



BSS News

The Newsletter of the
Botanical Society of Scotland

No. 99

September 2012







The Botanical Society of Scotland is a Charity
registered in Scotland (No. SC016283)

Front cover pictures

Outside

Cortinarius alpinus in association with *Salix herbacea* on the Isle of Skye. Photo by Emily Hesling. See article on page 26.

Inside

A selection of photos submitted in response to our request for a new image for the BSS membership recruiting leaflet

In landscape view:

Top left: Scottish bluebell (*Campanula rotundifolia*) Photo by Chris Jeffree

Centre left: Bogbean (*Menyanthes trifoliata*) Photo by Richard Milne

Centre right: *Polytrichum juniperinum* Photo by David Long

Top right: Blackthorn (*Prunus spinosa*) Photo by Barbra Harvie

Bottom left: Thistle (*Cirsium* sp.) Photo by Sigrid Dengel

Bottom right: Scottish bluebell (*Campanula rotundifolia*) Photo by Roger Crofts

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>

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. Alternatively, you can now pay by PayPal's Secure Server via the BSS website membership page.

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EDITORIAL

Thank you to everyone who has contributed to this issue. We really appreciate the time and effort that you have dedicated to ensuring that BSS news is useful and interesting. I hope that you will all enjoy the variety of articles we have included, not to mention the many superb images.

We also extend many thanks and our appreciation for the work of Barbara Sumner, our retiring president of BSS, and hope that as a result of extra leisure time Barbara will have more opportunities to write items for this newsletter! We extend a warm welcome to Prof John Grace as our new BSS President and look forward to working with him and the other new council members in the future. There are still vacancies on the BSS council (see page 9) and we welcome any nominations, or volunteers for people to fill these posts. We also extend a warm welcome to new BSS members and hope that they will also support BSS news and our Journal through articles and scientific papers.

Please visit the BSS web site where for the first time you can download two of the Society's publications made available on-line through the [Biodiversity Heritage Library](#) and the [Internet Archive](#), as part of the Society's 175 anniversary celebrations. The publications are: [John Anthony's Flora of Sutherland](#) and [The Botanical Society of Edinburgh 1836-1936, address delivered at the Centenary Meeting, 1st July 1936, by Professor F. O. Bower](#).

It is a pleasure to be able to congratulate so many in this issue and help to celebrate a variety of successes. We extend congratulations to Prof Roy Watling, who received an award for outstanding contribution to mycology and education, Richard Pankhurst for a new named species, Emily Hesling for her poster prize and the Scottish Wild Lands group on their 30th anniversary.

This is the first issue of the Newsletter to be printed by the University of Edinburgh since the retirement of our previous publisher. We hope that the quality is all that you would wish for. We look forward to the next issue of BBS news, (number 100!) and remind people to send articles by 21 January 2013, or sooner if possible – for details on how to submit news items and articles please see notes at the end of this newsletter.

Jill Thompson and Jane MacKintosh



Botanical Society of Scotland

SECRETARY'S REPORT ON BEHALF OF COUNCIL 2011/12

This has been a landmark year for the Society that began, immediately following last year's AGM, with celebrations of the 175th Anniversary of the formation of the Botanical Society of Edinburgh and the 20th anniversary of the change to Botanical Society of Scotland. Council thanks the many individuals who were involved in making the evening such a resounding success.

We have welcomed 31 new members to the Society (13 standard and 18 basic) in the last twelve months so once again the total membership has increased. We are especially pleased by the number of younger botanists who are joining our ranks and becoming actively involved in Society events.

The success of the Society's journal, *Plant Ecology and Diversity*, continues and we eagerly await the arrival of Vol 4 (4). A short written report from the journal editor, Dr Laszlo Nagy, is included in this issue. Council thanks Dr Nagy for all of his continued hard work in publicising the journal at conferences across the world.

The Society's other regular publication, *BSS News*, continues to provide a less formal medium for members to inform and entertain with items of botanical interest. Members are now able to access past issues of the News (from March 2010) via the members pages of the Society's website. Two excellent issues have been published in the past twelve months and our thanks go to Dr Jill Thompson and Ms Jane MacKintosh in producing the newsletter. Contributions are always welcome and the editors look forward to receiving your original articles, reviews, drawings and photographs.

John Anthony's *Flora of Sutherland* (published by the Society) and Professor Bowers' address delivered at the Botanical Society of Edinburgh centenary have now been digitalised and archived as part of a larger project by Biodiversity Heritage Library. Links are now available on the BSS website.

The Edinburgh lecture programme continues to provide information on a wide range of interesting topics throughout the winter months and

these are well-attended by both members and non-members of the society. The 2011/12 season began in October with Prof Mike Arnold, visiting us from the University of Georgia, USA, with a stimulating lecture "*Hybrid fitness, adaptation and evolutionary diversification: lessons learned from the Louisiana irises*". This was followed in November by a talk by Kay and Peter Bates (retired science teachers and educators) on the problems of invasive species in the Galapagos Islands. The last lecture of 2011 was by Dr Sarah Green, Forest Research, Northern Research Station, Roslin who gave us a worrying up-date on new *Phytophthora* threats in Scotland. The new year welcomed Dr Rene van der Wal from the University of Aberdeen in January with a fascinating insight to the effects of climate change on vegetation and biodiversity on the seabird islands in the Firth of Forth, followed in February by Dr Barbara Sumner who delivered her BSS presidential address "*Celebrating Diversity in Community Woodlands in Scotland*" an overview of a project on community woodlands in Scotland carried out between 2006 and 2010 and in March by Prof. Nick Harberd (Oxford University) with a fascinating talk entitled "*Seed to seed... and evolution*". April's lecture was the very timely "*Spanish Bluebells - menace or misunderstood?*" Dr. Fred Rumsey of the Natural History Museum dispelled several misconceptions about *Hyacinthoides* species and introduced us to some incredible images of the extent of within-species diversity.

The final (May) lecture was by Prof. Beverley Glover of Cambridge University who astounded us with microscopic images of flower petal surfaces in "*Gilding the lily: angiosperm diversity, petal evolution and development*". Council thanks Dr Maria Chamberlain, the programme secretary, for arranging this varied and entertaining programme.

The Society has also hosted and co-hosted successful meetings in Aberdeen, Dundee, Glasgow, Inverness and St Andrews during the past 12 months including "*Alpine flora of the Bradalbane Hills*" by Dr John Holland. Thanks as always go to the Local Secretaries of the BSS who liaise with universities and other societies to promote BSS-sponsored lectures throughout Scotland and also to our President, Dr Barbara Sumner, who this year re-introduced the 'grand tour' of the presidential address around the country.

The 2011 Field Programme provided opportunities to record, study and learn within a rich and varied range of events. The programme included a special 175th Anniversary visit to Benmore Botanic Garden, the annual Alpine field meeting (joint with BSBI) to the cliffs at the head

of Kirkton Glen in Perthshire, an opportunity to view saltmarsh species at Bellhaven and another to look for naturalised non-native species at Millerhill. Council thanks the many field leaders who gave their time and expertise to the various events, and also the members who produced short articles describing the visits for BSS News.

The annual BSS/BSBI Exhibition Meeting held at RBGE in November 2011 was, as always, an outstanding success. An account was published in BSS News 98 and our thanks go to the organisers.

The annual prize for best final-year dissertation in 2011 was awarded to Tiffany Aslam, a University of St Andrews/James Hutton Institute student, with a thesis entitled "Climate change and multi-trophic interactions: Plant mediated effects of drought on predator prey dynamics". The abstracts of all seven entries for the Student Prize were published in *BSS News 98*.

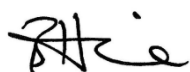
Alex Twyford, Student Representative on Council, arranged the "Next Generation Plant Ecology & Evolution workshop" in October at RBGE. This was a very successful, joint venture with the British Ecological Society and a report is available in BSS News 98, alongside an appreciation from a workshop participant.

The Society's web-site continues to develop and for the next twelve months (and beyond) will concentrate on the expansion of the members' section and related pages to enable improved links with our members outside Edinburgh (your thoughts and ideas are welcome). Our thanks go to Kim Harding for his hard work in maintaining the site.

A new BSS publication "*Celebrating Diversity in Community Woodlands in Scotland*" is now available and can be purchased at meetings or via the Society's website.

Council would like to express our thanks to Professor Stephen Blackmore, the Regius Keeper of the Royal Botanic Garden Edinburgh, for his continued support of the Society and for providing accommodation for our meetings. Council continue to encourage all staff and members of RBGE to become members of the Botanical Society.

President Barbara Sumner, Student Representative Alex Twyford and BSBI Representative Kim Harding will be retiring from their Council positions in June 2012. We would like to take this opportunity to thank them for their contribution to the Society during their terms of office.



Dr Barbra Harvie (Hon Gen Secretary)

Council welcome the following new members to the Society in 2011/12:

Standard

Dr Sigrid Dengel, Finland
Dr Simon Shackley, Edinburgh
Mr Murdo MacDonald, Oban
Ms Evelyn Roe, Dollar
Mr Athansios Tachtatzis,
Dunfermline

Ms Katherine White, Edinburgh
Mr Alec Thomson, Lairg
Ms Lawrie Ciano, Glasgow
Mr Jonathan Hughes, Edinburgh
Ms Ninnette Rowland, Edinburgh

Student Standard

Mr G Flint, Stirling
Mr Nikolaos Maragkos,
Edinburgh

Ms Lindsay Williams, Edinburgh

Basic

Mr D.E. Pryde, Perth
Mr Xinxin Xue, Canada

Miss Alison Wilson, Perth

Student Basic

Miss Tiffany Aslam, Reading
Ms Anja Liski, Edinburgh
Ms Merial O'Connor, Harrogate
Mr Arron Tippet, Edinburgh
Mr Dimiter Epihov, Edinburgh
Miss A Hosker, Shrewsbury
Miss S Perzley, Edinburgh
Ms Emily Moore, Dunfermline

Mr M.J. Todd, Johnstone
Ms Isla McCrone, Kilmacolm
Mr Jacob Assmann, Edinburgh
Mr Paul Stewart, Edinburgh
Mr Iain Pendreich, Edinburgh
Mr J Reilly, Edinburgh
Ms Jennifer James, Milnathort

You can keep up with botanical news through Facebook and Twitter - just go to the BSS website home page and follow the links.

BSS COUNCIL 2012-13

President:	Prof. John Grace
Vice-President:	Dr Chris Jeffree
Vice-President:	<i>vacant</i>
General Secretary:	Dr Barbra Harvie
Treasurer:	Dr David Chamberlain
Programme Secretary:	Dr Maria Chamberlain
Cryptogamic Secretary:	<i>vacant</i>
Alpine Secretary:	Dr John Holland
Conservation Secretary:	<i>vacant</i>
Journal Editor:	Dr Laszlo Nagy
Newsletter Editors	
Receiving Editor:	Dr Jill Thompson
Co-ordinating Editor:	Ms Jane MacKintosh
Publicity Officer:	Dr Anne Barker
BSBI Representative:	Ms Jenny Farrar
Student Representative:	Ms Niamh Britton
Website administrator:	Mr Kim Harding
Councillors:	Dr Liz Kungu
	Dr Richard Milne
	Dr Stephan Helfer
	Dr Richard Ennos
	Dr Julia Wilson
	Ms Trudi Dorr
	Ms Felicity Anderson

LOCAL SECRETARIES 2012-13

Aberdeen:	Dr David Burslem
Dundee:	Dr Brian Ballinger
Edinburgh (KB):	Dr Barbra Harvie
Edinburgh (RBGE):	Dr Heather McHaffie
Glasgow:	Mr Keith Watson
Inverness:	Mrs Margaret Fraser
St. Andrews:	Professor Robert Crawford

PROPOSED CHANGE TO TIMING OF AGM FROM 2013

At the AGM on 21st June 2012 Council asked members to consider a change of the timing of the Society's Annual General Meeting from June to September. Members attending the AGM agreed that the change should be made for the AGM of 2013 but requested that Council poll all members via BSS News (see how to vote below) before taking a decision to change the timing on a permanent basis.

Rationale:

The AGM is currently held in June at a time when members (including members of Council and Office-bearers) are engaged in field-work, resulting in a very low attendance. The June date allows little time for the preparation and auditing of the Society's accounts for the financial year just completed. A date in September for the AGM would provide additional time over the summer for the accounts to be prepared and audited, and for Council members to complete projects. At present the summer period is not utilised because the retiring Council is no longer in office and the newly elected Council does not meet until late September or early October.

Proposal:

- 1] From 2013 the Annual General Meeting should be held in September of every year followed by a meeting of the newly-elected Council in October
- 2] To accommodate this, the winter lecture programme should run from September to May instead of October to June.

How to vote:

The doodle poll that was set up prior to the AGM has been re-opened for those who have not yet had the opportunity to vote online: <http://www.doodle.com/mdf84mr9u7hn2y4f>.

If you prefer to register your vote by post please return the voting slip that has been enclosed with this issue of BSS News to: Hon.Gen. Secretary, Botanical Society of Scotland, c/o RBGE, 20a Inverleith Row, Edinburgh EH3 5LR. Please cast your vote by 30th September.

A FEW WORDS FROM THE RETIRED PRESIDENT

I thought I had retired from the presidency of the BSS at the AGM in June, but I've been brought back from the brink and asked to say a few words for BSS News, so here goes.

One of the strengths of the Botanical Society is its enthusiasm for meeting and talking. This enables ideas to be exchanged and plans to be devised and discussed. Unfortunately, the Society then struggles to find enough people to carry out the plans. Not surprisingly, people have other commitments, which limit the time they can give to BSS projects. If any BSS member has any time at all to spare, please tell the General Secretary or any other member of Council, so that they can call upon you when help is needed. If you prefer particular types of task, please make your preferences known.

I am sure that the new President and Council will appreciate support from the membership, and practical support for projects is particularly valuable. As a team the BSS can achieve much, and at the same time continue its usual friendly, encouraging environment in which botanists of any age can grow and flourish.



Good luck for the future!

Barbara E.H. Sumner, President (retired).

NEW BSS PRESIDENT PROFESSOR JOHN GRACE



John Grace is an Emeritus Professor at the School of GeoSciences in the University of Edinburgh.

He began his career at the University of Sheffield in 1964, where his botanical teachers included Professors Clapham and Harley, as well as the emerging stars Phillip Grime, David Read and Harold Woolhouse. Having been inspired by vacation employment at the Nature Conservancy's field centre, Moor House in the Pennines, his PhD research was on the eco-physiology of *Calluna* and *Sphagnum*, working towards a computer model of a moorland ecosystem under the supervision of Harold Woolhouse. He joined the University of Edinburgh in 1970 as a Lecturer in Ecology in the Department of Forestry and Natural Resources. He became a member of the Botanical Society of Edinburgh and served as a Council member and Programme Secretary.

At that time the Department of Forestry and Natural Resources had one of only two controlled environment wind tunnels in the world, and he developed an interest in the effects of wind on plants, and the aerodynamics of leaves. He published his first book in 1977, *Plant Response to Wind*. His interests veered towards trees, and especially their response to features of the natural environment. He became a Reader, and shortly afterwards he was awarded a Personal Chair in Environmental Biology. When the University of Edinburgh was re-

organised in 2002, merging Departments and creating 'mega-departments' called Schools, he became the Head of the newly formed School of GeoSciences, which included the disciplines of Geography, Ecology, Geology, Meteorology, Sustainability Science and Environmental Chemistry.

Current interests include: the carbon cycle in the tropics, carbon dioxide and methane fluxes over forests; tropical ecosystems; tree-lines in temperate and boreal zones; innovation in instrumentation for measuring plant-atmosphere interactions. He has published over 300 papers and chapters in peer-reviewed international journals and symposia; he has edited or authored ten books, and was the founder co-editor of the British Ecological Society's journal *Functional Ecology*. He is currently an Associate Editor of the Botanical Society's journal *Plant Ecology and Diversity*. He has served on a number of committees in the UK and elsewhere, including Scotland's *Advisory Committee on Sites of Special Scientific Interest*. He currently participates in research funded by the UK's Natural Environment Research Council and the European Union. He is a consultant to the Edinburgh-based company Ecometrica and from 2012 a Trustee on the *Scottish Forestry Trust*. He has designed, led and taught many BSc and MSc programmes in the general areas of ecology and environmental change, and supervised over 40 PhD students.

He is a former President of the British Ecological Society (2002), and Fellow of the Royal Society of Edinburgh. Like many botanists, he married a botanical classmate, Elizabeth; they have three children: Josephine (physician), Stewart (chef) and Tommy (artist and musician).

WINNER OF PHOTOGRAPHIC COMPETITION

The winner of our competition to find an image for the new BSS membership recruitment leaflet is Chris Jeffree, with a photo of *Campanula rotundifolia*, Scottish bluebell or harebell. Look out for the new leaflet at BSS events. Many thanks to everyone who sent in an image – a selection of the entries are shown on the inside front cover of this issue.

CONGRATULATIONS

Dr. Richard J. Pankhurst

One of our BSS members, Dr. Richard J. Pankhurst, of the Royal Botanic Garden Edinburgh, has been honoured by having a new species of dandelion named after him. The description, illustrated with photographs, can be read in the following paper: Richards, A.J. and Ferguson-Smyth, C.C. (2012) *Taraxacum pankhurstianum* (Asteraceae), a new dandelion endemic to St. Kilda, Outer Hebrides, Scotland. *New Journal of Botany* 2(1): 16-19. Richard has been interested in the taxonomy of dandelions for many years and has developed a computer-assisted method of identifying them. He is the BSBI recorder for the Outer Hebrides.



Professor Roy Watling

Congratulations to Professor Roy Watling of the Royal Botanic Gardens and past president of the Botanical Society of Scotland. Professor Watling is a renowned mycologist who received the RSPB Outstanding Contributor to Nature award for his long service to mycology and education and for inspiring the public to appreciate the importance of fungi. He received his award at a ceremony at the Balmoral Hotel, Edinburgh in March this year. Prof Watling still leads fungal forays with informal field meetings at 11.00 am on the first Sunday of each month, except January. Most of the sites they visit are in West-, Mid- and East-Lothian, but SE Scotland is interpreted liberally.

To find out about the next foray contact Chairman: Roy Watling-caledonianmyc@blueyonder.co.uk [01314673747] or Secretary/Foray organiser: Ali Murfitt spadali@hotmail.com 07521664530 and visit the web site <https://sites.google.com/site/scottishfungi/>

PLANT ECOLOGY AND DIVERSITY:

Report from Dr Laszlo Nagy, Editor-in-Chief

General remarks

The impact factor of 2.05 received in May 2011 has increased interest in the journal and as a result solicited and unsolicited submissions have increased (see Table 1 for breakdown of figures in 2011). Where Plant Ecology & Diversity is first choice it is because of rapid turn-around time of quality manuscripts and their fast publication on-line.

In 2011 the issue number increased to four. Issues 1 and 2-3 contained largely unsolicited material with some solicited reviews. Issue 4 will be the Special Issue on current Latin American botanical and plant ecological research, material from some of the symposia of the tenth Latin American Botanical Congress in October 2010.

The increasing time demand in processing manuscripts required the initiation of work by Associate Editors in 2011. Associate Editors handle reviewer selection and make recommendations, based on reviewers' comments and on their own evaluation.

Outlook for 2012

The 2011 impact factor was 1.04. Efforts will continue by the editor, editorial board and publisher to establish a steady respectable IF that will reflect a quality publication.

Events attended by editor-in-chief in 2011

1. Tropical forest savannization project workshop, Belém, Brazil, May 2011
2. Seventh Serpentine Conference, Coimbra, Portugal, June 2011
3. European Ecological Federation Congress, Avila Spain, September 2011
4. Annual meeting with Publisher, London, January 2012
5. Planet under pressure IGBP, London March 2012
6. Coloquio - As Lutas pela Amazônia no Início do Milênio, Coimbra March 2012

Planned meeting attendance 2012

1. BES Annual Meeting, Birmingham, December 2012

Table 1. Submissions received in 2011.

Original Article	165
Opinion Article	3
Review	5
Short Communication	10
Scottish Section	2
Special Issues	
Latin American Botanical Congress Special Issue - 4(4)	12
GMBA Conference SI – 5(1)	10
Forests and Environment (John Grace SI) – 5(3)	10
Next Generation Plant Ecology and Evolution	2
NIWOT RIDGE	1
Serpentine Conference Coimbra 5(4)	20
Tropical Forest Dynamics	1
Alpine Ecosystems - climate change & extreme events	2

PHYTOLEXICON CRUCIFORMIS B.S.SCOT EX WORD

Xword 7. In this crossword there are nine botanical names, mostly angiosperms but including three fungi, two alga, and three gymnosperms; seven words of botanical or biochemical terminology; and rather a lot of other words to fill in the gaps. That's not as I had intended it to be! Words do not read across grey squares or thick lines. I hope you don't find it too easy!

Still no seed of any cryptogrammic plants. I have emailed Japan to enquire about seed of *Sudoku* or related plants. They told me that there are no *Sudoku* plants, that sudokus are all hand crafted by skilled artisans in small villages. A likely story! But I shall have to try elsewhere.

Crucifer

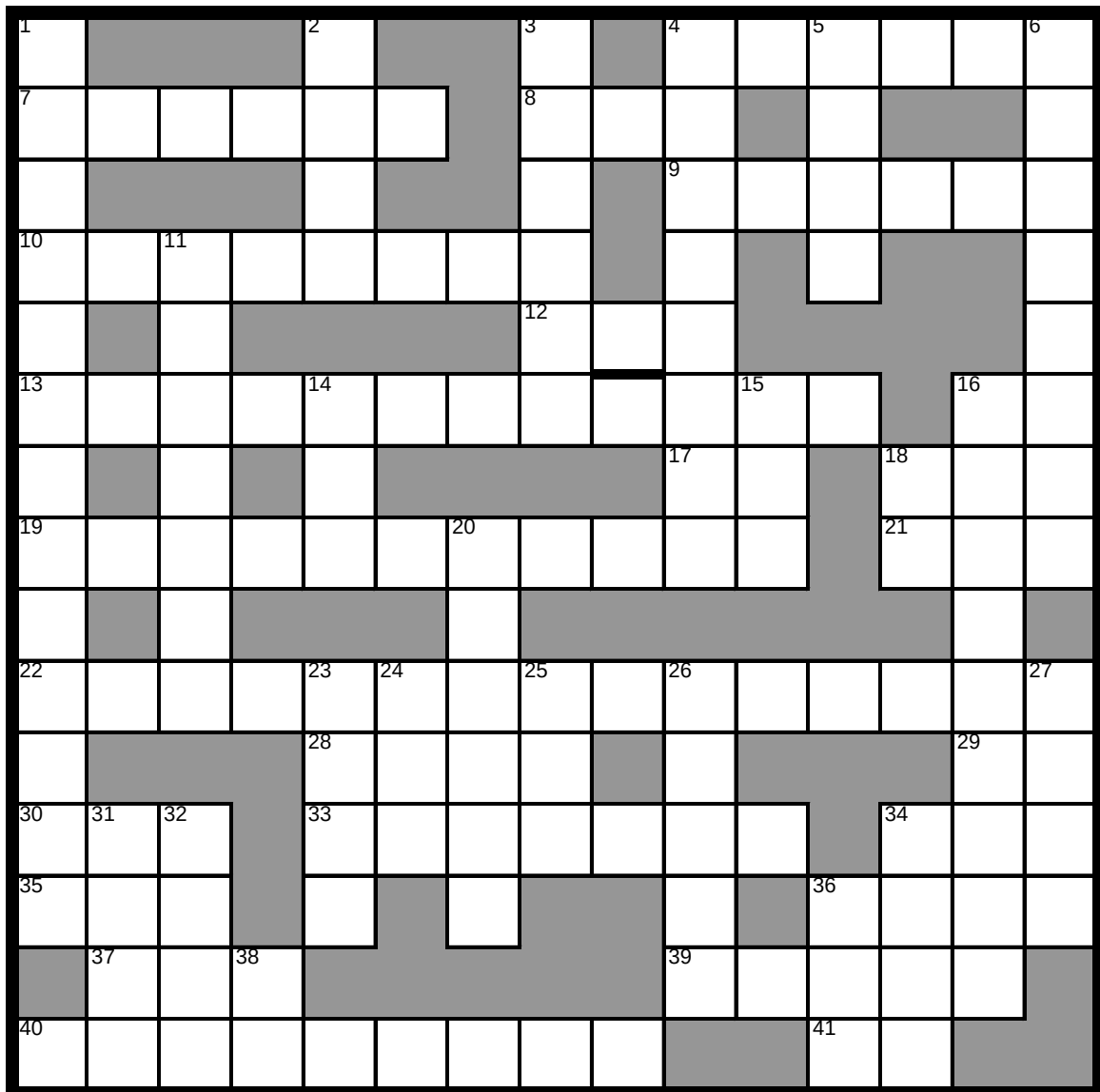
ACROSS

- 4 Acidulously related to jam, but found in circumspect, icosahedral combs! (6)
- 7 Fixes nitrogen at no cost environmentally. (6)
- 8 River found where extreme xerophytes can absorb it. (3)
- 9 Show misshapen leaves or – not so! (6)
- 10 Tipsy Duchess of Rothesay drank eastern tea. (8)
- 12 One of Jock Tamson's bairns hiding in Caledonian forest. (3)
- 13 Nine mixed with degree, and an ore all smelted, grew colourful tree. (4, 8)
- 16 Elementary content of Plumbaginaceae perhaps. (2)
- 17 Faery Queen with speech impediment but without a metallic element (2)
- 18 Hawaiian garland or Romanian money. (3)
- 19 Murdering ovarian cell, then splitting. (11)
- 21 Lady found in glad admiration of Thomas Babbage. (3)
- 22 Mycologist, North American, did a bad thing concealing the genus, specifically I can be concealed in priests' robes causing skin disease (7, 8)
- 28 Indian bread eaten in Clackmannanshire? (4)
- 29 Nutritious grain grows in this rare earth possibly. (2)
- 30 Light floret of *Helianthus annuus* perhaps. (3)
- 31 Crooked straw ryegrass yielded. (4)
- 33 Propel football eleven and a flower emerges (Scrophulariaceae). (7)
- 34 Last month in tumultuous circumstances. (3)
- 35 Emotional response inspired by clawed petals, perhaps. (3)
- 32 Aspect of plant community, perhaps, that scholar easily comprehends. (4)
- 37 Former empire held back by jam pot? (3)
- 39 Leaves four, perhaps, at European city. (5)
- 40 A trim, gory fungus. (9)
- 41 Fine old lawyer held back in blackmail case. (2)

DOWN

- 1 No bicycle area hides fungus (Cortinariaceae) (7, 6)
- 2 In which plants grow so ill? No, so well! (4)
- 3 Remove appendage or minutiae. (3)
- 4 See 6d.
- 5 Panic over bay: can it harbour a chap? (4)
- 6 And 4d. Act, O royal plebeian, to find fungus! (Trichlomataceae) (8, 8)
- 11 Rumex I cannot eradicate conceals central American. (7)
- 14 Some of boiling liquid used in mediaeval warfare. (3)
- 15 Nothing held back by pollinia. (3)

- 16 Maybe Perthshire Education Department briefly takes relatives to see
flower stems. (9)
- 18 Rare earth from Los Angeles. (2)
- 20 Opportunity for random variation perhaps. (6)
- 23 Marks paper about beheaded Dianthus species... (4)
- 24 ... or stock Welshman named. (4)
- 25 Question someone clothed in damask garments... (3)
- 26 ... about small airship or colonel. (5)
- 27 Spore capsule supported by coarse, tall stalk.
- 31 Crooked straw ryegrass yielded. (4)
- 32 Lifespan of plant found in very early season. (4)
- 34 Obtained from sour Ichthyornis excretion, so probably acidic. (4)
- 36 Zoological species were conserved here, but of plants only *Olea
europaea*. (3)
- 38 John Anderson Burns' ... (2)



EVOLUTION OF SCOTS PINE IN THE HIGHLANDS: Local adaptation, or the “home advantage”

Scotland could be thought of as a case study in deforestation. Ironically, the unadorned, rugged hills are exactly what many of us cherish about the Scottish landscape. Of course it was not always so, and much of the Highlands were once blanketed by the Caledonian Pine Forest dominated by the Scots Pine (*Pinus sylvestris* L.). Once widespread, the forest has suffered severe decline over the past 5000 years, which may be due to the influence of both environmental factors and human exploitation (Bennett, 1994). The remaining forest fragments are now estimated to cover only 1% of the area occupied by the original forest (McVean & Ratcliffe, 1962). Although these remnants are geographically disparate, we currently have no reason to believe them to be genetically isolated as, like all conifers, Scots Pine is wind-pollinated. Scotland is not a large country, but it is climatically diverse: pinewoods on the west coast experience around double the annual rainfall of those in the Cairngorms, and Scots Pine may be encountered from sea level to an altitude of 500 meters, growing in soils that are well-drained or outright bog-ridden. Different habitats present distinctive challenges to the flora and fauna they support. To ensure effective forest management we need to know if these ancient woodland fragments reflect these environmental differences in their genetic makeup. In other words, are they “locally adapted”?

We know that some plant species prevail under conditions in which others would not (the Shetland isles would be an imprudent choice for a cacti farm!). Survival strategies vary, and naturally plants will thrive in the environments which best compliment their own strengths. Broadly speaking, it can be useful to categorise plant survival strategies as belonging to one of three groups: the competitive, the stress-tolerant, or the ruderals (those that may propagate even when biomass destruction is common) (Grime, 1977). In reality we expect plants to fall somewhere along a continuum between these extremes, and for trade-offs to exist between one strategy against another. That is to say that the more stress-tolerant individuals are liable to be less competitive, or that a Jack-of-all-trades is master of none. Benign environments tend to favour competitive plants, characterised by rapid growth and swift assimilation of resources to the exclusion of their neighbours. Conversely, plants that can withstand short growing seasons, water shortages, or extremes of

temperature, occupy niches uninhabitable by their competitive counterparts.

It is also true that habitat specialisation (if more subtle) may occur within as well as between species. Individual populations are considered to be locally adapted when individuals possess higher fitness (i.e. greater ability to thrive and reproduce) at their home sites than those transplanted in from external provenances (see Savolainen *et al.*, 2004 for review). If plants grown from seed collected at site A perform better on site A than the same species of plant imported from site B or C, local adaptation to site A may be said to have taken place. However, if seed origin is of no consequence to performance, we do not consider populations to be locally adapted.



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So, can we find similar adaptive trade-offs within our native Scots Pine? Continental material has been shown to perform poorly in Scotland. In a number of trials established in the first half of the twentieth century, Scots Pine seed taken from a range of continental sources (southern Spain, the Urals, and Northern Scandinavia) were found to be inferior in terms of growth when compared with local material (Lines & Mitchell, 1964). Within Scotland, Perks and Ennos (1999) reported significant differences in timing of bud burst, height, and diameter of seven year old trees grown from four Scottish provenances. More recently, significant differences in bud flush were observed between Scottish provenances, with progeny from high altitude sites flushing earlier than those on lower land (Salmella *et al.*, 2011).

Currently, for my PhD study I am investigating the local adaptation of Scots Pine with respect to environmental stress: specifically, the ability to withstand waterlogging. Historically an east-west divide has been recognised in Scotland; pinewoods on the west coast of Scotland

being characterised by damp peaty soils frequently inundated with rainfall, in contrast to the better-drained, high altitude sites in the east. As you might expect, this is only a helpful generalisation, as marked variation might be observed within the boundaries of a single wood. In order to explore genetic variation between and within woodlands we can establish a common-garden trial. Here we may carefully examine how traits, morphological, physiological, or phenological, vary from one individual to the next when individuals collected from a number of different sites are grown together in a common environment. After all, genetic research need not always rely on an abundance of data on DNA or molecular markers (of course the “Father of Modern Genetics”, Gregor Mendel, knew of no such thing!). When seeds are collected for a common-garden trial they can be partitioned into family groups based on the ‘mother’ trees they were taken from. The ‘fathers’ (who supplied the pollen) sadly remain anonymous, and so seeds collected from the same tree are considered to be half-siblings. Knowledge of the seed origin and family-structure of the plants within a common-garden experiment allow us to make deductions about the genetic variability and heritability of traits we are interested in.

We have already set up a trial at a site located just outside of Edinburgh, and are growing a large number of Scots Pine saplings collected from a variety of sites within an experimental glasshouse. These plants have been grown from seed collected from nine native populations from across the north of Scotland, and half of the plants from each population have been exposed to long-term waterlogging with the remainder used as a control. We hope that via the application of waterlogging stress, genetic differences will emerge that would otherwise be elusive. Our primary method for assessing the stress endured by each plant is known as “chlorophyll fluorescence” (Maxwell & Johnson, 2000, provide a review). Plants are unable to utilise 100% of the energy they absorb from the sun: although solar radiation is used to drive photosynthesis, a portion will be re-emitted as fluorescence and the remainder dissipated as heat. When plants experience stress, their capacity to use light energy may be decreased and this can in turn alter the fraction re-emitted as chlorophyll fluorescence that we can measure electronically. This is a useful proxy for stress and measurements can be taken rapidly, which is highly convenient as we have several hundred plants to measure!

At present Scotland is divided into a number ‘seed zones’, with a view to protecting the genetic integrity of native pinewoods. However,

these boundaries are based upon genetic marker data not known to have any bearing on tree survivorship. We are interested therefore to learn as much as we can about any genuine adaptive differences between our woodlands that may exist to help justify future decisions regarding conservation and regeneration of Scots Pine. We often hear about biodiversity, and species richness, and genetic diversity is an important component of biodiversity that should not be overlooked, both to maintain the health of native pinewoods, and the flexibility of this important tree species to adapt to a future, which is uncertain but assuredly different.

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THE NATIVE PINWOODS OF SCOTLAND AND THEIR ECTOMYCORRHIZAL FUNGI

The native pinewoods of Scotland are recognised as important habitats for a range of native species of conservation concern. A broad range of taxa rely on the native pinewoods for survival, including birds such as the capercaillie, insects including the wood ants, and several rare plant species. Among the lesser known inhabitants of the native pinewoods are the fungi, with several rare species being found predominantly in mature stands of native Scots pine. Of particular conservation interest are the ectomycorrhizal stipitate hydroid fungi, for which the native pinewoods provide the main habitat. Currently almost all of the stipitate hydroid fungi found in Scotland have UK Biodiversity Action Plan targets associated with them which promote the understanding and conservation of these species.

While a fair amount of research has been undertaken into the distribution and abundance of the stipitate hydroid fungi (Newton *et al.* 2002; van der Linde, Alexander, & Anderson 2009) we know surprisingly little about the other fungal inhabitants of the pinewoods. Much of our existing knowledge comes from the records from amateur surveys collated into the Fungal Records Database of the British Isles by the British Mycological Society. While there are a great number of records in the database, with around 11,000 records of fungi from the native pinewoods recording 1571 species, there are several problems with the database. Primarily there are issues surrounding the correct naming of taxa. These are to do with both the nature of the database, collating records from a large number of observers, and the rapidly changing taxonomy of many regions of the fungal kingdom (Hibbett *et al.* 2007). The existing records are also biased towards a few highly surveyed sites, generally those with an active mycologist or mycological society nearby. Of the native pinewoods, only two thirds of the 84 pinewoods in Scotland have any records for fungi. This unequal surveying effort provides us with problems if we wish to look at the distribution of fungal species across Scotland. Because of these issues we currently have little knowledge about the ranges of many types of fungi in Scotland.

Knowledge about species ranges has been used for many groups, including fungi present in the lichen symbiosis, to understand whether species distributions are influenced by climate (Thomas *et al.* 2004; Ellis *et al.* 2007). If climate 'envelopes' of optimal climatic conditions for a

species can be identified, we can then start to predict whether that climate envelope might shift with future climate change. Mapping the movement of climate envelopes can give us some ideas as to whether species may be threatened by reduced habitat area in the future.

Currently the only fungi where we have some knowledge of their likely responses to climate change are the fungal partners of the lichen symbiosis and some pathogenic fungi (Desprez-Loustau & Robin 2007). There is currently little knowledge of the likely climatic responses of the ectomycorrhizal fungi, a group which includes the stipitate hydroid fungi. These fungi are predominately associated with temperate and boreal forests and form a symbiosis with forest trees, providing nutrients gained from the soil to the trees in exchange for carbon derived from tree photosynthesis. Because this symbiosis is essential for tree growth, and survival of the native pinewoods, there is growing interest in understanding how these fungi may respond to climate change.

To begin to understand how climate might affect ectomycorrhizal fungi in the native pinewoods it was first necessary to conduct a survey of the fungi present in Scotland along the range of climatic conditions present. To avoid the problems associated with the current fungal records a standardised sampling regime was adopted to prevent biases due to unequal sampling of forests. To reduce the potential errors in identification of fungal sporocarps (fruit bodies or mushrooms) the fungi were identified using DNA sequences gained from the fungal mycelium covering the pine roots, which is the site of nutrient and carbon exchange in the symbiosis. A total of 15 pinewoods were surveyed for ectomycorrhizal fungi, from those on the edges of the Cairngorms where winter temperatures are a degree below freezing on average, to those on the west coast where average winter temperatures are as high as 3.7°C and annual rainfall can reach 3000 mm.

From this survey 78 fungal taxa were found, including two species never recorded in the UK before (*Piloderma sphaerosporum* and *Pseudotomentella griseopergamacea*). Analysis of the distributions of fungi across Scotland showed that several species could exist in all the climates present, suggesting these fungi would be fairly tolerant of climate change. These 'all-rounder' fungi included mushroom-forming species such as the velvet bolete (*Suillus variegatus*) as well as species that have not been shown to form fruitbodies (*Cenococcum geophilum*). Other species were found to be more abundant in certain climates and both temperature and rainfall were found to be important in determining species distributions. The majority of species in the common genus

Cortinarius were found predominately where soil moisture was low, which tend to be pinewoods on the east of the country where rainfall is lower. One member of the genus *Piloderma*, *P. sphaerosporum* also showed a preference for drier conditions. The similarity of responses of these fungi may be due to their shared belowground morphology. Although the two taxa produce very different aboveground structures (*Cortinarius* species produce conspicuous mushrooms whereas *Piloderma* species form crusts on the bottom of dead wood) the morphology of their mycelial structures belowground is very similar and they belong to the same exploration type. The exploration type categorises fungi based on their ability to explore the soil environment, 'contact' or 'short-distance' types grow only very close to the plant root whereas 'medium-' or 'long-distance' types can explore soil further from the plant root through production of long hyphal strands (Agerer 2001). It has been hypothesised that different exploration types may respond to climate change in different ways because of their varying morphology. Fungi with medium- and long-distance hyphae are able to capture and transport water over long distances and might be more resistant to drought. Potentially drought resistance could give them a competitive advantage in drier soil environments and explain why fungi with this type are more common on the east of the country, where summer droughts are more common.

In conclusion, we now have a better understanding of the ranges of some of the ectomycorrhizal fungi in Scotland, and can identify groups which might be more sensitive to climate change. More work is now needed to monitor ectomycorrhizal fungi in the native pinewoods into the future so that species of conservation concern can be identified.

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THE FORGOTTEN ALPINES OF SCOTLAND

Fungal Associates of our Favourite Mountainside Flora

Current research is trying to draw attention to the little studied alpine ectomycorrhizal fungi.

What do the following plants have in common? *Betula nana*, *Arctostaphylos alpinus*, *A. uva-ursi*, *Dryas octopetala*, *Polygonum viviparum*, and all the montane *Salix* species? These plants cover much of the breadth of alpine habitats in Scotland, from the low alpine montane scrub inhabited by *B. nana* and several *Salix* species, to heathy, acidic mid-alpine ranges home to *Arctostaphylos* species, the base rich limestone outcrops favoured by *Dryas* and the extremities of our mountains topped with *Salix herbacea*. They can be thought of as the ‘wee trees’ comprising the forests of the mountain realm. Anyone who’s seen a dwarf willow peeping up its first green leaves of the year in May, above the sparse crust of gravelly soil strung between wind riddled boulders atop Cairngorm knows of their steadfastness. Aside from experiencing a short growing season and high exposure, these habitats are nutrient poor with often sparse or recalcitrant soils. A key attribute of

these plants' survival in inhospitable climes is their association with a suite of similarly hardy mycorrhizal fungi. These fungi use fine, fast growing mycelial networks in the soil to scavenge scarce nutrients, exchanged with the plants in return for photosynthetically derived sugars. The type of association found common to these dwarf shrubs is the ectomycorrhizal association, in which the fungal associate envelops the fine root tips of the plant to provide a contact surface for the exchange. This is considered to be an obligate relationship: neither the fungus nor the plant could survive without association with the other.

Ectomycorrhizal fungi are highly diverse morphologically and genetically, producing fruit bodies from large extravagantly coloured mushrooms, to truffles and encrusting mats. Readers are likely to be familiar with lowland forest ectomycorrhizal fungi, - picture fly agarics, ceps and chanterelles - where a diverse community of fungal species are associated with each tree, and mycelial networks within the soil are interconnected between trees throughout the forest. The situation is little different in the alpine 'forests', however a troupe of mushrooms five centimetres high can become the canopy above a wind clipped 'understory' of their plant hosts. This demonstrates the considerable quantity of carbon these diminutive plants are prepared to commit to the fungi in return for their scavenging capabilities.

The mycorrhizal association however is not the only trait these plants have in common. All have experienced declines over the past century, with their ranges contracting or local populations shrinking (Preston, Pearman & Dines 2002; Britton *et al.* 2009). At the end of the last ice age these plants were amongst the first to colonise the land as soils began to develop, and would have constituted the dominant vegetation akin to the tundra vegetation found currently in Northern Scandinavia. Along with the plants came their symbionts, including a selection of the ectomycorrhizal fungi which would have been found in the arctic vegetation of Europe at the time. As the climate in Scotland warmed these communities were forced up mountains and to the sub-arctic coastal areas in the far north and north west, becoming isolated by the now inhospitable tracts of warm lowland between these ranges. Prior to the deforestation of the uplands, the ectomycorrhizal habit in the mountains would have been widespread and interconnected from the lowland forests to the upper reaches of the alpine extent. Mountains were most likely ringed by a belt of ectomycorrhizal scrub (Gilbert, Horsfield and Thompson 1997), which grew from the tree line reaching up into the alpine zone, connected through a continuous gradient of

mycorrhizal host plants to the tops of the mountains. Now only fragments of host plant populations remain, and as such the biodiversity of the ectomycorrhizal community is likely to be diminished, and restricted by a lack of connectivity between habitats.

I am currently conducting a PhD project based at The James Hutton Institute and University of Aberdeen with Dr. Andy Taylor, to describe the current situation of alpine ectomycorrhizal fungi in Scotland. To do this I have carried out surveys in an attempt to describe the diversity of ectomycorrhizal communities associated with several alpine host plants, understand the biogeography of species in the context of perturbations currently threatening these habitats, and try to determine the level of connectivity between the ecotones from lowland through to alpine communities.

To simplify matters this project is focussed on the ectomycorrhizal communities associated with *B. nana*, *A. uva-ursi*, *A. alpinus* and *S. herbacea*. Broad scale surveys were conducted across the highlands incorporating 22 alpine sites. Traditional methods of recording fungi have been limited to collecting, describing and identifying above ground fruiting bodies of fungi based on their morphological features, and more recently identifying them by sequencing 'barcode' regions of their DNA. However, many ectomycorrhizal fungi fruit irregularly if ever above ground, so these methods are unlikely to give a clear representation of the true fungal community associated with a particular host. For this project we are employing state of the art 'high throughput' DNA sequencing techniques to identify the fungi directly from root samples taken from the host plants. Fruit bodies were also collected from sites sampled to provide reference DNA sequences and aid identification of those sequences detected on roots.

The diversity of ectomycorrhizal fungi we have recorded is substantial, with 55 species detected at one well sampled *A. uva-ursi* site in the Eastern Cairngorms. Below ground the diversity of ectomycorrhizal fungi was found to be comparable with similar studies carried out in old growth Caledonian pine woods.

We have found that the species were a mixture of lowland and alpine specific fungi. For instance several species commonly considered to be *Pinus sylvestris* specific associates were found at up to 850m in altitude in association with *A. uva-ursi*, such as *Suillus variegatus* (velvet bolete) and *Rhizopogon luteolus* (yellow false truffle). Alpine specific species included *Russula nana* (alpine brittlegill), *Cortinarius alpinus* and *Amanita nivalis* (snowbed amanita).

The most specious genus was *Cortinarius*, the webcaps, in which 36 species were recorded as fruit bodies over 8 sites in 2010. Other prevalent genera found included *Inocybe*, *Russula*, *Leccinum*, *Lactarius*, *Laccaria*, and *Tricholoma*.

A remarkable proportion of the species collected as fruit bodies appear to be previously undescribed species or new species records for the UK. During the 2010 field season ten new species of *Cortinarius* were detected as fruit bodies, whilst a further six species represent new records for the UK. The putative new species were collected at seven of the eight sites sampled for fruit bodies, and four were found at more than one site. This indicates that these are likely to be ubiquitous species within the alpine habitat of Scotland and have evaded previous detection due to low levels of recording in this ecosystem.

We are currently working to analyse the below ground samples collected throughout this project. This has included surveys designed to test the influence of climate, geography, habitat degradation and nitrogen deposition on the ectomycorrhizal community, and also look at the community composition over altitudinal gradients. This research will hopefully draw awareness to a highly diverse, but poorly recorded community, restricted to a rapidly declining habitat in Scotland.

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This article is adapted from a prize-winning poster presented at the Joint BES/BSSS/SG meeting in March this year: **Challenges for Scotland's Biodiversity Conservation: From the Soils to the Skies**. The poster was entitled 'Alpine Ectomycorrhizal Fungi: Exploring the biogeography of undiscovered fungal communities' for which Emily received £100 worth of books from Wiley Blackwell.

JUBILEE WOODS

The Woodland Trust's project to mark the Queen's Diamond Jubilee

The creation of the flagship 460 acres Queen Elizabeth Diamond Jubilee Wood in the National Forest in England and 60 other Diamond Woods across the UK, the remainder of which are around 60 acres, mark each year of Queen Elizabeth's reign.

Scotland responded strongly to the call for new woods, and 20 of the Diamond woods will be located in Scotland. In turn, these are part of a wider project to plant 6 million trees, including in over 300 smaller woods, and involving thousands of people in schools and communities across the UK.

Jubilee Woods reflects the Woodland Trust's ambition to see a significant increase in native tree and woodland cover in the UK. It is recognition of the value of trees, woods and other elements of the natural environment, including open habitats, in delivering a wide range of benefits to society.

Wider Ecosystem Services

The UK National Ecosystem Assessment (Watson and Albon, 2011) identified the value of ecosystem services benefits which arise from the natural environment. The UK's trees and woods make an important contribution to ecosystem services. What is clear is that these are both large and critical to the economy and people's wellbeing.

As the UK population grows, demands on ecosystem services will increase, at a time when climate change may be creating further strains and uncertainty. Competing pressures for land use will have to be reconciled whilst maintaining and increasing vital ecosystem services. These include the familiar products of forestry, such as timber and renewable energy, but also the prevention of soil erosion and maintenance of soil fertility, regulation of water quality and flood mitigation, improving air quality, urban adaptation and so on.

While some ecosystem services are independent of location, providing benefit wherever they are supplied e.g. carbon sequestration, others are locationally dependent and need to be sited where they can deliver the benefit. For instance, trees and woodland for water management need to be in specific locations in order improve water quality or mitigate flooding (Nisbet et al, 2011).

Consideration of the need for new trees and woodland is thus based on an assessment of where they should be located in order to provide the most benefit. For instance where in the catchment can tree cover contribute to improving water quality through increasing interception of pollution pathways? This consideration also takes account of protection of other valuable habitat, such as wetland and grassland, important for delivering ecosystem services.

Woodland Biodiversity

Key drivers affecting change in woodland ecosystems include climate change, pollution, wider land use, pests and diseases, non-native invasive species and changes to the age structure of woodland.

Climate change is leading to changes in species phenology and potential competitive advantage of some species (Thackeray *et al*, 2010), as well as altering species ranges (MONARCH 2007). Woodland management changed markedly in the second half of the last century, with a shift from widespread use of coppice management to high forest systems. This has led to an increase in shadiness in many woods and subsequent changes in vascular plant communities (Baeten *et al*, 2009).

Browsing pressure from deer has also intensified which, combined with other factors, is thought to be driving a reduction of under-storey in woods. This has impacts, for instance, on bird populations (Fuller *et al*, 2005). Tree planting and woodland creation thus sits alongside the need for management of existing woodland.

Design and management

Jubilee woods, in common with our other woodland creation projects, uses site native species for the majority of the planting, in line with our organisational objectives. However, communities often have specific features they would like included, reflecting local heritage or cultural associations, or as a way of creating additional interest. Orchard trees are a common addition, as are areas of coppice for bean poles, wild flower meadows and ponds.

Provided these features are compatible with the site we welcome the community putting its particular mark on the wood, creating greater interest on the site, and providing opportunities for greater engagement.

Future management needs to take account of the design intentions for the site – coppicing for firewood, release of canopies for parkland trees, thinning to create high forest and so on. Management to maintain open ground is also important. Woodland is often an important refuge for

open ground species, and even newly created woodland can support important populations of invertebrates, small mammals and birds in the open spaces.

People and woods

Whilst the Jubilee Woods will in many cases provide a range of benefits, the emphasis has been on public engagement and access to woods. Around 20,000 community and schools packs will be distributed and it is hoped that over 1 million children will be involved in planting trees.

Planting a tree and creating a wood is one of the ways in which we believe people can begin to establish a relationship with the natural world. For many of the children who will plant a tree as part of the project, it may be the first time they have had a chance to take positive action for the natural environment.

Get involved

The Jubilee project will continue over the coming planting season, so there is still chance to get involved with a site near you. Our Jubilee Woods web site gives information on Jubilee woods near you, and ways in which you can get involved individually or through your community – visit: www.woodlandtrust.org.uk/en/jubilee-woods/Pages/home.aspx.

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SCALE INSECT ON YELLOW-POPLAR IN INDIANA, USA

Yellow-poplar (*Liriodendron tulipifera*, Magnoliaceae), also called tuliptree, tulip-poplar, white-poplar and whitewood, is an attractive and tall tree in the Eastern USA. It is fast growing and long lived. The wood has high commercial value because of its versatility and as a substitute for increasingly scarce softwoods in furniture and framing construction. Yellow-poplar is also valued as a honey tree, a source of wildlife food, and a shade tree for large areas.

We recently visited friends in Indiana, which is one of the US states that has the Tulip-poplar as its state tree. There was much concern about a severe infestation of a scale insect, the tuliptree scale (*Toumeyella liriodendri* - Hemiptera, Coccidae) which was causing much nuisance with excessive dripping of sugary sap from the insects, so that new foliage of plants under the trees and saplings was becoming black with sooty moulds and other fungi; the removal of large quantities of phloem sap was also causing loss of vigour to the host plants. Scale attacks often kill leaders of seedlings and saplings causing them to be overtopped by competitors. As well as affecting the host plants, the infestation was causing a nuisance by leaving surroundings covered in a sugary sticky sap, which was transferring by contact to property and furnishings, and after a walk in the woods a shower was quite frequently needed to remove stickiness from ones' person. The scale is one of the

largest soft scale insects in the US - it is a key pest of yellow-poplar, and is so prolific that it quite often covers twigs and branches and could result in a rapid decline of an infested tree. Mature females are up to 6-7 mm diam., oval, convex, with a distinct flange around the margin of a protective waxy cover. It is speculated that the infection this year, in Indiana at least, is due to a relatively mild winter – normally the cold winters are thought to keep the usual infestation in check.

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Additional notes on the Tulip tree by the editor:

Liriodendron tulipifera is also found in the UK and Scotland. There is a large specimen in the Edinburgh Botanic gardens that can be adopted (next available for adoption in 2021). Although grown largely as an ornamental, it is also used as a honey plant. Bees feeding on it produce a dark honey which is mainly consumed as a table honey in the United States, and used in commercial baking. The soft, fine-grained wood of *Liriodendron tulipifera* is also used in the construction of house interiors, carriages and coffins. See http://celebratelife.rbge.org.uk/tree-adoptions/tree-details/E15/tulip-tree?garden=&available_only=&pg=3

Liriodendron tulipifera was popular with the early growers and it featured in Curtis' Botanical Magazine 275 in 1794. In 1838, Loudon mentions the oldest specimen of *Liriodendron tulipifera* in Scotland to be at Hopeton House, 60 feet high and planted about 1750; and thriving as far north as Dunrobin, planted about 1810.

In 2006 a fine specimen could be found in Hirsell Country Park, on the northern outskirts of Coldstream, Scottish Borders. Signposted access is off the A697. The tulip tree stands in the middle of the walled garden, which has been abandoned; this has left the tree in what feels like a wasteland. The tree with its hollow stem now has a girth of nearly 7.8 metres (26 feet) at 1.2 metres (4 feet) above the ground, and is a fantastic example of its type. See <http://www.forestry.gov.uk/forestry/INFD-6UFDJ8>.

WHY IS SCOTLAND'S GEODIVERSITY CHARTER IMPORTANT TO BOTANISTS?

Scotland's land mass has an unusually rich and diverse geology for its size ranging from some of the oldest rocks in the world, the Lewisian gneisses which were formed in the Precambrian period (up to 3,000 million years ago), to the deposits of peat and the development of coastal alluvium in the last 1200 years. The value and benefits provided by this geodiversity include: provision of fresh water, regulating erosion and flooding, supporting soil formation and terrestrial habitats, moulding the character of the landscape. All of these are reflected in Scotland's natural heritage, habitats and species.

Fossil evidence of the earliest land plants was discovered in the Rhynie chert in Aberdeenshire which contains exceptionally preserved plant, fungus, lichen and animal material from 410 million years ago. Historically one of the earliest examples of geoconservation is the Fossil Grove in Victoria Park Glasgow, protected since their discovery in 1887. In 2002, the Scottish Wildlife Trust recognised that the conservation of geodiversity is an important part of the land management of their reserves.

Plants from the geological past can even determine the plants of the present. During the Carboniferous Period (360–285 million years ago) Scotland lay on the Equator and the central Scotland valley was flooded by a vast tropical lagoon named Lake Cadell. Limestones developed from the coral reefs and coal was formed from the surrounding swamp of primitive plants under great thicknesses of sandstone. In the centre of the lagoon layers of fine silt and plant debris were deposited and compressed to form oil-bearing shale. Skip a few million years to 1851 when the Scottish shale-oil industry exploited this geological phenomenon and in the process deposited artificial mountains of burnt shale; the shale bings of West Lothian. Fifty years on from the demise of the shale-oil industry in 1962 the bings, like many other post-industrial sites, are a haven for plant and animal diversity. For examples of the exciting botany resulting from this unique combination of geological and industrial processes I draw your attention to Jackie Muscott's frequent references to bings and bing species in articles for past issues of BSS News and her displays at the joint BSS/BSBI Scottish Annual Meeting, and to my own papers in the Botanical Journal of Scotland and other journals.

Similar examples of geology moulding botanical diversity can be seen in the rare Alpine plant species found on the quartzose/mica-schist of Ben Lawers, *Primula scottica* on the old red sandstone of Orkney and Sutherland, our extensive and diverse peatland communities, native (and rare) orchid species on coal spoil and the many quarries across Scotland that are SSSI sites to protect their locally rare species.

“Biodiversity in general, and botanical biodiversity in particular, is predominantly a reflection of the rhizosphere which in turn depends on the actions of weathering and other geological processes on the underlying rock types. Any action towards protecting, elucidating and making people aware of our geodiversity will work in favour of all aspects of biodiversity” (Council member Jenny Farrar).

These are a few of the reasons why the Botanical Society of Scotland became one of the original signatories to the charter prior to its launch on 6th June 2012. The vision of the signatories to the charter is that "Scotland's geodiversity is recognised as an integral part of our environment, economy, heritage and future sustainable development".

Barbra Harvie

Links to additional information can be found from the following websites:

Geodiversity Charter- <http://scottishgeodiversityforum.org/charter/>

Fossil Grove-

http://www.glasgow.gov.uk/en/Residents/Parks_Outdoors/Fossil+Grove+History.htm

Rhynie chert- http://en.wikipedia.org/wiki/Rhynie_chert

Geology of Scotland- http://en.wikipedia.org/wiki/Geology_of_Scotland

Lake Cadell and the shale bings-

http://www.kirj.ee/public/oilshale_pdf/2010/issue_4/oil-2010-4-354-358.pdf

30 YEARS OF THE SCOTTISH WILD LAND GROUP

The Scottish Wild Land Group is a small charity dedicated to the protection and promotion of Scotland's wilder places, for their own sake and for their enormous importance to us all, whether ecological, aesthetic or economic. Celebrating its 30th anniversary this year, the Group is the oldest and only wholly volunteer-run charity of its kind. It remains a strong and independent voice for environmentally sensitive land management and for conservation.

It has of course been a long time since Scotland contained any true wilderness (as proponents of successive forms of environmentally damaging development are fond of pointing out). Every corner of the country, with one or two possible and very small exceptions, has been altered by continuing human activity, and even some of the 'wildest' areas are in fact profoundly affected by direct or indirect management practices. This is perhaps more evident to the eye of a botanist than almost any other, because the greatest impact of human activity has been in apparently small-scale but fundamental changes to plant communities.

Most dramatic of these changes is the loss of Scotland's native woodlands and their associated plant and animal communities. Native woodlands once covered between 50% and 80% of the country, but have been reduced to around just 1%. With these woodlands went the bears, wolves, lynx, elk, beaver, and a host of other cogs and wheels in the natural ecological system. Riparian habitats dwindled, bracken began to spread, and the open but impoverished landscapes of modern Scotland came to dominate. The resulting decline in floral diversity remains unquantified, but was certainly dramatic. Woodland plant species that persist, stranded in treeless glens, are one of the few visible indicators of the scale of these changes; another is the red deer population, made up of stunted versions of their woodland-dwelling forbears, sometimes bred to densities that can strip entire hillsides of much of their vegetation.

None of this, however, detracts from the importance of what we have left, much of which is all too often overlooked. Our remaining atlantic oak and montane woods, for example, contain numerous rare and sensitive ferns, lichens, and mosses - and are orders of magnitude more diverse than the rocky slopes or tussocky bogs that replace them when they are gone. Peatlands, where not burned or over-trampled, are some of Europe's most significant habitats, while our high mountains contain rare, endangered and endemic alpines.

The work of a group such as the SWLG, then, is not only to try and protect sweeping mountain panoramas and empty landscapes, but to ensure that, in our managed land, management decisions are made with one eye on their ecological consequences. Until recently, we have perhaps placed greater emphasis on the former aim, with mixed success. Early and high-profile campaigns to prevent the use of the Knoydart peninsula by the Ministry of Defence as a bombing range, to ensure continued open access to the countryside, and to protect the

Cairngorms from inappropriate development, were largely successful. Efforts to constrain the freedom of large landowners to cause overgrazing, construct unjustified hill tracks or otherwise damage environments without any oversight have had fewer effects, as have our recent attempts, along with many others, to resist the haphazard spread of windfarms across Scotland's wildest landscapes.

Overall, we have seen a gradual but steady loss of natural capitals, an attrition of the kind that conservation movements everywhere slow but rarely stop, and almost never reverse. It is tempting to summarise this trend in a single dramatic statistic: the loss of more than one quarter of Scottish land in which human development has had no visual impact, in the seven years between 2002 and 2009. To do so would be rather disingenuous, however.

Areas of high biological diversity often coincide with areas of high topographical drama, and both should be protected. In recent years, the SWLG has increasingly campaigned on this basis, focusing more and more on the ecological consequences of development or conservation. We have supported the work of Trees for Life at their Dundreggan estate near Inverness, where over 60 species of high conservation priority have so far been identified, along with huge numbers of fungi, lichens, bryophytes and vascular plant species. Such discoveries indicate just how much botanical diversity must remain to be identified by equally rigorous research elsewhere, and illustrate the great potential of Scotland's wilder areas for ecological restoration. This has also been demonstrated by the work of the RSPB in protecting and restoring some of the ancient pine and montane woodlands of the Cairngorms, and the National Trust's success, ecologically if not politically, in running an environmentally responsible sporting estate at Mar Lodge by reducing deer numbers from unprecedentedly high levels, removing hill tracks, and allowing the natural regeneration of native woodland to begin. Several other private estates are working along similar lines, unwilling to focus exclusively on maintaining high densities of deer or grouse to the detriment of wider ecology. Corrour, Coignafearn, Alladale and Glen Feshie, among others, are pioneering new models of estate management with ecological restoration as a key component.

In this context, the SWLG believes that we must not simply squabble over ever-diminishing scraps of 'wild' ground, but must highlight the enormous biological and potential economic value that remains largely unrecognised in much of our 'wet desert'. This work begins at the small scale, with the plants, fungi and insects that live and

die largely unobserved and unlamented, and ends with the re-connection of particularly important, protected areas, the free movement of native species through our working landscapes, and widespread ecological restoration. It is not, of course, an easy goal, but neither is it an impossible one, and it is the function of conservation bodies to make positive proposals that would benefit us all, not just to stand in the way of the juggernaut of 'development'.

We therefore publicise the importance of and threats to individual species that are often overlooked, such as pollinating insects and 'ecosystem engineers'. We campaign for the expansion of native woodlands, especially those of great natural value currently dwindling on coasts and mountains. We argue for corridors between protected areas to allow the movement of species and planned gradations of land use, and for the eventual reintroduction of some of Scotland's missing native species. And, of course, we champion the benefits of wild land to people and, most of all, its enjoyment for its own sake.

To do all of this we need support, and particularly the time and expertise of people with knowledge of these issues. Helping the SWLG can be as simple as donating, joining (a standard membership costs only £10 per year), writing an article for our quarterly magazine *Wild Land News*, or really getting involved and helping to shape the Group's work by volunteering for a specific campaign or joining the steering team. To do any (or all!) of these, visit our website at www.swlg.org.uk, or email admin@swlg.org.uk. Let's stem the loss of wild land and ecological health and make sure that, 30 years from now, Scottish environments are as valued and protected as they surely deserve to be.

Calum Brown
Member of Scottish Wild Land Group Steering Team
and editor of *Wild Land News*
calum@swlg.org.uk



Image from Wild Land News no. 80

BOOK REVIEW

Atlantic Hazel: Scotland's Special Woodlands **by Sandy and Brian Coppins**

The publication of this book follows years of survey and exploration of the Atlantic hazelwoods found on the west coast of Scotland, undertaken by the eminent lichenologists Brian and Sandy Coppins. It has been published on behalf of the Atlantic Hazel Action Group, funded by Scottish Natural Heritage, Argyll and the Islands Leader EU Project and the British Lichen Society.

As George Peterkin says in his Foreword, this book aims to change the way Atlantic hazel woodland is perceived, not just as 'scrub' a 'lesser form of something else' which doesn't nicely fit into any convenient NVC category; but as something so valuable as to deserve the recognition and protection which is currently so sadly lacking.

The authors underline the importance of Scottish hazelwoods as being of international importance, a Celtic rainforest of high biodiversity with a highly specialised associated flora, particularly of lower plants and especially lichens and fungi - a habitat now restricted in Europe to the coastal areas of the western Scottish Highlands, with remnants in western Ireland and Wales. They also make a very good case for considering these pure stands of hazel as examples of Scotland's most ancient woodlands, having arrived some 11,000 years ago, sweeping up the Irish sea to the western sea board of Scotland, where they dominated for the first 1,000 years. The implication is that the habitat has persisted in some places for over 10,000 years, as indicated by the highly specialised fungal and lichen communities in particular, which are only found on sites where pollen analysis indicates a long continuity of habitat.

The book is lavishly illustrated by photographs of different sites and habitat types as well as excellent close ups of the typical and special plants. The photographs illustrate the underlying argument that this habitat is very special and very different from hazel growing as an understorey shrub in other forms of woodland, and quite definitely requiring different management from that normally inflicted on hazel elsewhere, that is coppicing.

To this end the book is organised very logically, clearly expounding its arguments through a full description of hazel, the plant and the dynamics of its multi-stemmed growth pattern, and strongly debunking several management myths, such as the need to coppice. Next comes

a full description of the Atlantic hazelwood habitat and the ideal pure stands of dense dark green, in which hazel's natural growth cycle of continuously producing young shoots from the basal stool supports the two most characteristic lichen communities. The *Graphidion scripota* is a patch work quilt of 'script' crustose lichens clothing the younger branches. As the branch ages it is gradually colonised by bryophyte mats to eventually support a very different but equally characteristic community of large foliose lichens, the *Lobarion*, typified by the lungworts.

The presence of these two communities differentiates true Atlantic hazelwoods from other similar stands as both communities require old growth hazel stands which are self perpetuating, providing the ecological continuity that is essential for their survival. As these communities include several species which are UK BAP species, which may also be very rare and declining elsewhere in Europe, it gives Scotland an important international responsibility, both in a European and in some cases a world context.

As a non-lichen person I found the explanations, together with the excellent photographs, fascinating and I hope enlightening enough to encourage me at least to try to identify some of them in the field. I was also fascinated by the rare associated fungi which may also be used as indicator species for good habitat. Of particular note were hazel gloves *Hypocreopsis rhododendri* and the glue fungus, which apparently defies gravity - get the book and look.

All in all the excellent description of the associated flora of these woodlands demonstrates exactly why they should be properly recognised, adequately protected and, perhaps most importantly, sensitively managed.

As this is where my own primary interests and experience lie, I was particularly interested to read the sections on management. Firstly, four typical 'types' of Atlantic hazelwood are described: closed canopy, multi-stemmed stands of pure hazel (with over 75%) hazel; scattered hazel in pasture; antique veteran hazels; and hazel in woodlands. The first three are really formed along a gradient of grazing, and unsurprisingly grazing becomes the primary management tool though the dangers of coppicing are again emphasised. Detailed examples of each type are described, and they may often grade from one to another on a single site.

The primary objective of management should be to allow for the continual replacement of shoots from the stool, as only this supports the full range of epiphytic communities described above. Additional

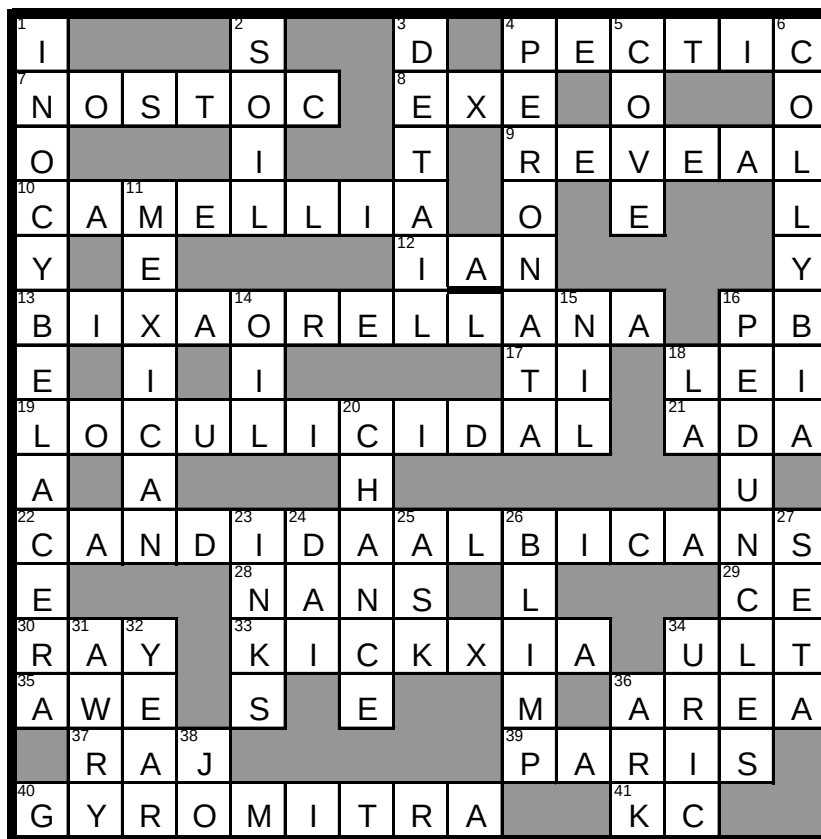
problems arise in the management of the ancient veterans, as with other veteran tree species, maintaining the viability of the old stock while keeping the old trunks stable.

Complex sites often prove to be the hardest to manage without considerable interested cooperation from the graziers involved. The final sections of the book address this issue, giving clear indication of the impact of all possible managements, arranged by a traffic light system from seriously damaging to highly desirable. The Appendix contains a well written key for assessing individual sites and evaluating their condition, using clear photographs and a scoring system. Intended for owners and managers of sites, it could not be clearer, and SNH would do well to ensure that all such receive a copy - immediately.

SNH might also be encouraged to produce a similar survey and document on the zoological interests of this fascinating habitat, which I suspect might well have more untold goodies to reveal.

Jo Whatmough

CROSSWORD SOLUTION



ANNIVERSARY OUTING TO BENMORE BOTANIC GARDEN

The Special 175th Anniversary excursion took place on Saturday 3rd September 2011. The outing was attended by BSS members and their families and friends, including visitors to CEH from Holland. The party assembled at Waterloo Place, Edinburgh and the coach left promptly at 9am. The weather, although unsettled during the journey across central Scotland, had cleared by the time we reached the ferry to the Cowal Peninsula in Argyll where the Benmore garden is located. We spent the day exploring the extensive site in sunshine.

In the lower reaches of the garden is the great Redwood Avenue planted in 1863 by Piers Patrick and a Formal Garden that was originally a kitchen garden but is now laid out with an array of rock plants, miniature conifers and larger ornamental trees.

The recently restored Victorian fernery in Glen Massan, about 30 metres above the valley floor, is possibly the most widely celebrated feature in the garden. This is well worth the visit, even for non-specialists, although there are steep steps to negotiate to reach the building and also between the different levels. The range of pteridophyte species on display was extensive and many areas have well-established specimens despite the recent re-establishment of much of the vegetation.

The steep area of hillside around the fernery has been developed to create plantings that represent the different flora of several countries and there was a wealth of *Rhododendron* species that must be spectacular when in bloom. I especially enjoyed following the winding tracks leading off the main paths, that meandered over streams and up (and down) flights of wooden steps through magnificent forest trees from Bhutan, Chile and Tasmania presented in naturalised groupings on some of the steeper slopes.

Finally to the Benmore shop and cafe where many of us met at the end of the day to browse the gifts and books or relax with a coffee and some of the traditional home baking and snacks available, before returning to Edinburgh

Benmore garden is laid out in a magnificent mountain setting with exotic plantings to 450ft. Some of the steeper paths might be challenging but there alternative routes with resting places that lead to even the highest parts of the garden. In addition the Benmore Explorer

people carrier offers rides through the lower reaches of the gardens for those with mobility needs.

Everyone agreed that the day was a great success and there were suggestions that a similar outing should be arranged to Logan Botanic Garden.

Benmore Gardens: <http://www.rbge.org.uk/the-gardens/benmore>

Logan Gardens <http://www.rbge.org.uk/the-gardens/logan>

Barbra Harvie

(The Editors apologise that this excursion report comes so long after the event.)

BSS EDINBURGH HERB EXPEDITION

This expedition was arranged with the Botanical Society of Scotland (BSS), Plantlife Scotland, and in association with the National Institute of Medical Herbalists, for Herbal Medicine Awareness Week.

After meeting up at ten a.m. in front of the Science Buildings at RBGE in Inverleith Row, Anne Barker MNIMH led the participants, Maria Chamberlain, of BSS, and Barbara Sumner, of BSS (who is also a BSBI recorder) to the start of the walk along the old railway line, now a cycle path, at the far side of the Goldenacre playing fields. During the walk, which ended at the Craighall Sidings Wildlife Meadow, Anne talked about the folklore and medicinal uses of twenty different plants, from Archangel to Yarrow, while Barbara and Maria recorded the plant life. We examined plants for special characteristics (the male and female forms of stinging nettle, *Urtica dioica*, and red campion, *Silene dioica*), the bee-shaped flowers of the white dead-nettle, *Lamium album*, the single fruit of the Hawthorn, *Crataegus monogyna*, the down-pointing thorns of the dog rose, *Rosa canina*, and the incipient sloes forming on *Prunus spinosa*, blackthorn, as compared with the still-green cherries on *Prunus avium*, the wild cherry. Maria also identified a tiny, delicate inkcap mushroom in the meadow verge, and an orange rust on *Salix caprea*, the goat willow.

The walk, about 1 km, lasted two hours as there was so much to see and record: 73 species, including 16 species of trees and shrubs, 48 species of herbs, and 9 species of grass. We were extremely lucky that

the rain held off during the walk. At noon, we repaired to the nearby Cafe Porto & Fi at Newhaven Harbour, and over bowls of excellent mushroom soup we filled in the Plantlife Survey form (using Barbara's BSBI plant checklist for the two 1 km squares through which we had passed), and added another 48 species which were not on the Plantlife list.

A.D. Barker

BAMFF BEAVERS - A botanical impact survey

A group of 14 or so BSS members gathered together on a fine May morning to admire a riparian and wetland habitat restoration programme. Yes, as the title reveals, the work was that of a few deft four-footed keystone engineers. The aim of our outing was to give our members the opportunity to see the work of the animals at first hand, and to provide the owners, Paul and Louise Ramsay, with a plant list – albeit in Latin.

The Eurasian beaver reintroduction has been a hot-topic for several decades. In 2009, the Scottish Government finally gave the go-ahead for a trial reintroduction in Knapdale, Argyll, and last year the Knapdale project even won the Lonely Planet Magazine Wildlife Comeback Award. However, not many people know that the Eurasian Beaver has been alive and well in Central Scotland for much longer – in fact for over a decade. Paul Ramsay and his wife Louise, are keen conservationists. Their estate is run with a strong emphasis on conservation management and their farm is organic.

Paul is a treasure trove of beaver facts and figures and he tells a good story. He made the first introduction, a pair of Norwegian beavers, in 2002. The carefully planned, panelled lodge which he and an architect friend had built for the new arrivals was scorned and demolished, to be replaced by a far superior one to suit the beavers' needs. The pair set to work immediately – cutting saplings and building little plug dams. Unfortunately one of the original pair died, squashed by a tree which he himself had felled. Paul feared that the long months spent in quarantine might have left him unfit and out of practice. The Norwegian female was soon joined by two from Poland and some more from Bavaria. We all know of the Eastern-European work ethic and the beavers proved to be

a testament to that. The dams stretched and today there is one which is 100m long, and visible from Google Earth.

We asked many questions:

How many animals do you think there are today?

Paul said that nobody really knows. There are, he thinks, two families: one occupying a pond surrounded by established woodland, and the other a wetland at the edge of a plantation of willow, grey alder and aspen. So there could be about a dozen animals on the estate at any one time.

How are the aspens coping?

The beavers did not seem to like the young trees, but this year as the trees matured the beavers seemed to find them quite tasty.

Are the felled alders, willows and aspens coppicing?

In some places they are, and he showed us some sprouting willow and aspen stumps. However, you have to take into account the roe deer, as they influence the extent of regrowth of trees felled by beavers. A very good study on willow and aspen regrowth of beaver-felled trees by Jones et al (2008) showed good regeneration. Another point worth noting is that the activities of beavers (through the production of dead wood and the modification of habitat) contribute enormously to the productivity of riparian systems.

What are the effects on salmon and trout?

Downstream from the dams, the water courses become rebraided, creating swamps. Of course these must have existed in the past when beavers lived here before 1600. The effect of many small ponds caused by the damming is good, particularly for trout. Studies in Norway found no evidence of any negative effect. Indeed salmon and sea trout catches increased over the period of beaver colonisation (Parker and Ronning, 2007).

While our host talked, the species plant list was growing, thanks to Jackie Muscott (vascular plants) and David Chamberlain (bryophytes). Between them they clocked up over 120 species of vascular plants and more than 40 bryophytes in the three hours of the visit. (Lists of these have now been sent to Paul.) Although the list may be no longer than would be expected from any comparable uncolonised site, and there are no special rarities, the list did contain a number of notable wetland

species: *Nasturtium officinale* (watercress), *Callitriche brutia* (water stonewort), *Potamogeton natans* (broad-leaved pondweed), *Stellaria alsine* (bog stitchwort), *Hippuris vulgaris* (mare's tail), *Carex distica* and *C. leporina*. Notable cryptogams included a stonewort (probably *Chara* sp.) and in the drier areas two lovely ferns: a spectacular stand of ostrich fern (*Matteuccia struthiopteris*) and an exquisite brittle bladder-fern (*Cystopteris fragilis*) in the stonework of the bridge.

Thank you Paul for a most delightful day.

Maria Chamberlain

References:

Jones, K. Gilvear, D.J., Willby, N and M. Gaywood (2008), Willow and Aspen regrowth after felling by Eurasian beaver, *Aquatic Conservation*, 19, 43-64

Parker, H. and Ronning, O.C. (2007) Low potential for restraint of anadromous salmonid reproduction by beaver *Castor fiber* in the Numedalslågen River catchment, Norway. *River Research and Application* 23, 752-762.



Beaver carrying building material

Image from Bamff Estate website: www.bamff.co.uk

PLANTLIFE SCOTLAND EVENTS CALENDAR 2012

Plantlife Scotland would welcome Botanical Society of Scotland members at any of our guided walks and workshops taking place in 2012. All our events are free of charge (donations welcome) and are open to participants with any level of experience.

Saturday 29th September, 2 – 4 pm

Dalkeith Country Park, Dalkeith, Midlothian.

Guided fungi walk. Find out more about the wonderful world of fungi, in this country park with its unique semi-natural woodlands, and its ancient oaks which play host to some interesting fungi species. Free entry to Park. Led by mycologist Nev Kilkenny.

Tuesday 16th October, 2 – 4 pm

Craig Phadrig, Inverness.

Guided fungi walk. Joint event with **The Waterways Trust**, part of a series of walks looking at the wildlife around the Caledonian Canal, Inverness. This walk, led by David Genney and David O'Brien of Scottish Natural Heritage, will explore the fungi and associated invertebrates in the Craig Phadrig woodlands. Bookings: Stephen Wiseman 01463 725561.

Sunday 4th November, 10 am – 12.30 pm

Cadzow Woods, near Chatelherault Country Park, Hamilton, Lanarkshire.

Guided lichen walk looking at the famous Cadzow Oaks, thought to have been planted by King David I (1124 – 1153) and among the oldest broadleaved trees in Scotland. The oaks represent a rare example of medieval wood pasture, and as a result of their great age support a rich assemblage of lichens. Led by lichenologist John Douglass.

How to book

For more details of events in Scotland, or to book a place, please email scotland@plantlife.org.uk or phone 01786 478509. For Wildflowers Count events, please contact davie.black@plantlife.org.uk or (01786) 469778. If you have any special requirements, please mention these when booking. Children under 16 should be accompanied by an adult.

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 items:

- Reports of field excursions (leaders please take note) picking out the botanical highlights.
- Descriptions and recommendations of other botanical sites in the UK or abroad. (It might help people to plan their holidays.)

- Articles of current or historical interest, including ethno- and 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 of the following guidelines. Just send what you can and the Editors will make adjustments.

File name for email submissions and web uploads

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

Text

The Newsletter is set up on a PC and saved as a document in MS Word 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>.
6. If you are not a BSS member receiving the BSS News then please send a postal address to receive your copy of the newsletter.

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

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

Send hard copy and CDs by post to:

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

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

**The LAST deadline for the next issue will be 21st January 2013.
Earlier submission would be appreciated.**

Back cover pictures

Inside

Top left: Beaver dam, Bamff, 26th May 2012. Photo by Mike Richardson.
See article on page 45.

Top right: Beaver-felled grey alders, Bamff, 26th May 2012. Photo by Mike Richardson. See article on page 45.

Centre left: Yellow-poplars (*Liriodendron tulipifera*) in Indiana. Photo by Mike Richardson. See article on page 33.

Centre right: Caledonian pines (*Pinus sylvestris*). Photo by Susan Jarvis.
See article on page 22.

Bottom left: Maria Chamberlain and Barbara Sumner on the Edinburgh herb expedition. See article on page 44. Photo Anne Barker

Bottom right: Anne Barker on the Edinburgh herb expedition. See article on page 44. Photo Anne Barker

Outside

A selection of the ectomycorrhizal fungi found in association with *Arctostaphylos uva-ursi* and *Betula nana*, demonstrating the morphological diversity found. Photo by Emily Hesling. See article on page 26.



