



BSS News

The Newsletter of the
Botanical Society of Scotland

No. 104

March 2015







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

Front cover pictures

Outside

Apple blossom. Photo by John Hancox. See article on page 32.

Inside

Photos from the Alpine field Meeting to Beinn Dubhchraig. See article on page 25.

Top left: *Rubus chamaemorus* in fruit. Photo by John Holland.

Top right: The group looking at *Carex magellanica* in the Coille Coire Chuilc pine wood. Photo by Hamlyn Jones.

Centre left: *Cornus suecica*. Photo by John Holland.

Bottom left: On the summit ridge of Beinn Dubhchraig. Photo by Hamlyn Jones.

Bottom right: Crossing the Allt Gleann Auchreoch. Photo by Hamlyn Jones.

Botanical Society of Scotland

(Incorporating the Cryptogamic Society of Scotland)

c/o Royal Botanic Garden Edinburgh

20A Inverleith Row, Edinburgh, EH3 5LR

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 incorporates the Cryptogamic Society of Scotland and so 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 exchange of information between botanists working in different areas. All people interested in plants are welcome to be members of the Society, including professional academic plant scientists, amateur field botanists and students. All members receive information about 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 the Botanical Society of Scotland and Taylor & Francis.

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
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Botanical Society of Scotland

EDITORIAL

On the back cover of this issue we present the first of a series of watercolour illustrations of non-native invasive plants painted by Janet Dyer. Further illustrations of non-native invaders will be reproduced in subsequent issues and each will be accompanied, as on page 15, by a text by Adrian Dyer. The editors send their thanks to Janet for making these beautiful illustrations available to BSS News and to Adrian for providing the written commentaries.

Readers who struggle with the regular BSS News Crosswords (and I am one) will be pleased to see an article by the compiler explaining how he constructs the clues. Our crossword compiler is also working on a new botanical puzzle based on the Codewords you see in newspapers. Watch the [BSS website](#) for further details.

We have several items about species recording in this issue of the newsletter. Starting with our regular update on the BSS's Urban Flora project, we then have reports of the Wildlife Information Centre (known as TWIC) Autumn Conference on under-recorded groups; of the 50th anniversary Bioblitz at Loch Leven National Nature Reserve last summer; and of the species recorded during the BSS 2014 alpine field meeting to Beinn Dubhchraig. All these events involve amateurs and volunteers adding to the sum of human knowledge. The next Urban Flora event will be a Walls Week in May – watch the website for dates and details and come and join us!

Finally, please note the date of the AGM, on 28th May 2015 at 5pm at the Royal Botanic Garden Edinburgh.

Jane MacKintosh (jane.mackintosh@tiscali.co.uk)
and Jill Thompson (jill.thompson99@gmail.com)

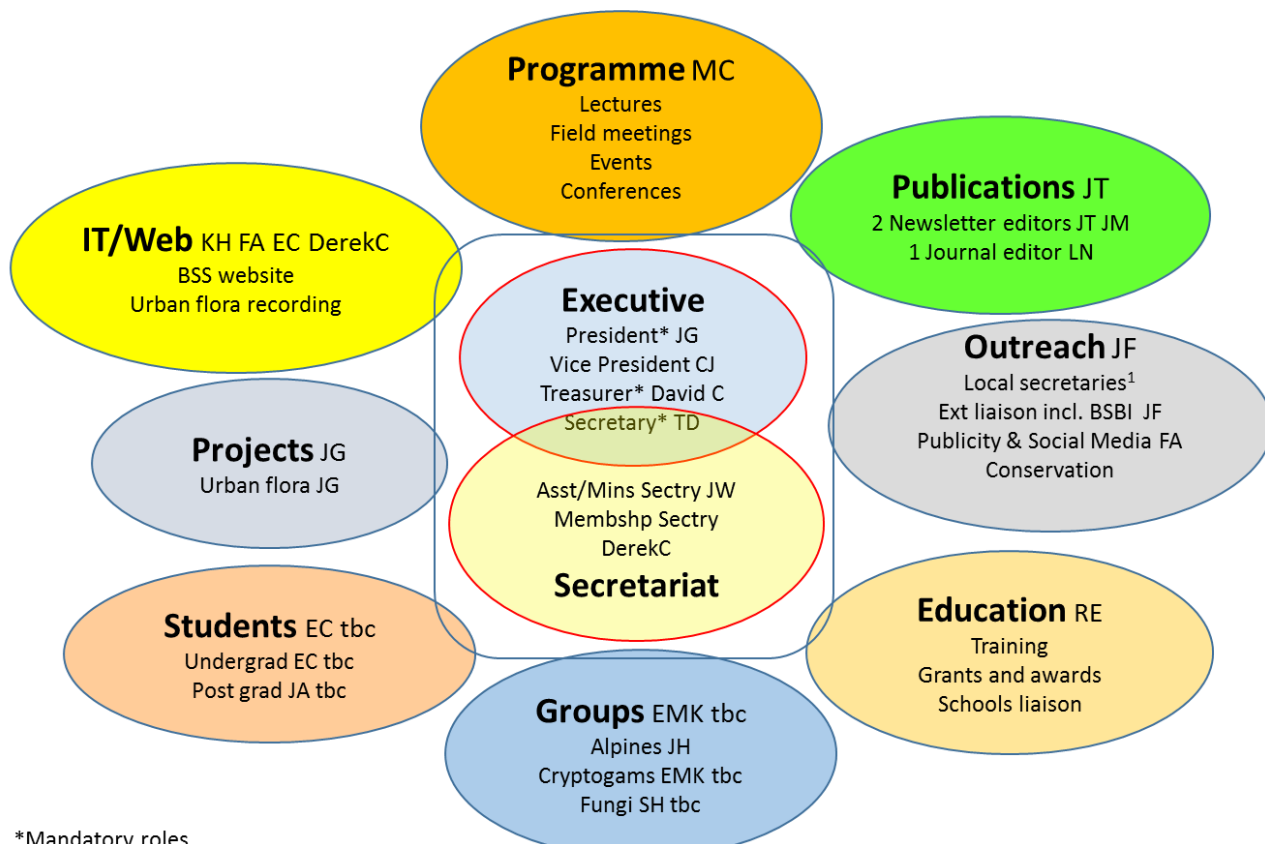
BOTANICAL SOCIETY OF SCOTLAND: AGM

The AGM will be held on 28th May 2015 at 17.00 at the Royal Botanic Garden Edinburgh. It will be followed by the final lecture of the season: *Deer management to enhance biodiversity in Scottish native habitats* by Dr Phil Ratcliffe.

NEW BSS COUNCIL STRUCTURE

Following the conversion of the BSS to a Scottish Charitable Incorporated Organisation (SCIO) last year, the BSS Council has restructured itself so that the Council itself is smaller and a number of committees linked to the Council undertake the various functions of the Society. The diagram below illustrates the new structure.

Proposed BSS Council structure - Executive and Committees



REPORT OF A MEETING ABOUT THE URBAN FLORA PROJECT, ROYAL BOTANIC GARDEN EDINBURGH, SUNDAY NOVEMBER 2ND 2014

We met representatives of other groups who have expressed interest in partnering us in the Urban Flora project, including Edinburgh Council, the BSBI, James Hutton Institute, Inverness Botany Group, The Wildlife Information Centre, Edinburgh Natural History Society, Perthshire Society for Natural Science, Inverness Botany Group, and other people who want to join us as recorders.

Here are some of the points raised. (I have tried to organize the points under headings although the discussion was at times quite wide ranging and crossed the headings).

Gardens and casuals

We must decide what to do about casuals, which are especially frequent as garden escapes on walls, graveyards and in allotments. We should not ignore them, as their escape from gardens may be ecologically significant. We decided the rule should be to count *all plants that have not been planted*. This immediately raises the subject of what to do about trees and shrubs, many of which have been planted, and many of which are exotics or particular varieties of native species that may be hard to identify. We should stick to the rule, and exclude them unless we think they are self-propagated i.e. naturalized. In some cases it will be impossible to know, and in case of any doubt, they should be included.

What constitutes urban?

Some delegates thought that we should adopt a more functional definition of what constitutes a town or city, rather than use the administrative boundaries. There was no consensus on this matter, although there was some support for the idea of using only 'built-up areas' (but this might exclude important sites, for example in Edinburgh the Castle Rock and Holyrood Park. If we decide on the administrative boundaries we include areas of farmland and uplands, which are surely not 'urban'.

Software

We discussed the ‘friendliness’ of the software that will be used for recording. Novice recorders need to feel a sense of achievement and they need to be given feedback by the software. This should be instant, something like ‘good job!’, and later, if their identification is deemed unlikely, they should be helped through the possible alternatives. Later, one delegate suggested that design of a set of responses could be the topic of a student project, possibly an informatics student. We were told about software used in the Aberdeen bee survey, which prompts the recorder. One can imagine software that establishes an intelligent dialogue with the user.

Attitudes in the city Councils

The local councils are expected to keep the urban environment ‘tidy’ and this often means frequent drenching of walls and pavements with herbicide. Likewise, some graveyards are frequently mown and stones are sprayed to ‘clean’ them. We were assured that in cases where important species occur, the Edinburgh council would accommodate our wishes and refrain from this practice.

Partners

There is now an extensive list of organizations that are keen to work with us as partners or volunteers (see appendix). Other organizations were suggested: scouts, Ecoschools, SWT groups, Wild Flower Society, Ranger Services.

Existing data sets

Much data for our major cities exist already, albeit not at the best level of resolution. Older data sets are still valuable and we should trawl our files and compile these data in a way compatible with our planned new database.

Geographical scope

We discussed at length the extent to which the project will be Scotland-wide, as opposed to Edinburgh-based. It was considered that whilst towns and cities out-with Edinburgh do not have as many botanists they nevertheless have small groups who are enthusiastic and keen to be involved. Although our main activities will be Edinburgh-based at first, we expect that satellite groups in other towns and cities will also make a start. Later, once the technical challenges have been addressed, the whole of Scotland will be involved. It will be important, in

the first 3-4 years to avoid over-burdening or distracting the BSBI recorders who are engaged in work for Atlas-2000. It might be useful to focus on city squares, which are already included in the set that the BSBI targeted in the presentation, given at the meeting on Saturday by Jim McIntosh. In this way we achieve a degree of synergism between BSS and BSBI.

Focus for 2015

Groups in other parts of Scotland should be encouraged to develop their own plans within the framework of this project, although in the first instance we shall apply for Edinburgh funding since that is more likely to be successful. We should progress our plan for a Walls Week in May 2014, with a Press Release. It will be important to have ready the recording system and the field handbooks in which will be showing 'Street Plants' (that's a good term that might resonate with the public and with the media). Include some bryophytes and ferns.

There were suggestions for:

- a photo competition for primary schools;
- adopting 10 metres of wall and watching what happens over the year (we call it 'wall-watch');
- events at the Botanic Gardens and Cammo Estate, perhaps Vogrie Park also, on 'identify 50 common plants';
- a book called The Urban Flora of Scotland.

Non-BSS participants at this meeting will be invited to attend planning meetings; their input is essential if the project is to extend beyond the BSS itself. Meanwhile we continue with allotments and bryophytes to build on what has been achieved.

Walls and allotments

In 2015 we will aim to work on the flora of walls and allotments, starting with a Walls Week in May. PLEASE LOOK ON OUR WEB SITE FOR DATES

Professor John Grace
Edinburgh University

THE WILDLIFE INFORMATION CENTRE AUTUMN CONFERENCE 2014 (15th November)

The Under-Recorded and Obscure – Addressing Gaps in Species Recording.

Graeme Wilson (TWIC Manager) introduced this one day event to highlight the deficiency of recorded information on a range of common, but often overlooked, groups of organisms. Not many plants as such, but definitely some species groups of botanical interest.

Dr Stephan Helfer from RBGE started off the morning with one of these groups, “Mighty Microfungi”, a brief overview of the 10,000 species of Micromycetes that grow, mainly undetected, all around us. He presented some wonderful images of individual species. This was followed by Keith Bland’s talk on “Recording Leaf-mining Insects” by charting the varying tracks of micromoths, flea beetles, small flies and occasional weevils, as they travel through leaf tissue in intricate and varied patterns, or follow leaf veins, or when hatching out the larvae in the garden shed (in jam jars!). The morning ended with three short ‘open mike’ sessions: Graeme Wilson, on recording small mammals from owl pellets and Longworth traps on behalf of Lothian and Borders Small Mammal Group; Natalie Harmsworth outlining some of TWICs recording excursions and events (from leopard slugs to badgers at <http://www.wildlifeinformation.co.uk/>); Susannah Jennings and Cathy Cooper introducing themselves and the new Penicuik Estate Ranger Service.

For me, the particular highlights came in the afternoon with Water Beetles presented in a sandwich of Spiders and Seaweeds. Katty Baird started us off after lunch with “Spiders – Nothing to be Scared of” and introduced us to a few of the 441 spiders, 17 harvestmen, 13 pseudoscorpions and unknown numbers of tick and mite species that can be found in Scotland, including the wonderfully named daddy long-legs spider, the four-spot orbweaver, the toothed weaver, the fork-palped harvestman and the eyelash harvestmen. “Water-beetles – the Which Lothian Question” was presented by Garth Foster of the Balfour-Browne Club. Water beetles, like plants, are recorded by vice county which can make recording difficult in the Lothians where rivers form much of the boundary between the three counties. If you find something in the River Almond does it belong in West or Mid- Lothian? The final talk of the day was from Dr Clare Scanlan with “Seaweeds – More than

just Slime: Seaweed Biodiversity and Uses in a Changing World” and an overview of the range of species and their uses from food to fertiliser, not only in Scotland but across the world. Sarah Eno (TWIC Chair) summed up this unusual conference that successfully raised awareness of some of Scotland’s under-recorded and more obscure groups of organisms.

In addition to the talks there were displays and information leaflets from several local recording groups. Links to these, and many other local and national organisations can be found on the TWIC website.

The TWIC Conference took place on Saturday 15th November at the Eric Liddell Centre, Morningside Road, Edinburgh.

Barbra Harvie
barbra.harvie@sruc.ac.uk

BSBI/BSS SCOTTISH ANNUAL MEETING 2014

The annual BSBI/BSS meeting was held at the Royal Botanic Garden Edinburgh on 1st November 2014.

Mark Watson opened the meeting with a welcome to the Royal Botanic Garden Edinburgh (RBGE) and some news on staff changes. Heather McHaffie (Scottish plants officer) and David Long (bryologist) retired this year, a new bryologist is in post and recruitment for a new mycologist is underway. Mark encouraged everyone to make use of the RBGE library and herbarium. For those who can’t get to Edinburgh, the RBGE is digitising the herbarium - 23% of specimens have been digitised so far, including all the type specimens.

Robin Payne, BSBI Scottish Chairman congratulated Jim McIntosh on completing 10 years in the post of Scottish Officer, and Rod Corner on receiving the Marsh Prize for Botany. A brief AGM elected new BSBI Scottish committee members.

Jim McIntosh, BSBI Scottish Officer, gave an account of his year’s activities with recorders and volunteers. The Scottish recording week at Shiel Bridge was over-subscribed so Angus Hannah ran a parallel week on Arran. Following this success, two recording weeks are planned for the next five years, starting with Ayrshire and Shetland in July 2015.

A huge amount of training goes on, including plant family identification workshops, a grass identification weekend and introductory workshops on grasses, sedges and ferns. Andy Amphlett organised a team of volunteers in the Cairngorms National Park, who together contributed 18,000 records from the Park. The BSBI Mapmate Handbook has been completed and is online. Jim has just completed 10 years in his post and is currently applying to SNH for further funding. As part of this process he calculated the value of the voluntary work done by BSBI volunteers – it comes to 1,500 volunteer days worth an astonishing quarter of a million pounds.

John Grace, BSS President, gave an update on changes to the society. The BSS became a Scottish Charitable Incorporated Organisation (SCIO) as a basis for expanding the society's membership and activities, and in order to be able to employ people in the future. The new Council will consist of a central executive along with representatives of working groups dealing with meetings, publications, IT, students, education, outreach and projects. The Urban Flora project is expected to last around 10 years, involving citizen science and using phone apps for recording.

Jim McIntosh talked about [Atlas 2020](#) and how volunteers can help with recording. The aim of this project is to produce comprehensive maps and data of botanical taxa across the British Isles. The BSBI plans to record a sample of at least five tetrads in every hectad in Britain and Ireland, visiting most of them twice. There are 1110 hectads in Scotland and 831 still need to be recorded in the five remaining seasons. A [map of suggested squares](#) on the BSBI website pages shows where recording could be targeted and volunteers can adopt a square to survey. All maps will eventually be available online (see the current [Online Atlas of the British and Irish Flora](#)). The main outputs will be interpreted data such as a Scottish red database.

Jakob Assman gave a presentation on the spread, population genetics and population structure of *Chalara fraxinea*, the fungus causing ash dieback. Spores are dispersed by wind, infecting new trees through the leaves. The first sign of infection is wilting, followed by black necrosis of the leaves. Diamond shaped lesions form on the stem potentially blocking vascular tissues and the disease can be lethal. Using genetic fingerprinting, Jakob looked at the spread of the disease in Scotland and found a large degree of differentiation between populations of the fungus compared with a much smaller degree in an

area of SE England. It is hard to say how this affects the resilience of ash.

Barbara Sumner gave an account of the work involved in compiling [A Rare Plant Register for Midlothian](#). Barbara's concerns that this publication would expose rare plants to the threat of collection were outweighed by concerns that a lack of knowledge about plant locations leaves them vulnerable to loss to development. The Register includes native and archeophyte rare and scarce plants. Non-persistent "casuals" are excluded unless they have conservation status. Ideally only naturally occurring plants should be included but this can be difficult to judge. Extinct species are also listed. Barbara concluded that habitat destruction has been the greatest cause of loss of plants on the register.

Ian Strachan described two projects he worked on this summer. The first was Scottish Natural Heritage's Habitat Map of Scotland, which will fulfil Scotland's obligation to monitor the habitats listed in Annex 1 of the EC Habitats Directive, and also the obligation (under the EC's INSPIRE Directive) for habitats to be mapped in a consistent way across Europe. Habitats will be mapped according to the EUNIS (European Nature Information System) classification, which covers all natural and artificial habitats throughout Europe including marine habitats. Ian has developed a manual of EUNIS terrestrial habitats and this is being used for a pilot project mapping the uplands of Scotland. All maps and data will be freely available on-line when they are ready. Ian noted that EUNIS is not a replacement for the NVC (National Vegetation Classification), which is still the basis of habitat mapping in Scotland.

Ian also recounted his experience of Extreme Botanising on Ben Nevis. The north face of Ben Nevis has the highest cliffs in Britain and is home to 30 nationally rare or scarce plants. Ian, together with Gordon Rothero, monitored these with the help of a team of climbing guides – the botanists trained the climbers in plant identification and the climbers helped the botanists to reach ledges that may never have been visited before. Several new locations for rare species were recorded, including *Saxifraga rivularis* (Highland saxifrage), *Saxifraga cespitosa* (Tufted saxifrage), *Saxifraga nivalis* (Alpine saxifrage) and *Poa flexuosa* (Wavy meadow-grass).

Maria Marin, together with Giles Laverack of Scotia Seeds, is participating in the NASSTEC (NAtive Seed Science, TEchnology and Conservation) Initial Training Network, a European consortium which

trains researchers in native seed science, conservation and use. Maria project is on Improving seed quality in large-scale production.

Jonathon Silvertown gave the final talk of the day, on Re-inventing botany in a networked world. He noted the decline of university botany departments in Europe. Although identification is fundamental to the study of botany and natural history, it is no longer taught in schools and universities. [iSpot](#) is an international crowd-sourcing website designed to help beginners put names to species, by connecting them with experts and fellow enthusiasts. Users wanting a species identification post their observation, with image and location, and other users then post their opinions, with explanations, until a consensus on the likely identification is reached. Users can develop a reputation according to the number of correct identifications they have made; their reputation then adds weight to their subsequent identifications. Identifications come quickly – 25% within 10 minutes and 50% within an hour. iSpot also provides keys, as well as software to allow users to make their own keys, and the facility to build on-line projects.

Jane MacKintosh

GREAT DIVERSITY OF AQUATIC PLANTS FOUND IN THE LOCH LEVEN NATIONAL NATURE RESERVE 50TH ANNIVERSARY “BIOBLITZ”

To help celebrate the 50th anniversary of Loch Leven’s designation as a National Nature Reserve (NNR), Scottish Natural Heritage organised a “BioBlitz” on the 5th and 6th July 2014. Local wildlife experts were invited to help interested members of the public find and record as many different species of organisms as possible over a 24 hour period. Two freshwater ecologists, Laurence Carvalho and Iain Gunn from the Centre of Ecology & Hydrology (CEH), led the search for aquatic plants at several different locations around the shore of Loch Leven. With the help of Emma Goodyear, a desmid specialist and wetland ecologist with the Scottish Environment Protection Agency (SEPA), and Claudia Ferguson-Smyth, a local enthusiast, we were able to find a wide range of aquatic species to show to members of the public.

In total we recorded 20 aquatic (submerged and floating-leaved) species. Particular highlights were the following records: *Potamogeton praelongus* (Long-stalked Pondweed), a species that was only recently

re-recorded in Loch Leven after an absence of almost 100 years; *Potamogeton filiformis* (Slender-leaved Pondweed), a nationally scarce species; five different stoneworts, including the nationally scarce *Tolypella glomerata* (Clustered Stonewort); and *Callitriche brutia* var. *brutia* (Intermediate Water-starwort), which is possibly a new record for Loch Leven (see photograph on inside back cover).

The diversity of aquatic plant species is indicative of the continuing recovery of this flagship lake site that has suffered for many years from the problems associated with nutrient enrichment. Evidence of Loch Leven's recovery is supported by CEH's long-term monitoring programme, which has been recording biological and chemical water quality data at Loch Leven since 1968. The CEH records have shown that algal blooms are reducing in frequency, the water is becoming clearer and underwater plants are beginning to thrive again in deeper water. Overall, a total of 447 different species, covering a wide spectrum of animal and plant taxonomic groups, were recorded around Loch Leven during the 2014 "BioBlitz".

One unsolved botanical mystery is a stonewort record from 2004 of the sub-tropical Arabian/Indian stonewort *Chara socotrensis*, which was confirmed at the time by Nick Stewart, the national stonewort referee. This species is thought likely to be an introduction, possibly brought in accidentally by anglers, but no one knows for sure. There was no sign of *C. socotrensis* in our 2014 survey, which may be good news in terms of losing a non-native species, but we suspect it may still be lurking somewhere in the 'depths' of the loch!

Iain Gunn
Centre for Ecology & Hydrology (Edinburgh)
idmg@ceh.ac.uk

For more details of Centre for Ecology and Hydrology monitoring at Loch Leven see:

http://www.ceh.ac.uk/sci_programmes/water/scottishfreshwaterecosystems-lochleven.html

ILLUSTRATIONS OF NON-NATIVE INVADERS 1

Fallopia japonica

Janet Dyer exhibited a series of traditional botanical illustrations of ten non-native invaders at the Royal Horticultural Society (RHS) Malvern Spring Show (2013, Gold Medal) and RHS London Shades of Autumn Show (2014, Silver Gilt Medal). Each species was illustrated in watercolour; in most cases the plant was portrayed life-size with enlarged flower dissections within standard dimensions of 532mm x 386mm. Most were also accompanied by an ink line drawing of the same subject at two-thirds life size within a 280mm x 360mm format.

Most taxonomic publications include only line drawings because of the additional cost of colour reproduction. BSS News is pleased to publish Janet Dyer's colour illustration of *Fallopia japonica* on the back cover of this issue. Further illustrations of non-native invaders will be reproduced in subsequent issues.

***Fallopia japonica* (Houtt.) Ronse Decr.**

Usually called **Japanese Knotweed** but also known by a variety of common names including Sally Rhubarb, Hancock's Curse and Elephant Ear Bamboo, this octoploid ($2n=8x=88$) is native to Japan, China and Korea. Much has been written about this, the most notorious of the invasive weeds, and the environmental and economic damage it causes. Eradicating it from the Olympic Park (London) alone is estimated by the RHS to have cost £70 million. It was first described in 1777 by Houttyn from specimens collected by Thunberg in Japan. In about 1825 von Siebold brought it back to his nursery in Leiden and distributed it throughout Europe for cultivation as an ornamental. It was sent to RBG Kew in 1850 and RBG Edinburgh in 1854 and about the same time it was first offered for sale, by Jackson and Sons of Kingston-upon-Thames. It was first found naturalised in the wild in 1886. Although still being recommended by garden designers in 1900, by 1905 the RHS was urging gardeners "not to plant Knotweed unless it is most carefully kept in check". It is still spreading and now frequent to common throughout the British Isles and a serious weed throughout Europe and North America. Also naturalised but less widespread are the dwarf Japanese Knotweed, tetraploid ($2n=4x=44$) *F. japonica* var. *compacta* (Hook.f.) J.P. Bailey; the Giant Knotweed, *F. saccalensis* (F. Schmidt ex Maxim.) Ronse Decr.; and, mostly in southern Britain growing with one

of the parents, the inter-specific hybrid *F. x bohémica* (Chrtek & Chrtková).

Japanese Knotweed produces aerial stems which grow rapidly (up to 7.5cm per day) to a height of 2-3m. The hollow stems, often red-blotched at the base and red towards the apex, are produced annually from perennial underground rhizomes, which can grow to a depth of 3m. The stems form dense colonies which expand as the rhizomes spread horizontally. The simple alternate leaves on red petioles are broadly ovate and cordate. The small white flowers are produced in large loose panicles in late summer. Although both ovaries and stamens develop in each flower, according to Stace in almost all flowers of British plants only the ovaries are functional, so the very few seeds that form are likely to be hybrid after pollination by other related species. As a result, it must be concluded that dispersal to new sites is by distribution of rhizome fragments, perhaps after soil erosion as well as by inappropriate disposal, including fly-tipping, of garden rubbish.

Japanese Knotweed colonises disturbed ground in river banks, roadsides and wasteground on a wide range of soils. The rhizomes can enter buildings, weaken foundations, damage flood defences, penetrate concrete and lift tarmac. Domestic properties with Japanese Knotweed can be difficult to sell because mortgages are withheld. It can cost £20,000 to remove Japanese Knotweed before selling a house. In the wild, the dense thickets of leafy shoots shade out native plants and the deep leaf litter suppresses seed germination. The rhizomes are very resilient and difficult to eradicate. A small clump was in the garden when we bought our house in 1968, and despite removing shoots as they appear every year since then, it still comes up every spring. Removal from a site by excavation requires soil to be removed to a depth of 3m from an area extending 7m beyond the edge of the colony and then transported to a site where it can be chemically treated. The plant is resistant to chemical control and herbicide treatment has to be both repeated and intensive, by spraying or stem injection, to be successful and elimination of Japanese Knotweed with chemicals is a very expensive procedure. In Britain there are no natural herbivores of Japanese Knotweed. Control by introducing a non-native sap-sucking plant louse, a 2mm-long psyllid called *Aphalara itadori*, has been investigated experimentally. Evidence from test sites in England indicate that *Aphalara* does not attack other plants, but while it can destroy the aerial shoots of *Fallopia*, it has not been shown to eradicate it.

Meanwhile, there is strict control of disposal of Japanese Knotweed by legislation in the Wildlife and Natural Environment (Scotland) Act 2011. It is not an offence to grow Japanese Knotweed in a garden but it is an offence to plant, or otherwise to cause it to grow in the wild, outwith its native range. More recently, an amendment to the Anti-social Behaviour, Crime and Policing Act of 2014 requires owners to aim to control Japanese Knotweed on their property in order to stop it being a problem in the neighbourhood. Plantlife recommends that gardeners do not compost Japanese Knotweed but dispose of it by burning on site. The combination of chemical or other control with legislation might restrict its colonisation of new sites, and even with considerable effort eradicate some existing colonies, in urban areas. However, it is hard to believe that its continued spread can be prevented in more rural areas such as Arran where there are many colonies, large and small, scattered widely around the island, near the shore and inland, both among habitation and out in the wider countryside.

Adrian Dyer



Detail with flower dissections from the ink line drawing accompanying the water colour of *Fallopia japonica* (Japanese Knotweed) by Janet Dyer.

STUDENT DISSERTATION PRIZE WINNER 2015

The winning entrant in this year's student dissertation prize competition is James Downie from the University of Aberdeen, by unanimous decision of the judges. Titles and abstracts from all four dissertations are presented below.

James Downie

University of Aberdeen. Supervisor Dr. Sarah Woodin

The effect of heather burning on lichen communities in a Scottish heathland

The effects of heathland burning on lichen communities were studied at the Maim (SAC) Crathie, Aberdeenshire. A blocked sampling regime was used to sample the lichen communities in different-aged patches of heather. Each block contained a young (~4 years old), a medium (~8 years old) and an old (~10-12 years old) patch. Ten quadrats were recorded within each patch and the percentage cover of each lichen species and other plants and environmental data were recorded. The data were analysed using multivariate techniques (DCA, CCA), linear models of Shannon-Weiner index with environmental variables and comparisons of different diversity indices.

Burning strongly promoted lichen community diversity; young patches had the highest diversity followed by medium and then old patches. Young patches were typically dominated by many small lichen species with small cover (such as *Cladonia chlorophaea* and *C. floerkeana*), whilst medium and old patches were dominated by mat-forming species such as *C. portentosa* and *C. arbuscula*. Burning cycles of 10-15 years are likely to be acceptable in maintaining the lichen communities at their present healthy status. However, if lichen community diversity is to be promoted, then areas of unburnt heather and burning cycles in the order of 15-20 years ought to be considered

Jakob Assman

University of Edinburgh. Supervisor: Dr. Richard Ennos

Population structure of *Hymenoscyphus Pseudoalbidus*, The causal agent of ash dieback, in Great Britain

The recent emerging ash dieback caused by the ascomycete fungus *Hymenoscyphus pseudoalbidus* is currently threatening the common ash tree *Fraxinus excelsior* in Europe. The aim of this honours project is to determine the genetic structure of the *Hymenoscyphus pseudoalbidus*

meta-population of Great Britain. Overall, six populations were studied: three in the east of Scotland and three in the south-east of England. Individuals were genotyped based on DNA extractions from bark lesions using six microsatellite markers. Strong evidence was found for genetic structure in the meta-populations in the south-east of England ($F_{ST} = 0.224$). Furthermore, the findings indicate well-pronounced differentiation among the populations in the east of Scotland and no differentiation among the populations in the south-east of England, but due to the limitations of this project no confident conclusions can be drawn about the differences between both meta-populations. Finally, the observed genetic variation is entirely distributed within, but not between the two countries, consistent with the introduction of the pathogen into both countries from a common source (i.e. continental Europe). So far no other evidence for structuring *H pseudoalbidus* populations based on microsatellite data has been reported from populations in Europe. These findings therefore suggest a unique situation in the pathogen's meta-data of Great Britain providing many opportunities for further research, in particular studying the spread of the pathogen.

Edward Marcher Lewis

University of Edinburgh. Supervisor: Dr. Barbra Harvie

Will forest habitat networks enhance the diversity of woodland plants in Central Scotland

This study aims to assess the efficacy of forest habitat networks (FHNs) in enhancing the diversity of Central Scotland's woodland plants. This is pertinent research as it also evaluates the ability of FHNs to help attain Scotland's biodiversity targets: that halt and subsequent reversal of biodiversity loss. This study uses four variables to appraise Central Scotland's FHNs; three are considered ecological cornerstones validating FHN expansion, and one explores anthropogenic management of FHNs. The cornerstones are woodland size, woodland isolation, and woodland connectivity, with the last variable gauging woodland quality. These variables were measured using a combination of data collected on sites and GIS analysis. A generalized linear model showed none of these variables to have a significant relationship with woodland plant diversity. Despite this, components of these variables were shown to impact botanical composition and abundance. This study complemented certain ecological theories such as the edge effect but countered others such as the species-area relationship. Further analysis demonstrated that the botanical community of Central Scotland's

woodlands vary both within and between woodlands: however, woodland generalist species clearly dominate at both patch and landscape scale. Despite plants of high conservation importance being present in the broader landscape, none were found in this study. The study therefore concludes that FHNs can benefit Central Scotland in many ways, but their ability to enhance botanical diversity, at least in the short term, is limited. Consequently, alternative strategies will be required for Scotland to accomplish its biodiversity conservation objectives.

Anja Helena Liski

University of Aberdeen Dr. Andy McLeod

Optimizing green roofs for plant biodiversity: A preliminary investigation

Green roofs are intentionally grown vegetation layers that sit on top of conventional roof surfaces, which can potentially be used to rebuild some of the ecosystem functions provided by nature. The aim of this study is to understand how the physical build-up of green roofs can be optimized in order to maximise plant biodiversity. The influences of substrate depth, substrate, mixture and methods of vegetation establishment on plant biodiversity were quantified on 85 experimental vegetation plots, located on seven green roofs in Helsinki and one in Oulu (Finland). The Species richness, species and functional diversity (forbs, graminoids, Sedum species and bryophytes) and plant cover was assessed.

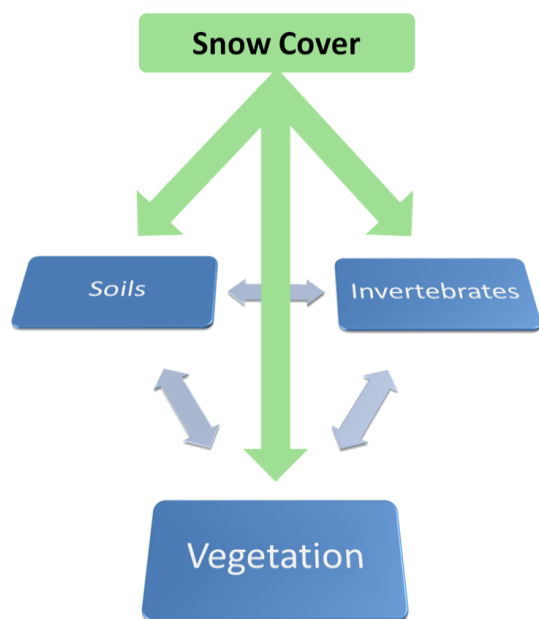
The addition of biochar and/or limestone in the substrate mixture did not affect the plant performance one year after the establishment. The performance of succulent Sedum species was not limited by substrate depth, whereas the functional plant diversity and performance of forbs and grasses was poor at shallow substrates (3-7 cm) and incrementally increased with substrate thickness. However, the depth effects on the plant could not be reliably distinguished from the “roof effect” (i.e. microclimatic differences between roofs), as plots with thicker substrates were only found on roofs that were experiences lower drought stress at the time of sampling. Plots were established using different methods supported plant communities with distinct functional profiles. As a result, they are likely to differ in their abilities to cool via evapotranspiration, reflect solar radiation and facilitate the performance of other species.

VARIATIONS IN ASSEMBLAGE AND FUNCTIONAL TRAITS OF PLANTS GROWING IN AREAS OF LATE-LAYING SNOW

Interim results from a study of feedback mechanisms within snow patch habitats in the Cairngorm Mountains, Scotland.

In the context of climate and environmental change, ecosystem resilience has become an increasingly important topic. However, trying to quantify ecosystem resilience is incredibly challenging due to the complex relationships that make up an ecosystem. As John Muir so eloquently wrote many years ago, “When we try to pick out anything by itself, we find it hitched to everything else in the universe”. Given how all the numerous parts of an ecosystem are inter-related, just how much can one element be changed, without consequences for the entire ecosystem (often referred to as the ‘tipping point’)? To answer this our study aims to quantify the feedback mechanisms that maintain the ecosystem state within areas of late snow-lie and will eventually incorporate data on snow cover, vegetation, above and below ground invertebrate communities and soil processes.

Late snow-lie ecosystems (Figure 1) were selected for study because forecasted climate change suggests we can expect to see an increase in temperatures over the next century, and as a result a



subsequent reduction in snow cover during winter as more precipitation falls as rain instead of snow. Although this will be prevalent at all altitudes, it is expected that temperatures at higher altitude will increase faster than those lower down, and we are already seeing the effects of climate change through increasing species richness on mountain summits across Europe (Dick, 2013; Pauli, 2012).

Figure 1 Basic conceptual model of late snow-lie ecosystem, and its principle environmental driver; snow cover.

Plant communities in areas of late snow-lie are symptomatic of the challenging habitat in which they live. Snow cover provides vital protection during winter from extreme low temperatures as well as from physical damage and desiccation resulting from exposure to wind. Accumulated organic material trapped within the snow also provides a source of added nutrient after the snow has melted. However, long lasting snow cover acts to reduce the length of the available growing season to plants growing beneath. Any future reduction in the thickness of snow cover would result in reduced protection from extremes in weather whilst simultaneously increasing the length of available growing season. In time this is likely to lead to changes in plant community assemblage as more environmentally ubiquitous species become established.

To make use of long-term environmental data available from Environmental Change Network (www.ecn.ac.uk), remnant late snow-lie patches were surveyed in June 2013, with suitable sites for study selected from the NW facing slopes of Sgoran Dubh Mor within the Allt a'Mharcaidh catchment, Cairngorms National Park. The initial focus was on surveying vegetation within, out-with and on the margin of the snow patches. The vegetation survey was accomplished using a 1x1m quadrat sub-divided into 100 10x10cm at each location. In each sub-plot all vascular species were identified, with bryophytes and lichens aggregated into functional groups (*Cladonia* sp., Bryophyte sp., *Sphagnum* sp., and *Racomitrium* sp.) and recorded as present or absent (occurrence). Percentage cover was recorded for the 1m² plot. Ten specimens of dominant species from both within and out-with areas of late snow-lie were measured for physical traits including in-situ height and lateral spread as well as leaf length, width, thickness and specific leaf area (SLA).

As expected clear differences were readily identifiable between plant community assemblages dependant on their location internally, externally or along the margins (transitional) of areas of late-laying snow (Figure 2). Occurance and cover of species such as *Empetrum nigrum* and *Deschampsia flexuosa* were found to be greatly reduced in areas of increasing snow-lie, along with *Cladonia* lichens and the moss *Racomitrium lanuginosum*.

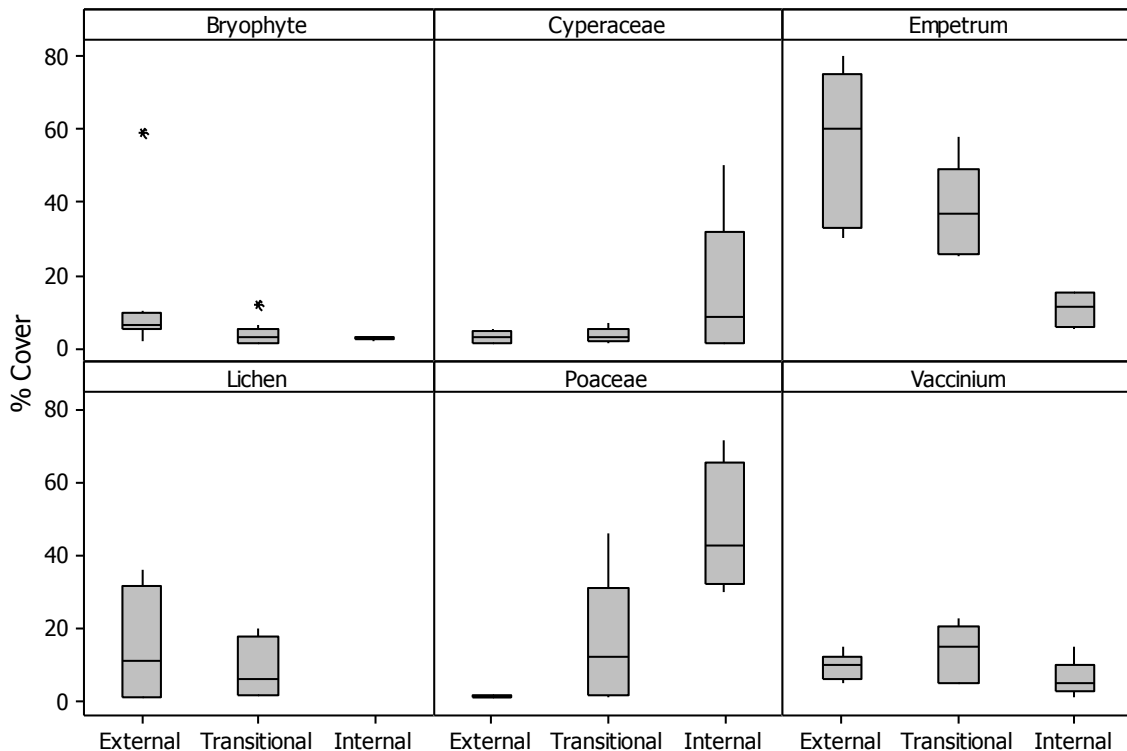


Figure 2 Percentage cover of six variable groups of species including two ericaceous genera - *Vaccinium* and *Empetrum*; two families - sedge (Cyperaceae) and grasses (Poaceae); Lichens (Cladoniaceae) and Bryophytes, situated externally, internally or marginally (transitional) to late laying snow patches.

Reduced species were replaced by large increases in cover and occurrence of *Nardus stricta* and sedges (typically *Tricophorum cespitosum*). Although percentage cover of Ericaceous species only declined slightly, changes to species assemblage did occur with *Vaccinium myrtillus* decreasing and *V. uliginosum* increasing as period of snow-lie increased.

It might also be expected that the physical traits of plants would vary as a response to the differing environmental pressures caused by increased snow-lie. However most observed changes were largely marginal. Leaf length of *D. flexuosa* was somewhat reduced in late snow lie areas, whilst leaf thickness remained fairly consistent. Despite little change in leaf length the heights of plants in-situ tended to be slightly higher in late snow areas particularly with *E. nigrum* and *V. myrtillus*, whilst the lateral spread of *E. nigrum* was slightly reduced. The increased growing height of ericaceous species in late snow-lie might well be related to the added protection afforded by snow cover from frost damage. Perhaps most interesting however was a small

increase in specific leaf area in *Carex bigelowii*, *V. myrtillus* and *D. flexuosa* in late snow-lie areas. An increased specific leaf area (SLA) provides the plant with increased photosynthetic capacity and could be an adaption to maximise photosynthetic potential in the shorter growing season. Increased SLA is often seen in plants tolerant of living in shaded environments for the same reasons.

Although much work remains in the coming year, quantification of the vegetation assemblage is now complete, and we should have a fuller understanding of the functioning of snow patch driven ecosystems once we have collected further data on the under-laying soil processes and invertebrate communities.

Christopher Andrews
Centre for Ecology & Hydrology
chan@ceh.ac.uk

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**BSS ALPINE FIELD MEETING TO BEINN
DUBHCHRAIG, WEST PERTHSHIRE
(V.C. 88) 28TH JUNE 2014.**

The 2014 joint BSS/BSBI alpine field meeting was to Beinn Dubhchraig (978 m) a Munro located 5.5 kilometres south-south-west of Tyndrum in the north-west corner of the Loch Lomond and the Trossachs National Park, and within Vice County 88. Our group of twelve mountain flower enthusiasts met at the Tyndrum Community Woodland car park at Dalrigh ("The King's Field" - the site of Robert the Bruce's skirmish with the McDougalls of Lorn in 1306), which is to the east of Beinn Dubhchraig. Our first stop was the field beside the car park, which is an un-grazed wet heath with abundant *Myrica gale* (Bog Myrtle), *Molinia caerulea* (Purple Moor Grass), *Narthecium ossifragum* (Bog Asphodel) and *Trichophorum germanicum* (Deer Grass). The ditches that flow through the field contained *Galium palustre* (Marsh Bedstraw), *Epilobium palustre* (Marsh Willow-herb), *Menyanthes trifoliata* (Bog Bean), *Myosotis laxa* (Tufted Forget-me-not), *Pedicularis palustris* (Marsh Lousewort) and *Potamogeton polygonifolius* (Bog pondweed). There was also abundant *Carum verticillatum* (Whorled Caraway), which is near the eastern edge of its main distribution in Scotland.

After spending a few minutes in the field we set off along the track over the White Bridge that crosses the River Fillan, and through an area of hummocky moraine dominated by *Molinia caerulea* (Purple Moor Grass). Along the track species included *Juncus tenuis* (Slender Rush) (a non-native species that is almost always found growing along tracks), *Plantago maritima* (Sea Plantain), *Pinguicula vulgaris* (Common Butterwort) and *Drosera rotundifolia* (Round-leaved Sundew). After crossing over the Crianlarich to Oban railway line, the path then went over an area of bog before reaching the Allt Gleann Auchreoch. There used to be a bridge across the river at this point, but it is now derelict and unsafe, and, therefore, the group had to cross using stepping stones. Luckily the weather had been dry for several weeks so the water level was low and we managed to cross without getting our feet wet.

Once across the river we were into the Coille Coire Chuilc Pine Woodland. Coille Coire Chuilc is one of the southernmost remnants of Caledonian Pine forest in Scotland and is designated as a SSSI. The woodland is composed mainly of old Scots Pine and Downy Birch

growing on moraine hummocks, with areas of open bog between the drier moraine features. There is very little structure to the woodland with hardly any regeneration of young Scots Pine and no maturing trees, resulting from a long and continued history of sheep and deer grazing. Despite this the woodland has its own distinctive character and beauty. The ground beneath the pine trees was dominated by *Vaccinium myrtillus* (Blaeberry) and *Melampyrum pratense* (Common Cow-wheat) with frequent *Neottia cordata* (Lesser Twayblade). The boggy areas were dominated by *Calluna vulgaris* (Heather) and *Erica tetralix* (Cross-leaved Heath), with *Eriophorum angustifolium* (Common Cotton-grass), *Eriophorum vaginatum* (Hare's-tail Cotton-grass), *Carex pauciflora* (Few-flowered Sedge), *Carex canescens* (White Sedge), *Rhynchospora alba* (White Beak-sedge) and *Carex magellanica* (Tall Bog Sedge). As we walked through the woodland we saw Common Crossbill, Redstart and a number of Scottish Wood Ant nests. The path up through the wood is often extremely wet, muddy and midge infested, but the recent dry weather meant that it was far better than usual.

Near the upper edge of the woodland we took a slight diversion from the path to look at the vegetation growing in the river gorge, where we found *Saussurea alpina* (Alpine Saw-wort), *Trollius europaeus* (Globeflower), *Geranium sylvaticum* (Wood Crane's-bill), *Galium boreale* (Northern Bedstraw), *Oxyria digyna* (Mountain Sorrel) and *Saxifraga aizoides* (Yellow Mountain Saxifrage). Above the woodland the hill slope was dominated by *Calluna vulgaris* (Heather) with *Vaccinium myrtillus* (Blaeberry), *Vaccinium vitis-idaea* (Cowberry), *Vaccinium uliginosum* (Bog Blaeberry) and patches of *Rubus chamaemorus* (Cloudberry), some of which were covered in fruit. Growing within this wet heath there were also a few *Trientalis europaeus* (Chickweed Wintergreen).

We stopped for lunch close to the Allt Coire Dubhchraig where there was a base-rich flush containing *Carex capillaris* (Hair sedge), *Linum catharticum* (Fairy Flax), *Juncus triglumis* (Three-flowered Rush), *Thalictrum alpinum* (Alpine Meadow-rue), *Saxifraga oppositifolia* (Purple Saxifrage) and *Persicaria vivipara* (Alpine Bistort). As we climbed higher up the mountain we found a number of flushes dominated by *Carex saxatilis* (Russet Sedge). Beside the path on the upper section of the walk heading up towards the summit ridge, we also saw frequent *Carex vaginata* (Sheathed Sedge) much of which was in flower, as well as *Silene acaulis* (Moss Campion) and *Sibbaldia procumbens* (Sibbaldia).

The summit ridge itself was dominated by a low growing mat of *Carex bigelowii* (Stiff Sedge), *Racomitrium lanuginosum* (Woolly Fringe Moss), *Festuca vivipara* (Viviparous Fescue) and *Salix herbacea* (Least Willow). Within this sedge-heath summit vegetation there were some patches of *Juncus trifidus* (Three-flowered Rush), and scattered *Luzula spicata* (Spiked Woodrush) and *Gnaphalium supinum* (Dwarf Cudweed).

Unfortunately the view from the summit was obscured by low cloud and this coupled with a strong breeze meant that we did not linger. Rather than returning along the same path on the side of the Allt Coire Dubhchraig we decided to descend the mountain down the north ridge. On the way back down we found a patch of flowering *Cornus suecica* (Dwarf Cornel), and a flush containing *Eriophorum latifolium* (Broad-leaved Cotton-grass) and *Tofieldia pusilla* (Scottish Asphodel). A total of 156 flowering plants and ferns were noted during the day, a number of which were new to some members of the group. To round the day off some of the party joined me for tea and cakes at the nearby SRUC Kirkton Farm, which was an agreeable way to end a very enjoyable and productive excursion.

The 2015 BSS alpine field meeting will be on Saturday 27th June and will be to Tulach Hill, near Blair Atholl. This Dalradian limestone site is of particular importance for its rare 'sugar limestone' grassland, grass heath, flush and limestone pavement vegetation as well as its alkaline fen vegetation.

John Holland (BSS Alpine Secretary)
john.holland@sruc.ac.uk

Photos from this meeting are shown on the front inside cover.

HINTS FOR SOLVING *Phytolexicon cruciformis* CROSSWORDS

Most of the solutions are families, genera or species of vascular plants taken from Stace or from Heywood et al. *Flowering Plant Families of the World*, so not necessarily in the British flora. There are some non-vascular plants of all groups. The list of short generic names given opposite may be helpful. There are also some words that might be found in a botanical or ecological glossary, and a small number of non-botanical English words, labelled (English) in the clue. There are more of these in some crosswords I wrote in my first batch, which have been mixed in with my second batch. The label (English name) means the English name of a plant. In the case of genera or species the name of the family is usually included unless it would make the clue too obvious. The assignment of families is to the best of my belief current in 2014, but genera keep swapping families recklessly, and there may have been changes by the time you read this; in particular, I have assumed that Chenopodiaceae has been gobbled up by Amaranthaceae. In the case of non-vascular plants I have included a few extra botanical details for those readers who are not bryologists, algologists, mycologists or lichenologists. I have tried to make these puzzles brainteasers but not excessively difficult. I hope you will relish the challenge.

I wish to thank Drs. David Chamberlain, Liz Kungu, Stephan Helfer and Rebecca Yahr, and Prof. David Mann, for help with non-vascular plants.

R.W.

Notes about the puzzles

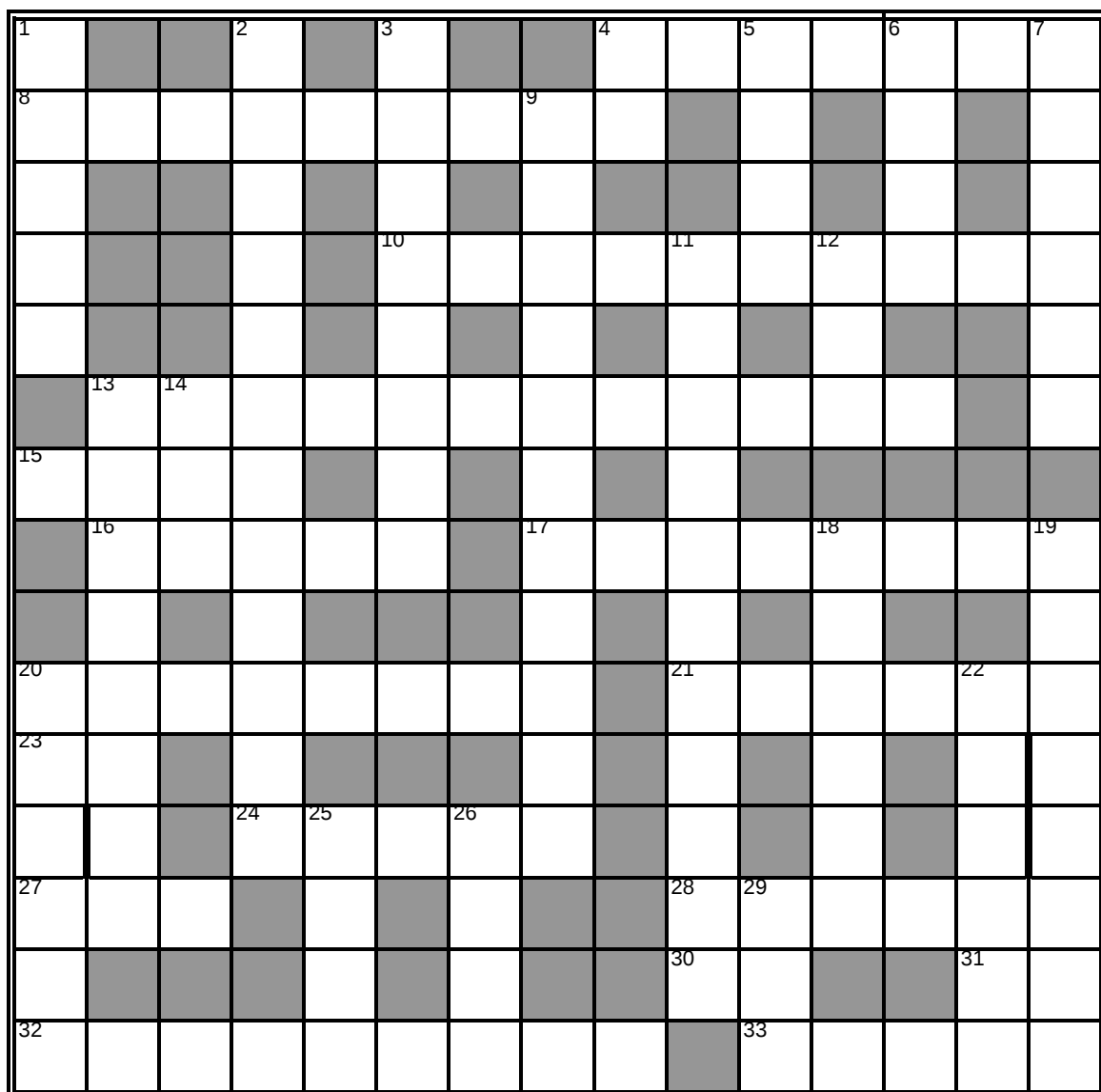
Many of the clues include the name concealed forwards or backwards in a phrase or as an anagram, but English names or other hints are often included. Sometimes I have only been able to find a near-anagram, and if so I have cryptically indicated letters that should be subtracted from or added to the anagram; in particular 'Noël' means omit L, 'Y not' means omit Y from the anagram and 'with/without energy' means add/omit E from the anagram before solving. Where two letters lying together in parallel words form the symbol of an element (and in a few other cases) this has been given as a clue; this may help you to put in some letters. See the list of short generic names given here.

Tables of short generic names

POA	CICER	SENNA	AGARUM	CONYZA	LANZIA	POTTIA
ZEAL	DASYA	SISON	ALARIA	CORNUS	LAURUS	PRATIA
ACER	DRABA	STIPA	ALISMA	CORREA	LEOTIA	PRUNUS
AIRA	DRYAS	TAMUS	ALLIUM	COSMOS	LESKEA	PTERIS
AMMI	ERICA	TAXUS	ALOINA	COTULA	LEYMUS	PYROLA
ARUM	ERUCA	THUJA	ANEURA	CRAMBE	LILIUM	QUALEA
ATLA	FAGUS	TILIA	ANKYRA	CREPIS	LOLIUM	QUIINA
BETA	FICUS	TSUGA	ARABIS	CRINUM	LUZULA	RADULA
GEUM	FOMES	TUBER	ARALIA	CROCUS	LYCIUM	RESEDA
HEBE	FUCUS	TYPHA	ARCTOA	CYNARA	MALOPE	RICCIA
ILEX	GAGEA	ULMUS	ASARUM	DAHLIA	MEESIA	RUPPIA
IRIS	GLAUX	ULOTA	ASEROE	DAPHNE	MELICA	RUSCUS
IXIA	INULA	UREDIO	ATROPA	DATURA	MENTHA	SAGINA
LENS	JANIA	USNEA	AUCUBA	DAUCUS	MIBORA	SALVIA
LUMA	LARIX	VERPA	AXYRIS	DILSEA	MILIUM	SCILLA
MEUM	LASER	VICIA	AZOLLA	DIRINA	MONTIA	SECALE
RHUS	LEDUM	VIGNA	BALLIA	ECHIUM	MYCENA	SESELI
ROSA	LEMNA	VINCA	BANGIA	EGERIA	MYRICA	SICYOS
ROYA	LINUM	VIOLA	BASSIA	ELIXIA	NARDIA	SILAUM
RUTA	LOTUS	VITIS	BELLIS	ELODEA	NARDUS	SILENE
SASA	MADIA	YUCCA	BERTIA	ELYMUS	NEPETA	SOLIVA
SIDA	MALUS	ACACIA	BERULA	EPHEBE	NEREIA	SORBUS
SIUM	MALVA	ACAENA	BETULA	ERINUS	NESLIA	STICTA
ULEX	MNIUM	ACERAS	BIDENS	EUTYPA	NOSTOC	SUAEDA
ULVA	MUCOR	ACORUS	BIFORA	EXIDIA	NUPHAR	SYNURA
ABIES	MYLIA	CISTUS	BLASIA	FATSIA	ONONIS	TAONIA
ADOXA	NAJAS	CITRUS	BORAGO	FERULA	OPHRYS	TERANA
AGAVE	NONEA	CLEOME	BRODOA	FILAGO	ORCHIS	THOREA
AINOA	PANUS	CNICUS	BROMUS	GALEGA	OTIDEA	THYMUS
AJUGA	PARIS	CODIUM	BUNIAS	GALIUM	OXALIS	TIMMIA
ALCEA	PHLOX	COLURA	BUNIUM	GONIUM	OXYRIA	TOLPIS
ALNUS	PHOMA	CONIUM	CAKILE	HASLEA	PADINA	TRACYA
ANODA	PICEA	CONYZA	CALTHA	HEDERA	PANNUS	TRAGUS
APERA	PIKEA	CORNUS	CATENA	HOLCUS	PELLIA	TRINIA
APIUM	PINUS	CORREA	CEDRUS	HYDNUM	PENIUM	TULIPA
ASTER	PISUM	COSMOS	CHENIA	HYELLA	PEZIZA	UDOTEA
AVENA	PSORA	COTULA	CHORDA	HYPNEA	PHACUS	URTICA
BRIZA	PYRUS	CRAMBE	CICUTA	HYPNUM	PHLEUM	VANKYA
BRYUM	RHEUM	CREPIS	CISTUS	IBERIS	PICRIS	VESTIA
BUXUS	RIBES	CRINUM	CITRUS	ISATIS	PICTUS	VISCUM
CALLA	RUBIA	CROCUS	CLEOME	JUBULA	PIERIS	VOLVOX
CAREX	RUBUS	CYNARA	CNICUS	JUNCUS	PITHYA	VULPIA
CARUM	RUMEX	DAHLIA	CODIUM	KALMIA	POHLIA	XERULA
CHAGA	SALIX	ACTAEA	COLURA	KERRIA	POPOVA	XYLOMA
				KURZIA	PORINA	ZINNIA

***Phytolexicon cruciformis* B.S.SCOT (XWORD 9)**

XWord 9. Alas! my expedition to The Land Where The Bong Tree Grows has not got off to a good start: Edward Lear didn't leave a navigational chart. But I still have hopes of bringing *Sudoku* into cultivation at RBGE. 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 in the article above.



ACROSS

- 4 Without article, fundamental change with energy is at root of seedlings (7)
- 8 and 10a. Pharaoh's men die following African mammal into thorny bush (*Elaeagnaceae*). (9,10)
- 13 and 32 Vertically trim album I.O.U. Notorious parasite of many higher plants. (*Plectosphaerellaceae*/*Hypocreaceae*) (12, 4-5)
- 15 Baltic city covered by lichen *Brigantiaea* (English). (4)
- 16 Write sweet ode about fern. A genus with massive, erect stem to 2m tall, leaves pinnate/bipinnate+pinnatifid, sporangia mostly confined to lower pinnae. 2 spp in S.Africa, New Zealand, Australia and Papua-New Guinea (*Osmundaceae*). (5)
- 17 See 18d.
- 20 Genera can thus conceal a genus /Shut a can concealing bear's trousers in their own family. (8)
- 21 Grass, maybe with a strict preference for moorland? (6)
- 23 Element central to *Acer*. (2)
- 24 Scarab I esteem depicts Christmas. (5)
- 27 Fish herring fleet threw back /Fish thrown back by *Keteleeria*. (3)
- 28 United Arab Emirates confuses elm with tribe of its family. (6)
- 30 Système International, constituent of sand. (2)
- 33 Old English ape tribe of grasses. (5)

DOWN

- 1 Half of anther caught by the camera of botanists. (5)
- 2 Are head pains cured by this relative of the Panama Hat plant? (*Cyclanthaceae*) (12)
- 3 Grass growing in ancient Greek city? No, on mud flats. (8)
- 4 Element from the Rhine with hesitation. (2)
- 5 Mesopitys as dead as this (English). (4)
- 6 In arctic old botanists are this. (4)
- 7 Jaboty butter is made from this, and hides it (*Vochysiaceae*). (6)
- 9 Arabs do sip concoction when I join them (*Brassicaceae*). (11)
- 11 In ethanol dean thus conceals a tree (*Oleaceae*). (11)
- 12 Promissory note written on scarious membrane (English). (3)
- 13 Family that makes wine. (8)
- 14 Self-esteem originating in archegonium (English). (3)
- 18 and 17a. Olive; rend apart then reassemble to find a different tree. (6,8)

- 19 Does this family ape a sacred pome? Not mapped, but contained within. (8)
 - 20 To contain maniac, men administer Lillypilly (Myrtaceae). (6)
 - 22 Does alpaca pout, but lose plot, in search for this genus? (Euphorbiaceae). (6)
 - 25 Sucrose is extracted from a member of this genus. (4)
 - 26 Cut off source of foul drain and get vessel for water (English). (4)
 - 29 Impudent feature of Labiate flowers? (3)
-

A FRUITFUL SCOTLAND

I'm writing this in the bleakest part of winter, just into the New Year, just about the most fruitless time of year you can imagine. But it is also a time of new beginnings, and of planting new orchards – as we are in the middle of the planting season. Right now the trees sit dormant and full of potential, but what looks very close to being dead is all outward appearance. By the time this is published in March/April, the trees will be coming to life firstly with a surge of plum and cherry blossom, followed by apple, pears and so much more.

While it is nice to do apple day events – trying to celebrate blossom days is much more unpredictable. Some years the trees are in full blossom late in March – other years they are fully dormant at that time. But sitting here in the middle of winter, the surge of blossom, bees and the buzz of new life seems like a miracle. It is no wonder that people since history began, celebrated the rebirth of the year in spring. The timing may be unpredictable but it's amazing that it happens at all.

This takes me to the rebirth of the orchard movement in Scotland. I am pleased to be part of the movement to save old Scottish varieties of apples, pears and plums and with the replanting of new orchards and the recovery of existing Scottish orchards.

My interest goes back a long way. Partly it goes back to my early childhood. I remember very vividly picking and eating plums straight from the tree in my Auntie Mabel's garden – aged 2 or so. Probably one of my earliest memories, come to think of it. The plums were warm from the sun, and made a deep impression on me.

Later, as a journalist with an interest in environmental and food issues, I interviewed Bernard Planterose (over a bottle of birch wine)

when the Tree planters Guide to the Universe, was launched – this has now blossomed into our well loved Reforesting Scotland. That discussion with Bernard, who was talking about the possibility of a forest economy – using the Norwegian model, seemed ambitious then but for me the seeds of other ideas were sown.

I was excited by the dreams of a forest economy. But I like my food, and I was even more excited by the idea of creating an orchard economy, where food and fruit literally grows on trees. Why not plant trees, but trees that can produce food? Ideas such as permaculture and the food for foraging had an appeal in the 1990's for me.

I planted my first apple tree outside my Partick flat using the fee from a wee diary story, which had run in the Herald. The story was that I'd been asking Glasgow City Council why there were no fruit trees in parks. Having hassled them for a while, I eventually got a quote that they wouldn't plant fruit trees, because people would eat the fruit. It's a story that amused lots of people (and it's a joke that seems to still be circulating) but it didn't get any fruit trees into parks.

I did finally have fruit trees planted in a Glasgow Park – or rather Glasgow Botanic Gardens in 2004 – and this led me on to develop the Children's Orchard which aimed to have children across Scotland planting and nurturing their own fruit trees. This was an idea that spread fast, and led to our Commonwealth Orchard project – developing community orchards and also to the Fruitful Schools project – which was launched with Scottish Government support, and has led to hundreds of small school orchards being established in schools across Scotland. The dream for me is that children across Scotland will plant and grow their own fruit trees and experience the pleasure of picking and eating fruit from trees they planted. And perhaps in time they will bring their children back to the school where their tree is still growing.

In the past five years we have seen an explosion in the planting of school orchards and community orchards, to the point they are now mainstream. And at the same time there has been a parallel explosion in interest in planting orchards (as well as other edible plants and bushes) in gardens across Scotland. A recent survey (in the Daily Mail!) showed that along with having a cleaner, ski holidays, or a pony, having an orchard in your garden is a contemporary sign of success. Suddenly it is fashionable!

For the early years I worked closely with John Butterworth, who did so much to promote old Scottish varieties. About 4 years ago John closed his nursery unexpectedly and I decided to take on the supply of Scottish fruit trees (www.scottishfruittrees.com) mainly budded from his collection in Ayrshire, and also to expand the amount of consultancy work I was doing. Obviously it was necessary for people to have a source of trees and for folk to know what they are doing.

Around the same time we launched Scottish Orchards as a networking organisation to pull together people with an interest in fruit growing. We have run a number of Scottish Orchards Gatherings across Scotland which were very successful in drawing people together, and also have held Holyrood Apple Days at the Scottish Parliament for several years. We also piloted the idea of Open Orchards where people can visit orchards in season. This is a great idea that needs further development.

So where are we now? Well – we have come a long way toward creating a Fruitful Scotland. We have trees planted from Shetland to the Borders and from the Hebrides to Fraserburgh. Over time people have sprung up to make apple pies, chutneys and ciders. We have the start of an orchard economy in Scotland. The seeds have been planted for Refruiting Scotland, but as anyone who has planted seeds knows, they need nurturing and support.

There are still big obstacles to achieving the dream of a Fruitful Scotland. Not everything goes well: I have personally planted apple trees in George Square (one for the launch of the Commonwealth Orchard and one for the Royal Wedding of William and Kate) and rather sadly have seen both dug up in preparation for the Commonwealth Games. I've seen other orchards – both new and old – that have had problems and in some cases been removed. Most notably the recent loss of the large mature orchard at the Royal Edinburgh Hospital in Morningside seems an odd message for a Health Board to send out. It underlies the need for orchards to be valued and perhaps given protection by local authorities and by the public agencies that should be protecting our natural heritage. This seems to underline the need for Scottish Orchards to exist to campaign for our orchards.

Another obstacle against the establishment of larger and more commercial orchards is an opinion appearing in Scottish Government, which casts doubt on the viability of developing an orchard industry in Scotland. This letter to a member of Scottish Orchards reads “our

climate doesn't lend itself to the introduction of large scale commercial production. Blossom could be liable to being frosted, the climate at night would be too cold, and as a result the skin finish would be likely to be very poor." While it is certainly true that the climate in France or in Kent is certainly easier for fruit growing, it is sad that the official opinion is that Scotland cannot grow its own apples, pears and plums.

The problem with this lack of official support is that the re-establishment of an orchard industry in Scotland would benefit from some seedcorn grant support, in much the same way as commercial timber production is not really viable without some financial support. Fruit trees are not annual crops – and it takes five years to start producing viable quantities of fruit. And that makes the business case a bit difficult. But the other side of that is that we need a quantity of good quality Scottish grown fruit available to start to be able to market it.

We have proved that top fruit grows across Scotland. People are voting with their spade and planting fruit trees. There is no doubt in my mind that despite setbacks that we are seeing a Fruitful Scotland appearing. For me creating a Fruitful Scotland is more than planting trees, or even the fruit or the products. It is really about people. People living Fruitful lives and creating the sort of Scotland they want to see. It is about problem solving and thinking creatively and putting these thoughts into action. It is about giving people the land, the tools, the skills and the confidence and we can do amazing things. And it is not yet a job done, by any means.

By the time you will be reading this Scotland will be coming into spring blossom. While you may have forgotten other New Year resolutions - do your bit for a Fruitful Scotland by planting some fruit trees right away. Here's wishing you all a Fruitful 2015.

John Hancox

Useful links

www.scottishfruittrees.com

www.scottishorchards.com

www.fruitfulschools.com

BOOK REVIEW

‘MEADOWS’ BY GEORGE PETERKEN

“Meadows” is the second book in a new series produced by British Wildlife Publishing. The books - three published so far - rival the New Naturalist series in their detailed coverage of natural history topics and their production quality.

George Peterken writes about meadows from a personal point of view – after many years as a woodland ecologist he turned his attention to meadows while living in the Wye Valley and managing his own fields. His definition of meadows is generous and he takes in all grasslands, since it is impossible to show that the meadow habitat has been maintained over the centuries in the way that he did for woods. (Old maps record the woodland cover but not the crops growing on open fields.) His ‘meadows’ include tall herb, dune grassland, machair, flood plains, bog hay, lawns and wood meadows.

Peterken makes the links between grasslands and woods throughout the book, but mostly he describes the grasslands and their plants, their management and history. In the chapter on the meadow flora, he draws a neat pen picture of each common meadow plant, never becoming repetitive. Then he does it again for each meadow community in the National Vegetation Classification, and yet again for the different European meadow types.

Geographically, the focus of the book is on England but Scottish meadows get a good few mentions, including the beautiful Aith Meadows in Shetland, corncrake on the machair of the Western Isles, and rushy pastures, too tough to harvest, in the Borders. Further afield, meadow management regimes in Europe are diverse, including wood meadows where grass and leaf hay could be harvested along with nuts, fruit and firewood, and litter meadows that were cut for bedding. Further afield again, whole communities of English grasslands were translocated to the colonies when the native grasses proved inadequate for rearing stock.

Historically, the scope extends from the Bronze Age, when trees were lopped for leaf hay, to modern restorations such as the meadows at the London Olympic Park and the new Inch Meadows in Aberdeen. Grass cutting on a large scale was impractical before the invention of metal bladed sickles, which were first seen in the second century BC.

The Romans were writing about meadow management around 100 AD and a haycock is carved onto Trajan's Column in Rome.

Much of the recent history of meadows is, of course, of loss and conversion to species-poor productive grasslands. Peterken balances this sorry tale with the story of meadow conservation and meadow conservationists, particularly those of the old Nature Conservancy Council (NCC). Meadows were dismissed as non-natural until the 1960s when it became apparent that the previously unregarded species-rich habitat was fast disappearing. So NCC grassland ecologists stepped in and, along with sympathetic farmers, recorded and protected as many meadows as they could, while others were ploughed up in front of their eyes.

The chapter on making hay the traditional way records how the date for shutting up the meadow varied across the county, not just in response to climate but to different needs and priorities for grazing before and after the hay harvest. Hay is particularly in demand where large numbers of stock graze extensive upland pastures, such as the Pennines, the Welsh hills and much of Scotland. This begs the question: why are there so few traditionally managed hay meadows now in Scotland? England and Wales still have many; Scotland has very few outside the crofting counties. Sadly, this question is outside Peterken's remit.

This is a beautifully presented book of 400 pages, with more information about meadows than you probably thought existed. One of the most appealing chapters is that on meadow lore in art and literature. Meadows were sociable places where people worked together in warm sunny weather. Haymaking was a happy activity. That's a cheerful image to be left with.

Jane MacKintosh

This review appeared first in the Spring 2015 issue of Scottish Forestry.

NEWS FROM THE ROYAL BOTANIC GARDENS EDINBURGH

Botanic Lights, one of the highlights of our year

Great news. The Royal Botanic Garden Edinburgh has been nominated in the 'Garden of the Year' category of the annual BBC Countryfile Magazine Awards. The shortlist has been compiled by BBC Gardener's World Magazine, and RBGE is up against other world-class gardens including Kew, Alnwick and the Lost Gardens of Heligan. Around 800,000 people visited RBGE both during the day and the November evenings to see the Botanic Lights show, making this a memorable year.

The closing date for votes was January 31 2015, and the award winner will be announced in the April issue of Countryfile.

Selection of upcoming events and courses

Spring lecture: Petticoats and Plants - Scotland's Gardening Women, 1800 – 1930

Join the Friends of RBGE and the Garden History Society of Scotland for their joint Spring lecture

Royal Botanic Garden Edinburgh Thurs 19 Mar 2015

Support Scotland's Garden Scheme Charities

Logan Botanic Garden is open to support Scotland's Garden Scheme Charities. The Garden reaches it's early summer climax with a canvas of colours ranging from exotic Rhododendrons, spectacular Paeonias and Meconopsis to name but a few.

Logan Botanic Garden Sat 24 May 2014 — Sun 24 May 2015

Vegetable Ancestors - Coffee Morning

The Really Wild Veg project explores how domesticated crops differ from their wild ancestors. Which is better for our health?

Scotland's Royal Botanic Garden Edinburgh Tues 10 Mar 2015

Open Garden: Rocheid Garden

A young, but rapidly maturing garden with an impressive diversity of native, exotic and rare plants, shrubs and trees.

Royal Botanic Garden Edinburgh Sat 13 June 2015

Blue Poppy (Meconopsis) Workshop

This one day workshop will look at cultivation and propagation techniques for successfully growing Meconopsis.

Royal Botanic Garden Edinburgh Sat 13 June 2015

Wildflower Identification at Dawyck

This one day workshop includes a hands-on session to teach you some basic skills, plus a field trip for a chance to put them into practice.

Dawyck Botanic Garden Sat 27 June 2015

PLANT TAXONOMY TRAINING COURSES

The Distributed European School of Taxonomy (DEST) <http://www.taxonomytraining.eu/>, an initiative under the CETAF umbrella and managed by RBINS, has launched its NEW website and training programme for 2014-2015!

Check out the Modern Taxonomy programme <http://taxonomytraining.eu/content/modern-taxonomy-2014-2015>.

Offering intensive theoretical courses in various subjects. Also, have a look at the Expert-in-training programme.

<http://taxonomytraining.eu/content/expert-training-2014-2015> Enabling trainees to develop and strengthen their taxonomic research skills through on-the-job-training.

DEST Training

Coordination - Dr Isabella Van de Velde

Secretariat - Dr Hendrik Gheerardyn

www.taxonomytraining.eu <http://www.taxonomytraining.eu>

dest-training@naturalsciences.be

<mailto:dest-training@naturalsciences.be>

Royal Belgian Institute of Natural Sciences

Vautierstraat 29, B-1000 Brussel

Tel: 32 2 627 43 34 (336)

<http://www.naturalsciences.be> <<http://www.naturalsciences.be>>

BSS NEWS – INFORMATION AND GUIDELINES FOR CONTRIBUTORS

The Newsletter of the Botanical Society of Scotland
ISSN 0967-5922

Editors:

Receiving editor:

Dr Jill Thompson

Tel. no.: 0131 258 2358 (evenings)

E-mail: jiom@ceh.ac.uk (work)

E-mail: jill.thompson99@gmail.com (home)

Coordinating editor:

Ms Jane MacKintosh

Tel. no.: 01968 675650 (evenings)

E-mail: jane.mackintosh@snh.gov.uk (work)

E-mail: jane.mackintosh@tiscali.co.uk (home)

Aims of BSS

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. By these means members can keep in touch with each other. There is also a further aim of providing interest, entertainment and stimulation for BSS members. Sometimes this may involve contributions from non-members. 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 (the latter to be in black ink on white paper). 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 a PC and saved as a document in MS Word 2010. Although it is printed on A5 pages it is set up on A4 pages using Arial font (size 15 for major text, 18 for main headings and 14 for acknowledgements and references). 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.

Text figures

Illustrations for the text can be line drawings, maps or graphs in black ink on white paper. Black and white photographs can also be reproduced. There is no colour reproduction in the text. Hard copy or digital images can be accepted.

Cover pictures

The cover is the display area for colour pictures (paintings, photographic prints or digital images). Original artwork will be returned to the author after careful use. Please ensure (and indicate in your correspondence) that you have appropriate copyright permission and permission from any people in photographs for publication in BSS news.

Submission

Please send your contributions to the Receiving Editor in any of the following forms:

- 1 E-mail attachment. This is the preferred option but, if you have many images, please send the images on a CD.
- 2 CD.
- 3 Hard copy (computer print-out and original artwork).
- 4 If you have no access to a computer, a typewritten or handwritten manuscript will be acceptable.
- 5 Through the template on the BSS website: <http://www.botanical-society-scotland.org.uk/content/bss-news-newsletter-botanical-society-scotland>.
- 6 If you are not a BSS member receiving the BSS News then please send a postal address to receive your complimentary copy of the newsletter.

Send email with text and photographs to: jill.thompson99@gmail.com.

For emailed pictures, please add the name of the photographer and the subject to the file name of the photograph. For photographs in articles, please add information and the credit to the photographer at the end of your article.

Send hard copy and CDs by post to:

Dr Jill Thompson
C/O Botanical Society of Scotland Newsletter
Royal Botanic Gardens Edinburgh
20A Inverleith Row
Edinburgh
EH3 SLR

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 August 2015. Earlier submission would be appreciated.

SOLUTION TO Phytolexicon cruciformis

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Back cover pictures

Outside

Watercolour Illustration of *Fallopia japonica* (Japanese knotweed) by Janet Dyer. See article on page 15.

Inside

Top: *Callitriche brutia* var. *brutia*, Intermediate Water-starwort. See article on page 13. © Claudia Ferguson-Smyth

Bottom: The North Orchard at Howkerse. Photo and description below by Crispin Hayes, taken from a Survey of Traditional Orchards in the Forth Valley, 2009, by Crispin Hayes.

The North Orchard at Howkerse is a fine old pear orchard. The orchard is on flat, heavy carseland and is somewhat wet underfoot. With the exception of the central section, which is fenced off, the orchard is grazed by cattle. It contains 26 old pear trees up to an estimated age of 200 years, and 3 apple trees of a century in age. Of particular interest is the new central section where there are 25 young pear trees – which are grafts of the older unusual varieties. The grafting was carried out in 1992 by John Geddes of Central Scotland Countryside Trust, and the young trees were grown on for a year at Lanark prior to being planted out. The work was grant aided. This is an excellent example of orchard replenishment. Fruit from these orchards is used by the keepers, and in recent years community groups have been involved gathering the fruit to sell at local farmers' markets.

See article on page 32 (A Fruitful Scotland) about the movement to save old Scottish varieties of apples, pears and plums and with the replanting of new orchards and the recovery of existing Scottish orchards.





Janet Dyer