees with mostly common carder at one patch and some white-tailed workers elsewhere.

Brian Ballinger

THE MILEY SWT RESERVE DUNDEE 17th JULY 2016

BSS AND SWT (ANGUS AND DUNDEE)

We planned this joint meeting to contribute to the Botanical Society of Scotland's Urban Flora Project and our knowledge of the reserve, as well as providing records for the Botanical Society of the British Isles atlas.

The Miley is a section of disused railway line in a cutting in the heart of Dundee, and as its name suggests, is about a mile long. It was

adopted by the Scottish Wildlife Trust's Dundee Group, after the closure of the line.

We walked slowly along the path from the south and made plant lists for the two tetrads (2x2km squares) crossed by the reserve. Seventy-six species were recorded in the first tetrad and 61 in the second.

Many of the species seen were native, including *Galium odoratum* (Woodruff), *Stachys sylvatica* (Hedge Woundwort) and *Centaurea scabiosa* {Greater Knapweed}. There were also various alien or neophyte species, presumably of garden origin, either self-seeded or thrown out.

Several *Campanulas* were seen, including *Campanula poscharskyana* (Trailing Bellflower) growing on a wall and, more unusually, *Campanula trachelium* (Nettle-leaved Bellflower) and *Campanula persicifolia* (Peach-leaved Bellflower). A *Hebe* species was just coming into flower by the gate. There was a solitary patch of *Carex pendula* (Pendulous Sedge) and the rather unusual *Lonicera nitida* (Wilson's Honeysuckle) was by the path. At the far north end of the railway cutting there were some patches of *Symphytum x uplandicum* (Russian comfrey).

The weather was kind to us for this Sunday afternoon meeting and the rain held off until we were on our way back to the cars.

Brian Ballinger

BSS/BSBI FIELD MEETING - URBAN FLORA OF DINGWALL

Dingwall is the largest town in East Ross (VC106), so it seemed to be the obvious choice for a field meeting devoted to urban flora in this area. This outing was intended to provide information for the Botanical Society of Scotland's Urban Flora Project and the Botanical Society of Britain and Ireland's Atlas 2020.

The group met at a car park, which unfortunately had recently suffered from a dose of weed killer, so we quickly moved on to the Silver Jubilee Wood, a strip of land between two parts of a housing estate. This proved quite fruitful, with 3 species of orchid, *Dactylorhiza fuchsii*

(Common Spotted-orchid), *Neottia nidus-avis* (Bird's-nest Orchid) and *Neottia ovata* (Common Twayblade). Other plants found included *Carex sylvatica* (Wood Sedge), *Elymus caninus* (Bearded Couch), *Veronica beccabunga* (Brooklime) and *Geum macrophyllum* (Large-leaved Avens). There were new vice-county records for the fungus *Pucciniastratum circaeae* growing on *Circaea lutetiana* (Enchanter's Nightshade) and *Ascochyta plantaginis* on *Plantago major* (Greater Plantain).

A walk south led us to the park by the River Peffery, where we had lunch and noted a remarkable quantity of *Crassula tillaea* (Mossy Stonecrop) in the gravel.

Following the River Peffery towards the old harbour we came to a patch of waste land, where there was a fine show of *Dactylorhiza purpurella* (Northern Marsh-orchid) as well as the sedges *Carex leporina* (Oval Sedge) and *Carex vesicaria* (Bladder Sedge).

At the point beyond the harbour, we found the two species of Eelgrass, *Zostera noltei* and *Zostera marina*, although most of the group did not venture far out from the shore on the soft mud. A range of shore plants was present including abundant *Bolboschoenus maritimus* (Sea Club-rush).

In all 114 vascular plant species were recorded in one tetrad and 14 more in a brief foray into an adjacent tetrad. Also 44 species of fungus were identified by Bruce Ing.

Brian Ballinger and Mary Dean

MUSINGS ON URBAN FLORA OUTINGS, 2016

The urban environment does not gain the attention that it deserves, maybe because of a pejorative view of what is after all largely man-made. Yet, the impact on the majority of us is immediate. So what do the cities of Scotland have to offer? As a resident of Edinburgh I accept that I am lucky to have a wide selection of open green spaces within the bounds of the city that support an incredibly diverse range of biodiversity, and of habitats. However, even the less green, more derelict areas have a lot to offer; these are common to all the cities of Scotland. The challenge for the Urban Flora Project that is being undertaken by the Botanical Society of Scotland is to tease out what is

special to each of our cities, as much as to find out what is shared across Scotland.

I do not apologise for presenting a very personal view of what I have gained from the Urban Flora project excursions that I have attended, yet I realise that there is a social angle to sharing the thrill of the hunt with a bunch of like-minded, often dedicated, city dwellers. The trigger for my musings has been two recent excursions along the cycle tracks in North and West Edinburgh, areas that may/should become Local Biodiversity Sites. These are well-wooded ribbons running through the city that are, for much of their lengths, no more than one hundred metres wide. It is difficult to discern what may have been planted, what has strayed in from adjacent gardens, what has been dumped and what are native plants taking advantage of human disturbance. Thus, a spectacular *Philadelphus* c.f. *inodorus*, and a floriferous *Fuchsia magellanica*, on the Pilton to Newhaven stretch of the cycle-way are most probably deliberate introductions. A *Heuchera*, with dark purple leaves had possibly taken root after being dumped. *Nigella* c.f. *damascena*, on the other hand, seen at the Dalry end of the Craighleith to Dalry stretch, could possibly have been a chance seedling in soil brought in to build up a ramp leading to the cycle-way. *Campanula trachelium* featured on both sites, clearly naturalised and possibly introduced when the cycle-ways supported railway tracks.

I am on safer ground with my specialist interest, bryophytes, but there are still questions to answer. These urban sites are not rich, and do not feature highly on a bryologist's radar. One can be fairly certain that the few that do occur have not been deliberately introduced. Scrambling up a cutting on the Pilton to Newhaven cycle-way, a population of *Hennediella macrophylla* was spotted on damp earth below a wall. I admit that it is not by any means a showy moss, but it turned out to be the first record of this species for the Lothians. *Hennediella macrophylla* otherwise occurs in the Borders along the River Tweed and again, associated with streams and rivers, in Banffshire and Aberdeenshire, where the vector that brought it is most likely fishermen's boots. So, how did it find its way onto a railway embankment in Edinburgh? The mystery deepens as it is closely related to *H. stanfordensis*, a species that is only known in Scotland from muddy tracks along the Water of Leith in Edinburgh and one site in East Lothian. In Edinburgh at least, footwear may well also be to blame. It is

open to conjecture just how distinct these two species are, but a recent monograph on the genus maintains them as distinct.

Another discovery this year, on a bryophyte excursion to Perth in March was *Myrinia pulvinata*, very close to an historic record. The significance of this sighting is that this species had not been reported in Scotland for around 40 years, and an entry in the recent Bryophyte Atlas suggested its apparent general decline in northern Britain was due to recent under-recording. *Myrinia* occurs naturally on silt-laden tree trunks in the zone of river flooding, a habitat that is rare in Scotland, but is a feature along the River Tay at Perth.

While these urban sites are unashamedly man-made, they share good tree cover that provides a serene semi-natural feel. Our brown-field sites are altogether more uncompromising, but no less interesting botanically. Two of our excursions have visited waste ground in Granton and the shore at Bo'ness. *Senecio inaequidens*, a striking adventive that I was not previously aware of, was a find at both sites (see photo on inside back page).

The Urban Flora project provides the impetus to search ground that at first looks unpromising. The impact of casual ruderals is clearly seen on brown-field sites and exploration of apparently natural habitats within the urban environment can offer rich pickings that could be easy to miss. Our cities should be more aware of the biodiversity that is available within their bounds. It is heartening that initiatives are bringing together natural history societies to highlight habitats and species that might easily be overlooked.

David Chamberlain, BSS Treasurer
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THE UK LAKES PORTAL – A NEW ONLINE PLATFORM FOR CITIZEN SCIENCE RECORDING OF FRESHWATER ALGAE AND PLANTS

The UK Lakes Portal (<https://eip.ceh.ac.uk/apps/lakes/>) is a new online gateway for discovering the lakes of the United Kingdom, linking biological (including algae, plants and animals) and chemical and hydrological data from many institutions into one central hub hosted by the Centre for Ecology & Hydrology.

The underlying database about UK standing waters has been in continual development since 2004, and includes chemical, environmental, physical and typographic data from an extensive set of sources. The portal provides a national inventory of standing waters in the UK, their ecology and surrounding environment. In addition, the portal has been developed to integrate with data from the National Biodiversity Network (<https://nbn.org.uk/>) creating an innovative platform for freshwater science recording and knowledge exchange, with each UK lake having a dedicated page with integrated biodiversity data.

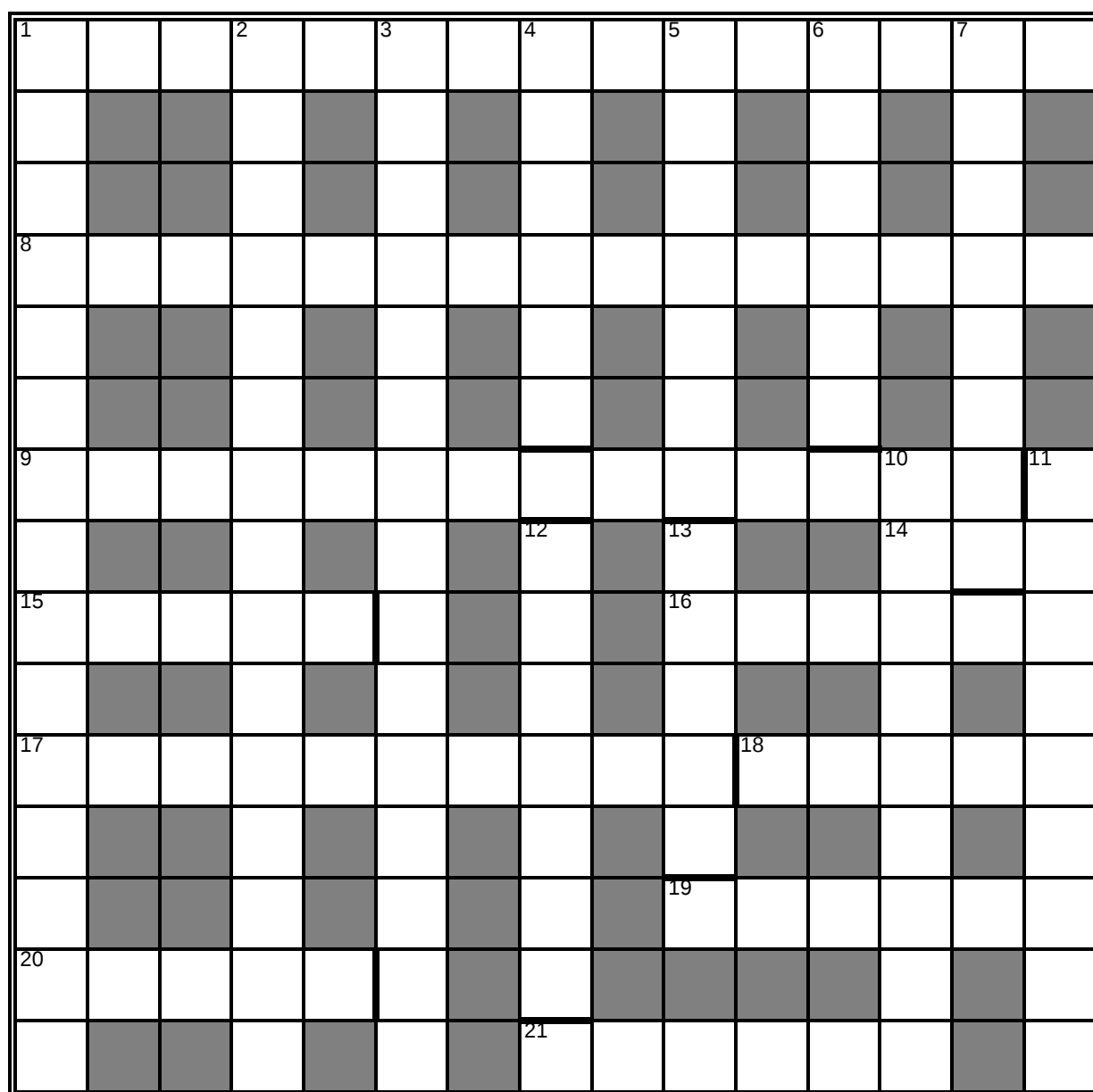
A new classification of freshwater species (including algae and plants) has been developed to filter the data. This allows members of the public to record new species observations, including the reporting of non-native species, at any site using the iRecord system developed by the Biological Records Centre (<http://www.brc.ac.uk/>). Freshwater biodiversity recording events, such as 'Bio Blitzes', organised with identification experts and interested members of the public, are being encouraged via the portal, to document the species present in and around lakes.

We hope that this new online platform will help generate new data on lake biological communities (which are often poorly represented in species records from citizen science projects) to support freshwater research into questions such as how well-connected biodiversity is across UK lakes and how fast invasive species are spreading across UK fresh waters. To conclude, the UK Lakes Portal is a fantastic new resource for both scientists and local citizen scientists interested in finding out more about their local lakes and the biodiversity within them, as well as, hopefully, increasing the appreciation of the value of our lakes. This vast dataset, with more than 40,000 lakes represented (including a third with detailed information on their catchments), is now freely-accessible via this newly-developed online portal.

Iain Gunn, Phil Taylor and Laurence Carvalho
Centre for Ecology & Hydrology, Edinburgh

PHYTOLEXICON CRUCIFORMIS B.S.SCOT EX WORD

XWord 15. The solutions to clues are mostly botanical names of families, genera or species and including some cryptogams. There are also words from botanical glossaries and some non-botanical English words, marked (English). Two-letter chemical elements are given as clues where they happen to occur. Solutions do not enter grey squares or cross thick lines. Further guidance is to be found at <http://www.botanical-society-scotland.org.uk/xwordhelp>



Across

- 1 Floor came in mile, bearing major group of monocots. (15)
- 8 Tree sits spun silvery in Caledonian forest (Pinaceae). (5,10)
- 9 Your ace cheats a family synonym (sorry!) for that part of Lycopodiaceae now included in *Huperzia*. (14)
- 14 Golf score achieved by *Cytisus scoparius*. (3)
- 15 Kate Moss possibly swallowed my Bru, but delivered a genus of 235spp. worldwide (15 in BI) that is the type of its family. Most have long capsules that are pendulous at the end of long, erect stalks. The leaves usually have a midrib and often end in a point (aristate). (5)
- 16 See d7
- 17 Disperse aria to trim moss Jungermanniales. Dioecious 'Notchwort' liverworts. Its leaves typically have 3 lobes. 4 quite common spp. in BI (Jungermanniales). (10)
- 18 If rut is decoded, ovary ripens. (5)
- 19 If goal is arranged we get. (6)
- 20 Tree emerges when I annul music. (5)
- 21 See 6d

Down

- 1 Fish in America? I wager you lose, it sounds a bit like it (Betulaceae). (8,7)
- 2 In *Taraxacum arosulum* I'm keeping back another genus; August TT completes the species (Scrophulariaceae). (7,8)
- 3 An asp allegedly hides nipplewort, so cumin (messier perhaps) supplies epithet (Asteraceae) (7,8)
- 4 and 10d. A snail, apiculate, hides ball mustard (Brassicaceae) (6,9)
- 5 and 5d. Sounds like it might liberate a hybrid from your garden (Iridaceae). (7,7)
- 6 and 21a "This tree might easily perplex/The botanist. It changes sex." It also changes unsaintly teenager's coat (Lauaceae) (6,6)
- 7 and 16a. Achilles, in Alps with Automobile Association, evaded SS and found mountain yarrow (Asteraceae). (8,6)
- 10 See d4.
- 11 A secondary bract. Olé! (Spanish registration). (9)
- 12 See d5.
- 13 A Dane, perhaps in Ruscaceae. (5)

NATIONAL MEADOWS DAY

National Meadows Day takes place throughout the UK every year on the first Saturday of July. It is a chance to visit meadows at their peak, to celebrate them, have fun and raise awareness of this forgotten habitat.

National Meadows Day was celebrated in Scotland this year at Weem Meadow, near Aberfeldy. Weem Meadow is a Site of Special Scientific Interest, and is one of the most species-rich meadows in Scotland. A huge number of flowering plants have been recorded in this 1 ha patch of grassland beside the river Tay, which has never been fertilised and is still managed by a traditional hay cut in late summer.

Scottish Natural Heritage organised guided walks throughout the day and a chance to learn about and identify the plants in the meadow. The meadow was at it's best, with abundant common spotted and northern marsh orchids (*Dactylorhiza fuchsia* and *D. purpurella*) as well as greater butterfly orchids (*Platanthera chlorantha* and typical species of northern hay meadows such as meadow crane's-bill (*Geranium pratense*), melancholy thistle (*Cirsium heterophyllum*) and northern bedstraw (*Galium boreale*).

National Meadows Day is organised by the Magnificent Meadows project, which aims to transform the fortunes of vanishing wildflower meadows, grasslands and wildlife throughout the UK. You can see more about the project at <http://www.magnificentmeadows.org.uk>.

Jane MacKintosh

INTRODUCTION TO OUR BOTANICAL SOCIETY OF SCOTLAND VIDEO MAKER

Hello! My name is Andrew MacLaren and earlier this year I made a website (<http://s1208685.wix.com/urbanfloraschools>) for the Botanical Society of Scotland. At the time I was studying for my degree in Ecological and Environmental Sciences at The University of Edinburgh and took the course Geoscience Outreach. This course encouraged students to work with people outside of the university; other students worked in museums or schools - I worked with the BSS! After chatting with Professor John Grace and attending a meeting, we decided that the Urban Flora of Scotland project ([22](http://www.botanical-society-</p></div><div data-bbox=)

[scotland.org.uk/Urban Flora of Scotland](http://scotland.org.uk/Urban_Flora_of_Scotland)) needed to reach out to schools, which is where I came in.

Originally designed as a series of videos, this project's aim was to encourage school children to go outside and look at plants in their local urban area. I came up with the idea of "Flora the Flower", the main character in all of the videos, and designed the videos to teach facts, species identifying features and to provide information about various common plants. The style reflects classroom learning (a teacher and a board), and fits in with many aspects of the Scottish School curriculum, making it suitable for use in schools.

After a chat with the Geoscience Outreach team, the set of videos changed to a website with videos on; then, after weeks of animating using motion-capture software that tracked my face as I spoke, the videos were made and put onto the website! The website currently has five videos, and there is potential for more pages and videos to go onto it over the coming months.

In the Geoscience Outreach course, I managed to get a first for my undergraduate degree work with BSS and the website, but the real reward will come when this is sent out to schools and when we see it helping to encourage children to go outside and become enthusiastic about plants! Feel free to use the contact form on the website to give me any feedback, and enjoy!

Andrew MacLaren

ILLUSTRATIONS OF NON-NATIVE INVADERS - 4

Hyacinthoides hispanica (Mill.) Rothm. (Asparagaceae)

There is a non-native Bluebell growing in Britain that has long been recognized as the **Spanish Bluebell**, also known as Wood Hyacinth and Spanish Squill. Identified as *Hyacinthoides hispanica* in Stace's "New Flora of the British Isles" (2010), older readers may have known it or bought it as *Endymion hispanicus* or even *Scilla campanulata*. *Hyacinthoides hispanica* is a native of the Iberian Peninsula, and a close relative of the English Bluebell or Wild Hyacinth, *Hyacinthoides non-scripta* (L.) Chouard ex Rothm., native throughout the UK. Because of its appeal in its native landscape, *H. hispanica* was brought to Britain before 1683 and introduced to British gardens. Promoted by Victorian

plant nurseries, it has become a popular mid- to late spring flower with several distinct cultivars, often planted to complement tulips. Unfussy with respect to soil but preferring a moist well-drained site in sun or light shade, it is resistant to disease, deer and rabbits. It was first recorded in the wild in Britain around 1909.



Image by Janet Dyer

More recently, the taxonomic status of Spanish Bluebell in Britain has been questioned (Grundmann *et al*, 2010) and it has even been suggested that it is a sub-species of *H. non-scripta* (Letswaart 1983) and that it differs from the wild *H. hispanica*, native in north-west Spain. Nevertheless, despite the fact that some of the Spanish Bluebells in Britain fall outside the morphological extremes of the native species in the Iberian Peninsula (see Table below), in Stace (2010), the Spanish Bluebell that is found in gardens and naturalized in Britain is still referred to as *H. hispanica*. Plantlife International also refer to Spanish Bluebell in Britain as *H. hispanica*, in their leaflet "A Guide to Britain's Bluebells." The plant illustrated by Janet (see BSS News back cover) was bought in Britain as "Spanish Bluebell, *H. hispanica*". In the following account, we

will use the name Spanish Bluebell to refer to those plants introduced into Britain, which most closely resemble the native *H. hispanica* in Spain.

Most invasive species escape from gardens and spread into the wild by dispersal of fruits, seeds or vegetative bulbils, or by means of horizontal rhizomes. Although very vigorous, Spanish Bluebell does not seem to spread far in any of these ways. The natural rate of increase of Spanish Bluebell is not known, but the spread of native *H. non-scripta* planted in woodland is slow, 0.06m per year. Both aliens and natives do well in suitable habitats, especially in wetter western areas, but there is no evidence that aliens out-compete natives. Spanish Bluebell is rarely found outside gardens and their immediate surroundings, and is probably a result of dumping garden waste. In 2003, a survey named "Bluebells for Britain" was organized by Plantlife International and the BSBI, and carried out by volunteers. Plants were identified on the basis of morphological criteria as *H. non-scripta*, *H. hispanica*, or the hybrid between them, *H. x massartiana* Geerinck that was first recorded in the wild in 1963. According to the survey results non-native Bluebells, mainly the hybrid, occurred mostly in gardens, built-up areas, hedges and roadsides but also in 15% of native bluebell populations in broadleaf woodland (<http://www.plantlife.org.uk/uploads/documents/Bluebells-for-Britain-report.pdf>). It is the apparent ease of hybridization, which prompted the suggestion that *H. non-scripta* and *H. hispanica* are not separate species. In 2004, the Royal Botanic Garden Edinburgh (RBGE) began a study of native and non-native Bluebells in the wild, in nurseries and in common-gardens in south central Scotland (Kohn et al, 2009). Plants were identified as native *H. non-scripta* by their tubular flowers, unilateral inflorescence nodding at the tip, cream pollen, leaves <2cm wide and anthers of different heights; all other plants were recorded as 'alien'. They found that 10% of natives were growing in populations that included aliens. Naturalized aliens usually occurred in small numbers close to habitation, suggesting frequent recent introductions. The authors conclude that alien *Hyacinthoides* taxa provide a considerable potential risk to native *H. non-scripta*.

Hybridization requires simultaneous flowering of the inter-fertile parent species growing within pollinator range, taken to be 1km - 3km for crops, but unknown for bluebells. As 40% of native Bluebells occur within 1-2km of aliens, there are considerable opportunities for genetic exchange. It thus appears that Spanish Bluebell can escape from

cultivation by pollen dispersal; some wild populations of *H. non-scripta* have become contaminated by Spanish Bluebell genes after bees, which visit both species for the rich nectar, have carried pollen of Spanish Bluebell to wild populations of *H. non-scripta*. The resulting hybrid, *H. x massartiana*, is not only viable and vigorous but also fertile. After a few generations, plants with a range of characters from almost pure Spanish Bluebell to almost pure *H. non-scripta* are formed, probably as a result first of back-crossing of the first-generation hybrid with each parent, and then further inter-breeding among the progeny. In my garden, I planted both taxa and now have increasing numbers of a range of intermediate hybrids, which have arisen spontaneously, and soon formed large clumps. They appear in parts of the garden where they are not wanted, perhaps dispersed by gardening activities, and are very difficult to eradicate.

Invasion by an alien through hybridization is less obvious than the aggressive spread of a plant like Giant Hogweed, which can colonize and then out-compete a whole plant community, and it is of course restricted to localities where the native relative is already established. Nevertheless, there is concern that the genetic integrity of the native Bluebell is under threat. (A similar and well-publicized situation from the animal world concerns the Scottish Wild Cat and its genetic contamination by breeding with feral domestic cats.) *H. non-scripta* was voted Britain's favourite wild flower in a Plantlife poll, and up to a half of the world's population of this species occurs in Britain, so, although there is a shortage of hard facts, this perceived threat of extinction by hybridization has been given considerable publicity. Some of the uncertainty about the true situation is due to the fact that it is not always easy to identify intermediates. *H. x massartiana* has been often mistakenly identified as Spanish Bluebell, which as a result has been over-recorded in gardens and in the wild. Most non-native Bluebells in gardens and naturalized outside gardens are hybrids. Records for Spanish Bluebell and the hybrid reveal them to be more widespread in the south and east of Britain, typically in shaded wood and field margins. In wild populations of *H. non-scripta*, it is difficult to distinguish all of the individuals with mixed parentage using only morphological characters.

Hyacinthoides hispanica is the type species of *Hyacinthoides*, and one of about 11 species of that monophyletic genus. According to a study based at RBGE and the Natural History Museum London, involving DNA sequencing of 5 non-coding regions of the chloroplast

genome, *H. non-scripta* is clearly defined, supporting its recognition at the species level. However, *H. hispanica* is not clearly separated from *H. cedretorum* and *H. paivae*. The native range of *H. hispanica* is restricted to the south and central part of the western Iberian Peninsula. At the Spain/Portugal border, it comes close to the range of *H. non-scripta*, although it is not clear whether hybridization occurs there.

All parts of Spanish Bluebell, including the deeply-buried (to 30cm depth) bulbs, are larger than those of *H. non-scripta*. The leaves are up to 35mm wide although descriptions in Flora iberica of *H. hispanica* in the Iberian Peninsula quote a maximum width of 19mm. The leaves are linear or oblong in outline with a blunt tip, smooth, shiny and almost succulent when they first appear. They are initially erect but relaxed and spreading on the ground as the flower spike extends. The inflorescence is an erect raceme up to 40cm tall with 4-20 flowers although the Flora iberica description of native *H. hispanica* states 6-13 flowers per raceme. There is little or no scent. (A large, vigorous and fertile clone sold as *H. hispanica* in my garden produces up to 40 flowers on each stem and a Hyacinth-like scent; although otherwise fitting the description of *H. hispanica*; it is perhaps of hybrid and/or polyploid origin.) The flowers are arranged around the stem on all sides, turning to face more or less outwards as they mature. Each flower is subtended by two blue lanceolate bracts. The tepals, in two whorls of three, are 12-18mm long, pale blue with a hint of lilac and a darker central stripe. Cultivars sold as *H. hispanica* include some with dark blue-flowered forms; white- and pink-flowered forms with cream anthers also exist. The tepals spread widely to form an open bell-, even saucer-, shaped flower, 15-25mm in diameter and are only slightly reflexed, if at all, at the tip. Within each flower there are two whorls of three anthers; before dehiscence they are blue, a darker blue than the tepals; in Flora iberica they are also described as “sometimes cream”. The pollen is a greenish-yellow colour. The filaments of the outer stamens are fused with the tepals, for less than 70% of their length. The ovary has three locules and a fused style and stigma. Plants fitting this description in my garden produced some well-formed pollen grains and, later, capsules with fully-developed seeds except when the plants were in deep shade, where it may be that pollination was less reliable. The characters that are used to distinguish Spanish Bluebell and native *H. hispanica* from English Bluebell, *H. non-scripta*, are summarised in Table 1.

Table 1. Morphological characters that are used to distinguish between the Spanish Bluebell *Hyacinthoides hispanica* and English Bluebell, *H. non-scripta*

	"Spanish Bluebell" Introduced and cultivated in Britain; described under ' <i>H.hispanica</i> ' in Stace (2010).	Native <i>H. hispanica</i> . As described in Flora iberica on line (2011)	<i>H. non-scripta</i>
Native range		South and central west Iberian Peninsula	Northern west Iberian Peninsula, extending north to western France, Belgium, the Netherlands, and Great Britain and Ireland.
Leaf width	Up to 35mm	Up to 19mm	Up to 20mm
Inflorescence (raceme)	Erect with up to 20 flowers arranged around the stem on all sides, facing more or less outwards.	6-13 flowers; otherwise as per Spanish Bluebell.	Pendant (drooping) at the apex with up to 16(32) flowers, pedicels turned so that flowers hang down one (the lower) side even though they arise all round the stem.
Flowers	Pale blue; some cultivars dark blue, pink or white. The tepals spread widely at anthesis to form an open bell-, even saucer-, shaped flower, 15-25mm in diameter and are only slightly reflexed, if at all, at the tip. Little or no scent.	Pale blue, sometimes white; otherwise as per Spanish Bluebell.	Deep violet-blue; a few populations include white- and pink-flowered individuals. The tepals are only fused, if at all, at the base, but form a narrow parallel-sided tube and are strongly reflexed at the tip. Strongly scented.
Anthers	Blue, darker than the blue tepals; pollen greenish-yellow. Anthers cream in pink- and white-flowered forms. The filaments of the outer three stamens are fused with the tepals for less than 70% of their length.	Blue sometimes cream. Pollen yellowish. Otherwise as per Spanish Bluebell.	Anthers and pollen are creamy-white and conspicuous in the mouth of the floral tube. The filaments of the outer three stamens are fused with the tepals for more than 70% of their length.

The hybrid *H. x massartiana*, sometimes referred to as 'Garden Bluebell', combines the characters that distinguish the two parent taxa, varying from plants that closely resemble one parent to those that resemble the other, and everything in between. Although few facts are available, it seems likely that the first generation hybrids are intermediate and fertile; the two parental chromosome complements must be sufficiently similar to allow regular pairing and separation at meiosis in the hybrid. These hybrids then give rise to the full range of hybrid morphologies by back-crossing to the parents. I observed a majority of apparently normal pollen grains in plants of hybrid morphology and almost all the flowers of self-seeded hybrids in my garden produced seeds.

According to some published records, including Stace (2010), *H. hispanica*, *H. x massartiana*, and *H. non-scripta* all occur as diploids and triploids, $2n=2X=16$ and $2n=3X=24$, but in the Flora iberica description of native plants of *H. hispanica*, there is a question mark against the number 24, and Grundmann *et al* (2010) state that while triploids have been confirmed in Spanish Bluebells in Britain, there is no record of triploids in wild Spanish material. In a table that collated published results with some new counts of their own, for accurately identified plants, Grundmann *et al* (2010, online supplementary data) reported 9 counts for *H. hispanica* that were $2n=16$, and 1, for a British population, that was $2n=24$; 9 counts for *H. non-scripta* were $2n=16$. To these results I can add my own count of $2n=16$ for plants from a wild population in Currie, Edinburgh. Among plants for which accurate identification was deemed to be less certain by Grundmann *et al* (2010), 7 counts for *H. hispanica*, 8 for *H. x massartiana* and 2 for *H. non-scripta* were $2n=16$; and 4 counts for *H. hispanica* and 2 counts for *H. non-scripta* were $2n=24$. The existence of triploids suggests that meiotic errors in diploids, probably during embryo sac formation, have produced occasional unreduced ($2X$) gametes resulting in a triploid embryo after pollination. Triploids may well have been selected in cultivated material because of their greater size. Typically, triploids in other species produce no or very few viable gametes but there is little or no information about the fertility of triploid Bluebells.

The native English Bluebell is protected by the 1998 Schedule 8 of the 1981 Wild Life and Countryside Act against loss of habitat, illegal collecting, and unlicensed trade but there is no legislation to protect it from hybridization. Plantlife International issues guidance on the

dangers of purchasing incorrectly labelled bulbs (such as Spanish Bluebells supplied as *H. non-scripta*) and on the disposal of unwanted plants of non-native Bluebells, but it is still legal to sell Spanish Bluebells and to plant them on one's own property. It has been claimed that it is in several ways a better garden plant than the native Bluebell and some suppliers still stock them. Kevock Garden Plants list 11 named varieties of different colours. However, it will not be possible to properly assess the threat this presents to the conservation of the native English Bluebell without more information.

More information is needed about the hybridization process, including the behaviour of pollinators and the cytology of pollen development, fertilization and embryo development after inter-taxa pollination. Details of the field performance of the first-generation hybrid and its reproductive biology are also required. In addition, the RBGE, in conjunction with the Natural History Museum in London, has embarked on an investigation into Bluebells in Britain using molecular techniques (<http://www.rbge.org.uk/science/genetics-and-conservation/molecular-ecology/bluebell-hybridisation>). The main objectives are:

- to clarify species limits between *Hyacinthoides* taxa in Britain and establish relationships to taxa elsewhere;
- to assess the extent of hybridization between native and non-native bluebells in the UK;
- to develop a molecular test to distinguish *Hyacinthoides non-scripta* from other *Hyacinthoides* taxa; and
- to determine which morphological characters are most reliable for taxon identification.

Studies such as these require a considerable investment of time, technology and technical expertise. However, interesting new information about the triploids could be gained using less sophisticated investigations. Triploids could be unequivocally identified by examining the chromosome complement at root-tip mitosis using traditional cytological methods, which work well in Bluebells. The chromosomes are large and the individual members of the haploid set of eight can be identified on the basis of length and centromere position. Grundmann *et al* (2010) state that the complements of the native and alien Bluebells are very similar. A survey of the commercially available named varieties, possibly including triploids, would make a good student project. Bulbs obtained in the autumn could be grown in pots and the young roots used for mitotic chromosome studies over the winter. Having identified

triploids, it would then be possible to study their fertility. An examination of meiosis would be interesting but it is more difficult than a mitotic chromosome count. The critical stages of meiotic pairing occur briefly and synchronously within each anther and, in *H. non-scripta* and perhaps also in Spanish Bluebell, within the subterranean bulb in January or February. A measure of fertility could be obtained more easily by studying mature pollen under the microscope. A high percentage of aborted pollen grains would indicate sterility. Because some pollen that looks normal might also be non-viable, a more accurate estimate would be provided by a pollen germination test using a simple culture medium. Having studied the commercial cultivars, the survey could be extended to include garden and naturalised populations of Spanish Bluebell and the hybrid, and even of *H. non-scripta*, if there were indications of triploidy, such as large size or 'bad' pollen. Plants would probably have to be potted-up to make growing root tips easily obtainable. It might be possible to speed up the search for triploids if it was first demonstrated in material where the chromosome number was known, that the average size of stomatal guard cells was significantly greater in triploids than in diploids. Stomatal guard cell measurement in epidermal strips has been used in other species to identify polyploids. Not only is this method quicker than making chromosome preparations, but it can be conducted on plants growing in the wild without disturbing them unduly. If necessary, putative triploids could be confirmed by chromosome counts.

Adrian Dyer

References:

- Grundmann M, Rumsey F J, Ansell S W, Russel S J, Darwin S C, Vogel J C, Spencer M, Squirrel J, Hollingsworth P M, Ortiz, S, Schneider H. (2010). Phylogeny and taxonomy of the bluebell genus *Hyacinthoides*, Asparagaceae [Hyacinthaceae]. *Taxon* 59 (1);68-92.
- Kohn D D, Hulme P E, Hollingsworth P M, and Butler A. (2009). Are native bluebells (*Hyacinth non-scripta*) at risk from alien congenics? Evidence from distributions and co-occurrences in Scotland in Scotland. *Biol. Conservation* 142, 61-74.
- Letswaart J H, De Smet S J and Lubbers J P M (1983). Hybridization between *Scilla nonscripta* and *S. hispanica* (Liliaceae) in the Netherlands. *Acta Bot. Neerl.* 32(5-6) 467-480.
- Stace C. (2010) New Flora of the British Isles. Third edition. Cambridge University Press.

LIVING WITH DISEASE IN THE CALEDONIAN PINWOODS

Pathogens are an integral component of the environment inhabited by our native flora. Most of the time the presence of these organisms goes unnoticed and their effects are overlooked. However, on occasion, rapid declines in plant health occur, triggering calls for control of the organisms concerned. While it may be realistic to undertake costly 'plant protection' using chemical pesticides for a limited range of intensively managed and economically valuable crops, this option is not generally feasible either for extensively grown crops of low value e.g. forest trees or for the vast majority of our native plant species. Instead, we must build up an understanding of the ecological and evolutionary interactions that occur between the plants and their parasites. Armed with this knowledge, we can discover the underlying reasons for disease outbreaks and implement appropriate management measures that rely on exploiting the existing defence mechanisms of the plants. The objective is to prevent major outbreaks in the future and limit damage caused by the pathogen to an acceptable level – in other words we can learn how to live with disease.

The philosophy outlined above lies at the heart of the ongoing PROTREE programme (www.protree.net) of collaborative research funded under the Tree Health and Plant Biosecurity Initiative ([THAPBI](#)). One of its aims is to investigate the reasons behind the recent upsurge in damage to pine species in Scotland caused by the ascomycete fungus, *Dothistroma septosporum*. This fungus is spread by asexually derived, rain dispersed spores, which invade the needles of pine, causing defoliation, reduction in growth and, in the most extreme cases, the death of the trees. Dothistroma Needle Blight (DNB) was first reported in the early 2000s as a serious problem in the UK on Corsican pine plantations in East Anglia and elsewhere in England. Increases in the disease can partly be accounted for by a series of warm wet summers, and lack of thinning of plantations, which results in dense, poorly ventilated canopies that provide ideal environmental conditions for spore infection. Furthermore, Corsican pine planted as an exotic is known to be highly susceptible to *D. septosporum*. However, since 2008, the disease has shown further dramatic increases, which have resulted in serious damage on Corsican, Scots and lodgepole pine plantations in Scotland. Most concerning, from a Scottish conservation point of view however, is the recent discovery that *D. septosporum*

infection is widespread throughout the native Caledonian pinewoods, a resource that is highly valued for the biodiversity that it supports. Moreover, its location at the northwestern edge of the distribution of Scots pine means that it is likely to contain unique forms of genetic diversity. The PROTREE research programme was initiated to provide the ecological and evolutionary understanding needed to inform the development of appropriate management strategies for *D. septosporum* in the Caledonian pinewoods.

To establish the seriousness of the threat posed by *D. septosporum* to the Caledonian pinewoods it is essential to know the origins of the pathogen in Scotland. If the pathogen is endemic and has, therefore, had the opportunity to co-evolve with Caledonian pine, it is likely to be far less of a threat than if it has been introduced and trees in Scotland are encountering it for the first time. Detailed genetic analysis of *D. septosporum* isolates derived both from plantation and Caledonian pine from throughout Scotland has yielded some very interesting results.

Far from being a homogeneous pathogen population, three genetically distinct races of *D. septosporum* have been identified within Scotland. The first is mainly found on Corsican and Scots pine plantations in the south of Scotland. The second is found only on lodgepole pine plantations in the north of Scotland and the third is predominant on native Caledonian pine. The current hypothesis to explain these results is that *D. septosporum* is actually endemic to the Caledonian pinewoods. However a different race is now spreading north from epidemic outbreaks on Corsican and Scots pine plantations in the south, and is beginning to enter the Caledonian pinewoods. Finally, there is a third race, currently confined to lodgepole pine, which is most likely to have been introduced from North America when lodgepole pine was planted as an exotic in Scotland.

The tentative conclusion that *D. septosporum* is endemic in Caledonian pine is reassuring, suggesting that native pine may already have evolved a degree of resistance to the pathogen. However, the finding that Caledonian pine may increasingly encounter new races of the pathogen in the future is of concern and we need to consider whether Caledonian pine populations have the genetic variation that will allow them to adapt to these new races. This question has been addressed directly in a second part of the project. Collections of Caledonian pine seedlings from different mother trees and different native pinewood sites were deliberately infected with the *D.*

septosporum race that is currently invading from the south. The most encouraging finding is that within each of the native pinewoods tested there exists substantial genetic variation in resistance to this *D. septosporum* race. This means that all of the populations have the potential to evolve increased resistance to DNB and to escape its worst effects if the disease becomes more prevalent in the future. Another finding is that Caledonian pine populations located in western areas, where warmer and wetter conditions are most suitable for *D. septosporum* infection, are genetically most resistant to the disease. This is what would be expected if *D. septosporum* is endemic and has been co-evolving with Caledonian pine over a long period of time.

The results from this research are therefore very encouraging, in terms of the prognosis for Caledonian pine in the face of an increased threat from *D. septosporum*. Nevertheless, considerable caution is also required at this point. Caledonian pine can only evolve greater levels of resistance to the pathogen if offspring of the genetically more resistant individuals in each pinewood are able to establish and form the next generation so that natural selection can operate. This requires the presence of abundant natural regeneration in the Caledonian pinewoods that can only occur if there is appropriate ground preparation, control of herbivores, and adequate initial protection of regenerating seedlings and saplings. Thus, the single most important management practice for protecting Caledonian pine from *D. septosporum*, and the many other abiotic and biotic changes in the environment predicted to occur in the future, is the encouragement of abundant and regular cycles of natural regeneration.

Before closing, it is worth drawing one further conclusion from the research described above. One of the major factors contributing to the Dothistroma Needle Blight problem in Caledonian pinewoods is the widespread planting of exotic pine species that share pathogens with Caledonian pine populations. Plantations of Corsican pine that are highly susceptible to *D. septosporum* have generated a huge population of the pathogen from a southern source, which is apparently moving north. Large scale importation of lodgepole pine appears inadvertently to have led to the introduction of a new race of *D. septosporum*, which has the potential to spread to Caledonian pine populations. If we wish successfully to manage diseases in our native plant populations we would do well to recognise the dangers of indiscriminate introduction of

exotic plant taxa that are related to, and share pathogens with our native plant species.

Professor Richard Ennos
University of Edinburgh

Acknowledgements:

The PROTREE project on which this article is based is funded jointly by a grant from BBSRC, Defra, ESRC, the Forestry Commission, NERC and the Scottish Government, under the Tree Health and Plant Biosecurity Initiative. PROTREE is a joint project with researchers from the Centre for Ecology and Hydrology, James Hutton Institute, Forest Research, The Royal Botanic Garden Edinburgh, SRUC Edinburgh, the University of Aberdeen and the University of Edinburgh.

Full link to THAPBI:

<https://wiki.ceh.ac.uk/display/THAPBI/THAPBI+-+Tree+Health+and+Plant+Biosecurity+Initiative>

TREE HEALTH AND PLANT BIOSECURITY INITIATIVE (THAPBI)

Tree Health and Plant Biosecurity is an increasing issue in today's world of travel and plant material imports into the UK from around the world. Trees have significant impacts on rural and urban landscapes and contribute to biodiversity, economy, ecosystems and ecosystem services, heritage and human wellbeing. They also have the potential to contribute to reducing the rate of climate change by removing carbon dioxide from the atmosphere and storing it for many years. Members of several Scottish Institutions (see below) are participating in the Tree Health and Plant Biosecurity Initiative that is funded by the research councils (see below), Scottish Government and Defra under the auspices of Living with Environmental Change (LWEC).

There are now nine projects involved in [THAPBI](#); seven started in 2014 and are now delivering important results from their research, while two projects started in April 2016. Two of the projects are based in Scottish Institutions: PROTREE led by Stephen Cavers at the Centre for Ecology & Hydrology (CEH) (see previous article) and Phyto-threats led by Sarah Green at Forest Research, Roslin. Other Scottish Institutions, including Aberdeen University, Forestry Commission Scotland, James Hutton Institute, St Andrews University, Scottish Agricultural College and

Royal Botanic Garden Edinburgh, are involved in these and other THAPBI projects led from English and Welsh Institutions. All together the projects are addressing many issues identified in [the Scottish Plant Health Strategy](#) as needing new research and understanding to promote plant and tree health and reduce the impact of pests and diseases. Not only are the projects studying the biological and ecological aspects related to plant health but they are also conducting research that will inform policy makers, help us understand how people respond to tree health issues, and how public behaviour might be changed to reduce the spread of pests and diseases. We will have to learn to manage pests and diseases and to adapt to changes in our rural and urban landscapes as tree species are affected. The public interest in tree pests and diseases waxes and wanes with media attention and people may be concerned for only a relatively short time. The forestry commission has published information on how to maintain [biosecurity](#) to [protect](#) our forests and people need to be constantly reminded to protect plants.

Some results from the PROTREE project were featured in a previous issue of the newsletter with an article by Annika Perry. Richard Ennos has also described some of the implications from the PROTREE results in the previous article. Annika Perry and colleagues now have two journal publications one describing the heritable variation in Scots pine susceptibility to Dothistroma needle blight (DNB; *Dothistroma septosporum*) (Perry et al (2016a) and, in the second publication evidence for spatial heterogeneity in the susceptibility of native Scots pine provenances (Perry et al 2016b). In the first publication, they used four-year-old Scots pine trees, and 3-5 families from six populations from native Caledonian pinewoods that were artificially inoculated with *D. septosporum*. The percentage of non-green needles, was measured regularly over a period of 61 days following inoculation, during which plants were maintained in conditions ideal for DNB development (warm; high humidity; high leaf wetness) to assess susceptibility to *D. septosporum*. The study found significant differences in susceptibility to *D. septosporum* among families indicating that variation in this trait is heritable. It concluded that native Scots pine populations contain sufficient genetic diversity to evolve lower susceptibility to *D. septosporum* through natural selection, in response to increased prevalence of this pathogen. In the second paper (Perry et al 2016b) investigated the spatial heterogeneity in pathogen pressure as this leads to genetic variation in, and evolution of, disease-related traits among host populations. Hosts are expected to be highly susceptible to exotic

pathogens as there has generally been no prior opportunity for evolution of defense responses. Over two years of observations on different provenances of Scots pine seedlings, Perry et al (2016b) found highly significant differences in susceptibility among tree provenances but not among tree families. Provenance mean susceptibility to *D. septosporum* was negatively and significantly associated with environmental water-related variables at site of origin of the tree provenances, potentially due to the evolution of low susceptibility in the host, in response to historical high pathogen pressure in the wetter environments.

The Phyto-threats project started in April 2016 (led by Sarah Green from Forest Research) will study the distribution and diversity of *Phytophthora* species in water and plant samples collected from different UK plant nursery management systems, including those locations considered to be at a high risk of importing new *Phytophthoras*. State-of-the-art DNA sequencing technology will be used to identify the *Phytophthora* species, and the risk of genetic interactions when *Phytophthoras* meet that may result in new aggressive types will be assessed. The Phyto-threats project will investigate the international pathways for *Pythphphthoras* to enter the UK, and the wider distribution of nursery-associated *Phytophthoras* will be obtained from samples taken from streams and ponds in amenity environments. They will investigate the potential of *Phytophthora* to spread from nurseries into woodland or other natural ecosystems and will provide evidence to guide the development of UK-wide policies for nursery and plant management practises. Through discussions with plant nursery managers, the project will assess the feasibility and the economic and social opportunities and barriers to the implementation of new plant health strategies. For more information, see <http://www.forestry.gov.uk/fr/phytothreats>.

The THAPBI programme is funded jointly by BBSRC, Defra, ESRC, the Forestry Commission, NERC and the Scottish Government.

Jill Thompson
Centre for Ecology & Hydrology

References:

Perry, A., Wachowiak, W., Brown, A., Ennos R.A., Cottrell J.E., Cavers, S. Substantial heritable variation for susceptibility within populations of native British Scots pine (*Pinus sylvestris*). (2016a). Plant Pathology. DOI: [10.1111/ppa.12528](https://doi.org/10.1111/ppa.12528)

Perry A., Brown, A., Cavers, S., Cottrell, J., Ennos, R. Has Scots pine (*Pinus sylvestris*) co-evolved with *Dothistroma septosporum* in Scotland? Evidence for spatial heterogeneity in the susceptibility of native provenances. (2016b). Evolutionary Applications [DOI: 10.1111/eva.12395](https://doi.org/10.1111/eva.12395)

Full web links for printed copies

Biosecurity leaflet

[http://www.forestry.gov.uk/pdf/FCMS028-guidance.pdf/\\$FILE/FCMS028-guidance.pdf](http://www.forestry.gov.uk/pdf/FCMS028-guidance.pdf/$FILE/FCMS028-guidance.pdf)

Video of biosecurity actions. <http://www.forestry.gov.uk/forestry/infd-8zjmq4>

<https://wiki.ceh.ac.uk/display/THAPBI/THAPBI++Tree+Health+and+Plant+Biosecurity+Initiative>

<http://www.gov.scot/Topics/farmingrural/Agriculture/plant/PlantHealth/ScottishPlantHealthStrategy>.

MEDICINAL PLANTS IN THE HIGH ATLAS: TRADITIONAL ECOLOGICAL KNOWLEDGE AND CONSERVATION

In the Mediterranean, as well as in most of Europe, both environmental and botanical diversity are as much a product of biological, geological and climatic processes as they are of human activity. This is true in rural areas of Morocco, where local inhabitants still practise subsistence agriculture. Shepherds guide their herds across mountain passes and villagers maintain the fragile irrigated and non-irrigated fields in the valley bottoms. In a fragile equilibrium, now threatened by climate change and increased droughts, locals help preserve biodiversity by maintaining a variety of agricultural man-made habitats, yet they also erode it by overgrazing and overharvesting. In this context, why study medicinal plants? Medicinal plants play an important role for local livelihoods. Some medicinal plants are locally harvested and traded, contributing to the monetary income of most families in rural communities. Importantly, it is through the trade of medicinal plants that women, the main harvesters, acquire some revenue. Besides being central to local economies, these plants are also the primary source of healthcare. According to the World Health Organisation, up to 80% of the population in developing countries depends on plants for healthcare.

Medicinal plants are used in ways which are culturally specific, since they carry meanings and stories that link the botanical world with local constructs of health and illness. While medicinal plant use in Europe was guided for centuries by the Doctrine of Signatures (wherein herbs resembling body parts are used to treat respective areas), Moroccan narratives are centred on concepts such as “hot” and “cold” plants and ailments. These concepts also underpin local understandings of plant diversity. Plants that “warm you up” when you drink them in infusion, such as *Thymus saturejoides* Coss., *Artemisia herba-alba* Asso, and *Lavandula dentata* L., are popular medicines. These are also among the most abundant aromatic plants in the High Atlas, growing on mid-altitude, dry slopes, where they are collected sustainably during the late spring. Harvesting traditions dictate plant collection well after the beginning of the flowering time, which allows sustainable use and the maintenance of plant populations in the wild.

On the other hand, there are plants that “cool you down”, such as *Mentha suaveolens* Ehrh. This species grows in cooler environments, along traditionally built irrigation canals in the shade of olive groves. *Mentha suaveolens* Ehrh. is often used to treat headaches; women wear a poultice of this plant under their hijab especially after long summer working days in the fields. When at home, women burn dry branches and leaves of *Tetraclinis articulata* (Vahl) Mast., a Moroccan endemic and a popular remedy against headaches and muscular pain. Like most of the Cupressaceae, its wood and leaves contain resins that release sweet fragrances when burned. This and other aromatic plants add flavour to mountain drinks, serving prophylactic and nutritional purposes at the same time. Like *Mentha suaveolens* Ehrh., many aromatic species, including *Mentha pulegium* L. and *Salvia officinalis* L., are cultivated in field margins, where they benefit from humid micro-habitats. Others, such as parsley or coriander, are cultivated in home gardens.

Overall, more than 150 plants are used medicinally in the High Atlas, of which 60% are harvested from the wild (Teixidor-Toneu et al, 2016). Some of them are endemics and endangered species and community-based conservation projects are in place to address the challenges for biodiversity. The Global Diversity Foundation (<http://www.global-diversity.org/>) is especially committed to promoting the sustainable use of wild plants in the High Atlas. Drawing from ethnobotanical research in the area, key species are targeted as part of projects that address both the improvement of local livelihoods and the

conservation of endangered diversity. A key tool for this is the distribution of important and endangered or vulnerable species cultivated in community nurseries for enrichment planting in semi-wild areas. For example, the medicinal endemic *Lavandula maroccana* Murb. and the endangered *Mentha gattefossei* Maire are good candidates for enrichment planting schemes. Such schemes build upon local practises of *in situ* conservation: local inhabitants, well aware of the decline of populations of these culturally and medicinally valuable species in the wild, grow them in their home gardens.

The interaction of humans with their natural environment is always complex: human-plant relationships are established in a multitude of ways, are dynamic and historically contingent, and are grounded in oral traditional knowledge. Rural development, through formal schooling and the integration to market economies, often results in the erosion of traditional knowledge. With its erosion, the fragile equilibrium between humans and their environment in rural Morocco may be put in jeopardy.

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Reference

Teixidor-Toneu, I., Martin, G.J., Ouhammou, A., Puri, R.K., Hawkins, J.A. (2016). An ethnomedicinal survey of a Tashelhit-speaking community in the High Atlas, Morocco. *Journal of Ethnopharmacology*. 188, 96-110.

WHY DO WE IMPORT SO MANY NATIVE TREES AND SHRUBS?

Importation of live plants for a range of purposes is strongly and repeatedly implicated as a major pathway for the entry of pests and pathogens into Great Britain. Internet searches for ornamental plants yield a remarkable diversity of outlets and products located all over the world, enabling me to have directly purchased ten “Fern bigs” from India,

half a dozen Cycads from a nursery in North Carolina and a few hundred grams of Himalayan balsam seed from Devon, in the space of about fifteen minutes. The love of diversity implicit in horticulture is long established and understandable – opportunistic online plant retailers can hardly be considered the most sinister symptom of global consumerism. However, even for native tree and shrub species used in publicly funded woodland creation and landscaping, the country is still importing a very significant proportion of the trees that are planted out. In 2012, members of the confederation of forest industries' nursery producers group (CONFOR NPG) estimated that they had produced 70 million trees and shrubs and imported a further 10 million between them that year (Anon, 2012) – which means that one in eight trees sold had been imported. Whilst this is a large reduction on figures from the 90's, where estimates of 70% imports were given (Gordon, 1998), it is still a very significant proportion. Why should this be the case when the public are also investing, both materially and personally, in measures to reduce the threat of exotic pests and pathogens in the landscape?

There are several reasons why we are still importing millions of trees. Firstly, it is important to note that the vast majority of native trees and shrubs in GB are grown speculatively from seed by wholesale forest nurseries. For the most part, this reliance on speculative production is due to a lack of confidence for tree planters to purchase their plants in time to specify species, seed origins, sizes, growth methods and so on because of uncertainties in obtaining planting grants. It can take a very long time for woodland grant scheme applications to be processed and approved, and there is typically a short time limit placed on completing the planting work in order to recoup funds following grant approval. This creates a major bottleneck in the prediction of demand for trees, which can take up to three years to grow from seed.

Ironically, this situation is hindered further by policies regarding sourcing local seed. GB is geographically divided into a series of 24 'seed zones'. These seed zones were devised to (rightly) promote the use of currently adapted seed for woodland establishment. However, at the time, there was rather little evidence about biologically relevant patterns of variation in native tree species and so they were no more than a first attempt to divide the country into regions that were, likely to contain populations that experienced similar climatic conditions and to separate those that did not. However, there can be both very strong microclimatic influences within a single seed zone in upland areas and

there can be rather little difference between some of the seed zones in the lowlands. Sourcing seed that is currently adapted to local climatic conditions is in my opinion, a sensible start for new native woodlands, but we need to generate a better understanding of how 'local' actually operates on a landscape scale. It is possible that the current seed zones are too conservative, which has the effect of creating a large number of product lines nurseries are expected to manage. Especially bearing in mind the number of different species and sizes they are already expected to supply. We can make an allegory of this situation with ice cream.

Let us suppose an ice cream vendor has a repertoire of 24 flavours of ice cream and is deciding which flavours of ice cream to make to put in the ice cream van, which has a limited capacity. They want to sell as much of the perishable ice cream as possible so that profits can exceed their overheads by as large a margin as possible. Let us also suppose that 95% of the customers are discerning schoolchildren, whose ice cream consumption is subsidised by their parents on the condition that their behaviour is good and they avoid 'unhealthy' ingredients. Let us suppose that the neighbourhood is a health-conscious one, full of parents who are frequently becoming concerned over the nutrition status of different flavourings and ingredients due to regularly changing and conflicting health advice in the media. Add to this a possibility of rain on the following day, which would typically reduce sales. The ice cream vendor, with a limited capacity to predict demand, is faced with a decision about the number of flavours, and the quantities of each of those flavours to produce. They must compromise between producing large quantities of fewer flavours, thereby minimising their overheads in the hope that those flavours will be popular the next day or producing smaller quantities of many flavours in order to satisfy as many customers as possible but risk running out of popular flavours and being unable to sell unpopular ones. If the ice cream vendor makes too much of a given flavour and cannot sell it, it goes to the gulls. If they do not make enough, they can purchase it from a larger competitor who has the efficiencies of scale to store a larger range of flavours.

There are some very large scale nurseries on the near continent that seem to have efficiencies of scale to enable them to advertise and speculatively grow a large range of trees grown from many British seed origins for sale back into the British marketplace, or perhaps elsewhere if it is not possible. Indeed, 57% of the native trees we import are grown

from British collected seed (Whittet et al., *unpublished*). It seems unusual that the continental producers are in a position to provide this safety net for British nurseries.

Before getting carried away with expressions of sympathy, it is worth noting that these types of compromise are common to most commercial enterprises. In forest nurseries, overproduction leads to needless destruction of domestically produced trees, and underproduction leads to reliance on importation of non-GB grown stock (+ associated biota). The difference here is that the industry is currently supported by taxpayers on the understanding that many benefits tree planting can deliver are realised. These losses experienced by private producers, which are largely caused by the configuration of grants and regulations have a knock on effects for the public and for woodland habitats throughout our landscape. This would not be such a large problem if nurseries had at least an inkling of the species and seed origins that might be in demand two years on from the time of sowing, and the most effective way to address this would be to have a close look at the way woodland creation is funded.

Large wholesale forest nurseries are often portrayed as the ‘bad guys’ when a tree health issue arises and the digits of blame start wagging. However, I find this view to be firstly extremely unhelpful – plant pathogens are a natural component of any ecosystem and not something to be ‘ashamed’ of - and secondly, factually inaccurate as it is clearly not in nurseries interests to supply unhealthy trees to their customers!

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References:

- Anon. 2012. Confor welcomes Government proposal to boost plant health resources.
<http://www.confor.org.uk/NewsAndEvents/News.aspx?pid=23&id=1327>
- Gordon, A. 1998. Whence British Trees? *Tree News*. Autumn 1998, 15
- Whittet, R., Cottrell, J., Cavers, S., Pecurul, M. and Ennos, R. (in review). Supplying plants in an era of environmental uncertainty: identifying challenges faced by the British forest nursery sector.

CODEWORD 2

In this codeword each number always codes for the same letter, and each letter occurs at least once. All the words are botanical genera (including some cryptogams). Solutions do not enter grey squares or cross thick lines. Further helpful hints may be found at <http://www.botanical-society-scotland.org.uk/xwordhelp>

22	25	1	24	2	24	14		22	13	10	5	22		16
25		10		25		2		4				11	10	22
22	14	2	25	22	20	22	27	24	14			26		2
1		24		20		32		30	1	10	27	27	30	14
30		27		24		7		27		25		27		26
21		22		14		12		10	25	30	32	22		5
26			3		3	14		20		26				30
15			5		12			30		32	22	27	27	22
14	22	23	30	31	25	22	20	22		22				
30			24		30				24	24	32		26	
14	30	24	3		32	22			25	27	12		23	
	5		1	27	22	32	6	14	2	26	5	30	22	
	24					10			30	5	22		27	
	27					25	30	32	32	22	25	21	30	22
17	22	32	4	24	30	5	30	22	22		22		14	

1	2	3	4	5	6	7	10	11	12	13	14	15
B	T											
16	17	20	21	22	23	24	25	26	27	30	31	32
A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

OBITUARY: DUNCAN POORE

Duncan Poore, who has died at the age of 90, worked in the Middle East, Cyprus, Pakistan and Malaysia before becoming Director of the Nature Conservancy in 1966, then Scientific Director and, later, Acting Director-General of the International Union for the Conservation of Nature (IUCN). In 1980 he became Professor of Forest Science and Director of the Commonwealth Forestry Institute at the University of Oxford, where his chief interest was the sustainable management of tropical forests. He was also a Senior Research Fellow at the International Institute for Environment and Development, where he set up its Forestry and Land Use Programme. He worked with International Tropical Timber Organisation (ITTO) to promote sustainable forest management and was instrumental in the development of criteria and indicators for assessing progress towards sustainable tropical forest management.

Duncan lived latterly in Inverness-shire, where he was active in local land use issues. He was an honorary fellow of the Botanical Society of Scotland for many years. We send our sympathy to his wife and family.

Jane MacKintosh

SOLUTION TO PHYTOLEXICON CRUCIFORMIS 15

1	C	O	M	2	M	E	3	L	I	4	N	I	5	F	L	6	O	R	7	A	E
	A				I		A		E		R		C		C						
	R				M		P		S		E		O		H						
8	P	I	N	U	S	S	Y	L	V	E	S	T	R	I	S						
	I				L		A		I		S		E		L						
	N				U		N		A		I		A		L						
9	U	R	O	S	T	A	C	H	Y	A	C	E	10	A	E	11	B				
	S				G		C		H		D				P	A	R				
15	B	R	Y	U	M	O		Y		A	L	P	I	N	A						
	E				T		M		B		N			C		C					
17	T	R	I	T	O	M	A	R	I	A	F	R	U	I	T						
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	L				T		N		D		F	I	L	A	G	O					
20	U	L	M	U	S	I		A						T		L					
	S				S		S		21	T	E	N	E	R	A		E				

BSS NEWS – INFORMATION AND GUIDELINES FOR CONTRIBUTORS

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Aims of BSS News

The chief aims of BSS News are to communicate with the membership, to keep members informed and to act as a vehicle for members' contributions on all things botanical. All contributions are welcome.

Scope of the newsletter

The content of BSS News is as kaleidoscopic as possible around the botanical theme and we are keen for this variety to continue. For a list of ideas for contributions see the BSS website (www.botanical-society-scotland.org.uk) and the following list, but please don't feel constrained by it. New ideas are welcome. Regular contributions include the following items:

- Reports of field excursions (leaders please take note) picking out the botanical highlights.
- Descriptions and recommendations of other botanical sites in the UK or abroad. (It might help people to plan their holidays.)
- Articles of current or historical interest, including ethno- and archaeobotany.
- Biographical profiles of botanists.
- Botanical poems.
- Botanical notes, news items, announcements of future events, reports of meetings attended, correspondence, small ads., etc.

- Book reviews.
- Crosswords and quizzes.
- Illustrations, including paintings, photographs and line drawings. Subjects could include plants, habitats, people, events, or even witty cartoons if they are your forte!

Guidelines for contributors

Don't worry if you cannot comply with all of the following guidelines. Just send what you can and the Editors will make adjustments.

File name for email submissions and web uploads

Please include your own name and indicate article content in the file name. Also add your name, preferred title and affiliation etc. to the end of your article.

Text

The Newsletter is set up on A4 pages in MS Word 2010 using Arial font (size 15 for major text, 18 for main headings and 14 for references). And acknowledgements. Margins are set at 2 cm (sides), and 2.5 cm (top and bottom), with headers and footers at 1.5 cm. Text is justified and single-spaced. Paragraphs are followed by 6pt spacing. Please use the [template](#) on the BSS website to submit articles in this format.

Illustrations

The cover is the display area for colour pictures. Please include the name of the photographer or artist with all images. Line drawings, maps or graphs within the text look best in black and white or greyscale.

Submission

Please send your contributions to the Receiving Editor by:

- post at the address above,
- email to jill.thompson99@gmail.com,
- or through the BSS website at <http://www.botanical-society-scotland.org.uk/content/bss-news-newsletter-botanical-society-scotland>.

When sending something by post please phone 0131 258 2358 or email jill.thompson99@gmail.com to let Jill know something has been posted.

The LAST deadline for the next issue will be 15th January 2017. Earlier submission would be appreciated.

Back cover pictures

Outside

Watercolour illustration of *Hyacinthoides hispanica* (Mill.) Rothm. (Asparagaceae), (Spanish Bluebell), by Janet Dyer. See article on page 23.

Inside

Top left: *Thymus saturejoides* Coss. cultivated in local (Morrocan) plant nurseries. Photo by Inanç Teguç. See article on page 38.

Bottom left: Landscape in the High Atlas, Morocco. Photo by Inanç Teg. See article on page 38.

Top right: *Senecio inaequidens* at Granton. Photo by Chris Jeffree. See article on page 16.

Bottom right: Screen shot of schools video page showing Flora Flower. Image by Andrew MacLaren. See article on page 22.

SOLUTION TO CODEWORD 2

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Urban Flora Schools

Video Gallery

Please click on each of the videos to watch and learn about plants that you may find by your school!

Garlic Mustard
Alliaria petiolata

Cleavers (Synedra)
Galium aparine

Cow Parsley
Anthriscus sylvestris

Urtica dioica
Stinging Nettle

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