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Front cover pictures

Outside

Intermediate Wintergreen flower spike. July 2010, Glencairn Meadow.

Photo: © Andy Scobie. See article on page 40

Inside

Photos from the Next Generation Plant Ecology and Evolution Workshop.
See articles on pages 10 and 13.

Top: Delegates of the workshop. (Photo: Lynsey Wilson)

Bottom left: The Molecular Ecology Prize being awarded to Prof. Deborah Charlesworth for her work on the evolution of sex chromosomes and mating systems. (Photo: Lynsey Wilson)

Centre right: Next Generation Plant Ecology and Evolution logo. (Image: Catherine Kidner and Chris Jeffree)

Bottom right: *Megapalpus capensis* bee-fly visiting a *Gorteria diffusa* capitulum. (Photo: S. Brockington). See article on page 14.

Botanical Society of Scotland

(Incorporating the Cryptogamic Society of Scotland)

c/o Royal Botanic Garden Edinburgh

20A Inverleith Row, Edinburgh, EH3 5LR.

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

RBGE website: <http://www.rbge.org.uk>

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. After more than ten years without change, membership subscriptions will rise from October 2012 to:

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.

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The Newsletter of the Botanical Society of Scotland

EDITORIAL

This issue of BSS News spans botanical work from the cutting edge to the traditional. At one end of the spectrum, we have articles on next-generation DNA sequencing technologies and phylogeny based on DNA evidence. At the other end, we have the results of classic field survey, including the discovery of the rare saltmarsh sedge *Carex salina* at two new sites, and a new BSS publication *Celebrating Diversity in Community Woodlands in Scotland*. Congratulations to Barbara Sumner, BSS President, and Barbra Harvie, our Secretary, on the publication of this report of the Society's Community Woodlands Project, which ran for five years from 2006 to 2010. You can see further information on the report on the following page.

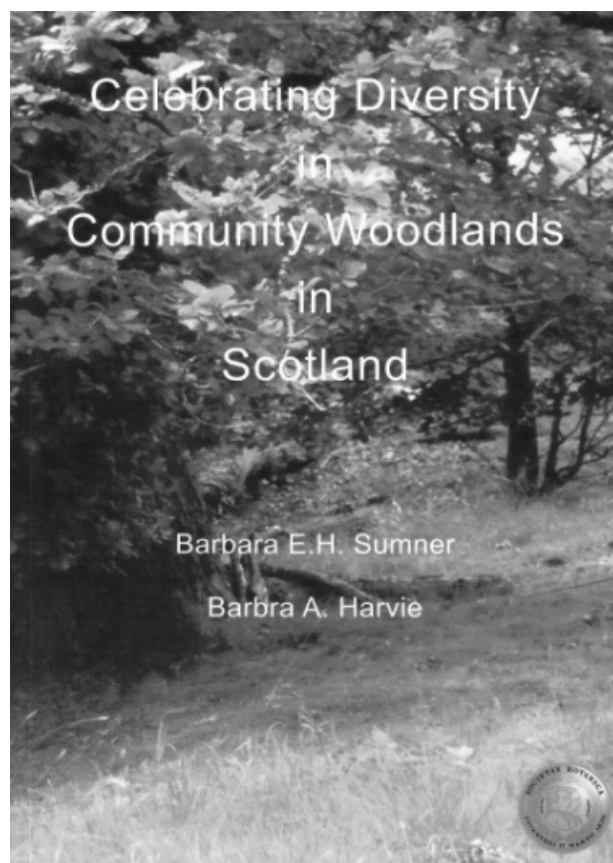
For many years now, BSS News has come to you via the Pen-y-coe Press in Penicuik. This old-fashioned printers shop is now closing and this is the last issue to be printed there. We wish the proprietors, Ian and Pat Wallace, a long and happy retirement.

The previous two editors of BSS News were both accomplished artists; not so, unfortunately, the current editors. Barbara Sumner provided the illustrations for this issue and we would welcome further contributions of botanical drawings from our readers for future issues. Thank you to all our contributors. If you have any comments on BSS News - the articles, the production or anything you would like to see in future issues, please get in touch with either of the editors.

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Jill Thompson, jiom@ceh.ac.uk

SOCIETY NEWS

We are sorry to announce the death of Dr. Agnes Walker, BSS member and author of *A Garden of Herbs: Traditional Uses of Herbs in Scotland*.



NEW PUBLICATION FOR THE BSS!

The BSS field project on community woodlands in Scotland has culminated in a 60-page, illustrated report, published by the Botanical Society this summer (Sumner & Harvie, 2011). This report is intended for a popular readership, including woodland groups and anyone interested in plants and the woodland habitat. The report begins with introductory sections describing the background to the project, the aims of the study and the survey methods used. These sections are followed by an overview of the woodland sample. Then each of the 15 community woodlands studied during the project is briefly described in terms of structure and floristic composition and illustrated with a photograph. The location of each woodland is shown by means of a sketch map and an OS grid reference. Some of the vascular plants found are illustrated with line drawings. The woodland management groups were given a chance to contribute to the report by providing an update on their woodland if they wished, and the updates reveal their enthusiasm, their plans for the future and their resilience in the face of adversity. The final sections of the report summarise the findings and make suggestions for the future.

Books and websites which may be of interest are listed. Faunistic records and a few records of bryophytes, lichens and fungi are summarised in an Appendix. The full reference for the report is given below.

Reference

Sumner, B.E.H. and Harvie, B.A. (2011) *Celebrating Diversity in Community Woodlands in Scotland*. Published by the Botanical Society of Scotland, Edinburgh. ISBN 978-0-903077-07-1

This report can be purchased at £6 per copy (plus £2.75 postage & packing for mailing a single copy within the UK) from the Hon. General Secretary, Botanical Society of Scotland, c/o Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh, EH3 5LR

INVITATION TO KEEN PHOTOGRAPHERS

The BSS is updating its membership recruiting leaflet and would like a striking picture for the front page. We are looking for a photograph, **in portrait orientation**, of a single plant or a small group of plants that are characteristic of the Scottish flora. We cannot use the Scots primrose (*Primula scotica*) because that has already been used as an emblem by the Scottish Wildlife Trust in the past. Other photogenic possibilities include the Scots pine (*Pinus sylvestris*), the Scottish bluebell or harebell (*Campanula rotundifolia*), bell heather (*Erica cinerea*) or spear thistle (*Cirsium vulgare*), but you are welcome to choose your own idea of a typical Scottish plant. If you prefer to select a small group of plants, we suggest you include non-flowering as well as flowering species, e.g. a vascular plant with bryophytes and fungi.

We invite you to submit high resolution digital images by e-mail attachment to the BSS General Secretary (barbra.harvie@ed.ac.uk). If you are sending more than one picture, please only attach one picture to one e-mail message. Any photograph submitted should have been taken by you, i.e. it should be your copyright. The **closing date** for receipt of entries is **30th April, 2012**. Entries will be considered by the BSS Council in early May and the winning picture should appear on the front of the recruiting leaflet by June.

Thank you for any images you are willing to send.

Barbara Sumner, President BSS

ILLUSTRATING MODERN PLANT RELATIONSHIPS

Plant classification is a funny thing. Most of us know our genera and families, and what know what's a monocot or a dicot. but how do the families fit together? Apart from knowing the difference between monocots and dicots, many of us know very little about how flowering plant families are related to one another. Until I started teaching the subject, I tended to assume that families were related if they occurred on the same or adjacent pages in Keble Martin's (1974) *Concise British Flora*. While that is sometimes the case (the sequence of families in Keble Martin (1974) seems to reflect assumed relationships at the time), there are plenty of surprising relationships that seem to confound morphology. For example, it turns out that the closest British relatives of the Asteraceae are the Menyanthaceae (which some previous classifications lumped with Gentianaceae). Campanulaceae comes a distant second.

Scientists now know the relationships of vascular plant families in considerable detail, due to the efforts of the Angiosperm Phylogeny Group (APG). This is a broad working group of plant scientists who use molecular phylogenetics: the science of determining relationships between species based on DNA evidence. This evidence can demonstrate more than just genetic similarity; it can provide a robust statistical test for any hypothesis of shared ancestry, and hence determine whether a given group of species shares a unique common ancestor or not. The APG philosophy is that all members of any plant family or order must share a unique common ancestor: i.e. one that is ancestral to all of it's members, but no other species. Their classification system encompasses all flowering plants, and was first produced in 1998, and then updated in 2003 and 2008.

At the same time, relationships within families were being scrutinised by the same methods. Most familiar families survived this process intact, but a few that we grew up with - notably Scrophulariaceae, Liliaceae and Caprifoliaceae - have been, to quote a friend from Kew, shattered! Scrophulariaceae has lost speedwells, toadflaxes and foxgloves to a greatly expanded Plantaginaceae, and *Mimulus* to Phrymaceae, and now among British species comprises mainly figworts, mulleins and the recently added *Buddleia*.

Former Liliaceae members are spread across families too numerous to list; tulips and lilies remain Liliaceae, *Paris* and *Colchicum* are in Melanthiaceae and Colchicaceae respectively, but the real surprise is that bluebells and *Scilla* are now in the Asparagaceae, which is now in a separate order (Asparagales) from Liliaceae (Liliales). Asparagales also contains orchids, daffodils and irises, which each retain their familiar family names. Meanwhile Caprifoliaceae has been greatly reduced in size by the transfer of *Sambucus* and *Viburnum* to the formerly monotypic Adoxaceae, which from an evolutionary perspective indicates that *Adoxa* itself is a specialised species derived from large woody ancestors, much like *Cornus suecica*. One also wonders what Linnaeus would make of the erection of the family Linnaeaceae to contain his favourite flower and some of its close relatives. The latest edition of Stace (2010) largely follows these changes, though Stace balked at uniting *Plantago* with refugees from former Scrophulariaceae, instead calling the latter Veronicaceae.

When I began teaching plant relationships at Edinburgh University, I was faced with the challenge of conveying these relationships to the students. I needed a resource that would show how families were grouped into orders, and the orders themselves into larger groups. Hence I began to design a large diagram describing with precision the exact relationships of vascular plant families. This was made possible by the fantastic Angiosperm Phylogeny Website (Stevens, 2001 onwards), which contains an astonishing amount of detail about the latest knowledge on plant relationships. The diagram was drawn by me from scratch using information from the website over the past 12 months. I also wanted to do something that I have never seen elsewhere, which was to indicate throughout the diagram how many species were in each group, to show just how uneven a process plant evolution has been. The diagram comprises all vascular plants but not Bryophytes, whose relationships are not quite as clear yet as those for vascular plants.

The resulting diagram is spread across twelve A4 sized pages, which are designed to be printed individually, and then fitted together into a whole. This should allow anyone with a simple printer to print the diagram. I've tried to make it as colourful as possible (although it looks OK in black and white; the following page shows an extract but the original is sharper), adding in pictures of familiar plants to help the eye to navigate the evolutionary tree. Some of these are my own, one

(*Rafflesia*) is by Maria Chamberlain, but the majority are copyright-free images taken from Wikimedia.

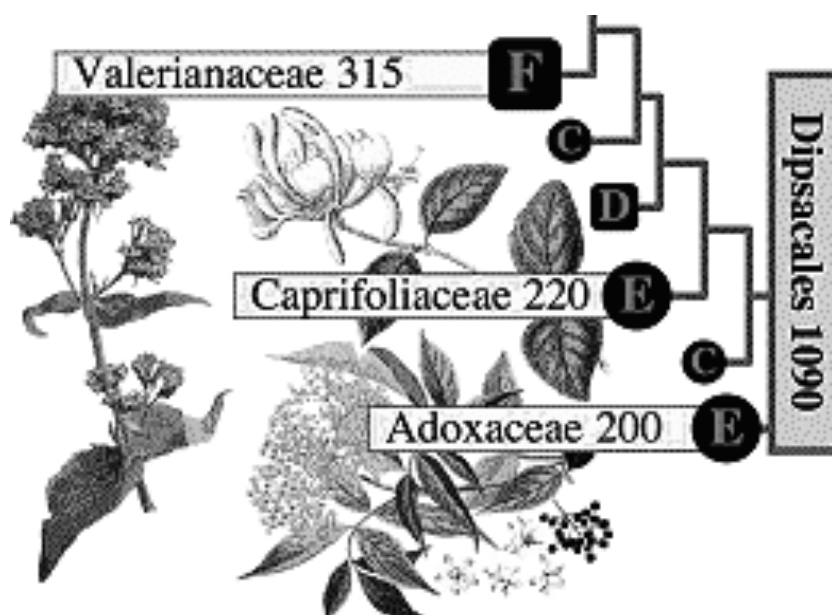
Our understanding of relationships among plants may continue to change, but large scale changes seem unlikely in the future due to the non-subjective nature of DNA evidence. However, changes at the family level will continue to occur occasionally as individual groups are examined in more detail. For this reason, my diagram should be taken to represent relationships as understood during spring 2011.

The diagram is being made available to all BSS members to download through the BSS website. We include a taster here on the cover of BSS news. I also aim to make a full poster version available for sale. However, as with any work of this kind, mistakes may creep in. Therefore, I will be grateful for any and all feedback, as this is a new project and there is always room to improve!

Dr Richard Milne
University of Edinburgh

References:

- Keble Martin, W. (1974). The concise British flora in colour. Ebury Press, UK.
- Stace, C. (2010). New Flora of the British Isles, 3rd Edition. Cambridge University Press, UK
- Stevens, P. F. (2001 onwards). Angiosperm Phylogeny Website. Version 9, June 2008 [and more or less continuously updated since]
<http://www.mobot.org/MOBOT/research/APweb/>.



NEXT GENERATION PLANT ECOLOGY AND EVOLUTION: WORKSHOP REPORT

What new scientific approaches will be central to plant biology in the 21st century? What is the molecular/biochemical basis of heterosis [hybrid vigour]? How can we use our knowledge of the molecular biology of disease resistance to develop novel approaches to disease control? These are three of the 100 most important questions in the plant sciences (Grierson *et al.* 2011) and like many of the others, are unanswered questions with old roots that will only be solved with new scientific approaches. In many cases, answers are likely to come from DNA sequence data. The workshop “Next Generation Plant Ecology and Evolution”, held at the Royal Botanic Garden Edinburgh in October 2011, and part funded by the BSS, was organized to discuss such questions and the ways in which the next-generation of sequencing technologies may answer them.

Next-generation DNA sequencing technologies (NGS) allow large portions of a plant genome to be sequenced at a (relatively) low-cost, even for species where no genetic information is currently available. The exciting development of NGS techniques will mean that ecologically interesting species, which have not previously been the subject of genetic analysis, can now be worked on. This is particularly relevant to the Scottish flora, which is characterized by a large number of taxonomically complex species, many of which are polyploids and/or hybrids, where resolving species relationships has been difficult (e.g. *Euphrasia* and *Sorbus*; Ennos *et al.* 2005). This technology therefore opens up a window of opportunity to investigate species in a new light, and the emphasis now falls on designing good quality research which can fully utilize this technology.

To highlight the ways in which these techniques might be used, the meeting was organized around six main themes: adaptation and fitness, gene flow and genetic differentiation, species-relationships (phylogenetics), the genetics of speciation, DNA barcoding, and gene expression patterns. In each case, we were told how to apply NGS to the specific research area by a leading expert in the field. Many of the experts highlighted the need for good experimental design and classical methods (such as field transplants) to complement DNA sequence data.

A general consensus emerged that the development of new bioinformatic tools is required to make the most of the available sequence data. Urmi Trivedi, a bioinformatician at the University of Edinburgh, gave an excellent talk on just this: What bioinformatic tools are currently available, and how should these best be used? She emphasized that assembling the information from reading short sequences of DNA typical of NGS (typical Illumina Solexa reads of 150 base-pairs) is currently the greatest challenge, as there is often little overlap between the sequences. However, she suggested that the next-generation of plant scientists could easily learn basic bioinformatics to manipulate the data into a useful format, and that we shouldn't see it as a 'no go' area limited to the experts. The PowerPoint presentation accompanying her talk is available to download from the BSS website.

A good illustration of the scale of NGS for evolutionary studies came from Douglas Soltis, Professor of Botany at the University of Florida. His group has been working on a number of projects that have used NGS to study the evolution of flowering plants. One of these projects was sequencing the whole genome of *Amborella*, an early divergent angiosperm, which is the sister group to all living angiosperms. This genome will be a valuable genomic resource for comparing genetic changes across the angiosperms. Another example is the large collaborative project 1000 Plants (www.onekp.com), which aims to sequence the transcriptome (the expressed genes in a plant) of 1000 green plants. This will enable the evolutionary relationships across the angiosperms to be clarified in much more detail than is currently available. Finally, he discussed the way his group has been studying genome duplication (polyploidy) in *Tragopogon* (Salsify). They have used a new technology (Sequenom MassARRAY iPLEX) to compare the expression of each copy of a gene that has been duplicated by polyploidy. Their results showed that 22% of duplicated genes were expressed at different levels, and 8.5% were silenced relative to one of the parents (see Buggs *et al.* 2010). Douglas Soltis told the audience that the only limit to experiments using NGS is your imagination, and the projects he has developed to date have clearly illustrated this.

Another exciting talk, with a more ecological context, was by Eric Coissac, from the l'université Joseph Fourier in France, who informed the audience on how NGS can change the way DNA barcoding is used. DNA barcoding, involves the sequencing of a standardized short DNA segment that is diagnostic of a particular taxa. This is one way of

identifying a plant, as long as certain conditions are met (i.e. that the specific sequence and those of related individuals have already been determined and are available in a reference database, and that the particular sequence is diagnostic for the taxa of interest; see CBOL, 2009). Using DNA barcoding and NGS a number of regions of the plant genome can be sequenced using a minimal number of reactions, and compared with the large number of sequences already held in reference databases to increase efficiency and the speed of plant identification. This 'meta-barcoding' approach will lead to most plant families or genera being identified, and this method can easily be applied to a range of environmental samples, such as water, soil and faeces to see what plant species fragments they contain.

The meeting was well attended, with 176 delegates including participants from as far afield as Mexico and Japan. Many people said they were inspired with the direction the field is moving in, and keen to apply NGS to their own favourite organism. It was also an opportunity to reflect on previous developments in plant genetics, with the Molecular Ecology Prize being given to Deborah Charlesworth, Professor at the University of Edinburgh, for her work on the evolution of sex chromosomes and plant mating systems (see cover photograph).

I would like to thank all of the delegates who attended the workshop and made it such a great success. I would especially thank the speakers, and those who provided posters, for their time and effort. I am also grateful to the Botanical Society of Scotland who provided financial and logistical support, RBGE for use of the conference venue, and my co-organisers for their help throughout the event: Richard Buggs, David Burslem, Richard Ennos, Peter Hollingsworth and Catherine Kidner. If you are interested in reading more about the workshop, please visit the BSS website, read the report by Rachel Walker (also in this issue of BSS news), and look out for a special issue of Plant Ecology and Diversity later this year which will feature papers from the meeting.

Alex Twyford: Workshop Organizer
University of Edinburgh and Royal Botanic Garden Edinburgh

References

- Buggs, R. J. A., S. Chamala, W. E. I. Wu, L. U. Gao, G. D. May, P. S. Schnable, D. E. Soltis, P. S. Soltis, and W. B. Barbazuk. 2010. Characterization of duplicate gene evolution in the recent natural

allopolyploid *Tragopogon miscellus* by next-generation sequencing and Sequenom iPLEX MassARRAY genotyping. *Molecular Ecology* 19:132-146.

Ennos, R. A., G. C. French, and P. M. Hollingsworth. 2005. Conserving taxonomic complexity. *Trends in Ecology & Evolution* 20:164-168.

Grierson, C. S., S. R. Barnes, M. W. Chase, M. Clarke, D. Grierson, K. J. Edwards, G. J. Jellis, J. D. Jones, S. Knapp, G. Oldroyd, G. Poppy, P. Temple, R. Williams, and R. Bastow. 2011. One hundred important questions facing plant science research. *New Phytologist* 192:6-12.

CBOL working group. 2009. A DNA barcode for land plants. *Proceedings of the National Academy of Sciences* 106:12794-12797.

NEXT GENERATION PLANT ECOLOGY AND EVOLUTION: APPRECIATION FROM A WORKSHOP PARTICIPANT

The Next Generation Plant Ecology and Evolution workshop was held at the Royal Botanic Garden in Edinburgh on the 18th – 19th of October. This provided an excellent setting for what was an interesting workshop. In recent years DNA sequencing has enabled plant scientists to learn much more about their organisms of interest, creating phylogenies of species relationships using one or more markers, in addition to morphological analyses. The latest developments in next generation sequencing (NGS) present us with the opportunity for unparalleled sequencing of genomes and transcriptomes in many species and not just model plant species. Not only is the amount of sequence data generated much greater (thousands to millions of sequence reads per reaction) but so are the questions and approaches able to address evolutionary and ecological research. The conference aimed to provide an environment for discussion about available techniques, examples of studies and questions that can be addressed using NGS.

On the first day we heard introductory talks about the different sequencing approaches available and the challenges proposed for bioinformaticians from the wealth of sequence data that can be generated from these experiments. The keynote talk by Doug Soltis was particularly relevant for the audience because he discussed his work on non-model species, including using NGS to study polyploidisation in

Tragopogon (Asteraceae) and sequencing the *Amborella* genome. Lunchtime provided the opportunity for a herbarium or living collections tour and this was followed by 'How-to' sessions with some excellent examples of the studies currently happening in different labs using NGS.

After the talks had finished posters were on display at the drinks reception, including how NGS is being used to investigate the genetic basis of iridescence in the leaves of *Selaginella willenowii*. This was followed by an excellent conference dinner, which gave attendees and speakers the opportunity to discuss the talks of the day. On the final day of the meeting we heard talks about metabarcoding and RAD-sequencing and the afternoon presented the opportunity to hear contributed talks from conference attendees. There were a wide variety of talks, from using NGS to understand the diversity of tropical species to exploring giant plant genomes in the genus *Fritillaria* (Liliaceae). This also gave me the opportunity to present my Ph.D work (see next article) in which I am using NGS to determine the regulators of petal spot development and how these genes have evolved in the species complex of the South African daisy *Gorteria diffusa* (Asteraceae).

I would like to take this opportunity to thank the course organizers for awarding me the student prize to attend this conference, which not only provided an excellent environment in which to present my work, but also a stimulating and illuminating series of talks.

Rachel Walker
University of Cambridge Ph.D. student

PETAL SPOTS IN SOUTH AFRICAN DAISY *GORTERIA DIFFUSA*

For my PhD studies, I am investigating the evolution and development of petal spots in the South African daisy *Gorteria diffusa* Thunb. Petal spots have evolved in a phylogenetically broad range of angiosperm species, particularly in the Asteraceae, Liliaceae and Iridaceae families. Petal spots form by the accumulation of pigment colour in a group of cells on the petal surface. In some cases the cells of the spot can be different shapes to those of the rest of the petal.

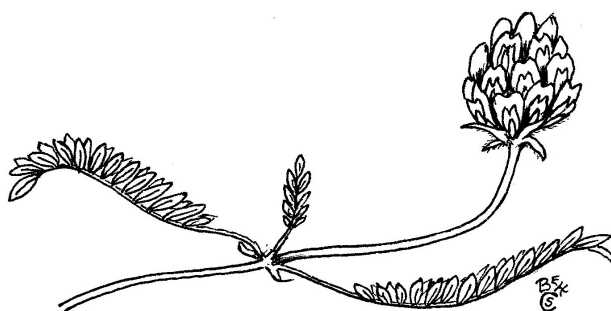
Gorteria diffusa is endemic to South Africa, growing mostly in Namaqualand. Pollination studies in the native habitat have

demonstrated that the pollinator of *Gorteria* is a small bee-fly, *Megapalpus capensis* Wiedemann (see cover photograph). Pollination is achieved by providing an overnight shelter in the closed capitulum for *Megapalpus* flies. In the morning, male flies search for mates in opening capitula, and the presence of the petal spots is thought to encourage males to visit, achieving pollination, even in the absence of female flies.

The morphology of the *Gorteria diffusa* petal spot is surprisingly complex, consisting of different cell shapes and rich in anthocyanin pigment. In the centre of the spot is a group of flat cells with a smooth surface that contain no anthocyanin pigment, we have termed this the petal spot highlight. The spot also has large papillae cells, full of anthocyanin pigment, that give the spot a raised 3-dimensional insect-like appearance.

Gorteria diffusa is a particularly good system in which to study petal spots because of a unique aspect of its population biology. Within its geographical distribution, *G. diffusa* exists as at least 16 geographically distinct populations with different floral and vegetative morphologies. We term these populations “morphotypes”. The morphotype spots have different cell shapes, number and position of spots on the capitulum and contain different amounts of pigment. Hence, *G. diffusa* provides an interesting system to study the differences in petal spot development in each morphotype. During my PhD studies I have identified and characterized several genes, which are responsible for producing the pigment and cell shape components of the petal spot. I am comparing the function and expression patterns of these key genes in each morphotype, to understand how changes to each gene, and the petal spot they control, have evolved.

Rachel Walker
PhD student University of Cambridge



PHYTOLEXICON CRUCIFORMIS B.S.SCOT EX WORD

Xword 6. In this crossword there are ten botanical names, mostly angiosperms but including two fungi, three gymnosperms and two vernacular names; seven words of botanical or biochemical terminology; and some other words to fill in the gaps. Words do not read across grey squares or thick lines. I hope you don't find it too easy!

I hope that work will soon start on planting the maze and the Araucaria for the cryptogrammic garden. But I am getting a bit worried about finding fertile seed of any of my cryptogrammic plants. Oh dear! Watch this space.

Crucifer

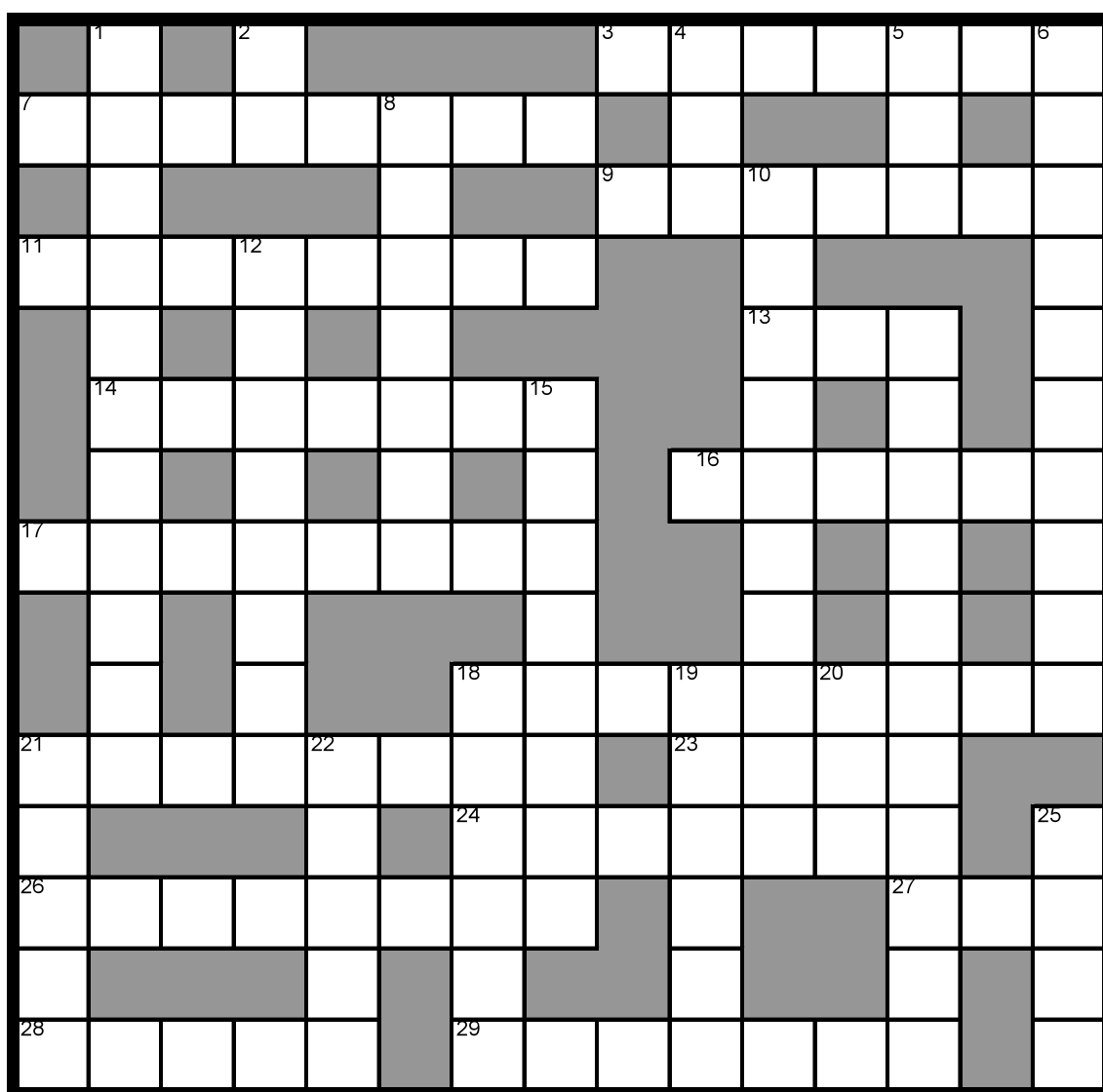
Across

- 3 Sounds like access to ovaries is protected by small arms. (7)
- 7 Occurring in summer is temporarily growing tissue. (8)
- 9 Drier, indehiscent and with a woodier pericarp? That's even more eccentric. (7)
- 11 and 18a. I tax Dutch sodium; I'm concealing a conifer. (8, 9)
- 13 It sounds like you bend this in archery. (3)
- 14 *Oenothera biennis* could be *O. crepuscularis*. (7)
- 15 Runner sounds as if he crept along quietly. (6)
- 17 and 15d. Italian composer with a small mass in is combined to infest cereal crops. (Uredinales) (8, 8)
- 18 See 10a.
- 21 Immigrant pondweed in Britain. (8)
- 23 Irradiation from nuclear ad? Something in that! (4)
- 24 Vessel from giant arum? (7)
- 26 Pea lay thus, right? (8)
- 27 Means of advancement causes bitterness in brewery. (3)
- 28 A *Xylocarpus*, deprived of cupola, is useful in diagnosis. (5)
- 29 Sounds like a devourer of male persons, but only poisons them (Agaricales). (7)

Down

- 1 Tell AA some quiet dawn redwood grows (11)
- 2 Sir, I bear a rhyme excelling/In mystic power and magic spelling ... (2)
- 4 Promissory note extracted from English *Knautia arvensis* or *Succisa pratensis*. (3)

- 5 Chemical group found in xerophytic Iridaceae. (3)
 6 See 18d
 8 Teaching that is instinctive if within! (7)
 10 Adjustment to pH in cytologist's stain yields essential amino acid.
 (10)
 12 Openings for spores; otherwise in spores
 15 See 17a.
 18 and 6d. Mounts raid: trauma arising from spiny fruit (Solanaceae)
 (6, 10)
 19 Radon in cave makes us cowardly. (6)
 20 Stupid person lost Old Testament, but became Ugandan dictator.
 21 Sepals found on scaly xerophytic plant...
 25 ... without water and as eight petalled species perhaps. (Rosaceae)
 25 Likely receptacle for nectar is an incentive. (4)



BSS STUDENT DISSERTATION PRIZE 2011

The winning entry of the BSS Student Prize 2011 was judged to be Tiffany Aslam with a final year undergraduate project carried out at St Andrews University and the James Hutton Institute. Many thanks to this year's judges Dr Richard Milne (Edinburgh) and Dr David Burslem (Aberdeen). The abstracts of all entries are presented below, beginning with the winning entry.

Author: Tiffany Aslam

Institution: University of St Andrews, James Hutton Institute

Degree: BSc Ecology and Conservation

Supervisor: Steve Hubbard

Climate change and multi-trophic interactions: Plant mediated effects of drought on predator-prey dynamics

Summer drought is predicted to have adverse effects on crop production in the future, yet the impacts on subsequent trophic levels are relatively understudied. This study was conducted using a watering regime to mimic summer drought conditions. The objectives of the study were to determine the mechanics by which plant mediated effects of drought affected the performance of the aphid *Rhopalosiphum padi* at the individual and population level, and how such effects influenced the foraging behaviour of its parasitoid, *Aphidius ervi*. At the plant level, above-ground growth and total biomass of *Hordeum vulgare* were reduced under drought treatment. Foliar nitrogen concentration also decreased both above-ground and below-ground. Drought conditions did not lead to significant changes to aphid population structure or individual performance; notable trends were observed suggesting that *R. padi* benefited from stress-induced changes in plant nutritional chemistry. Increased honeydew quality, measured in terms of protein amino acid content and essential amino acid content, further supported these observations. Overall, these findings lend support to the Plant Stress Hypothesis (PSH), suggesting that aphid populations may increase with increasing intensity of drought conditions. At the third trophic level, attack rate of *A. ervi* was significantly higher for aphids reared under ambient conditions.

The dissertation entries were all highly commended by the judges. The abstracts of the other six entrants are presented below in alphabetical order by author.

Author: Kate Collingridge

Institution: University of Edinburgh

Degree: BSc Ecological Science (Ecology)

Supervisors: Colin Legg, Maurizio Mencuccini

Effects of sheep grazing on sea buckthorn regrowth in sand dunes

Sheep grazing has been suggested as a control method for the invasive species sea buckthorn, *Hippophaë rhamnoides* L.. This study investigated the effects of sheep on sea buckthorn regrowth at Aberlady Bay, East Lothian. Eight paired patches of sea buckthorn regrowth were selected. One from each pair was grazed for 11 weeks over summer 2010 (16 sheep/ha), the other was monitored as a control. Additionally, clipping simulations were carried out for 2 weeks in spring 2011 in an unheated greenhouse, culminating in determination of root starch concentration.

The proportion of shoots browsed was found to increase in the grazed areas (Friedman's test, $p < 0.05$) compared to ambient levels of deer browsing. Sheep removed shoot tips and leaves, with many plants becoming completely defoliated. No difference in plant volume was found between grazed and control area, and there was no significant difference in total shoot length between sheep-browsed and unbrowsed shoots. Deer-browsed shoots were significantly longer than sheep-browsed and unbrowsed shoots (partly nested ANOVA, $p < 0.001$).

None of the plants in the clipping simulation showed any main root growth, though most produced new fine roots. No difference was found in root starch between clipped and unclipped plants.

Sheep grazing was ineffective in this case at hampering regrowth of sea buckthorn, but does show potential as a control method, providing the sheep are introduced early in the season and at a high enough stocking density to remove compensatory growth. Continued grazing in subsequent years may be necessary to prevent the plant from becoming re-established.

Author: Oliver Edmunds

Institution: University of Edinburgh

Degree: BSc Ecological Science (Environmental Science)

Supervisor: Kate Heal

An investigation into the factors influencing the success of species-rich grassland recreation schemes

The recreation of species-rich grassland (SRG) is an option under many agri-environment schemes. A prescribed seed mixture of desired low productive species is typically sown together with an agreed management regimes. On the basis of the low rates of monitoring carried out to assess the success of such schemes primarily in terms of percentage of the sown seed mixture species which establish, this study aimed to identify influences upon the success of the mixture. Two null hypotheses were first tested, examining the potential influence of soil properties and time since conversion respectively. The former identified only soil pH as suggesting a significant influence on the success of the seed mixture. The age of the plot appeared to correlate positively with the number of sown species establishing and although this relationship is weak it suggests that the schemes are not currently long enough for maximum benefit to be realised. Soil moisture content exhibited a strongly positive relationship with the abundance of sown species and this was also shown to be adversely impacted by the abundance of external unsown species. Sown grass species do not appear to establish well and forbs show moderate success. It is suggested that only cutting or grazing once annually may in fact be encouraging these external species at the expense of those desired. Recommendations are made regarding the scheme design for how performance can be improved. The relationship between seed mixture success and plant community diversity was also investigated to see whether the objectives contributed to more than one aspect of a recreated grassland ecosystem.

Author: Jenny Farrar

Institution: University of Edinburgh, RBGE

Degree: BSc Evolutionary Biology

Supervisor: Louis Ronse de Craene

Staminodes in *Sauvagesia erecta*: their anatomy and floral development

The floral development and anatomy of *Sauvagesia erecta*, family Ochnaceae, was investigated with scanning electron microscopy (SEM) and light microscopy (LM) to determine the nature of two types of staminode – petaloid and filamentous – observed in this species. *Sauvagesia* is basal to Ochnaceae, therefore determining whether the two types of staminodes have evolved from existing organs or are novel organs will clarify the ancestral nature of the androecium of Ochnaceae.

SEM showed the petaloid-staminodes are initiated after the stamens and in the phyllotaxic position of a second stamen whorl. LM showed that the vascular bundles of both the stamens and the petaloid-staminodes originate from one trace which then splits, confirming the petaloid-staminodes to be true staminodes.

The filaments, traditionally regarded as filamentous-staminodes, were observed using SEM to be initiated very late and to develop from a hypanthium. This suggests they are a corona, as seen in Velloziaceae and some Passiflora species. The filaments were found to have vascular bundles which were un-associated with the vasculature of the stamen/petaloid-staminode whorls.

These findings give good support to the ancestral androecium of Ochnaceae being composed of two stamen whorls of five stamens each, which SEM analysis confirmed is conserved in the diverged genus *Ouratea*.

Author: Jamie V McQuilkin

Institution: University of Edinburgh

Degree: Ecological Science (Ecology)

Supervisor: Barbra Harvie

Mycorrhizal communities of two oil-shale bings in West Lothian

This study is a comparison of the mycorrhizal communities of two similar shale heaps, or bings, in West Lothian, with identical management histories but different vegetation and successions. It focuses on arbuscular mycorrhizal spores and infection of plant roots, with the hypotheses that both bings have similar mycorrhizal

communities and are not notably unusual in a wider context. To research this, substrate samples were taken in a sampling strategy that was nested and stratified by position and wind exposure. Spores were extracted and counted by wet-sieving, centrifuging and dissection microscopy. Nutrient (N, P, K, Zn, Cu) and physical soil analyses were performed and correlated with this. In an exploratory context, roots of selected dominant plants on the bings (*Cytisus scoparius*, *Crataegus monogyna*, *Ulex europaeus*, *Fragaria vesca* and Poaceae spp.) were taken and stained, then microscopically examined for infection. Spore abundances were found to be extremely high on the plateau of one bing (up to 352 per gram of dry substrate), and the bings were found to differ significantly in mean spore abundances after a 3-way ANOVA ($F(1,36) = 5.56$; $p=0.024$), but not on Shannon's diversity index ($F(1,36) = 0.0003$; $p=0.986$). All species were mycorrhizal, with grass species having the highest infection percentage. These bings are clearly mycologically interesting, and they may prove to be of scientific importance in mycorrhizal research. There are now excellent grounds for further study of mycorrhizal influences on succession, especially so given the unique abiotic similarities and community differences of the bings.

Author: Remi Oduyemi

Institution: University of Aberdeen

Degree: BSc Biology

Supervisors: Jim McDonald, Adam Price

Aerenchyma and root hair formation in response to phosphorus deficiency in rice (*Oryza sativa*)

Although there has been much research regarding the importance of aerenchyma formation in waterlogged conditions, little is known about the formation of aerenchyma in response to phosphorus deficiency. The aim of this study was to investigate aerenchyma and root hair formation in four rice (*Oryza sativa*) cultivars when phosphorus was omitted from the nutrient solution. Rice cultivars belonged to two main sub-species which differ in ecotypical origins: *indica* (Bala and IR64) and *japonica* (Azucena and IAC25). In the absence of phosphorus, the *indica* species developed root hairs and showed a reduced root diameter. Conversely, the *japonica* species formed inducible aerenchyma and showed an increased root diameter. Aerenchyma and root hairs increase the absorptive surface area available for phosphorus uptake. Aerenchyma

has the additional benefit of improved gas exchange. Genotypic variation in the proportion of constitutive to inducible aerenchyma existed between cultivars.

Author: Nadia Russell

Institution: SAC, RBGE, University of Glasgow

Degree: BSc Horticulture with Plantsmanship

Supervisor: Greg Kenicer

Evolution and ecology of the fern genus *Woodsia*: Investigations in phylogeny and spore germination

Phylogenetic relationships were inferred in the fern genus *Woodsia*, using Bayesian maximum likelihood analysis of the *rbcl* chloroplast gene region to construct phylogeny in order to gain an insight into inter- and intra-specific relationships of the genus. A total of ten *Woodsia* species *rbcl* sequences published on Genbank (five new species sequences published midway through this study), were used with a further seven sequences from this study. Results show *Woodsia* is a well resolved monophyletic genus with excellent support (BS = 100%). The genus forms two distinct clades and possible subgenera are indicated by phylogeny outcome that is strongly supported by morphological evidence based on diagnostic character state of the indusia.

This study also looks at the paraphyletic tendencies of the Woodsiaceae family, which has four families nested within in it: Blechnaceae, Onocleaceae, Thelypteridaceae and Aspleniaceae. On close analysis of the circumscription of Woodsiaceae, limits are not clear and the formation of several new families may be warranted including: Gymnocarpiaceae, Cystopteridaceae, Depariaceae, Diplaziaceae, Rhachidosoridaceae and Homalosoridaceae.

The ecology of *Woodsia* was explored through a spore germination trial on native rare fern *Woodsia ilvensis* to ascertain spore fitness in the few remaining UK sites, in relation to different temperature regimes. Results showed eventual maximum germination across the 10°C, 15°C, 20°C and 25°C temperature regimes. Optimum germination temperatures are 20°C-25°C at 92% and 96% total percentage germination respectively with both temperatures reaching maximum germination in 24 days. Results showed that spores from across all known UK sites are viable and will germinate readily in a range of temperatures.

SECOND FLOWERINGS

Climate change has led to a lot of interest in phenology – when a plant comes into flower, and what causes it. But what about plants which have a second go?

In mid-October last year (2011) I visited a friend in Edinburgh New Town and looking out of the window was surprised to see a Portugal Laurel *Prunus lusitanica* in good flower – and also bearing fruit. There was a Cherry Laurel *P. laurocerasus* nearby, also in flower and fruit, though in this case with only a few flower spikes on a single branch. A month later I was even more surprised to see a male Holly *Ilex aquifolium* flowering well on the Gosford Estate (the females seemed to be concentrating on their berries which were already red).

Quite a few trees and shrubs throw up the odd flower among the fruit; I've seen several Elder bushes *Sambucus nigra* at it this year and Rowen *Sorbus aucuparia* in previous years, while in the garden Darwin's Barbary *Berberis darwinii* usually throws up some flowers in the autumn. Similarly I am unsurprised to see both flowers and fruit on Cowberry *Vaccinium vitis-idaea* in September, and while I've never been early enough to see Bearberry *Arctostaphylos uva-ursa* flowering in the spring I've been lucky enough to catch it in flower, along with the berries, in the autumn.

A few plants regularly have two flowerings. Probably the best known is the Scottish Primrose *Primula scotica* which first flowers in June and has a second flush in August. White Deadnettles *Lamium album* usually have a second flowering in the autumn, and so do Dandelions *Taraxicum spp.*

Many perennials carry on flowering well into autumn and winter if conditions are suitable – Red Campion *Silene dioica*, Herb Robert *Geranium robertianum*, Feverfew *Tanacetum parthenium* and the Common Daisy *Bellis perennis*, to name but a few. While this year False Oat *Arrhenatherum elatius* has continued flowering into the new year, and several plants of False Brome *Brachypodium sylvaticum* were flowering happily in a sheltered spot (at Gosford again) on January 5.

Annuals of course are opportunists and can germinate and flower whenever there's a warm spell during autumn and winter – particularly in the warmth of the city. But what stimulates those perennials which regularly or occasionally have a second flowering?

J Muscott, Botanical Recorder for West Lothian (VC84)

THE BSBI AND BSS SCOTTISH ANNUAL MEETING 5 NOVEMBER 2011

The meeting was opened by Professor Mary Gibby, Director of Science, Royal Botanic Garden Edinburgh, who welcomed the delegates to the RBG. Professor Gibby reminded us of the four Botanic Gardens in Scotland. Edinburgh, Benmore, Dawyck and Logan each experience different climates and plants behave differently at each site. Tree ferns in Logan are doing much better than in past years and are self propagating. The threat of climate change and potential changes in the ability of non native species to spread from the garden collections has lead to each of the gardens carrying out a risk assessment on the potential invasiveness of plants growing in the gardens. Species that are judged as potentially invasive will be removed.

Chris Miles, who is retiring from the Chair of the BSBI (Botanical Society of the British Isles) Scottish Committee, thanked members of the BSBI and BSS for organizing the meeting and the Royal Botanic Gardens for hosting the meeting. Ian Bonner, who took over as BSBI President in June 2011, spoke about the BSBI, including updates on staff changes and some exciting new plant records. Ian reminded recorders about the need for more work on the rare plants register. He also gave advance notice of a BSBI conference: A Great Leap Forward, which will celebrate Biological Recording since the 1962 Atlas of the British Flora. This will be held at the RBG on 20 and 21 September 2012. See the BSBI web site for details

Barbara Sumner, BSS President, spoke about the history of the Botanical Society of Scotland, which was started as the Botanical Society of Edinburgh in 1836, with the aim of setting up a public herbarium and library. These became the nucleus of the RBG's current herbarium and library when they were donated to the Garden. The BSE became the BSS 20 years ago and celebrated it's 175th anniversary in 2011. (For anyone new to the BSS, our previous newsletter, BSS News 97, contained an article on the first century of the Society's life, which you can read on the BSS website.)

Robin Payne, Vascular Plant Specialist at SNH, talked about recent significant changes to the law on non-native plants and the need for biosecurity to prevent the spread of invasive species and diseases. His message is summarized in the article on page 36.

Bob Ellis, previously BSBI Volunteers officer and now Projects officer, discussed how important it is to enter plant distribution and ecology data in long term databases and how the rare plants register can become a focus for planning and conservation activities. He stressed the importance of continually updating records and reminded us that there will be a new atlas of flora in 2020.

Angus Hannah, Acting BSBI Scottish Officer, described plans for the year ahead. The BSBI will continue its policy of appointing joint recorders where requested. Four educational field visits are planned for next summer, as well as a workshop at Kindrogan in March for recorders and potential recorders. There will be a week's trip to Coll and a meeting for Scottish recorders in July. Angus's invitation to BSS members to become involved in recording is on page 39. At the time of the meeting there were three vacancies for recorders in the Scottish Highlands. Training in plant identification and recording would be given and prospective recorders could join experienced members to gain experience.

Jonny Hughes, Head of Policy, SWT, spoke about the Scottish Wildlife Trust's botanical gems. The SWT has 35,000 members and manages 121 wildlife sites covering 20,000 ha. It runs a 'flying flock', a flock of Shetland and Hebridean sheep that are moved from site to site to provide targeted grazing to encourage floristic diversity. This is the only project of its kind in Scotland. The flock was set up in 2001, to give SWT more control over the grazing levels on its SSSIs. Since the sheep have been introduced there has been an overall trend towards greater plant diversity on all grazed sites, with positive indicator species increasing and negative indicators decreasing. Since 2010, the SWT also have a "flying" herd of cattle. Jonny also described SWT's monitoring work and the implications of climate change - site protection alone will not be enough to protect individual species in future and we need an 'ecosystem approach' to maintain ecosystem health in the wider countryside. Sadly funding for this environmentally friendly method of increasing biodiversity is becoming more difficult to find.

Alan Scobie, Project Officer, Cairngorms Rare Plants Partnership, talked about rare plant conservation in the Cairngorms National Park. He has written an account of this work for BSS News - see page 40.

The final talk was from Richard Gornall, of the University of Leicester, who discussed new methods of classifying the beautiful and variable genus Saxifrage. There are believed to be around 460 species,

divided into 15 sections during the last classification of the genus in 1987. Saxifrages grow in a wide range of environments such as wet meadows, cliffs, rock faces and scree slopes and are often very difficult to cultivate. They are vegetatively very variable though usually with 5 petals, 5 sepals 10 stamens and 2 fused carpals, but the sex and functionality of flowers and the breeding biology of some species is unknown. Some of the variation appears to have arisen by parallel evolution with similar patterns in species from the UK and the Himalayas. Some species are dioecious with both male and female flowers but it is not clear if both are functional on the same plant. Other species have flowers of only one sex. Vegetative characteristics such as degree of carpal fusion, seed coat structure and leaf venation patterns have been used to distinguish species. Richard Gornall also described ways in which new DNA sequencing methods and a variety of statistical techniques are now being used to investigate the evolution of this genus, and the construction of a phylogeny that describes the evolution of the species found in different countries.

Jane MacKintosh and Jill Thompson

THE BSBI AND BSS SCOTTISH ANNUAL MEETING: EXHIBITION ABSTRACTS

***Melampodium* not *Sanvitalia*. Geoffrey Halliday**

As Eric Clement has pointed out, the popular yellow-flowered garden plant sold as *Sanvitalia procumbens* (Asteraceae) is actually a species of the central American genus *Melampodium*. There are three British records to date: from Somerset, South Hants. and Westmorland, all from urban pavements and no doubt derived from plants in hanging baskets or tubs. I have two clones in my garden, neither produces obvious seed, one is annual, like the above three plants, the other is perennial. Eric has referred all these plants to *M. montanum* which he describes as being annual and rhizomatous. However, none of the British plants have rhizomes. I have recently learnt that an American authority on the genus has a paper in the press in which he refers all these plants to a new species closely related to *M. montanum*.

Some recent finds in Dumfriesshire. Chris Miles

A number of interesting species have been found or refound in the last couple of years:

Eleocharis mamuilata, Northern Spike-rush a new vc record just over the Border from populations in Selkirkshire in the Esk catchment

Erigeron acer, Blue Fleabane, a new VC record, in a quarry with an interesting flora including *Ophris apifera*.

Carex limosa, Bog-sedge, still present at Stroanshalloch Loch since recorded in the Flora of 1896 despite afforestation of the area and possibly the only extant record in vc72.

Carex magellanica Tall bog sedge. in a new site on a bog protected from recent afforestation.

Coeloglossum viride, Frog orchid, found near the *Gentianella* in a new hectad. This is only the 7th record for the vc.

Blysmus compressus, Flat-sedge refound in an inland site in a hectad where recorded in 1896.

Trientalis europea, Chickweed wintergreen, a new hectad record well to the west of other records and only the 5th record for the vc.

Gentianella campestris, Field Gentian, refound in an old site after 110 years. The 7th site for the vc.

Seashore to Roadside Plants in Lanarkshire (vc77). Peter Macpherson

Sea Spurrey (*Spergularia marina*). From a first sighting in 1996 there are now 223 x 1km² records. Danish Scurvygrass (*Cochlearia danica*). From a first sighting in 1989 there are now 114 x 1km² records. Sea Plantain (*Plantago maritima*). From a first roadside sighting in 2009 there are now three x 1km² records.

Newspaper 'Bloomers' Peter Macpherson

Four examples are shown of conservation issues in which the plant purported to be an orchid was obviously not so. In two cases the photograph was of Self-heal (*Prunella vulgaris*), in one each Hedge Woundwort (*Stachys sylvatica*) and a Gentian (*Gentianella* sp.). An article in 2001 stated that the Japanese Knotweed had been seen in Glasgow for the first time. It has been known since at least 1931 and by the mid 1950's was described as "everywhere". A magazine article in September of this year stated that "Lesser Knapweed, Field Scabious,

Bird's-foot Trefoil and Red Clover are becoming increasingly rare in the British countryside”.

Peeblesshire Records 2011 Luke Gaskell and Kathy Velandar

Recording at tetrad level has resulted in a number of new species found as well as confirmation of a number of historic records. As we are particularly interested in farming it is perhaps not surprising that quite a few of these records have been arable or invasive weeds. For example, surveying fodder crops particularly turnips and kale has produced *Centaurea cyanus*, last recorded in 1924 (Buchan, 1924), *Brassica rapa sylvestris*, first vice county record and *Ammi majus*, bullwort, a Southern European umbellifer which appears to have arrived as a contaminant of grass seed. Native species include *Clinopodium vulgare*, which was found between Innerleithen and Walkerburn, the only previous record occurring near the Tweed East of Peebles in 1911 (Druce, 1911). *Poa compressa* was discovered on the lime mortar walls of Hay Lodge Park, Peebles. *Carex laevigata* was recorded flowering in a fenced water margin below the Megget reservoir, the first confirmed record since 1903 (Annals of Scottish History, 1901-03). These and other specimens were exhibited at the AGM.

In all over 5000 records have been added to the data base this year and we intend to gradually increase the number of tetrads surveyed though full coverage is unlikely any time soon. In all it has been a very enjoyable summer getting to know the beautiful countryside of Peeblesshire and the plants within it.

Roxburgh (v.c.80) and Selkirkshire (v.c 79) Plants. Rod Corner

v.c. 79: *Stellaria pallida*. (Lesser Chickweed). New to the vice-county by Jeff Waddell. It was thought to be confined to thin soiled igneous outcrops as an inland species in the Scottish Borders until J.W. discovered it as a weed in Selkirk and Kelso. Is it extending its range or has it been previously been overlooked as stunted *Stellaria media* (Common Chickweed)? The distinguishing features were given.

v.c. 80: *Cotula squalida*. (Leptinella). New to the vice-county by Alison Murfitt. Close scrutiny of the lawns of mansions are required to detect this native of New Zealand.

Juncus compressus. (Round-fruited rush.) This rare Scottish rush is known from basaltic rocks by the Tweed upstream from Kelso where it was first noted in 1874 by Andrew Brotherston, one of the most astute

Border botanists of his day and re-found in 1972. His record was rejected by the "First Atlas" as being "known or suspected to have been recorded in error." The editors underestimated Brotherston's expertise. It still survives in good quantity.

Medicago arabica. (Spotted Medick). On path by Tweed away from habitation as a possible adventive from the wool industry upstream.

Myosotis stolonifera. (Pale Forget-me-not.) In a new hectad in only its third extant vice-county site. It is very much commoner in v.c. 79 and under recorded there.

Poa palustris. (Swamp Meadow-grass.) In a new hectad. Stated to have undergone a substantial decline in the last 40 years but several new Tweedside records in recent years are bucking the trend. It has presumably been overlooked.

Vaccinium uliginosum. (Bog Blaeberry.) Yet another good sized colony in the Newcastleton area was found at 220m altitude. These plants are the northern outliers of the North Cumbrian populations of lowland peat mosses.

Berwickshire BSBI Botanical Site Register. Michael Braithwaite

The Site Register is stated to be a provisional edition as a resurvey of Berwickshire is ongoing and a more complete version is planned when the resurvey is complete. Maps showing progress with the resurvey were exhibited. 16 out of 23 hectads or part hectads, representing 811 out of 1202 monads, have been resurveyed to date to a sampling strategy. At the current rate of progress two more years fieldwork are needed to complete the resurvey. The number of taxa recorded per hectad currently averages 115% of the 1987-1999 survey. The number of distinct monad taxa currently averages 159% of the 1987-1999 survey.

A 'second generation' CRPR was exhibited that had been completed in March 2011 and presents data site by site within hectads. The text that accompanies the tables of species records is available for free download from the [BSBI website](#) under '[Rare Plant Registers](#)' as '[A Botanical Tour of Berwickshire](#)'.

Herbal plants surviving in the wild at a medieval hospital site in Berwickshire. Michael Braithwaite

Hyocyamus niger (Henbane) was found in quantity on an eroding sandy bank at Dalcove Braes NT63 overlooking the River Tweed. This species had not been seen in Berwickshire since 1956. Associated species included *Ballota nigra* (Black Horehound), *Conium maculatum* (Hemlock), *Echium vulgare* (Viper's Bugloss), *Malva sylvestris* (Common Mallow) and *Reseda luteola* (Weld). There was a medieval hospital at or near this site dedicated to St Mary Magdalene which was destroyed by the English in 1544. It seems inescapable that some or all of these species, all of which had medicinal uses, have survived from plants grown at the hospital half a millennium ago.

A New Hybrid to Europe: *Geum macrophyllum*, from N. America, and *G. urbanum*. Douglas McKean & Heather McHaffie

The former garden plant is similar to a giant *G. urbanum* and the hybrid is found in two localities in the Lothians and probably occurs elsewhere in the U.K. The hybrid between *G. macrophyllum* and *rivale* was also found as a weed in the RBGE by Heather McHaffie.

A Midlothian update of probable *Epilobium x aggregatum* (*E. montanum x E. obscurum*). Douglas McKean

The plant was originally determined by me as *E. tetragonum* subsp. *lamyi* but Dr Pennington, the referee, corrected my mistake. The plants were huge for *lamyi*, being almost a meter high and some leaves up to 4 cm wide. Specimens of this were found by Isla Browning in cultivated fields at Gogar, near Edinburgh Airport.

New and old plants near Philpstoun Bing (West Lothian). Jackie Muscott

Great Lettuce *Lactuca virosa* recently appeared in the centre of Philpstoun Bing a hollowed out oil shale bing by the Union Canal. Another unusual plant recorded on the bing is Deadly Nightshade *Atropa bella-donna*. It was first recorded in 1934, then 'lost' for 50 years, but is now widespread.

To the east of Philpstoun two weedy patches left for pheasants have produced some unusual plants: to the north of the canal Chicory *Cichorium intybus* and to the south a single plant of Purple Vipers

Bugloss *Echium plantagineum*, together with a good deal of Field Woundwort *Stachys arvensis* (from a seed bank?) at both sites.

Rare and Interesting Plants In Vc85 (Fife & Kinross). Sandy Edwards

Apart from the tetrad recording I have started in VC85 I have also been going through George Ballantyne's list of rare plants in Fife and Kinross. Where they are confirmed I have recorded and photographed them and they can be accessed on the [BSBI website](#) for [Fife and Kinross](#). This list has just started and will of course be added to as I find them.

Vice County 87, West Perthshire, 2011. L. Lavery, J. Jones and P.D. Stanley

Displayed were the principal additions to the flora for VC87 with updates of significant taxa. New to the VC were Many-seeded Goosefoot, *Chenopodium polyspermum*, *Calystegia x lucana* (*C. sepium* x *C. sylvatica*) and *Senecio x ostenfeldii* (*S. jacobaea* x *S. aquaticus*) all in the vicinity of Callander. Updates were provided for *Sorbus x thuringiaca* (*S. aucuparia* x *S. aria*) and a second extant location for Hedge Bedstraw, *Galium mollugo*.

Not displayed, but new for VC87 were Yellow Figwort, *Scrophularia vernalis*, recorded in the derelict station yard at Doune and *Salix purpurea* x *S. cinerea*, discovered by the Perthshire Society of Natural Science, Botanical Section, in the Menteith Hills.

East Perthshire Rare Plant Register (RPR). Martin Robinson

The 1st version of an RPR for VC89 was written during 2011. 287 species were included, comprising all those with IUCN (International Union for Conservation of Nature) designations other than Least Concern (Cheffings & Farrell 2005) and all Nationally Rare and Nationally Scarce species. Locally Rare (1-3 sites) and Locally Scarce (4-15 sites) were also included, and these together comprised about half of the total number of species in the Register. The causes for the rarity or scarcity of some of them were identified: e.g. restricted area of their habitat, edge of their range, under-recording. The species most special to East Perthshire is *Polygonatum verticillatum* Whorled Solomon's Seal. The vice-county has 8 of its 10 sites in the UK. Illustrations of members of each qualification category are presented.

***Sinapis alba* White Mustard in VC89 (East Perth). Martin Robinson**

Sinapis alba, found in a field of mixed forage rape and stubble turnips beside my house, was, surprisingly, a new record for the VC. It is suggested that this may be a greatly under-recorded species, on account of its superficial resemblance to *S. arvensis* Charlock and an antipathy towards yellow crucifers on the part of many botanists.

New willow hybrid. Leslie Tucker

On Saturday 2nd July 2011, whilst descending the burnside path to Dal Righ (NN 2727 Mid-Perth v.c.88) with SNH Ranger Steve Longster, I facilely identified a low shrub as the hybrid between Mountain Willow *Salix arbuscula* L. and Eared Willow *S. aurita* L., growing with its parents in exemplary and photogenic proximity. However, at home, I could find no record of this combination; apparently it is a new type specimen. Subsequently, pressed leaves showed none of the blackening which would indicate derivation from Dark-leaved Willow *S. myrsinifolia* or Creeping Willow *S. repens*, considered as possible alternative parent species.

Exhibit included abstract note with appropriate binomial, diagnosis, and description; also voucher specimens (Hbm LCNT EQ1, 2 & 3 for RBGE), including rooted leafy cuttings being cultivated to produce catkins, &c., for further study.

Salix ×*luiensis* L. C. N. Tucker *hybrida nova inter Salicem arbusculam* L. *et S. auritam* L., *nominis provisorii ab loco invento, cum parentes crescens ac proprie intermedia: foliis rectiellipticis glandiserrulatisque sed etiam rugosis crispihirsutis stipulatisque primita evidenta; postea ut nunquam nigricantis nec a Salice myrsinifolia* Salisb. *neque a S. repenti* L. *oriunda distinguitur. Amenta nundum visa.*

Evidence of Climate Change in the Uplands. Theo Loizou

In general, it is assumed that plant responses to climate change lag behind those of the animal kingdom. Here, evidence is presented which suggests that this might not be the case. In a relatively short period (< 25 years) several species including *Athyrium distentifolium* (Alpine Lady-fern) and *Carex norvegica* (Close-headed Alpine Sedge) appear to have shown marked declines in the uplands. Photographic and other empirical information concerning these species is presented.

Is Moroccan Ivy one of the parents of the Atlantic? Alison Rutherford

Living sprays of *Hedera helix*, *Hedera hibernica*, *H. hibernica* 'hibernica' and *H. maroccana* are displayed to show some features which have been noticed in the Atlantic: Similar sap scent; rampant growth; yellow-green foliage; bigger leaves that don't open flat and scale-hairs intermediate between the small reddish and the white-haired *Hedera* groups.

Botanising on wheels Alison Rutherford

An arthritic dog was mobilized on a converted pushchair, which required hard surface walks. Some neglected 1 km squares in vc99 and a few in vc75 round the coastal town of Ardrossan were visited. Both areas proved surprisingly rich in species. More ground was covered by sampling, not recording. This method (minus dog) might help cover built-up areas.

***Sedum villosum* Hairy Stonecrop in Mull. Lynne Farrell**

In BSBI News No. 115 September 2010, Michael Braithwaite wrote an article on *Sedum villosum* in Berwickshire, its decline both in that vice-county and its future in the British flora. This species was part of the TPP recently, and so I surveyed the sites on Mull, VC 103. In addition to the survey, I found a new site on the Ross of Mull during my on-going tetrad recording. The exhibit shows some of the sites on Ardmeanach and the new site on the Ross, due south of Ardmeanach.

The flora of far north railway stations. Brian Ballinger

The publicly accessible areas of the 12 railway stations in Easter Ross (VC106) were visited on two occasions in either 2000 or 2005 and again in 2011. 227 vascular plant species were noted in all, but 72 seen on the first occasion were not re-found in the second survey. 31 new species were recorded during the 2011 visits. There appears to have been an increased use of herbicides in recent years, particularly on platforms. However many stations continue to produce a good floral display. Interesting finds included *Orobanche minor* (Common Broomrape) and *Crassula tillaea* (Mossy Stonecrop).

New sites for Saltmarsh Sedge *Carex salina* from the Scottish Saltmarsh Survey. Ian Strachan

The Scottish Saltmarsh Survey 2010-12 is a national assessment of all saltmarshes around our coast of at least 3ha, and a sample of smaller sites. Funded by SNH and SEPA, the work is being carried out by the ecological consultancy NatureBureau Ltd and is being project managed by BSBI member Thomas Haynes over 3 years. It will update the last national saltmarsh survey from the 1980s, assess the state of the resource in Scotland and establish a new baseline for monitoring change.

Saltmarsh Sedge *Carex salina* was first discovered in Britain in 2004 by Keith Hutcheon (Watsonia 27: 51-57) at Morvich in Loch Duich (VC105). Subsequent searches on the west coast had failed to find additional populations. So it was with great excitement that this enigmatic sedge was found in August 2011 at two sites in Loch Sunart (VC97). The large saltmarsh at the head of the loch (NM8360), beside the mouth of the River Carnoch, has a number of scattered occurrences. A large stand was also found at Strontian beside the mouth of the Strontian River (NM813614). In common with the Morvich site, very few flowering spikes were present.

For further information on the Scottish Saltmarsh Survey contact Tom@naturebureau.co.uk

West Sutherland: some surprises. Pat and Ian Evans

It has been a good year, both for species new to the vice-county and rediscoveries. *Galium album* (Hedge Bedstraw) appeared on a roadside north of Lower Badcall (new to vc.108). We found *Trisetum flavescens* (Yellow Oat-grass) near the entrance to Balnakeil Golf-course, possibly introduced, but nevertheless the first recent record. An extensive marsh at Balnakeil and associated drainage channel yielded *Glyceria declinata* (Small Sweet-grass -first recent record) and *G. x pedicellata* (Hybrid Sweet-grass -new to the north-west). Finally, we rediscovered *Leontodon saxatilis* (Lesser Hawkbit) in quantity in coastal grassland at Sheigra (last recorded in 1966) and found it on roadsides in five other hectads.

The BSBI Distribution Database ('The Big Database'). Tom Humphrey

The new Big Database was demonstrated.

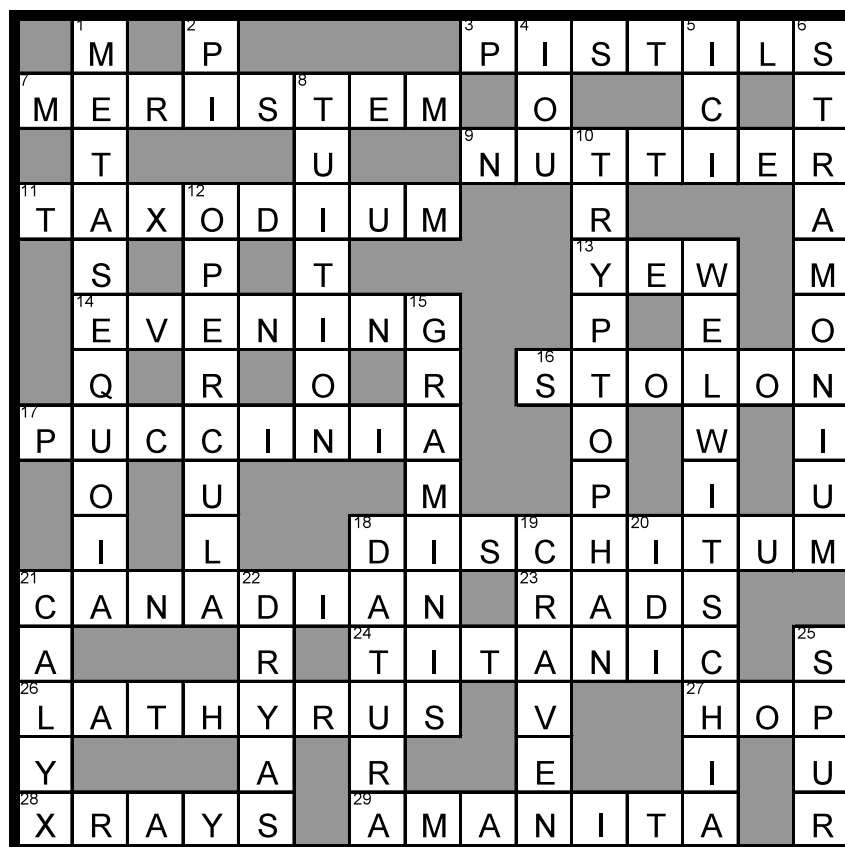
Botanising in Lapland. Mark Tulley

Some photographs of plants taken in Lapland were displayed on a laptop.

Identification help. Douglas McKean

A table was provided for the display of unidentified specimens and/or photographs. It was well used and many identifications were made

CROSSWORD SOLUTION



CHANGES TO THE LAW ON NON-NATIVE SPECIES

The passing of Wildlife and Natural Environment (Scotland) Act 2011 (“the WANE Act”) has made significant changes to the law in Scotland relating to non-native species. It is now an offence to plant or cause to grow any non-native plant species in the wild. Previously, only the planting of a few problem species such as Japanese knotweed was prohibited.

This wide-ranging offence includes allowing a non-native species to spread into the wild from an area such as a garden, nursery or development site. The term *non-native species* includes native species beyond their native range.

A *Code of Practice on Non-native and Invasive Non-native Species* will set out guidance on how to act responsibly within the law and will provide definitions of terms such as *native range*, *non-native*, *invasive non-native species* and *in the wild*. It will explain how the offence of releasing a plant or animal into the wild is a strict liability offence and does not require proof of intent or recklessness. The Code will also set out the due diligence, that is, reasonable steps which should be taken to ensure such an offence is not committed.

Scottish Natural Heritage takes on the role of licensing authority for many of the activities covered by the new laws on non-native species. An example of this will be the release of a non-native species as a biological control agent.

Why make these changes to the law now?

In 2008 the Scottish Parliament held a debate on invasive non-native species issues and passed a motion requesting the Scottish Government to draft legislative improvements. Drawing on the expertise of the members of the Scottish Working Group on Invasive Non-native Species, proposals to improve the law on non-native species were drafted and then included within the WANE Bill eventually passing into law with only minor changes along the way. This comes at a time of growing awareness of the threats posed by non-native species.

Are non-native species a problem in Scotland?

We often associate the problem of invasive non-native species with the new world, particularly countries such as Australia and New Zealand. Scotland may not be in this league in terms of the impact of

invasive non-native species on our native species and habitats but we have a significant and growing range of problems such as:

- *Rhododendron ponticum* which has invaded vast areas of our western woodlands, internationally important for their mosses, liverworts and lichens
- Giant hogweed which poses a significant health threat and chokes the banks of watercourses preventing access for recreation.

In addition, global trade and transport networks continue to bring new non-native species to our shores.

Why do the new laws focus on the release of non-native plants and animals rather than the control and eradication of those already growing and living in the wild?

Preventing the release of non-native species into the wild is the least environmentally damaging and most cost effective form of intervention. There is a growing awareness of the need for biosecurity to prevent the unwanted spread of plants and animals as well as pests and diseases.

What about invasive native plant species such as bracken and gorse?

Native plants can be invasive but this behaviour is more likely to be a result of land management practices or lack of them and should be addressed through improved land management techniques. Native plants which become invasive are still host to a range of native invertebrates, fungi and other species as well as creating a habitat for native species such as nesting birds. Non-native plant species, by contrast, lack this range of the 'natural enemies' (typically invertebrates and fungi) which restrict their growth in the regions in which they evolved and stop them from being invasive there.

The new powers rely on a definition of *in the wild*. Can this really be defined?

An understanding of which land is *in the wild* is a cornerstone of the new legislation. Non-native species can be released in the areas exempted from the definition of *in the wild* if this is done responsibly with an understanding of risk that they might spread into the wild. In the Code of Practice *in the wild* will be defined by exception, all land being

in the wild unless it is one of the exempted categories (such as arable fields).

Will these changes mean that landowners now have a duty to sort out all the non-native species problems on their land?

The new legislation sets out a clear duty for landowners (and all of us) not to release non-native species into the wild. For example, landowners must prevent non-native plants from escaping from gardens into land which is 'in the wild' whether they own the wild land or not. They must not plant non-native species in the wild in future. The new legislation doesn't, however, oblige landowners to control existing established populations of non-native species on wild land.

What about species that were once native to Scotland but became extinct long ago and now may be part of a re-introduction project. Are they covered by the new legislation?

Former native species fall within the definition of non-native species as, once extinct, Scotland is no longer part of their native range even though this range reduction may have been caused by human action. Re-introducing that species is therefore a release into the wild of a non-native species and will require to be licensed by SNH.

Non-native species have hit the headlines as some mortgages are being refused because of the presence of Japanese knotweed on a property. Will the new law change this?

The changes to the law relate to the release of non-native species into the wild and controlling them *in the wild*. Japanese knotweed affecting a property or structure is unlikely to be within the definition of *the wild*. Allowing the knotweed to escape beyond the property boundary into the wild may now, depending on the circumstances, be an offence. This doesn't change the situation with a refused mortgage; the knotweed is an issue for the structure for the building in the same class as subsidence or tree root damage and is the responsibility of the property owner. If a property owner is aggrieved that knotweed has spread from an adjacent property they will have to rely on the common law to seek a civil action to pursue their claim for damages.

Robin Payne
Policy and Advice Manager: Non-native Species
Scottish Natural Heritage, Battleby

AN INTRODUCTION TO THE BSBI

At our joint annual meeting, your editor suggested I should write a short piece on what your sister society BSBI has to offer BSS members, in the way of opportunities to get involved in vascular plant recording. The supply of accurate records is our primary activity, and the more precise and detailed they are, the more useful to both conservation bodies and academic researchers. But there is a lot of Scotland out there, and we are relatively few and thinly spread. There is room for anyone with enthusiasm and basic skills to join us.

Since H C Watson published his *Topographical Botany* in 1873-4, the vice-counties which he devised have remained the basis of much biological recording. Watson's general principle was to retain smaller counties and divide larger ones into less extensive areas. Thus, there are 41 vice-counties in Scotland, and BSBI has traditionally maintained a recorder in each one. To see a map of vice-counties and how to contact their recorders follow this link:

<http://www.bsbiscotland.org.uk/contacts.htm>

Watson simply recorded the presence of a plant in each vice-county, but when the first botanical atlas was being planned in the 1950s, it was decided to use 10km squares (hectads) as the basic mapping unit. This represented a huge leap in the precision and value of the data, but also a corresponding increase in work for the recorder, as the larger vice-counties contain 50 or more hectads.

A conference celebrating the legacy of this atlas will take place at RBGE in September 2012. During the half century since its publication, it has become increasingly apparent that the finer the resolution achieved in recording and mapping, the more valuable the outcome. The tetrad (2x2km) is now widely used as the basic recording unit, but as there are 25 tetrads in every hectad, this requires hugely more effort, and it is not practicable for a recorder to survey every tetrad in a large vice-county. But even tetrads are too big for some purposes, and it makes sense to record at monad (1km) precision whenever possible, even though we cannot cover every square. The advent of GPS, currently allowing a precision of about 3m with a cheap hand-held set, has transformed the recording of scarcer plants, making re-finding and monitoring a much simpler process, as well as giving us confidence about the exact location of grid-lines and vice-county boundaries. Our recording cards are customised for each vice-county, the scarcer

species being deliberately omitted, so that if one of them is found we have to write it on the back with a precise grid-reference.

It is evident that vegetation changes with time, and plants can serve as indicators of change in such things as climate and pollution levels. To obtain useful data for monitoring it is desirable to repeat surveys in a systematic way. BSBI run a project to repeat the recording of a set of sample tetrads every 15 years or so for this purpose, as well as summarising all general recording in decade or 20-year date-classes, which means trying to get back round your vice-county every ten (or at most twenty) years.

All of this adds up to a much bigger workload for the recorder, not only in making the records but in entering them into a database. Working with computers is not everyone's cup of tea, and some recorders find this a tedious chore. However, as records are of no use unless they are accessible, it is every bit as important as making them in the first place. Anyone who enjoys computer work, and finds satisfaction in making potentially valuable records actually useful, will find that their skills are always greatly appreciated. We have appointed joint recorders in a number of vice-counties, and we would like to establish a recording team in each area where enough botanists are available. This means there are opportunities for everyone to employ their particular skills, whether it be in field identification, herbarium work, data entry or education and communication.

When and where we go out is a compromise between what is likely to be productive, given the season and weather conditions, and what is coherent with the broader strategy of recording the vice-county in a reasonably systematic way or carrying out some project for the BSBI. In general, woodlands are better recorded earlier in the year and uplands later, but certain species can only be seen at particular times, so repeat visits are often necessary to achieve good coverage. Especially in urban areas, the most productive sessions are often those spent on post-industrial sites or disturbed ground where construction is in progress, as it is in these places that alien species often make their first appearance in a district. Monitoring the spread of these is another important aspect of our work.

Chance finds are always pleasing, but it is more satisfying to find a plant that you feel should be in a particular place, because it is the right sort of habitat, even though there is no previous record of it growing there. It is especially rewarding to re-find a plant which has been

thought extinct in an area. I remember the satisfaction of seeing *Scleranthus annuus* (Annual Knawel) for the first time on Bute, where it had been last recorded by James Robertson in 1768.

For most of us, field recording in the company of a more experienced botanist is a great treat, and this is what BSBI field meetings can offer, in particular those focused on teaching and learning. We hold several meetings of this kind each year, open to all 'beginners and improvers', and anyone who is keen to learn will find others at their own level, and help at hand to progress. Anyone slightly more advanced will find our ordinary field meetings enjoyable and stimulating, as many plants will be pointed out to you and there is always someone to ask about anything unfamiliar.

If you feel that you might like to join in some of these activities, please contact me or your local recorder, or just book yourself a place on any field meeting you fancy. You will be very welcome!

Angus Hannah, BSBI Scottish Officer
Glenmore, Rothesay, Isle of Bute, PA20 0QU
e-mail butesedge@yahoo.co.uk



THE CAIRNGORMS RARE PLANTS PROJECT: WORKING TO CONSERVE THREATENED PLANTS IN THE CAIRNGORMS NATIONAL PARK

The Cairngorms Rare Plants Project was launched in March 2010 to deliver targeted conservation action for four rare plants of high conservation importance in the Cairngorms National Park. Twinflower (*Linnaea borealis*), Intermediate Wintergreen (*Pyrola media*), Lesser Butterfly-orchid (*Platanthera bifolia*) and Small Cow-wheat (*Melampyrum sylvaticum*) are the focus of this project, all of which have undergone considerable UK declines and have been identified as national conservation priorities in the UK Biodiversity Action Plan and the Species Action Framework for Scotland.

The three year project was set up as part of the Cairngorms Local Biodiversity Action Plan to address both local and national conservation targets, and is a partnership between the Cairngorms National Park Authority, Scottish Natural Heritage (SNH) and the University of Aberdeen with additional funding support from the Species Action Framework for Scotland and the Esmée Fairbairn Foundation. Project work is coordinated by a full time project officer based in the SNH offices in Aviemore.

The project aims to secure and enhance the long-term survival prospects of the four target plants by delivering practical action to address their individual conservation needs. To achieve this, the project set out to: (i) establish the full distribution and current status of the four target plants in the Cairngorms National Park, (ii) conduct surveys of selected populations to gather baseline monitoring information and identify key conservation issues, (iii) work alongside land managers and conservation partners to develop and deliver targeted conservation action, and (iv) encourage local participation and involvement in the project.

The job of recording and surveying populations of these plants in an area as large as the Cairngorms National Park (total area = 4528 square kilometres!) is a big one, but information provided by local botanical recorders and members of the public, and the assistance of a small group of dedicated volunteers, has so far proved invaluable to this task. Searches have been conducted for recent and historical records and in areas of potentially suitable habitat. This work has been rewarded with the discovery of a number of new sites for Twinflower, a long list of

new sites for Intermediate Wintergreen, and one or two for Lesser Butterfly-orchid. However, despite some careful searching in the right places, new sites for Small Cow-wheat have so far proved elusive. The following sections provide a brief introduction to each of the four target species and describe the conservation work being implemented for them in the Cairngorms National Park.

Twinflower: This delicate creeping dwarf-shrub is a characteristic species of pinewoods in the northeast of Scotland and also occurs, although less frequently, in open heathland, birch woodland and juniper scrub. The Cairngorms National Park is the UK stronghold, where the species occurs locally along Strathspey and Deeside with outlying sites in Glen Doll and Strathdon. Most of the remaining populations are small and highly isolated, set little or no seed each year, and persist entirely by vegetative reproduction.

Inappropriate woodland and heathland management practices (for example, heavy felling of pinewoods, over- and under-grazing of the pinewood habitat, the creation of dense plantations of closely spaced trees, and extensive heather burning) are key threats to this species and have undoubtedly contributed to its historical decline. In addition to this, low seed production, due to reproductive isolation of single clone patches, limits potential for dispersal and spread into new areas of suitable habitat, leaving remaining populations highly vulnerable to extinction.

The project is currently working with land managers to deliver targeted habitat management for Twinflower at a number of key sites in the Park. Actions include canopy thinning in plantations where shade levels are currently too high, localised management of sub-shrubs where growth has become rank due to under-grazing, and the implementation of protective measures in commercially managed woodlands. Translocation trials are also being set up to restore genetic diversity and the potential for seed production to promote the long-term spread and recovery of this species in the Park.

Intermediate Wintergreen: This evergreen perennial herb with loose rosettes of distinctive round, stalked leaves is relatively widespread in the Highlands of Scotland but has declined considerably in other parts of the UK. The Cairngorms National Park is the UK stronghold where it occurs in pinewoods, bearberry heathland and birch

woodland. Intermediate Wintergreen can be shy-flowering making it easy to overlook and creating uncertainty over identification since, at first glance, leaves appear similar to the closely related Common Wintergreen (*Pyrola minor*) and Round-leaved Wintergreen (*P. rotundifolia*).

Surveys of Intermediate Wintergreen sites in the Park have revealed that large extensive populations are associated with sites where the field-layer is kept short and open and there is a degree of regular disturbance, such as heathlands managed by rotational muirburn or moderately grazed by cattle, sheep and/or deer. In contrast, populations in unmanaged heathlands, and in pinewoods where deer numbers are highly controlled, are much more restricted in extent and typically confined to the edges of forest tracks, footpaths and animal tracks.

The project is currently setting up a series of management trials to investigate the effectiveness of various techniques (including brush-cutting, burning and scarification) to create suitable habitat conditions for Intermediate Wintergreen. These trials are aimed at recovering Intermediate Wintergreen populations in under-managed pinewoods and heathlands where shading from rank growth of sub-shrubs and a lack of disturbance of the moss-layer are limiting the persistence and spread of this species.

Lesser Butterfly-orchid: This attractive orchid flowers for an all too brief period during mid-June to early July when it produces a loose spike of striking white flowers. Although relatively widespread in Britain and Ireland this species has undergone a considerable recent UK decline. The current stronghold lies in the north and west of Scotland. In the Cairngorms National Park, Lesser Butterfly-orchid is restricted to just a handful of sites in the Aviemore - Boat of Garten - Nethy Bridge area but historical records suggest that it was once more widespread.

Lesser Butterfly-orchid occurs in unimproved grassland, heathland and woodland edge habitats and appears to require a short and open sward since the majority of good sites in Scotland are either seasonally grazed or cut. However, the intensity and timing of management is critical. Heavy grazing or cutting during the flowering period can prevent the orchid from flowering and setting seed and, over time, this may ultimately lead to the disappearance of the species from a site. Equally, under-grazing can be a big problem leading to the development of a tall

and dense sward, or the encroachment of scrub, which may shade out the orchid.

Project work for this species aims to implement and secure favourable grazing or cutting management at existing Lesser Butterfly-orchid sites, historical sites and areas of potentially suitable habitat to safeguard existing populations and promote the long-term spread and recovery of this species in the Park. In addition to this, information gained from site surveys to date, and considerable research conducted as part of the Species Action Framework, is being pulled together to create a set of guidelines for land managers to promote favourable management at Lesser Butterfly-orchid sites throughout Scotland.

Small Cow-wheat: This small annual with bright yellow flowers has undergone a huge decline in the UK. Previously recorded from over 200 sites in the Britain and Ireland, it is currently known from less than 20 sites in the Highlands of Scotland and only a few in Northern Ireland. The Cairngorms National Park holds just three populations, but one of them is among the largest in Scotland.

Small Cow-wheat occurs in the remnants of upland broadleaved woodland, or former sites of, often in isolated gullies and tree-lined ravines, or high up on rock ledges, escaping from heavy grazing pressure. The majority of remaining populations in Scotland are small and highly isolated with low levels of genetic diversity, often persisting in small refuges surrounded by otherwise highly unsuitable habitat. To add to the problem, the seeds of Small Cow-wheat are relatively large and are adapted for dispersal by wood ants, which have also disappeared along with the woodland habitat. With large, heavy seeds and no dispersal agent, the prospects of this species reaching and colonising new areas of suitable habitat are extremely limited and remaining populations remain vulnerable to extinction due to random population fluctuations and environmental change.

A species recovery project was implemented by the Small Cow-wheat National Steering Group which set up a series of trials in 2005 in an attempt to introduce the species to new sites in Highland Perthshire with apparently suitable habitat. Seed collected from a selection of remaining populations was planted into these sites to create new populations of increased genetic diversity. The Cairngorms Rare Plants Project aims to build on this previous work by establishing new populations of Small Cow-wheat in suitable habitat areas in the

Cairngorms National Park. However, finding a suitable site in the Park has so far proved problematic, due to the poor condition and inappropriate management of existing broadleaved woodland sites, and it appears that the hunt for a suitable site may need to extend beyond the Park boundary.

Population expansion work, conducted at one of the largest remaining Small Cow-wheat populations near Blair Atholl, has been met with more success. Here, seeds have been collected from this vulnerable trackside population and moved into areas of adjacent suitable habitat to extend the extent and safeguard the future of the population. Initial success levels have been high and further seed collection and planting work is to be conducted next season.

It is hoped that the action delivered through this project will not only conserve and enhance populations of the four target plants in the Cairngorms National Park, but information gained by examining these species more closely and implementing practical management trials for them will contribute significantly to the development of successful future conservation strategies for these plants and other rare plants facing similar conservation issues in the UK.

A big thank you to everyone who has contributed to the project so far. If you would like to find out more about the Cairngorms Rare Plants Project, please visit the new project website at: www.cairngormsrareplants.org.uk or contact Dr Andy Scobie the project officer by e-mail: a.scobie@abdn.ac.uk tel.: 01479 810477 or postal address: Scottish Natural Heritage, Achantoul, Aviemore, Inverness-shire, PH22 1QD.

Dr Andy Scobie
Scottish Natural Heritage, Achantoul

FLOUER O SCOTLAND? A POEM IN SCOTS BY ROGER WEST

Which plant is the 'Flower of Scotland'? Many nations have chosen a native plant as a national emblem. The choice is a matter of patriotic sentiment, and anyone can have an opinion, but botanists can offer some advice. Such an important question can only be debated in verse – and in Scots. I thank David Purdie, an accomplished Scots poet, for help with vocabulary, syntax and idiom. Traditionally the plant emblematic of Scotland has been the thistle, tall, prickly and purple flowered. Clapam Tutin & Warberg (but not Stace) bestow the name 'Scottish Thistle' on *Onopordum acanthium*. But it is not native in the British Isles and should therefore perhaps be excluded. *Cirsium vulgare* looks the part, is native and common in Scotland, is therefore arguably a better candidate, and has been recognized by some authors. *Erica tetralix* has a strong cultural association with Scotland and should not be overlooked. *Primula scotica* is not only beautiful but also endemic. I offer these and some other attractive plants, but the decision is yours. Which do you think deserves the title of -:

Flouer o Sotland?

Tak tent o the guid Scotch thrissle
wi fell jags whilk wull gar ye whistle.
Tho it's a plant that aa Scots luve
I wairn ye, touch not bot a gluve!

Its flouers, aa in nectar ryke,
wull draw bees from their hamelt byke
where they dance a cantie reel
afore they ettle far afiel.

Hugh McDiarmid (C. M. Grieve),
's a gryte Scots makar. He did scribe
that A Drunk Man Looks At you,
alse do botanists, (tho scantlins fu!)

But fegs! At whilk perticular flouer
did Hugh McDiarmid's Drunk Man glour?
Wad some botanist disentangle
this unco awfu fashious cangle!

Honest, learned Clive Stace, whiles,
leuks at their anthers, leaves and styles,
an being canny, even tholes
speirin o their bracteoles.

Jalousin thair lang syne histor,
speirs, dwalt they north o Hadrian's Wa
afore the first o Scotland's fowk
wan here, the broon Scots erd to howk?

There's Echinops, which we maun tyne, a
puir obtender, like Carlina.
Ilk has but a silly prickie,
unworth o a Scottish thrissle.

Silybum gies milk, tho no a coo,
Sonchus, that English cry efter Soo¹,
but o jaggies they hae nane,
sae we may lae them on thair lane.

Onopordum, graun an hairy,
Scotch or Cotton's vernaculary.
But Stace says, an we maun agree,
it won til Scotland ower the sea.

Ilk o these we maun owerleap,
their plea's nae worthy o a cheep.
Thir athout jags or no naitrial
Scotland's thrissle never sall!

Forby *Cirsium*, *arvense* or *vulgare*,
or in a moss *Aiblins palustre*.
Thrissles aa, wi mony a pruckle/pricke,
purpie flouers, bonnie an muckle/mickle.

Twa plants that Scotland luves abune aa
are bonnie Erica and Calluna.
Sib ilk is tae the ither,
They are the Scottish Heath an Heather.

¹ The Scots name for *Sonchus oleraceus*, the Sow Thistle, is Swine-thrissle, not Soo-thrissle, but Swine doesn't rhyme with cool!

In his claes the Scotsman pricks
The flouer o *Erica tetralix*
A funtane o the best nectar,
Whilk for Scotch hinnie's necessar.

Anither plant that's popular is
purpie flouer't *Calluna vulgaris*.
Wha wadna dance a Hielan Fling
In honour o the braw Scots Ling!

Baith dwall on mountains, heigh an faur,
Baith luv the rain an blastin haar,
Baith herty in the hieland glaur:
Bethankit for their bonny flouer!

Gin aa this is ower quixotic, a
firsten chyce is *Primula scotica*.
Wordy is o this polemic;
's a bonnie flouer – an it's endemic!

Or the odorative myrthus
whilk dwalls in mosses an lang furth is.
The poticary kens its vaill,
the botanist cries it *Myrica gale*.

Or aiblins there's the wee twinflower
wi petals whilk wull gar ye glour.
This little plant we wadna tyne
dwalls on bare erd neth the pine.

At lang an lest here ends my ragment;
O Scotland's flora's but a fragment.
Ane is aiblins Scotland's flouer:
whilk to chuse is in your pooer.

ANTHER SMUT FUNGI

I was interested in the recent article about anther smut fungi on *Caryophyllaceae* (BSS News No 97 p40) as a friend and I have also been studying anther smut for some time. These smuts are pretty conspicuous as they replace pollen by purple smut spores and were previously all bundled together as *Ustilago violacea*. Now they have been reclassified as species of *Microbotryum*.

So far we have recorded *Microbotryum silenes-dioica* on Red Campion *Silene dioica*, *M. lychnidis-dioicae* on White Campion *S. latifolia* and *M. silenes-inflatae* on Sea Campion *Silene uniflora*, but have not so far recorded a smut on Bladder Campion *S. vulgaris*. We have also seen Ragged Robin *Silene (Lychnis) flos-cuculi* attacked by the smut *M. violaceum*(?). Generally speaking the infection seems to be scattered among the populations of these plants and not threatening, although I have seen a widespread infection of Red Campion along a roadside verge near Hopetoun House.

However the most frequently affected plant in our experience is Lesser Stitchwort *Stellaria graminea*. It's a widespread plant and it's unusual to find a sizeable population unaffected by *Microbotryum stellariae*. We have never seen this smut on Greater Stitchwort *S. holostea*, but I have (once) on Bog Stitchwort *S. alsine*.

Perhaps more worrying from the conservation point of view is the anther smut *M. dianthorum*(?) which affects Maiden Pink *Dianthus deltoides*, a nationally scarce plant. A particularly large population of Maiden Pink occurs at St Cyrus and this is quite heavily infected, although smaller populations elsewhere seem to be free of the disease.

Incidentally purple anther smuts also affect some *Dipsacaceae*. Recently the Edinburgh Natural History Society visited Auchtermuchty Common where an unusually large (for Scotland) population of Field Scabious *Knautia arvensis* was quite severely infected by *Microbotryum flosculorum*. *M. flosculorum* is apparently uncommon, but also affects Devilsbit Scabious *Succisa pratensis*, while *M. intermedium* affects Small Scabious *Scabiosa columbaria*.

There is also a yellow anther smut *Microbotryum scabiosae* which affects both Field Scabious and Devil's-bit, but for obvious reasons is not so conspicuous. It is said to be common, but I seem to have missed it; however Devil's-bit is quite widespread, and I'll be on the lookout for yellow smut spores from now on!

Jackie Muscott
Botanical Recorder for West Lothian (VC84)

Editor's note Tatiana Giraud was very grateful for the flower and smut samples she received following her request in BSS news 97 and would be happy to obtain further samples from other locations. We have investigated and there are no restrictions on sending specimens of these flowers and fungus to France.

Please send samples, kept in dry paper bags, with their location and GPS coordinates if possible to:

Tatiana Giraud
Université de Paris-Sud 91405 Orsay cedex France
email: tatiana.giraud@u-psud.fr

FOLLOW UP ON MEUM ATHAMANTICUM

This lovely description gives a derivation of Balmoney, the common name of *Meum athamanticum*, which was not mentioned in the September 2011 article about the plant.

"Above the trees which surround the bridge at Coulshill you come out into a little piece of upland meadow ground at the foot of which the burn runs in streams and little falls, with good pools between. In June on the drier parts of the meadow overlooking the stream grow quantities of a flower known locally as "bald mingie" or St. Baldred's money, though I think the full name is *Meum Athamanticum*. Its flowers are like small cream-coloured cow parsley, the buds and stems tinged with pink, the sweet-smelling foliage is a delicate green, soft and feathery as asparagus fern. It is a flower fanciful in its choice of surroundings and seldom have I seen it elsewhere than on ground sloping down to a burnside in these hill meadows of the Ochills, sharing a dry sunny bank with the harebell, the lady's bedstraw and the thyme."

This quotation is from 'The Path by the Water', by ARB Haldane, Published by Nelson's in 1944, page 33.

Sent in by David Adamson at the request of George McDougall.

BOOK REVIEW

***Remembered Remedies: Traditional Scottish Plant Lore*, by Anne Barker (2011).** Published by Birlinn, Edinburgh. 128 pages. Price: £9.99. ISBN: 978 178027 004 3

This pocket-sized, attractively illustrated little book is a welcome addition to the literature on plant-derived remedies in Scottish folklore. The aim of the book is to document a collection of memories told to the author by people who have either used traditional remedies themselves or remember others using them. The recipes and methods have been passed from generation to generation by word of mouth, often for many centuries, but since the growth of modern medicine and the establishment of the National Health Service (1947) there has been less need for traditional remedies and there is a danger of losing the knowledge and skills as the practitioners pass away. Fortunately, Anne Barker and other recent authors (e.g. Beith, 1995; Darwin, 1996; Walker, 2003; Milliken & Bridgewater, 2004) are ensuring that at least some of the oral tradition is recorded before it is too late. It is appropriate that the foreword is written by Mary Beith, who has studied in this field for many years.

The plants from which the remembered remedies have been derived are grouped in the broad habitat categories in which they are usually found. The plants and their folk uses are described individually, and for each plant flowering times and more precise habitat details are given. Each plant is identified as far as possible by a common English name, a scientific Latin name, and a Gaelic name where available. Additionally, there are often local names for plants, which vary in different parts of Scotland. The author has done her best to establish the identity of the useful plants, but it is not always easy to be certain which precise species (or hybrid) was used. This is especially the case for eyebright, which was used as a treatment for sticky eyes (p. 7). Eyebrights are variable and difficult to identify and it is not clear whether one or more taxa were involved in the treatment. Among a group of closely related plant species it is possible that several taxa might have been effective and the choice might have varied according to availability. In the well known use of dock (docken, p. 35) for alleviating the irritation of nettle stings, *Rumex obtusifolius* is likely to have been used as it is abundant, widespread and easily recognisable, but *Rumex crispus* is

also common, and may also have been used in some instances. For some plant uses the author does not attempt a precise identification of the species. For instance, among seashore plants, a particular seaweed is remembered as having a frilly edge around a more solid central strip, and as being brought ashore by storms (p. 83). The seaweed was dried and stored to be eaten in times of famine. This reviewer suggests that among possible species *Laminaria saccharina* might be considered as a candidate. This species is a frilly-edged, lower-shore seaweed which yields a sugary coating of mannitol as it dries (Hayward *et al.*, 1996). The uncertainties show that there is still much work to be done on the identity of plants in folklore uses and on the chemical nature of the effective agents.

The range of plant uses described is much broader than the title of the book suggests. Plants were used not only for curing the ills of people and livestock, but for many other purposes around the home, e.g. for food (for people and livestock), making wine (for people only!), dyeing fleeces, whitening linen, making baskets, stuffing mattresses, covering floors and roofs, and as playthings for children. Some of the uses described continue to this day. The resourcefulness of Scottish country people has to be admired. Anne Barker has been particularly successful in gathering these folk memories together and writing such an interesting account of them.

References

- Beith, M. (1995) *Healing Threads*. Polygon, Edinburgh.
- Darwin, T. (1996) *The Scots Herbal: The Plant Lore of Scotland*. Mercat Press, Edinburgh.
- Hayward, P., Nelson-Smith, T. and Shields, C. (1996) *Collins Pocket Guide to the Sea Shore of Britain and Europe*. HarperCollins, London.
- Milliken, W. and Bridgewater, S. (2004) *Flora Celtica: Plants and People in Scotland*. Birlinn, Edinburgh, in collaboration with the Royal Botanic Garden Edinburgh.
- Walker, A. (2003) *A Garden of Herbs: Traditional Uses of Herbs in Scotland*. Argyll Publishing, Glendaruel.

Barbara E.H. Sumner, Midlothian

BOTANICAL COURSES AT KINDROGAN FIELD STUDIES CENTRE: 2012

Lichen Identification	Friday 30 March - Friday 06 April
Scottish Spring Birds, Flowers and Butterflies	Friday 20 April - Friday 27 April
Sphagnum Moss	Tuesday 24 April - Saturday 28 April
Big Tree Country: Introduction to Tree Identification	Friday 27 April - Sunday 29 April
Mosses and Liverworts	Saturday 28 April - Saturday 05 May
Big Tree Country: Tree Identification for Improvers	Sunday 29 April - Thursday 03 May
NVC: Woodlands	Friday 11 May - Monday 14 May
Isle of Coll Trip	Saturday 12 May - Saturday 19 May
A Uist Spring	Saturday 02 June - Saturday 09 June
Freshwater Algae	Friday 08 June - Friday 15 June
Identification of Highland Plants	Friday 15 June - Friday 22 June
Flora and Fauna for Hillwalkers	Friday 15 June - Monday 18 June
Wild Orchids of Scotland	Tuesday 19 June - Saturday 23 June
Plant Communities of the Scottish Highlands	Friday 22 June - Friday 29 June
Aquatic Plants	Friday 22 June - Friday 29 June
Discovering and Identifying Wild Flowers	Monday 25 June - Friday 29 June
Discovering Mountain Flowers	Friday 29 June - Monday 02 July
Fern Identification	Monday 02 July - Friday 06 July
Grass Identification	Friday 06 July - Friday 13 July
NVC Grasslands	Friday 20 July - Monday 23 July
Introduction to NVC	Monday 23 July - Thursday 26 July
Identifying Sedges and Rushes	Monday 06 August - Saturday 11 August
NVC: Heathlands	Friday 10 August - Monday 13 August
Identifying Fungi	Friday 07 September - Friday 14 September

EXHIBITIONS AT THE ROYAL BOTANICAL GARDENS

Botanics 360 Degrees — Outdoor Exhibition

RBG Edinburgh 16 Jan — 11 Mar 2012

More flowers of Spring

RBG Edinburgh 1 Feb — 30 Mar 2012

Science on a Plate - Exhibition

RBG Edinburgh 2 Feb — 15 Apr 2012

The Nature of Metal by Jackie Roberts.

Dawyck Botanic Garden 4 Feb — 29 Apr 2012

Edinburgh Pinhole Photography Festival

RBG Edinburgh 5 — 6 Mar 2012

Allotments: Paintings and Prints by Pamela Grace

RBG Edinburgh 10 Mar — 7 May 2012

Pteridomania - The Renaissance' - Exhibition

Logan Botanic Garden 15 Mar — 29 Apr 2012

RBGE's Secret Garden : The wild woodland garden of Larachmhor.

RBG Edinburgh 3 Apr — 1 June 2012

Locating the Nest

RBG Edinburgh 27 Apr — 22 July 2012

The Nature of Metal by Jackie Roberts

Logan Botanic Garden 5 May — 1 July 2012

Out of the Woods, Linocuts of trees by Mungo McCosh.

Dawyck Botanic Garden 6 May — 26 Aug 2012

William McKeown (1962-2011)

Inverleith House, Edinburgh 12 May — 8 July 2012

We are extlnked

RBG Edinburgh 12 May — 29 July 2012

Remarkable Trees

Inverleith House, Edinburgh 12 May — 8 July 2012

Botanical Images Scotia (BISCOT)

RBG Edinburgh 6 — 22 June 2012

Exhibition - Gardening in Galloway

Logan Botanic Garden 2 July — 31 Aug 2012

Fairies and Folklore

Logan Botanic Garden 19 July 2012

Philip Guston (1913-1980): Late Paintings

Inverleith House, Edinburgh 25 July — 7 Oct 2012

"Garden Texture" a Textile exhibition by Fibretrix

Dawyck Botanic Garden 2 Sept — 30 Nov 2012

BSS NEWS – INFORMATION AND GUIDELINES FOR CONTRIBUTORS

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

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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 list:

- 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 archaeo-botany.
- 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 the following guidelines. Just send what you can and the Editors will make adjustments.

File name

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 2007. 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 more than one image, 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>.

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. Add information and credit the photographer at the end of your article if the photographs with your article are not by the article's author.

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 July 2012.
Earlier submission would be appreciated.**

Back cover pictures

Inside

Top: images from the Cairngorms Rare Plants website by Andy Scobie (<http://www.cairngormsrareplants.org.uk>). See article on page 40.

Top left: Twinflower flowering spike. June 2006, Birkhall. © Andy Scobie

Top centre: Lesser Butterfly-orchid early flowering spike. June 2011, Glencairn Meadow. © Andy Scobie

Top right: Small Cow-wheat plant. July 2010, Glen Derry. © Andy Scobie

Bottom: photos by Jackie Muscott, (VC84) See articles on pages 48 and 24.

Bottom left: Violet anther rust on *Stellaria graminea* at Easter Inch Moss, July 1992.

Bottom centre left: Violet anther rust on *Dianthus deltoides* at St Cyrus, July 2003.

Bottom centre right: Violet anther rust on *Silene dioica* at Hamilton High Park, May 1985.

Bottom right: Flowers and fruit of *Sorbus aucuparia* at Uphall Station, September 1987.

Outside

Part of a diagram of the relationships of vascular plant families, prepared by Dr Richard Milne and described in his article, *Illustrating modern plant relationships*, on page 7. This is one of 12 A4 sheets that can be combined to create a poster showing a complete diagram of plant families.