



BSS News

The Newsletter of the
Botanical Society of Scotland

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

Front cover pictures

Outside

Beauty and the Beast: the main illustration is of the Beast (*Allium paradoxum* var. *paradoxum*), with details bottom left, the smaller drawing lower right, shows the flowering umbel and other details of the Beauty (*Allium paradoxum* var. *normale* Stearn). Watercolour by Janet Dyer. See article page 45.

Inside

Top

Jane MacKintosh: Botanical Society Council member from 2007 and coordinating editor of the Botanical Society newsletter since 2010. Photograph by Chris Sydes. See Obituary page 10.

Bottom

Field excursion at North Kessock (Brian Ballinger) see Field notes, starting page 56.

Botanical Society of Scotland

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

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

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

Applications for membership of the Botanical Society of Scotland should be made to the Hon. General Secretary at the address at the top of this page. Subscriptions can be paid by cash, cheque (payable to the Botanical Society of Scotland), or Banker's Order. Please ask for a Banker's Order form if required. Or you can join online and pay by PayPal via the BSS website at <http://www.botanical-society-scotland.org.uk/content/bss-membership>

Subscriptions fall due on 1st October each year:

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

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EDITORIAL

We were very saddened to hear of the sudden death of Jane MacKintosh, co-ordinating editor of this Newsletter since 2010. Jane fulfilled an essential role for the newsletter and her advice and efficiency will be difficult to replace. Jane was a long-time member of the Society and served on the Council from 2007. Jane's quiet voice of reason and moderation at Council where she stimulated the change to the new SCIO, will be sorely missed. Jane had recently retired from Scottish Natural Heritage. An obituary prepared by SNH, and printed with their permission, is on page 10.

There have been several changes to BSS Council over the last year. Felicity Anderson, Trudi Dorr, Jenny Farrar, Kim Harding and Stephan Helfer have all stood down. We thank them for their help in running the Society, cumulatively they have contributed to Council for more than 34 years. In accordance with the Botanical Society's constitution, the Council has redeployed existing council members while other BSS members have been co-opted onto Council to fill the vacant roles.

Brian Ballinger is our new President (see more about him on page 6), having taken over from John Grace, who will continue to be a member of council and lead the Urban Flora Project (see farewell note page 7). Lauren Wayland (General Secretary) and Maude Grenier (Student Representative) were elected to Council at the recent AGM. As some positions are still not filled a full list will be produced for the next edition.

Council meets about five times a year, usually in the evening, at the RBGE. Everyone is a volunteer. This is YOUR society, and we need help to run it. If you are interested, please contact Julia Wilson at membership.secretary@botanical-society-scotland.org.uk.

Remember that Botanical Society lectures are not always in the same week of each month so don't forget to check the programme carefully.

We thank everyone who has contributed to this edition of the Newsletter and hope than many more of you will contribute articles in the future.

Jill Thompson and Julia Wilson



Botanical Society of Scotland

MEMBERSHIP MATTERS

Subscriptions and Gift Aid

Thank you for your continued support of the BSS. Payment of annual membership subscriptions is due on 1st October for all members except those who have joined us since 30th April 2017, whose membership will run until October 2018.

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

Membership rates remain unchanged, at £40 standard and £20 basic rate. Students pay reduced rates of £30 standard and £5 basic rate. All members receive the BSS News and copies of our lecture and field programmes, standard members also receive hard copies of our journal *Plant Ecology & Diversity* and can also access the online archives of previous volumes of *Plant Ecology & Diversity* (2008 – current), the *Botanical Journal of Scotland* (1991 – 2007) and *Transactions of the Botanical Society of Edinburgh* (1844 – 1990).

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

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

Finally, if you decide not to renew your membership, please tell us. However, if we do not receive your subscription by Feb 1st 2018, your membership will lapse.

Your Contact Details

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

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

Julia Wilson – Membership Secretary
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BRIAN BALLINGER - INCOMING PRESIDENT OF THE BOTANICAL SOCIETY OF SCOTLAND

I am writing to introduce myself as the new President of the BSS for the coming year. I am very grateful to my predecessor Professor John Grace for his work as President over the last few years and for the tremendous contribution he has made to the work of the society, not least in leading the urban flora project.

Unlike my immediate predecessors I am not Lothian based and live mainly in Dundee, but also spend a lot of time in Easter Ross. I am an amateur botanist, being a retired doctor, having been a consultant psychiatrist in Dundee, a post which entailed research, teaching and management as well as clinical duties.

Over the years my interest in natural history and in particular botany, which started when I was at school, has grown. I have been involved in the work of other societies including the Scottish Wildlife Trust, Dundee Naturalists and Butterfly Conservation.

For the last 14 years I have been the Botanical Society of Britain and Ireland's botanical recorder for Easter Ross VC106, initially jointly with my late wife. This year I have been having another busy season in the field, recording in a variety of habitats, which, as usual, has been very enjoyable. I also own and manage some small woodlands.

For the last 7 years I have been BSS local secretary for Dundee and Tayside and have been organising joint events with local societies. This year there have been several field meetings in Tayside and Easter Ross, which have been enjoyable and productive, being mainly devoted to the urban flora project.

The BSS has continued to mount an excellent programme of lectures and field events. The journal is successful and highly regarded and our newsletter is well produced and informative.

I am very grateful to our office bearers and council members for their hard work over the year. It was with great sadness that I heard of the recent death of Jane MacKintosh, one of our newsletter editors.

We are planning another good programme and events for the coming year and I look forward to taking part.

Brian Ballinger

FAREWELL FROM THE OUTGOING PRESIDENT OF THE BOTANICAL SOCIETY OF SCOTLAND

As I write this Presidential farewell I am preparing to fly to China, to participate in the Congress of INTECOL, the International Association of Ecological Societies. The theme of this, the 12th Congress, is *Towards an Eco-Civilisation*. How do we build an eco-civilisation? Indeed, what is an eco-civilisation? The term is almost unknown outside China. We talk instead about a sustainable future, one in which our children and grandchildren can enjoy at least the same quality of life as we have ourselves. But eco-civilisation goes beyond that idea – it says something about our values, how we educate people, how we design our urban spaces, and how we care for our people. It's about the relation between people and nature as much as it is about our use of resources.

Learned Societies like ours have much knowledge to contribute to the process of eco-civilisation, but only if they can reach out to people and to government. In the Botanical Society we can do some of this by bringing ecological and botanical knowledge into the public arena. It isn't easy. In the modern world, people's lives are busy and their attention is distracted by material concerns. There isn't much time for wild flowers or botanical observation, even in schools. A few weeks ago I trailed behind an excited school outing at Blackford pond. I think they were nine year olds on a nature walk. As they approached the margins of the pond, one exclaimed 'miss, miss, a purple one'. Evidently the educational objective was to spot flowers of different colours. That is all it was. I stepped in and told the young teacher what the plant was called, Purple Loosestrife. She looked at me as if I were deranged. On this occasion I failed miserably to transmit my knowledge to the pupils.

Last year, when we talked to Education Scotland about bringing botanical knowledge to schools our suggestions were warmly welcomed. Observing and recording, using geographical systems to pinpoint location, it's all there in the curriculum. But, we were told, it would need us to be there in the schools, working with teachers several days a week. It's a big task and it requires special aptitude. We are a small organization, we are all volunteers, we have no paid staff. Some of our students have been successful through giving talks to school audiences. But we have a long way to go.

Meanwhile we've pressed ahead with our normal agenda. Our international journal *Plant Ecology and Diversity* has been doing very well, and is now generating a modest income. Our public lectures have been very successful, and our audiences have increased partly because of an effective advertising strategy making a more effective use of social media. We are seeing new faces in our audiences, and there has been a healthy annual recruitment. Next year we will be joining forces with the Royal Botanic Garden to increase our outreach.

Our field visits in the summer months have often been co-organised with other groups, natural history societies and the Botanical Society of Britain and Ireland. During my Presidency, we launched the Urban Flora project, which is now in full swing. I hope that more of you will participate. Our aspiration to engage novices in this work is a challenge. It takes much time to become a competent botanical recorder – many of us took our first steps at school, encouraged by inspirational teachers to learn more than just the colours of flowers.

As the President, I have been privileged to work with some exceptional botanists, young and old, and I wish to warmly thank the Botanical Society of Scotland office-bearers who have supported me. I wish Brian Ballinger, the incoming President, every success. Having stepped down as President I will continue to serve on the Council, and I hope to spend more time on the Urban Flora project. It's time to bring it to the people.

Professor John Grace

A poem

The Editors disclaim all responsibility for the following doggerel, which insinuated itself into BSS News without their knowledge or consent. Polythene and polyurethane indeed! We all know that xylem is nylon.

Jill, when in Puerto Rica,
Found a new plant and shouted "Eureka!
I've found a new phylum
With polythene xylem
I don't think anything could be uniquer."

Her co-editor, a lady called Jane
Replied, "Roger, I have to complain.
You've ruined your poem
It's not xylem but phloem
And the plastic's polyurethane."

I disclaim all responsibility for this doggerel. It was written by my Jack Russell Terrier, Bonny, (who cannot spell Puerto Rico) and surreptitiously buried by her, with a bone, in the pdf file of this issue, just before it was sent to the printers.

Roger West

JANE MACKINTOSH, CONSERVATIONIST AND EXPERT ON SCOTLAND'S GRASSLANDS

Born: 7 August 1953 Died: 19 July 2017

Jane MacKintosh, who has died after a brief illness, aged 64, led grassland conservation work in Scotland working for Scottish Natural Heritage (SNH). She played a key role in raising the profile and importance of semi-natural grasslands and their conservation and ensured the survival of many of these flower-rich habitats.

A graduate of the Department of Forestry and Natural Resources, Edinburgh University, Jane joined SNH's predecessor GB body, the Nature Conservancy Council, in 1979, having previously worked with the Institute of Terrestrial Ecology (now the NERC Centre for Ecology and Hydrology). Joining the redoubtable Scottish Field Unit, Jane was the botanist in a team of four tasked with servicing a rapidly expanding programme of conservation site designation and habitat protection. However, then we knew very little about important areas of what are now called semi-natural grasslands, and many were given up to intensive agricultural use, forestry or other developments. They had become tiny fragments of formerly large swathes of flower-rich meadows, yet Jane, with her youthful, expert knowledge of plants (rather rare in university graduates in botany, even then) had an eye for seeing and advising on protection for some wonderfully rich areas for wildlife.

Initially working in agricultural and woodland Argyll, later on meadows in Shetland, machair and hay meadow in the Uists, and sea cliffs in Caithness, Jane honed an unrivalled expertise in identifying important grassland hotspots for wildlife. She supported the work of the Unit of Vegetation Science at Lancaster University, during 1980-95, in developing the National Vegetation Classification for grasslands, with the results of a huge team effort published mainly in volumes 3 and 4 of the landmark *British Plant Communities* (edited by Professor John Rodwell, and published by Cambridge University Press).

Quietly passionate about the conservation of species-rich grassland in Scotland, Jane led the establishment of the Scottish Lowland Grassland Database. Beginning work on this in the 1980s, with a programme of local grassland surveys (many undertaken by Jane) the database now has nearly 800 sites, containing information on location, extent and composition of sites. When she started out, tracing paper

overlays of field maps served as the basis for detailed notes, but now we have a fundamentally important resource of digitised maps which is the backbone of grassland conservation in Scotland – something Jane was justifiably proud of.

For many of us driving in Scotland, 2013 is arguably significant, for in that year an 87-page SNH report overseen by Jane advised on improvements for wildlife along our 59,000 km of roadside verges. Typically detailed and well-illustrated, this pointed to management practices for diversifying what many of us take for granted. A year later, Jane co-authored guidelines, published by the UK Joint Nature Conservation Committee, for the protection and conservation of lowland grasslands in Britain. This drew on her experience of field surveys, and collaborative work with a highly talented group of grassland experts. That year also saw her oversee the publication of a remarkable report on the species rich lowland grasslands of Scotland. Alarming, reporting on revisits to sites surveyed some ten to twenty years earlier, it found that just over 15% of grasslands had had been lost, and only around 40% were in a 'favourable' state. It was a wake-up call for urgent action needed to restore the richness of what were formerly rich and widespread habitats so accessible to many of us. It is the foundation for key work to determine the future of landscapes that so many of us take for granted.

Jane was a long term member of the Botanical Society of Scotland and was actively involved as a council member from 2007, and as Co-ordinating editor of its Newsletter from 2010. As Jane approached supposed retirement, in 2016, she acted as grasslands mentor for the British Trust for Conservation Volunteers' Natural Talent Grasslands Apprenticeship, influencing a cohort of skilled and enthusiastic grassland conservationists.

Though Jane raised the profile of semi-natural grasslands and their conservation in Scotland, and directly ensured the survival of many of these habitats, she had many other interests. She was active in the arts and cultural community of her home town of Penicuik as one of the early activists in its Development Trust (established in 2005) – promoting community activities and regeneration. Many converts to films owe a debt to Jane in cajoling them to join compatriots in the 'Open House and Cinema' in the Town Hall. Jane was a leading light in developing community gardening in the 'Lost Garden of Penicuik', and helped run the Pen-y-Coe Press, a traditional printing and stationery shop

upholding the papermaking heritage of Scotland's 41st largest town. For many first time mothers she was a wonderful adviser with the Penicuik National Childbirth Trust.

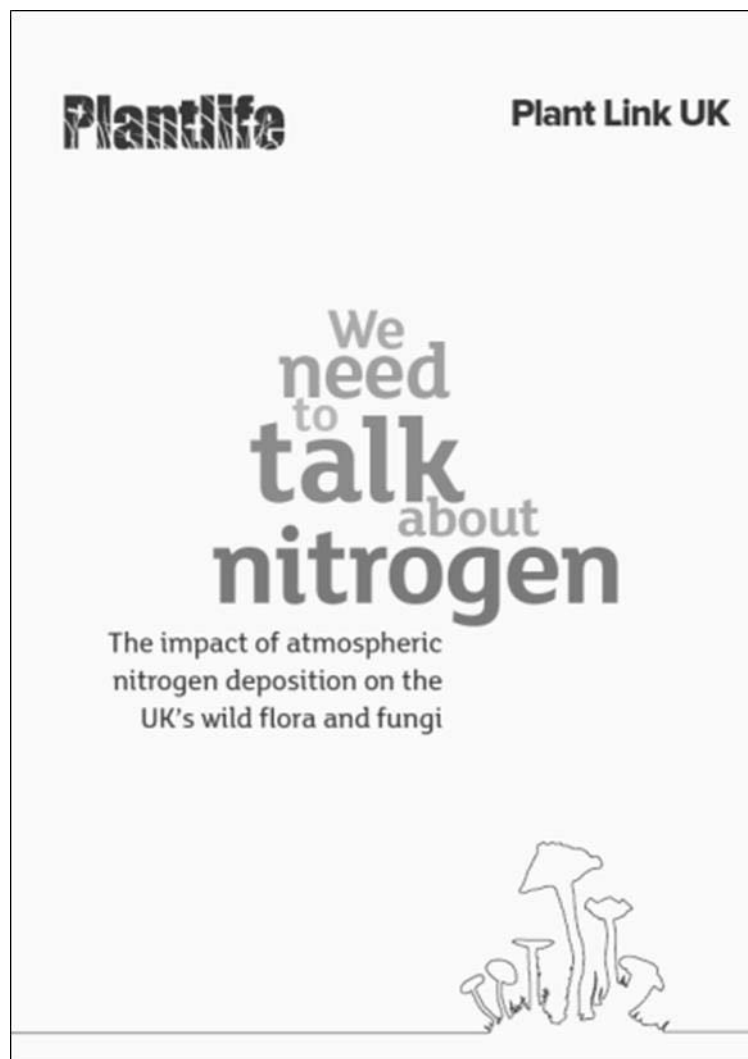
Caring, determined, concisely spoken, and skilled as a botanist, Jane won the hearts and minds of many of us through her modest charm, dependability and range of avid interests.

Jane is survived by husband Dr Chris Sydes, children Tom, Zachary and Katie, and sisters Caroline and Susan, and a brother, Simon.

Kate Holl, Claudia Rowse and Des Thompson

Printed with permission from Scottish Natural Heritage, and Herald newspaper

http://www.heraldscotland.com/opinion/obituaries/15476658.Obituary_Jane_MacKintosh_conservationist_who_fought_to_save_Scotland_s_grassland_habitats/



WE NEED TO TALK ABOUT NITROGEN

The Impact of Air Pollution on Scotland's flora and fungi

Air pollution has hit the headlines in recent years due to its terrible impact on human health. Less well known is the damage that it also causes to fungi, plants, soils and ecosystems across the country.

Yet nitrogen in air pollution is one of the major threats to biodiversity. In Scotland, 83% of land in Special Areas of Conservation already has nitrogen levels higher than it can tolerate (Hall *et al*, 2015). Effects include loss of species richness, changes in soil chemistry and habitat degradation, including in woodland, bog and mountain heaths.

Using decades of scientific research, Plantlife has launched a campaign to tackle this issue, in collaboration with the Plant Link network in Scotland, Wales and England. In 2017, following our stakeholder workshop and launch of the report 'We need to talk about nitrogen', the priorities for action have become clear (Plantlife, 2017).

Why do we need to 'talk about nitrogen'?

Air pollution rarely gets a mention in the familiar list of issues affecting wildlife – such as climate change, habitat loss and water pollution. It is often referred to as 'atmospheric nitrogen deposition' (too technical for many of us) or as 'nutrient enrichment' (which sounds like a good thing - nitrogen is well-known as a fertiliser).

Although 78% of the atmosphere is made up of nitrogen gas, most of it is inert. Reactive nitrogen – the type used by flora and fungi – is scarce in nature, and many of Scotland's species-rich habitats have evolved in low-nitrogen (or nutrient-poor) conditions. When nitrogen levels go above the 'critical load', species loss or habitat degradation is expected, either immediately or in the long term.

Where does reactive nitrogen come from?

Naturally, reactive nitrogen is formed only by a volcanic eruption, a lightning strike or last, but certainly not least, specialist soil bacteria. Yet human activity has caused global nitrogen emissions to double since 1960. In Scotland, nitrogen in air pollution is mostly in the form of nitrogen oxides (NO_x), mainly from burning fossil fuels, and ammonia (NH₃), mainly from farming. Both NO_x and ammonia cause the formation of Particulate Matter (PM), and are harmful to the health of humans and ecosystems.

NO_x emissions are forecast to level out globally by 2030 (and have already fallen significantly in Scotland). Ammonia emissions, however, are expected to rise globally until 2050; in Scotland, ammonia emissions have declined somewhat in recent decades but are projected to stay stable at least until 2020 (RoTAP, 2012).

What is the impact on wildlife?

Reactive nitrogen in air pollution is deposited onto vegetation and soils, enriching the ecosystem. Certain species thrive but many other species of fungi, lichens and plants cannot survive in such fertile conditions. In extreme cases, close to sources such as intensive chicken houses, flora and fungi are directly damaged by 'dry' nitrogen deposition through bleaching, leaf discolouration, dieback and increased susceptibility to drought, frost and disease.

Upland habitats are more affected by 'wet' nitrogen deposition in rain. In blanket bog, for example, the *Sphagnum* cannot tolerate such high levels of nitrogen and this may inhibit growth. Faster-growing vascular plants such as grasses can exploit this, outcompeting and ultimately displacing peat-forming species (IUCN UK Committee, 2016).

More broadly, there is a loss of biodiversity as nitrogen-tolerant species out-compete more sensitive species. Early evidence suggests that this may have a knock-on effect on other groups, including invertebrates and birds (Plantlife, 2017). In those very places to which many rare species are now confined – such as field margins and road verges – air pollution (from farm fertilisers and traffic fumes) is likely to be higher.

What is next?

In 2017, Plantlife and the British Ecological Society held an expert workshop to define a way forward. We heard many examples of positive action by statutory agencies, local authorities, research institutes, farming bodies and conservation groups to reduce nitrogen emissions and restore wildlife. This is encouraging, but we know that faster and more coordinated action is required at a much bigger scale.

Taking forward the findings of the workshop, Plantlife has six ambitions in this area:

1. Politicians, civil servants, farmers and conservationists are talking about nitrogen

Nitrogen's impact on nature deserves to be part of our mainstream thinking on wildlife conservation, air quality and farming - and taken up by policy-makers and budget holders in the Scottish Government.

The work of specialists at the Centre for Ecology and Hydrology, Scottish Natural Heritage, Scottish Environmental Protection Agency and others should be better understood and acted upon. The widespread media coverage of Plantlife's report in March got this off to a great start, with lots of positive feedback and new contacts.

2. A stronger evidence base through funded research

Further research is needed to improve 'critical load' assessments for wildlife sites across a range of habitat types. We must also track trends in nitrogen emissions, sources and rates of deposition, as well as the effectiveness of measures to reduce these.

There are gaps in our knowledge about the impacts of nitrogen deposition on flora and fungi, as well as knock-on effects for other species and ecosystems. The interactions between nitrogen deposition and other chemical processes, including carbon and ozone, also require further research.

You can help to monitor the impact of nitrogen on your local wildlife and improve our knowledge through citizen science surveys such as the 'Lichen App' <http://www.apis.ac.uk/lichen-app/main> or the OPAL Air Survey <https://www.opalexplorenature.org/airsurvey>.

3. Nitrogen deposition is included in SSSI assessment and management

Despite being one of the major threats to biodiversity, nitrogen deposition is not factored into the monitoring of Sites of Special Scientific Interest (SSSIs) and so is not reflected in SSSI condition assessment and management plans.

Without monitoring, it is much harder to demonstrate nitrogen impacts at particular sites and to get the action necessary to reduce nitrogen levels and restore priority species and habitats.

4. Farmers are positively engaged and properly supported in reducing ammonia emissions

NO_x emissions are already the focus of government air quality strategies as well as being reduced indirectly by initiatives to reduce greenhouse gas emissions. The same level of action is required to reduce ammonia emissions in farming.

Many farmers are already taking action through, for example, better flooring systems in animal housing and covers for slurry stores. Some of these measures can help farmers to save money without losing production, such as using 'precision' injection technology to spread fertiliser onto fields more efficiently.

5. Local nitrogen action plans have political support and adequate funding, backed up by effective regulatory and planning systems

New site-based nitrogen action plans are needed in Scotland to tackle nitrogen levels at badly-affected wildlife sites. This requires political support and funding to engage farmers and other stakeholders in practical action on the ground.

6. Nitrogen's impacts on plants are addressed in air quality plans and new land management policy post-Brexit

Action on nitrogen deposition cuts across several policy areas, giving "win-wins" with efforts to tackle climate change, improve public health and water quality, make farming more efficient and sustainable, and restore our biodiversity.

As the UK prepares to leave the EU, nature conservationists must send the government a clear message about the importance of maintaining and strengthening environmental legislation and equivalent new policy. We can demonstrate how public money can be better used to provide public benefit - including a healthy natural environment.

In particular, there are opportunities to replace the Common Agriculture Policy (CAP) with a better system for land management and farming, and to strengthen environmental protections established in EU Directives on air quality, water quality and habitats. Nitrogen deposition and its impacts on wildlife deserve to feature as a key part of this.

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“BLOOMIN’ ALGAE!” – A NEW APP FOR MONITORING HARMFUL ALGAL BLOOMS IN FRESHWATERS

If you are out plant surveying, or just having a leisurely stroll, and spot a bloom of blue-green algae (cyanobacteria) at a loch, local pond, or canal, you can now record its presence with a new app, called “Bloomin’ Algae”. Blooms of blue-green algae (cyanobacteria) are a major health hazard for people and animals as they commonly produce potent toxins that can cause people to experience skin rashes, eye irritations, fever, muscle pain and worse. Algal blooms have also caused the deaths of

dogs, cattle, birds and fish across the UK. The app allows a more rapid alert service to SEPA, EA, local authorities and Health Protection Boards to put up warning signs to minimise risks to the public.

The app, which has been developed by Prof. Laurence Carvalho and colleagues at the Centre for Ecology & Hydrology (CEH), enables users to submit a photo of the bloom and state what activity takes place at the location, so that the potential risks to people and animals can be assessed. The app will also be used to understand the environmental reasons for the development of algal blooms and scums, particularly the role of short-term weather events. The app contains a photo guide with images of harmful algal blooms and also images of other species often confused with algal blooms, such as duckweeds (*Lemna*), filamentous green algae (e.g. *Cladophora*) and water fern (*Azolla*).

Blue-green algae naturally occur in lakes, ponds, canals, rivers and reservoirs around the world and are most commonly seen during the summer and early autumn. The algae are microscopic but clump together in visible colonies, or filaments, up to a few millimetres in size. If the numbers of blue-green algae are very large, these can rise to the surface and form thin wispy green blooms or thick paint-like scums. They are a major health risk when they bloom, especially when scums accumulate along the shore where children or dogs play, or where livestock come to drink.

You can download the app from Android and Apple app stores, and if you then come across an algal bloom, use the app to send CEH a photo and details of its location. CEH will then alert the UK environment agencies so they can take action. Please also add notes or comments; for example, if warning signs are already in place or not.

Before using the app in the field, we recommend that you set up an iRecord account with the Biological Records Centre and validate your email address for your account. This will allow us to send you feedback and contact you if we have any queries. You do need to have an iRecord account to submit a record, but this is the same account if you already use the general iRecord app or other BRC apps to submit records of other plants, lichens, butterflies, or ladybirds.

Please do not touch anything that you suspect is a bloom or allow children or pets to come into contact with, or swallow, the water. Dogs are at particular risk, as they can ingest large quantities when cleaning their coats after swimming in the water.

To download the app: <http://www.brc.ac.uk/app/bloomin-algae-app>

To register an iRecord account: <https://www.brc.ac.uk/irecord/>

Prof. Laurence Carvalho,
laca@ceh.ac.uk

Photograph of William Brand taken in 1865. From the Botanical Society Club Album.



WILLIAM BRAND WS – FIRST TREASURER OF THE BOTANICAL SOCIETY OF EDINBURGH

The Library at the Botanic Gardens has recently acquired a new member of staff – or should that be an old member of staff? Certainly an old member of the Botanical Society of Scotland...

The Royal Botanic Gardens was recently contacted by the curator at the Bank of Scotland, looking to rehouse some of their less well used artworks – could more appropriate homes be found for them? When looking to rehouse the bust of William Brand WS, the Secretary of the Union Bank of Scotland between 1846 and 1869, research showed he had botanical connections, and so we were contacted. Of course we said yes!

Born in 1807, the son of a farmer at Blackhouse, near Peterhead, William Brand was initially educated in parish schools before being apprenticed to Writers (solicitors) in Peterhead then in Edinburgh where he entered legal classes at the University. Having completed his legal education he became a Writer to the Signet in 1834 and a partner in the Edinburgh firm of Scott, Findlay and Balderston. In 1846 he was elected Secretary to the Union Bank of Scotland, a position he held until his death. In 1863 he was elected Fellow of the Royal Society of Edinburgh.

But what are his connections to RBGE?

Whilst completing his medical degree at Edinburgh University, Brand developed a strong interest in botany, accompanying Professor Robert Graham (Regius Keeper of the Royal Botanic Garden Edinburgh and Professor of Botany at Edinburgh University) on collecting excursions throughout Scotland during 1830 and 1831. In 1836, when meetings were being held to discuss the creation of a new Botanical Society, Brand was there. He attended the inaugural meeting of the Botanical Society of Edinburgh on the 8th February 1836 making him a founding member and also logical choice for its first Treasurer. He developed ideas for a number of Society publications, devised methods for arranging and cataloguing the Society's herbarium and collected a significant herbarium collection himself, discovering several new plants including *Astragalus alpinus* in the process.

He was also a member of the Botanical Society Club, an offshoot of the Botanical Society of Edinburgh, initially comprising its original members, becoming its Secretary. At the last Club meeting he attended, in June 1869, he complained of feeling ill. After a couple of months he

recovered enough to visit relatives in Peterhead, but became ill again on his return home, dying on October 15th 1869. He left behind a widow, a son and two daughters.

John Hutton Balfour describes Brand in his obituary, published by the Botanical Society in 1870:

“Mr Brand was a person of great energy and vigour, a shrewd and intelligent observer, an excellent and fearless cragsman, capable of enduring great fatigue, and of accommodating himself to all the discomforts which might happen during excursions. His happy and cheerful disposition rendered him a most pleasant companion; whatever occurred, he was never out of temper, but on all occasions was a true peace-maker.”

The bust itself (see pictured on newsletter cover) was sculpted by William Brodie R.S.A. in 1860 and is now on display in RBGE's Library at 20a Inverleith Row. We're very grateful to Douglas MacBeath, curator at the Bank of Scotland for offering the bust to us. It is a reminder that without the Botanical Society of Edinburgh (now Scotland), RBGE's Library, Archive and Herbarium collections would not be of the high standard that they are today as it was the Society's collections that became the foundation of our own.

Leoni Patterson
RBGE

Copy of original Botanical Society of Edinburgh members list

1886	Original Members.	County or place of birth.
March 17 th	Rob Graham	Stirling
	J.H. Balfour	Edinburgh
	E.C. Walker	Glasgow
	Edward Forbes	Isle of Man
	Wm. Graham	Cornwall
	J. Brown	Hesden Chire
	W.M. Macdonald	Edinburgh
	W. H. Campbell	Edinburgh
	James Macdonald	Edinburgh
	William Macdonald	Yorkshire
	David Falconer	Edinburgh
	Edward Houston	Northumberland
	Wm. Veill	Edinburgh
	R. Macdonald	Edinburgh
	Robert Kaye Greville	Durham
	Martin Barry	Hampshire
	Richard Parnell	Devonshire
	Stewart	Isle of Man

UNUSUAL PHYLLOTAXIS IN DICOTS WITH OPPOSITE LEAVES

The phyllotaxis of angiosperm species is generally so constant that compilers of floras can state “lvs. spirally arranged”, “lvs. opposite” or “lvs. alternate” safe in the knowledge that this will be true of almost every plant of that species that their readers may encounter. I am interested in exceptions to rules, and I have looked at dicot plants, which usually have leaves in opposite pairs, but occasionally 3 or more leaves in a whorl. In the species with which I am familiar, whorls are always decussate, by which I mean that, in a shoot with N leaves per whorl, successive whorls are rotated by $180/N$ degrees. I refer to a shoot with decussate whorls of N leaves as an Nd shoot, e.g. opposite pairs are $2d$. I also use the notation p_2, p_3, p_4 etc. for the fraction of $2d, 3d, 4d$ shoots on a plant and for the probability that any particular shoot is $2d, 3d$ or $4d$. Probabilities can only be estimated by counting and are therefore the same as fractions within the limits of statistical error, and of course $p_2 + p_3 + p_4 + \dots = 1$.

Species Investigated

The plants which I have found are mainly within dog walking distance of my home in Fairmilehead, a residential area of Edinburgh where many houses have well-tended gardens, but where there are also sizeable untended areas. The species in which I have found exceptional whorled leaves are:

Weigelia (*Weigela florida*, Caprifoliaceae). This garden shrub is stated by Stace 1997 to be mainly *W. florida* with some admixture of other species; the one I have mostly studied looks like *W. florida* sensu strictu or *W. florida rosea*. From 2011 to 2015 a shrub in my garden produced $2d$ and $3d$ shoots roughly in the ratio 86%:14% (with a single $4d$ shoot in 2011), giving $p_2 \approx 86\%$ $p_3 \approx 14\%$, $p_4 \approx 0.2\%$, but p_3 increased to $\approx 46\%$ (56/123) in 2015 following very severe pruning in the Autumn of 2014. I found no evidence that the phyllotaxis of side shoots was correlated with that of their parent shoot. I inspected other *W. florida* plants in other people's gardens, including a shrubbery of 14 closely planted shrubs which I suspect to be clones of the same plant: it was difficult to identify which shoots came from which plant. The mean value of p_3 in this shrubbery was 1.6% but I estimated two of the shrubs to have $p_3 \approx 7.5\%$.

Garden Privet (*Ligustrum ovalifolium*, Oleaceae). If you examine a 10 meter length of privet hedge that was trimmed a month previously and has a good growth of emergent shoots, you would be unlucky not to find at least one 3d shoot. I guesstimate that p_3 in privet hedges averages roughly 0.1%. It is often, though by no means invariably the case, that 3d privet shoots are more vigorous and have larger leaves than 2d shoots of the same shrub. I have also noticed that vertical privet shoots very occasionally undergo dichotomous bifurcation, with the two shoots then diverging at an angle of about 1 degree (by comparison, dichotomous shoots of Lycopodiopsida spread by ~30-60 degrees). This disrupts the phyllotaxis: a 2d shoot appears to be irregularly 4d at the point of bifurcation, then 1d in both shoots for about 4 nodes above the bifurcation, then reverting to 2d in both shoots above that. I interpret this that each fork 'thinks' that it is half of a 2d shoot, until it 'realises' that it is a whole 2d shoot, which suggests that topological appraisal is involved.

Hydrangea (*Hydrangea macrophylla*, Hydrangeaceae). I have seen quite a number of 3d shoots on shrubs of this species in other people's gardens. Although I have not been able to conduct a proper survey, it has been evident to me that p_3 is much greater in some shrubs than in others.

Purple-loosestrife (*Lythrum salicaria*, Lythraceae). 3d shoots are fairly frequent in this species also, but I have not conducted a proper survey.

Yellow Loosestrife (*Lysimachia vulgaris*, Primulaceae, or, according to Ståhl & Anderberg 2004, Myrsinaceae). This perennial herb has 2d, 3d and 4d upright shoots in various proportions. There are too few lateral shoots to determine whether they do or do not inherit their phyllotaxis from their parent shoot.

Fuchsia (*Fuchsia magellanica* sensu latu, Onagraceae). Like *L. vulgaris*, this species has 2d, 3d and 4d upright shoots in various proportions. As far as I can tell, the phyllotaxis of side shoots is not inherited from their parents.

Wilson's Honeysuckle (*Lonicera nitida*, Caprifoliaceae). I have seen a few 3d shoots in one hedge, but probably more than one shrub; their side shoots were all 2d. I think it fairly likely that all shrubs in the hedge were clones of the same plant.

Forsythia (*Forsythia* × *intermedia*, Oleaceae). A large shrub of this species had produced only 2d shoots during a large number of years,

but I cut it down almost to ground level in 2015, and next year it produced 2d, 3d and 4d shoots.

Red Valerian (*Centranthus ruber*, Valerianaceae). A 3d shoot in a roadside garden escape.

Butterfly Bush (*Buddleja davidii*, Buddlejaceae). I have seen one young individual of this species with a 3d primary stem, growing atop a wall in Inveresk. I do not know if it was tricotyledenous.

Elder (*Sambucus niger*, Adoxaceae). I have seen one vigorous 3d shoot arising from near the base of a tree. Its side shoots were all 2d.

Broad-leaved Willowherb (*Epilobium montanum* (I think), Onagraceae). I have seen one young 3d plant growing in a crevice beside a pavement. I do not know if it was tricotyledenous.

Sycamore (*Acer pseudoplatanus*, Sapindaceae). Sycamore has epigeal germination and produces plentiful seedlings, most of which die not long after the first pair of true leaves (which are decussate to the cotyledons) have appeared. The cotyledons are strap-shaped and conspicuous, and quite a large number of seedlings seem at first sight to be tri- or even tetracotyledenous. Closer inspection shows that one or both cotyledons have undergone dichotomous bifurcation, and the first true leaves are 2d. I have however found three seedlings that had three cotyledons and whose first leaves were 3d and decussate to the cotyledons. I rescued two of these, and they are now growing in plant pots in my garden. One of these plants is now two years old, and both continue to be 3d. I had hoped to be able to assess the phyllotaxis of its side shoots, but none have yet emerged. I have, however, never seen 3d shoots on a Sycamore tree.

I must conclude this section of the essay with a brief reference to *Galium* and freshwater aquatic dicots:

Bedstraws (*Galium* spp., Rubiaceae). *Galium* spp. appear to have leaves in whorls of up to 9, according to species. Clapham et al. 1962 state: "The British representatives [of Rubiaceae] all belong to the tribe Galieae with 2 or more lf-like interpetiolar stipules so that there appear to be 4 or more lvs in a whorl, of which, however, only 2 have axillary buds." The stems of *Galium* are square in cross section, and the axillary buds are situated on the corners: this makes it easy to ascertain that the whorls are strictly decussate. This remarkable morphology deserves more attention than it usually receives.

Fresh water aquatics. There are several unrelated species of freshwater aquatics of still or slow-moving water, which have, or appear to have, leaves in whorls. This is apparently an adaptation to their environment, and is beyond the scope of this essay.

General Remarks on these Observations

Firstly, none of my data would survive statistical scrutiny for a peer-reviewed journal, and the following remarks are surmises only. The species in which I have found 3d shoots are phylogenetically diverse, but the great majority of occurrences have been in garden shrubs that are subjected to regular and quite severe cutting: only *Lysimachia vulgaris* and *Fuchsia magellanica* frequently produce 3d and 4d shoots without pruning. In most species, the mean frequency of 3d shoots is probably no more than 0.1%, but my observations on *Weigela florida* suggest that it can vary considerably between individual plants, even when those plants are (probably) clones of the same plant. I get a similar impression from my observations of *Ligustrum ovalifolium*, in hedges of which, 3d shoots seem to occur in about the same place in successive years, and of *Lonicera nitida*, where the few 3d shoots I have seen were clustered on two(?) shrubs. There does not seem to be a correlation between the phyllotaxis of a shoot and of its side shoots in any species. The phyllotaxis appears to be determined when a bud is initiated: the phyllotaxis of the first 1 or 2 nodes may be irregular, but thereafter remains constant for that shoot indefinitely. I have seen reversion of a shoot from 3d to 2d only twice, both in privet, and I believe it to be very rare.

A Hypothesis for the Evolution of Opposite Phyllotaxis in Dicots.

The species in which I have observed 3d shoots, in normally 2d species, include Asterids, Fabids, Campanulids and Rosids, which is not to say that it does not occur in other clades. I hypothesise the existence of a 'switch', which can be set to values 2, 3 or 4 with probabilities p_2 , p_3 , p_4 , apparently at random, immediately after the bud is initiated. Once set, the phyllotaxis almost invariably remains constant throughout the growth of the shoot. The values of p_2 , p_3 , p_4 vary between species and within species, and can be influenced by the stress of pruning, which suggests some sort of epigenetic mechanism probably influenced by plant hormones: I cannot speculate as to the molecular biology of this

mechanism. There is nothing in my observations to contradict the hypothesis that this mechanism is similar in many species, and may go back to the earliest angiosperms or even earlier. The earliest dicots had spiral phyllotaxis, and the occurrence among dicots of species with opposite or whorled leaves indicates that this change has happened independently on many occasions. I propose the existence in angiosperms with spiral phyllotaxis (including early angiosperms and possibly their pre-angiosperm ancestors) of four controlling hypothetical 'gene clusters', which for easy of discussion for this article I designate P, S, C and L. P controls the phyllotaxis of the plumule, and in dicots causes the cotyledons to form a whorl with $p_2 = 1$, or close to 1, in all species. S controls the phyllotaxis of the shoots, causing a spiral phyllotaxis: it is beyond the scope of this essay to consider the possible variations in spiral phyllotaxis and how they may arise. C controls the morphology of the cotyledons, and is clearly quite different from L which controls the morphology of the 'true' leaves. These four hypothetical 'gene clusters' do not seem to be linked. P and C are switched on at a very early stage in the development of the plumule, causing the cotyledons to have the correct cotyledon morphology and to have opposite phyllotaxis: presumably a mutation in P early in the evolution of angiosperms caused monocots to have only one cotyledon. In species with spiral phyllotaxis, S and L are switched on, immediately after and immediately above the initiation of the cotyledons, causing subsequent leaves to be spirally arranged and to have the 'true' leaf morphology; S also switches off P permanently. This switching on of S is an exception to what I take to be a general rule that the phyllotaxis of a shoot, once determined, does not change. If S is disabled by a mutation, P continues to function and the plant produces 'true' leaves by a continuation of the opposite phyllotaxis of its cotyledons. I am not aware of any angiosperm in which the 'true' leaves have the morphology of cotyledons, so I assume that if L is disabled the plant produces no leaves, which is presumably quickly lethal (if any reader of *BSS News* knows differently, could they please let the editors know, so that a correction can be printed in the next issue). I like this hypothesis because it is simple and provides a unified explanation for a change of morphology that has happened many times.

Alternate phyllotaxis might arise by a mutational change from 2d to 1d in a species with whorled phyllotaxis, or by a change from say a 5/3 spiral phyllotaxis to a 1/1 spiral phyllotaxis. That is beyond the scope of this essay.

I have no doubt that there are readers of *BSS News* who have a better knowledge of this subject than I, and may have valuable comments to make on this essay. If so, I hope they will send a reply to the editors, correcting any errors I may have committed.

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SYCAMORE SEEDLINGS

Commonest of trees, the sycamore
bestrews its seeds on woodland floor.
The winged fruits of these handsome trees
are carried the slightest breeze,
ensuring some are scattered far
from where their parent sycamores are.
Their germination's epigeal,
which means that seedlings all reveal
their cotyledons, in a pair,
above the ground, in open air.
Look around and you may see
seedlings with not two, but three
cotyledons ranged in symmetry.
But, when we make close examination
of this botanical aberration,
we find anomalous bifurcation
has led to this strange situation.
Sycamore seedlings have become
dichotomous, like *Lycopodium*!

Roger West

BACK FROM THE EDGE, EDINBURGH BIODIVERSITY ACTION PLAN PLANT CONSERVATION WORK

Past, present and future.....

In this article I take a look at the work of some of the organisations and individuals who have been involved in plant conservation in Edinburgh as part of the Biodiversity Action Plan (BAP). In preparing to write this article, I began by looking back at the plants that were listed in the first Edinburgh Biodiversity Action Plan (EBAP) 2000-2004. This original plan had a list of 36 species of flowering plants, trees, lower plants and fungi. In the current Plan 2016-2018 only 10 species of plant, lower plant and fungi are mentioned. This is not to say that the work of the Edinburgh Biodiversity Partnership is complete with regard to 26 of the species on the original list! On the contrary, threats and actions in relation to most of the original species is very much ongoing. For example, Hairy Stonecrop (*Sedum villosum*) is still under threat from upland drainage, grazing pressure and eutrophication (see Braithwaite, M.E. 2010) and actions in relation to its conservation include surveying and re-creating upland flushes.

In 2016 the latest version of the EBAP streamlines actions to amalgamate habitats into green and blue networks to reflect a landscape-scale approach to nature conservation. However, key species are considered separately to focus on actions that are targeted to specifically address conservation issues. A recurring theme in nature conservation is being on the edge, whether that is edge of their range as a result of climate change or habitat fragmentation, or ecotone, or simply being geographically on a boundary. One of the plants that is an example of being on the edge is Field gentian (*Gentianella campestris*). It is found on the boundary of the Vice County, as well as on the edge of coastal grassland and woodland/scrub. Actions such as scrub clearance, seed propagation and creating new suitable habitats adjacent to the current plants are being undertaken to conserve the population. (See Walker, K.J.)

To lead conservation efforts a Rare Plants sub group was formed involving key Partners in plant conservation; RBGE, BSS VC Recorder, Historic Environment Scotland as well as City of Edinburgh Council officers. The species that are currently having focussed conservation actions are: Maiden pink (*Dianthus deltoides*); Purple Milk-Vetch

(*Astragalus danicus*); Field gentian (*Gentianella campestris*); Sticky catchfly (*Silene viscaria*); Spring sandwort (*Minuartia verna*) and Pillwort (*Pilularia globulifera*). Work associated with these species involves protecting and enhancing the habitat for the existing populations. This has included gorse and scrub removal, re-seeding areas and translocating plants. The translocations will be monitored over the long term as part of the project permission from SNH. This information will hopefully feed into any future translocation work so that best practice can be applied and errors avoided.

Looking to the future, it is vital to keep up the momentum of work for the current list of species. It is also important to look for opportunities to add value to this work, for example through habitat management that benefits a range of species as well as the target species. Actions in Holyrood Park for Maiden pink also benefit Purple Milk-Vetch and Sticky catchfly and I am delighted to report that translocated Maiden pink has now self-seeded and flowered. This is especially pertinent when resources and funding are stretched and the mythical magic money tree is also on the edge.

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PATRICK MATTHEW'S REDWOODS

"Do behold the King in his glory, King Sequoia! Behold! Behold! seems all I can say. Some time ago I left all for Sequoia and have been and am at his feet, fasting and praying for light, for is he not the greatest light in the woods, in the world? Where are such columns of sunshine, tangible, accessible, terrestrialized?"

(Gifford, Terry, John Muir, 1996. *His Life and Letters and Other Writings*, Wicks, London & The Mountaineers, Seattle, 1870. pp. 39-140.)

Introduction:

The Giant Sequoia - *Sequoiadendron giganteum* - also known as Giant Redwood, Wellingtonia, or simply, Big Tree, is a conifer native to North America that grows naturally between 1280 m to 2150 m in mixed stands along with Douglas fir, sugar pine, ponderosa pine, incense cedar, red and white fir, black oak and canyon live oak, mountain dogwood, and big-leaf maple, and is found in 75 scattered groves on the western slope of the Sierra Nevada. It is in one of the northern groves that this story begins.

Patrick Matthew was born in 1790 at Rome, a farm near Scone Palace along the River Tay. At seventeen, Matthew took over the modest estate of Gourdiehill on which he eventually developed pear and apple orchards of up to 10,000 trees. In 1831 he wrote a book with the title; "On Naval Timber and Arboriculture" and in one appendix he put forth the concept of natural selection several years before Charles Darwin, a fact that Darwin later acknowledged.

In 1852, five years after gold was discovered at Sutter's Mill in the foothills of the Sierra Nevada of California, as part of Matthew's interest in feeding the British colonies, he sent three of his sons west to California to report back to him regarding what they found. Sons Charles and James travelled on to New Zealand to set up orchards using Gourdiehill seeds. John, however, stayed in California as an engineer and surveyor, and eventually in July of 1853 worked his way up to the Calaveras Grove of Giant Sequoia (today's Calaveras Big Trees State Park) where he gathered seeds of the Giant Sequoia to send back to his father at Gourdiehill.

What exactly is a Giant Sequoia?

The Giant Sequoia is the largest non-clonal living species on Earth by volume growing up to 94.8 meters tall with a maximum diameter of 8 m. Giant Sequoia needles are evergreen, 3 mm long and awl-shaped. The cones that stay closed on the tree for up to 20 years, are about 6 cm long with 30-50 scales with an average of 230, 5 mm seeds in each cone. The tree's bark is thick and fibrous, providing protection from the periodic fires that sweep through the Sierra, opening the scales of the cones and burning layers of duff to create the bare mineral soil necessary for the germination of the trees' seeds. The oldest known Giant Sequoia was estimated from a count of annual rings count to be 3500 years old.

The Giant Sequoia of the Sierra Nevada Range of California were known by Native Americans for centuries, and called Wawona by the Sierra Miwok of the Yosemite region. The first group of explorers to happen upon the Giant Sequoia of the Tuolumne or Merced groves was the Walker Party in 1833. The groves, however, remained unexploited by the general public until a hunter named Augustus T. Dowd - in tracking a grizzly bear - came upon the Calaveras Grove and brought word back to the mining camp of Murphys.

Further credit for the discovery, according to Edwards James Ravenscroft in *Pinetum Britannicum*, 1884, should go to W. Whitehead, Esq., "*who while tying his shoe, looked casually round him, and saw the trees, June 1850.*"

(Ravenscroft, James Edward, (1884). *The Pinetum Britannicum. A Descriptive Account of Hardy Coniferous Trees Cultivated in Great Britain*, Vol. II, W. Blackwood & Sons, Edinburgh and London.)

Sequoiadendron giganteum (Giant Sequoia) is one of three known species of redwoods, the other two being the Coast Redwood (*Sequoia sempervirens*), the tallest tree on Earth; and the Dawn Redwood (*Metasequoia glyptostroboides*), a native of Lichuan County in the Hubei Province of China. In addition to setting girth and height records, both Giant Sequoia and the Coast Redwood store more carbon than any other tree.

The race to bring Giant Sequoia seeds to Britain:

By the time John Matthew made it to the Calaveras Grove in 1853 it was a thriving tourist attraction. A house had been built on one tree, others

were cut down to discover their ages, and even though Sequoia wood is of a poor quality, logging had commenced with a vengeance. One tree called the 'Mammoth Tree' whose stump measured 7.3 m wide at its base and whose rings showed it to be 1244 years old, was cut to create a dance floor, which may be seen to this day.

After collecting seed in the grove in June 1853, John Matthew sent to his father back in Scotland a packet of Giant Sequoia seeds, a branch from an 1800 year old tree, a sketch of the tree, and a letter describing the grove. The shipment arrived on 18th August, 1853. An extract of the letter was then sent by Patrick Matthew to the *Gardener's Chronicle and Agricultural Gazette*:

"Wellingtonia ... dated Jamestown, Tuolumne county, Alta California, July 10, 1853 :- 'Last Saturday I went along with one of my partners to see the 'Big Tree,' discovered in Calaveras county near the head waters of the Stanislaus river ... From Carson's Hill, we went on to Murphy's Camp, where we got horses, and after a three hours' ride over a tolerably good trail, ascending pretty rapidly towards the base of the Sierra Nevada, at first through woods chiefly of Oak and Pine (Spruce), and afterwards of immense Pines, Fir, Arbor vitae, and Cedar, we reached a closely wooded-bottom ... we found the Wellingtonia, whose dimensions are as follows: - Diameter at the ground, 34 feet; diameter 20 feet up, 20 feet; diameter about 120 feet up, 14 feet; height, 290 feet; age estimated at nearly 3000 years ... They are now cutting the tree down, and should it be perfectly solid to the centre, the exact age will soon be ascertained ... In the same swamp there are many other trees of nearly the same diameter. I stepped round several, 30 yards in circumference, while one which had fallen has a hollow inside fit to stable 50 horses. This gigantic Methusalem forest of the olden time seems to have extended back into periods anterior to any but geological record. The whole surface of the ground is strewn with immense trunks, or their remains, in every stage of decay, in many instances covered with vegetation - so as to look like green earthen mounds ... The bark, for about 100 feet has been removed from the 'Big Tree,' for the purpose of putting it up in its natural figure at the World's Fair, New York, along with a section of the butt. There has been much talk here of the Goth-like act of cutting down the tree, the largest and oldest in the world, as the Californians boast. It would have been a pity to do so, were there no others like it; but many in the same swamp are nearly of the same dimensions ..."

(P. Matthew, Gourdie Hill, Errol, N.B, (1854) (*The Gardener's Chronicle and Agricultural Gazette* No. 1, p. 373.)

The same year that Matthew visited the Calaveras Grove, botanist William Lobb also visited and collected many more seeds, than Matthew, along with several shoots and two live specimens which he carried on a voyage in December 1853 back to James Veitch of the Vetch Nursery near Exeter, the largest family run nursery in Europe of the 19th century. The seeds and botanical material were handed over to John Lindley who believed he was the first to receive the seeds in Britain.

Lobb had initially arrived in California in 1849, the year the California Gold Rush began, to search for exotic plants for Mr Veitch. After consulting with Sir William Hooker, the director of Kew, Veitch decided that California might well provide a plethora of new plants for English gardens, and a potentially lucrative venture for Veitch.

Botanists of the mid-1800s were well aware of David Douglas's 1820s exploration of the Pacific coast of America for the Horticultural Society. Douglas had sent back seeds from many conifers new to science, including those of the Coast Redwood; as well as seeds of the Douglas fir (Latin name *Pseudotsuga menziesii* after the Scottish botanist, Archibald Menzies) one of which was planted at Scone Palace, which today remains the first Douglas fir to be planted in Britain.

Lobb proceeded to send seeds of Monterey pine, bishop pine, knob cone pine, gray pine, coast redwood and sugar pine, as well as many other plants to Exeter, where Veitch soon had seedlings available for sale to clients eager to add to their estate collections.

It was while in San Francisco that Lobb attended a meeting of the newly formed California Academy of Sciences, there meeting Dr. Albert Kellogg, a founding member of the Academy who had heard of the giant trees of the Calaveras Grove. Having obtained a branch and samples in 1851, Kellogg had been waiting for complete herbarium specimens before making a formal description of the big trees that he planned to name *Washingtonia gigantea* in honour of George Washington, Revolutionary War hero and "Father of our Country."

Upon learning of the Mammoth Trees, however, Lobb immediately travelled east into the Sierra Nevada collecting complete specimens; seeds, shoots and seedlings. Not sharing his plans with Dr. Kellogg, Lobb then travelled back to Britain with his botanical treasures that were

soon exhibited at Horticultural Society meetings and at Veitch's London nursery. Within two years Veitch had thousands of seedlings for sale for two guineas each or 12 guineas a dozen for those wishing to grace their estate gardens.

A controversy as to who was the first to have brought Giant Sequoia seeds over from California, simmered for a time in Britain. This argument was more or less settled in 1866 in the *Gardener's Chronicle and Agricultural Gazette*, " ... there is another point on which general opinion is also at fault, viz., who first introduced it into Europe? The credit of doing so is generally given to Mr. Lobb and his employer, Mr. Veitch, for whom he was collecting. But, if our information be correct, it belongs to Mr. John D. Matthew, son of Patrick Matthew, Esq., of Gourdie Hill near Errol. Mr. Lobb returned from California in December, 1853, bringing his seeds with him as appears from the following remarks by Dr. Lindley in this Journal on December 24 in that year :— " The other day," says he, "we received from Mr. Veitch branches and cones of a most remarkable Coniferous tree, also Californian, seeds and a living specimen of which have also been brought him by his excellent collector Mr. W. Lobb, who, we are happy to say, has returned loaded with fine things." The extraordinary Conifer referred to was the *Wellingtonia*, and this announcement was the first of several notices by the Doctor regarding it. Six months before that, however, Mr. Matthew's son had written to his father, informing him of the discovery of the giant trees, and forwarding a sketch of some of them, a small branch and some of its seeds. His letter was dated 10th July, 1853, and was received along with the seeds on the 28th of August following. The letter was published in extenso in this Journal in the following year (10th June, 1854). It contains little but details which, then fresh and full of interest, are now old and well-known, but it fixes the date of the first envoi of seeds."

((The) *Gardener's Chronicle and & New Horticulturist*, (1866) Volume 26, p. 1191.)

And so, as Ravenscroft stated in *Pinetum Brittanicum*, "But suum cuique tribute. The first seeds received in this country were sent by Mr Matthew, and the oldest plants are those which were raised from them." (Ravenscroft, James Edward, (1884). *The Pinetum Britannicum. A Descriptive Account of Hardy Coniferous Trees Cultivated in Great Britain*, Vol. II, W. Blackwood & Sons, Edinburgh and London.)

Naming the big tree:

But what was the Big Tree to be called? The 1853 Christmas Eve edition of the *Gardeners Chronicle*, edited by the noted botanist John Lindley, who had claimed priority for the tree on behalf of Lobb, contained the following: *“What a tree is this! – of what portentous aspect and almost fabulous antiquity! They say that the specimen felled at the junction of the Stanislau and San Antonio was above 3000 years old ... The seed received by Messrs. Veitch has all the appearance of vitality, and since the tree is hardy and evergreen, it is a prodigious acquisition. But what is its name to be? ... we think that no one will differ from us in feeling that the most appropriate name to be proposed for the most gigantic tree which has been revealed to us by modern discovery is that of the greatest of modern heroes. Wellington stands as high above his contemporaries as the Californian tree above all the surrounding foresters. Let it then bear hence-forward the name of Wellingtonia gigantea. Emperors and kings and princes have their plants and we must not forget to place in the highest rank among them our own great warrior.”*

((The) Gardener’s Chronicle and Agricultural Gazette Dec. (1853), p 823.)

And so Lindley named the tree *Wellingtonia gigantea* after the British hero who died in 1852. Meanwhile back in California, Dr. Kellogg was fit to be tied having been the initial person to share his specimens with Lobb. Kellogg and other American botanists were outraged that an English botanist who had never seen a Giant Sequoia had named the tree after an English war hero. Several names had already been put forth for the tree: *Washingtonia californica*, *Taxodium washingtonium*, *Sequoia wellingtonia*, and *Sequoia washingtoniana* while back in Europe the name *Sequoia gigantea* was proposed by Joseph Decaisne, a Belgian botanist, and accepted by British botanists. (The name *Sequoia* is thought to come from the name of the inventor of the Cherokee alphabet, Sequoyah, although this opinion is sometimes challenged.)

In 1855, Sir William Hooker, the Director of the Royal Botanic Gardens of Kew, in *Hooker’s Journal of Botany and Kew Garden Miscellany* quoted Dr. C.F. Winslow who wrote in *The California Farmer* about his visit to the Calaveras Grove. After several flowery descriptive paragraphs, Winslow wrote, *“The name that has been applied to this tree by Professor Lindley, an English botanist, is Wellingtonia gigantea. By him it is declared to be so much unlike other Coniferae, as not only to*

be a new species, but to require description as a new genus. Other botanists of eminence think differently. To this, however, he has seen fit to apply the name of an English hero, a step indicating as much personal arrogance or weakness as scientific indelicacy; for it must have been a prominent idea in the mind of that person that American Naturalists would regard with surprise and reluctance the application of a British name, however meritoriously honoured, when a name so worthy of immortal honour and renown as that of Washington would strike the mind of the world as far more suitable to the most gigantic and remarkable vegetable wonder indigenous to a country where his name is the most distinguished ornament. As he and his generation declared themselves independent of all English rule and political dictation, so American Naturalists must in this case express their respectful dissent from all British scientific 'stamp acts.' If the 'Big Tree' be a *Taxodium*, let it be called now and for ever *Taxodium washingtonium*. If it should be properly ranked as a new genus, then let it be called to the end of time *Washingtonia californiana*. The generic name indicates unparalleled greatness and grandeur; its specific name, the only locality in the world where it is found. No names can be more appropriate; and if it be in accordance with the views of American botanists, I trust the scientific honour of our country may be vindicated from foreign indelicacy by boldly discarding the name now applied to it, and by affixing to it that of the immortal man whose memory we all love and honour, and teach our children to adore. Under any and all circumstances, however, whether of perpetuity or extinction, the name of Wellington should be discarded, and that of Washington attached to it, and transmitted to the schools of future ages."

(Hooker, Sir William Jackson, (1855). *(The) Big Tree (Washingtonia gigantea, Lindl)*, Hooker's Journal of Botany and Kew Garden Miscellany, Volume 7, p. 26-29.)

However, in the long run neither Kellogg's *Washingtonia* nor Lindley's *Washingtonia* nor Decaisne's *Sequoia* were allowed to be used as all three names had previously been used for other species. In 1855 Kellogg put forth the name, *Taxodium giganteum*. By the time that George B. Sudworth's book, *Forest Trees of the Pacific Slope*, was published in 1908 by the U.S. Department of Agriculture (one of my prized possessions that my grandfather took along on his treks up into the Sierra Nevada in the early 1900s) the accepted name for the Giant Sequoia was *Sequoia washingtoniana*.

Finally in 1939 the Big Tree received the name *Sequoiadendron giganteum* from John T. Buchholz, a botanist at the University of Illinois, who maintained that the Giant Sierra Redwood did not belong in the same genus as the Coast Redwood, *Sequoia sempervirens*. The Giant Sequoia's formal name is thus *Sequoiadendron giganteum* (Lindl.) Buchholz.

Where are Patrick Matthew's redwoods today?

When Patrick Matthew received the seeds from his son John, he divided them into three batches. According to Ravenscroft , *"On receipt of the seeds, Mr Matthew, in order to multiply the chances of their success, divided them into three portions, one of which he retained, one was given to Dr John Lyall of Newburgh, and the other to Mr Duncan, then gardener at Megginch Castle. All succeeded well; and a considerable number of plants were distributed among nurserymen and others, of which we have been able to trace eleven ..."* (Ravenscroft, James Edward, 1884. *The Pinetum Britannicum. A Descriptive Account of Hardy Coniferous Trees Cultivated in Great Britain*, Vol. II, W. Blackwood & Sons, Edinburgh and London.)

The eleven trees mentioned by Ravenscroft are distributed as follows (from p. 1191 of *The Gardeners' Chronicle and Agricultural Gazette*, December 15, 1866):

- 2 at Gourdie Hill, by Errol.
- 2 at Mayquick Castle, by Errol.
- 2 at Ballendean, by Inchtute.
- 1 at Kinnoul Nursery, Perth.
- 1 at Dr Lyall's Newburgh Fife.
- 1 at Balbirnie, Fife.
- 1 at Inchry House, Fife.
- 1 at Eglinton Castle, Ayrshire.

The following reflects our current knowledge of these trees:

- Gourdiehill: One of the two original trees planted on his own estate by Patrick Matthew is currently growing behind the back fence of a private residence that is part of a housing development on the former location of Matthew's estate at Gourdie Hill, which was demolished in 1991.

- Megginch Castle (Mayquick Castle): Two Giant Sequoia are still to be seen near the north entrance to the castle grounds behind the former Gardener's Cottage.
- Ballindean (Ballendean): Now a teen camp, one of Matthew's redwoods grows next to the race track.
- Kinnoull (Kinnoul): No less than 13 large redwoods are found on the east side of Dundee Road (A85) in and near the former Kinnoull Nursery grounds. It is unknown if any of these is the tree mentioned by Matthew.
- Newburgh: The Giant Sequoia located in front of the Dunvegan Manse in Newburgh is likely one of the eleven redwoods mentioned by Matthew.
- Balbrinie: Two Giant Sequoia are located west of the golf course in Balbirnie Park, said by Historic Environment Scotland to be 'raised from the first seeds in Scotland in 1853'.
- Inchryra (Inchyra): A Giant Sequoia stands among a collection of exotic conifers in front of Inchyra House.
- Eglinton Castle: Although volunteers are currently searching for the Giant Sequoia, the grounds of Eglinton Castle were logged more than once during the 1900s, leaving the survival of the documented redwood on the estate grounds doubtful.

Along with Matthew's documented trees, it is distinctly possible that many other Giant Sequoia, of about the same age in Scotland, may also have been grown from the first Matthew seeds. In 2016 the Dodd Lab of the University of California, Berkeley, conducted genetic profiling of several known Matthew redwoods, as well as several redwoods from the Stirling area to try to establish the trees' original sources as well as their relationship to each other. Results of the testing showed that all of trees analyzed could have come from the Calaveras Grove while the two known Matthew trees could have come from a single-tree collection of seed having genetic profiles consistent with a common mother (cone-bearing tree).

One location claiming to have an original Matthew redwood is Castle Leod near Inverness, whose Giant Sequoia grows next to a plaque that reads, *"The tree is one of the few surviving original species brought from America by the Scottish botanist, John Matthew, in 1853."*

Other possible Matthew trees include those found at Blairgowrie, Camperdown, Glendoick, Kinfauns, Balhousie Castle (home of The Black Watch), Scotlandwell on the east shore of Loch Leven, and Cluny

House Gardens where there are two Giant Sequoia, one of which is the stoutest tree in Scotland measuring 12m in girth and 4m in diameter.

Additionally *The Pinetum Britannicum* lists the following Giant Sequoia as having been measured in 1854 and 1960: “Murthly Castle, Rosehal; Stirling; Fordell, Fife; Taymouth Castle, Perth, Riccaron & Borthwick Hall, Mid-Lothian; Greenock Cemetery, Renfrew; and Balgowan, Perth.”

Giant Sequoia were also planted in rows lining estate approaches throughout Britain. Veitch was particularly proud of the double avenue at Orton Hall, Peterbrough, in which 75 pairs of trees stretched over 640 metres. In Scotland rows of Giant Sequoia are found at Inchtute, not far from Ballindean; at the House of Dun, Montrose, Angus; at the Dunmore Estate, Airth; at Dall House, Loch Rannoch; and at the Benmore Botanic Garden, which boasts a magnificent double row including one specimen that is the tallest redwood in Britain measuring 56.4m (2014).

Giant Sequoia have thrived in Britain - especially when planted in the countryside. However, the survival of the trees in urban areas was once another matter. A passage from the *Gardener's Chronicle and Agricultural Gazette* – 1866 stated, “As a rule Conifers have an antipathy to smoke ... and we anticipate that in a few years not one of the much-prized Victoria-planted or Albert-planted Wellingtonias will remain in any city to show the spot which it was intended to mark for ages to come. ... No doubt we should ‘all prefer something striking and remarkable-something for its rarity its cost, and its beauty, worthy of the planter and the event to be commemorated. But if we cannot get this we must do without it. A living dog is better than a dead lion; and a thriving Plane tree than a moribund Wellingtonia.”

((The) *Gardener's Chronicle and & New Horticulturist*, (1866). Volume 26, p. 1191).

The future of the Giant Sequoia:

Although many Giant Sequoia groves are protected within the trees' native range, the species remains under threat. The International Union for Conservation of Nature (IUCN), a “global authority on the status of the natural world and the measures needed to safeguard it” lists the species as *Endangered* – a listing emphasizing the urgency to preserve trees in northern latitudes as the trees' southern populations come under the increased threat of climate change.

Despite the fact that nearly all existing Giant Sequoia groves are located in protected areas the trees' population continues to decline. According to Richard Dodd, University of California, Berkeley professor of Environmental Science, Policy and Management, *"Our inferences of past demographic changes suggest that the decrease in summer rainfall has led to a general decline in giant sequoia that has been exacerbated by cold, dry glacial cycles. ... if conditions in the current range of the species become drier and warmer, the long-term decline that we have detected is likely to continue, and the future of this iconic California paleoendemic may be a signal of what can be expected for other Mediterranean ecosystem paleoendemics. In the absence of human intervention to plant in suitable habitat, the dynasty may indeed be at an end."*

(Dodd, Richard S. and Rainbow DeSilva, (2016). *Long-term demographic decline and late glacial divergence in a Californian paleoendemic: Sequoiadendron giganteum (giant sequoia)*).

In this decade alone, California has experienced five years of severe drought which drained the state's aquifers and resulted in the demise of ~102 million trees – Giant Sequoia faring better than other species of conifer - accompanied by 6986 wildfires in 2016 alone burning 565,070 acres. According to Dodd, if droughts continue in the state bringing with them warmer and drier weather, the Giant Sequoia may need to either migrate to higher elevations, or migrate north *"200 to 300 kilometers ... We've just begun researching that question—how far north the giant sequoia range might extend (under various climate change models), ... "* However, Dodd warns against the risk in trying to match specific genotypes with changing climatic conditions saying that assisted migration of Giant Sequoias should only be a last resort, *"Once you start moving genes around, it's difficult or impossible to reverse the process."*

(Martin, Glen, *Saving the Sequoias: The Most Magisterial of Trees in California Face a Big Risk*, 2015. Cal Alumni Association, U.C. Berkeley).

Another organization that is working to "save the world's most threatened tree species and their habitats." Is the *Global Trees Campaign*, a joint initiative between *Botanic Gardens Conservation International* (BGCI), *Fauna & Flora International* (FFI), the U.S. Forest Service, and other partners. Calling for 75% of threatened taxa to be held in *ex situ* collections by 2020, the group's strategy includes

conducting a *Global Survey of Ex situ Conifer Collections* to help provide increasing capacity for threatened conifer conservation through supplying and managing *ex situ* collections. The hundreds of *Sequoiadendron giganteum* established in botanic gardens and estates throughout Britain may well serve as a valuable *ex situ* collection.

Additionally, in Scotland, the *Carse of Gowie Sustainability Group* (CoGSG) has recently received Heritage Lottery Funding for the *Patrick Matthew Memorial Project* that, according to Fiona Ross, CoGSG chair, “will create a story-map and trail for people of all ages to discover Patrick Matthew’s Carse and his contribution to science, orchards, redwoods and social justice.” The group’s first event hosted by Catherine Drummond-Herdman of Megginch Castle, took place on 5th May when a Giant Sequoia seedling propagated from one of Matthew’s 1853 trees was planted on the castle grounds. Subsequent events included a talk about the Giant Sequoia by Peggy Edwards at Dundee University Botanic Garden on 20 August and a festival weekend will be held from 30 September to 1 October 2017, with three days of events including the project launch and reception with speakers Howard Minnick, botanist and Patrick Matthew descendant; and Dr. James Sutton of Nottingham Trent University, who will discuss Matthew’s role in developing the theory of natural selection; the opening of a heritage trail with information boards; a tour of Megginch Castle grounds by Catherine Drummond-Herdman; a viewing of the Errol Park Redwood Row and tea in the house hosted by CoGSG and Jamie Heriot Maitland; a Private Viewing of the AK Bell Library Archive’s ‘Original Matthew’s to Lord Kinnaird letter; a Historic Orchard Pruning workshop in collaboration with the Tay Landscape Partnership; and the placement of a Memorial stone on Matthew’s grave.

Another Scottish group, the *Perth and Kinross Countryside Trust* (PKCT), launched its new Giant Redwoods Project at Inchtute as part of its 10th Anniversary celebration in March of 2007, its purpose to record and protect Perthshire’s unique collection of giant redwood trees. The group gifted two Giant Sequoia saplings to the community where they were planted by children from Inchtute Primary in the school grounds and at the west end of Main Street. In December 2015 as part of its iCONic (International Conifers in our Care) conservation project, the PKCT also gifted a Giant Sequoia to the Black Watch Castle and Museum next to a plaque commemorating both the 40th National Tree Week and the memory of Black Watch soldiers who fell during WWI.

Currently, the most pressing threat to the Giant Sequoia is the Trump administration's placing of 27 national monuments (a designation established by President Theodore Roosevelt's Antiquities Act of 1906 to protect federal land containing cultural or historic landmarks) under consideration for review including six monuments in California, one of which is *Giant Sequoia National Monument* in the Southern Sierra Nevada, home to nearly half the world's population of Giant Sequoia. Logging companies have been pressuring the administration to reduce the monument from 328,000 to 90,000 acres so that the areas surrounding the groves can be logged, an activity that would further isolate the groves from one another. The public comment period for the move ended on July 11, 2017 with over 1.2 million Americans objecting to any downsizing. The original designation of *Giant Sequoia National Monument* was brought about by the *Sierra Club*, and environmental group founded in 1892 in San Francisco by the Scottish-American preservationist John Muir, who became its first president. The *Sierra Club* along with *Save the Redwoods League* are vociferously campaigning against any alteration of the monument's status.

"Any fool can destroy trees. They cannot run away; and if they could, they would still be destroyed -- chased and hunted down as long as fun or a dollar could be got out of their bark hides, branching horns, or magnificent bole backbones ... God has cared for these trees, saved them from drought, disease, avalanches, and a thousand straining, leveling tempests and floods; but he cannot save them from fools -- only Uncle Sam can do that." (Gifford, Terry, John Muir, 1996. *His Life and Letters and Other Writings*,

Wicks, London & The Mountaineers, Seattle, 1870. pp. 372-373.)

Peggy Edwards

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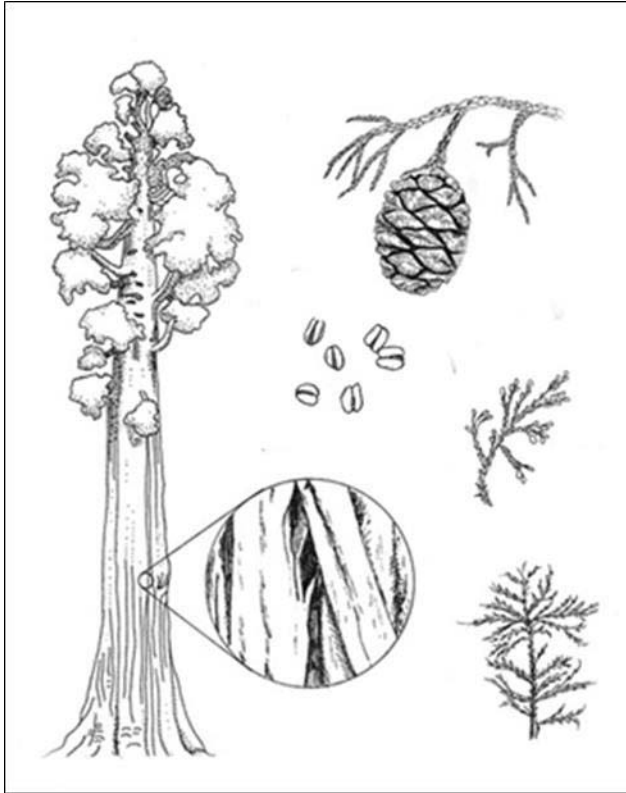
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Sequoiadendron giganteum life cycle. Pen and ink drawing by Peggy Edwards.



Patrick Matthew 1790 - 1874
Wikimedia Commons (Public Domain photograph)

ILLUSTRATIONS OF NON-NATIVE INVADERS - 6

***ALLIUM PARADOXUM* (M. BIEB.) G.DON**

(AMARYLLIDACEAE)

This is a story of Beauty and the Beast. *Allium paradoxum* (M. Bieb.) G. Don, variously referred to as Asian, Siberian, Persian, Quaint or Few-Flowered Garlic/ Leek/Onion, has been introduced into Britain in two distinct forms - the first, 'Beauty', forming only flowers, is a pretty addition to a rock garden, the second, 'the Beast', producing vegetative propagules (bulbils) in place of flowers, an unattractive monster that spreads like a green tsunami, suppressing all other Spring plants. Some authorities recognise them as distinct named varieties: respectively var. *normale* and var. *paradoxum*, but in their 2015 New Naturalist book "*ALIEN PLANTS*", C. A. Stace and M. J. Crawley do not give the two forms separate taxonomic status; and they also place the genus *Allium* in the family Amaryllidaceae. In his most recent Flora (3rd Edition 2010), however, Stace had placed it in the Alliaceae, and in many earlier floras it was included in the Liliaceae. In many other references, in print and on-line, about *A. paradoxum*, the two distinct forms are also not formally recognised, and the information presented relates to var. *paradoxum*. Unlike other non-native invaders previously considered in this series, which spread aggressively by seeds or rhizomes, *Allium paradoxum* var. *paradoxum* invades by means of the bulbils.

The Beast: *Allium paradoxum* var. *paradoxum*. (In both illustrations, on the newsletter cover and at the end of this article, this is featured in the main portrait, with details bottom left.)

Allium paradoxum var. *paradoxum* is the better known variety, and the longer known in Britain. It is the form to which the names 'Few-Flowered' and 'Quaint' apply. It has even been referred to as the 'Real' *A. paradoxum*. Originating in an area south and west of the Caspian Sea in northern Iran, Azerbaijan and Turkmenistan, there is some uncertainty regarding the date of its first introduction to Britain, and of its first record in the wild. The on-line '*ATLAS OF THE BRITISH AND IRISH FLORA*' states that it was introduced to the British Isles in 1823, and first recorded in the wild, near Edinburgh, in 1863, and these facts are repeated on other web sites, but I have been unable to trace the sources of these dates. When George Don (the Younger, 1768-1856) described and named the species in 1827 in his monograph on *Allium*, he examined material sent from Berlin. According to Stearn (Curtis's

Botanical Magazine vol.4 pp.194-7, 1987), it had been collected by Christian Wilhelms in the Caucasus and given to F. A. Marschall von Bieberstein who named it *Scilla? paradoxa* in 1819. It was subsequently cultivated in Berlin; according to Don, a Mr Otto in Berlin sent material to Mr Anderson at Chelsea Physic Garden. Perhaps this accounts for the 1823 introduction date. The GB Non-Native Species Secretariat web site states that the first British record (presumably in the wild) is for 1849 in vice-county 83 (which is Midlothian) at 'Moredon' (there is a district in S E Edinburgh called 'Moredun'). The same date is given by Stace and Crawford (2015). In 1866, in the Transactions of the Botanical Society of Edinburgh, vol. viii, p.458, Professor John Hutton Balfour reports that he visited a site in woods near Binny Crag/Craig where Alexander Craig Christie, who had previously made the discovery, showed him the bulbil-bearing form generally distributed through the wood. It appeared to have been introduced "for some time" and was by then naturalised. Binny Crag is close to Binny House, about 12 miles west of Edinburgh in West Lothian. According to Balfour, Rev. Dr. John Smith, the minister of the nearby Ecclesmachan church, thought that it might have been introduced by Mrs Stewart of Binny House, who had planted various exotic species in the woods. Smith revealed that it had also been introduced into his Manse garden where it had become a troublesome weed, "propagating freely by its underground bulbs and its aerial bulbils". Balfour also reported, in 1866, that Rev. Dr Duns and Rev. P. Hyslop had found it on the banks of the Water of Leith, "above Colinton" (perhaps Juniper Green; Colinton is 4 miles south-west of Edinburgh city centre). Also in Trans. Bot. Soc. Edin. (vol. ix, p. 480), there is an 1868 record of a new site for *A. paradoxum* in the grounds of Arniston House, about 11 miles south-east of Edinburgh in Midlothian.

These records confirm that by the 1860s, *A. paradoxum* was already extensively naturalised in several sites within 12 miles of Edinburgh centre, having been first brought to the area as a deliberate horticultural introduction many years earlier. The possibility that its first establishment in the wild in Britain was in the Edinburgh area focuses attention on Mrs Stewart and Binny House. Captain John Stewart RN (born Linlithgow ca.1776, died 7 June 1854) bought Binny House in about 1800. He married Janet Houston Dundas (born ca. 1784 in London, daughter of Captain James Dundas R.N.), in Edinburgh on 8th of February, 1809. Census returns confirm that John and Janet Stewart were living at (East) Binny House with several servants in 1841 and 1851; Janet was still living there as a widow with three servants in 1871.

She died at Binny House on Christmas Eve, 1879 aged 96. She must be the 'Mrs Stewart' mentioned by Rev. Smith. It is tempting to suggest that Captain Stewart brought *A. paradoxum* back from his foreign travels for the Binny garden before 1854, although of course Mrs Stewart might have obtained it from another garden. This bulbil-bearing form must have been introduced as a novelty because it has no ornamental merit. Stearn commented in 1987 that it had little to commend it except occasional use in Spring salads. As Dilys Davies remarks in her 1992 book, (*"ALLIUMS THE ORNAMENTAL ONIONS"*), *A. paradoxum* is "...of little interest other than that of curiosity". (Binny House was inherited from Mrs Stewart by a great-nephew, George Mercer Falconar (b. 1843), who took the name George Mercer Falconar Stewart as a condition of the inheritance. George's father was George Falconar of Carlowrie, about 4 km from Binny, and his paternal grandmother was Jane Stewart from Binny. George M. F. Stewart sold the Binny estate in 1894.

British Floras of the 19th Century add nothing new; some (including those by Babington, Hooker, W.J., and Pratt) do not refer to the species at all, others do so only in later editions. J. D. Hooker included it in the 3rd Edition of his Student Flora dated 1884 but only as a mention in an Appendix of "Excluded species", giving a single locality, Linlithgow (probably the Binny Woods site); it is not in earlier editions. Sowerby describes it in *"ENGLISH BOTANY"* of 1883, but only repeats the information extracted from the 1866 and 1868 Balfour references. In the first half of the 20th Century, little changed. There is no mention of *Allium paradoxum* in *"FIRST RECORDS OF BRITISH PLANTS"* by W. A. Clarke, published in 1901. Despite the entry in Hooker's Student Flora, *A. paradoxum* is not featured in the standard flora of the British Isles at the time, *"HANDBOOK OF THE BRITISH FLORA"* by G. Bentham and J. D. Hooker, even in the 7th Edition of 1943. However, by 1952, in the 1st Edition of the *"FLORA OF THE BRITISH ISLES"* by A. R. Clapham, T. G. Tutin and E. F. Warburg, *A. paradoxum* has become prominent enough to appear alongside other native and introduced species of *Allium*, with the comment that it is "naturalised in a number of places". Some local floras add a little more information but others did not mention it. The *"POCKET FLORA OF EDINBURGH"* of 1894 by C. O. Sonntag contains no mention but in the 1933 *"FLORA OF THE CLYDE AREA"* by Lee, *A. paradoxum* is reported to be very rare, in woods, at two localities, Crossford and Torrance. According to the *"FIELD CLUB FLORA OF THE LOTHIANS"*, dated 1934, *A. paradoxum* had become

more widespread in the Lothians area; it occurred in Saltoun, Winton, Inveresk, Little France, Lasswade, Braid Burn, Gogar and Carlowrie as well as still at Colinton and Ecclesmachan, indicating the continuing spread. In 2002, in "*PLANT LIFE OF EDINBURGH AND THE LOTHIANS*", it is recorded in 45 of the 578 (2 km x 2 km) squares surveyed; those 45 are in the lowland, northern, part of the Lothians. To the west and south of Edinburgh it was stated to be continuing to advance, invading old woodlands and competing successfully with native species; in some squares it was recorded as 'abundant'. In East Lothian it occurred in fewer squares and was more sparse but spreading to new sites.

However, its spread was not limited to southern Scotland. In a detailed investigation starting in 1948, Barling (*Watsonia* vol.8 pp. 379-384, 1971) describes large, dense, woodland populations of up to a million plants in Gloucestershire, probably formed after escape from a local garden, and comments that "in recent years" it had been found at many new localities in the south of England and was spreading fast. During his investigation, small new populations had appeared up to 1 mile from his study site. He attributed the gradual spread along roads to dumping leaf mould, mowing road verges and plants being picked, examined and then discarded by passers-by. In 2012, BSBI records showed that by then it occurred in 396 10 km square hectads throughout Britain. The 2017 BSBI on line distribution map shows, unsurprisingly, a concentration in south-east Scotland and the Central Belt but also in a large area around and south of London, with smaller concentrations in East Anglia and east of Inverness along the south side of the Moray Firth. Elsewhere, there are sites scattered through Britain from the Orkneys to Cornwall, with an easterly bias; there are few sites in Cornwall, Wales, and west Scotland. The few Irish sites are near the east coast. Typical habitats include moist circum-neutral soils in mixed and deciduous woods, in scrub and along stream banks and roadside verges, often in partial shade. Whether it has reached other parts of Britain by intentional or accidental transplanting of material traceable back to the Lothians or by separate introductions from outside Britain is unknown. It seems unlikely that natural dispersal, without human intervention, of bulbils from populations in the Lothians could account for the present UK distribution. Elsewhere in Europe, it is reported in *Flora Europaea* (1980) to be locally naturalised across central and north-western Europe, including Denmark, Holland, Germany and what was then Czechoslovakia. It might be spreading in continental Europe like it

is in Britain: in the "*NYA NORDISKA FLORAN*" of 2003, Mossberg and Stenberg show an illustration of *A. paradoxum* from Harlösa, near Lund in southern Sweden, where it is called 'Snowdrop Garlic'.

Identification is easy: if it smells like an onion, has a stem that is triangular in section, and has usually only one white flower, never more than three flowers, together with several bulbils, then it is *Allium paradoxum* var. *paradoxum*. It is a diploid, with eight large chromosomes in each haploid set. Populations can be very dense (with up to 120 individuals per square foot according to Barling, though most of these are immature plants). Recently released bulbils lie in the surface soil layers but older bulbs can be up to 13 cm deep in the soil; both bulbils and bulbs are dormant from June until October, when roots form. Meiosis takes place in January before the blunt shoot emerges. The shoot arises from a simple, almost spherical, bulb and consists of an outer modified leaf, with a small axillary bud; a foliage leaf, which also has an axillary bud that is protected by the outer leaf; and, in all but the youngest plants, the scape (flowering stem). The linear-lanceolate leaves are keeled with many ribs; they have a curious posture: they curve over inwards so that the keeled undersurface becomes uppermost. Later, they tend to lie flat on the ground. The scape is about as long as the leaf, up to 40 cm in height and triangular in section. At the top of the scape is an inflorescence, produced in April or May and initially enclosed within a membranous 3-valved spathe (bract). Usually, the mature inflorescence, essentially an umbel, consists of several small (up to 10 mm long) drop-shaped bulbils and one flower on a long pedicel; most of the flowers in the umbel have been replaced by vegetative bulbils. The smallest juvenile plants produce no umbels; slightly larger juvenile plants produce a scape with a small group of bulbils but no flower. Some of the largest plants produce two flowers, sometimes together with one to three small subsidiary inflorescences on long stalks and consisting of bulbils. In the very largest plants, at least one subsidiary umbel also produces a single flower. Each fully-developed flower is nodding with six similar, broad (up to 11 mm long and 7 mm wide), white unfused tepals (perianth members) that turn inwards at the tip to form a 'closed bell'. However, flower development is frequently imperfect resulting in, for example, reduced numbers of parts, and wing-like expansions of the pedicels. The white stamens are much shorter than the tepals; pollen is formed, but it is not known whether it is functional. The style ends in a three-lobed stigma. The ovules appear to develop normally in most ovaries and the flowers are visited by bees

and various Diptera. However, seed set is very poor; for example, Barling found a total of five apparently mature seeds in 250 capsules (i.e. from 1500 ovules). Other investigations revealed that there were irregularities at meiosis and that some embryos were formed but did not reach maturity. Viability of the few seeds formed has not been confirmed. The aerial parts wither and die back completely in late May or June, leaving the bulbils, which turn green, scattered over the soil surface close to the parent plant. They may detach before this if the mature scape is shaken (as when being weeded!). Bulbils will germinate the following spring to produce a juvenile plant, but according to Barling, bulbil mortality is very high. In each bulb, the main axillary bud of the previous year produces the aerial parts for the following year; the axillary bud of the modified outer leaf dies or, more rarely, produces a small offset bulb.

If *var. paradoxum* does not produce viable seeds, all the plants around the Lothians comprise a clone in which all plants are genetically identical to the original introduction. If fertile seeds are formed, *var. paradoxum* can combine the potential adaptive benefits of sexual reproduction with the rapid exploitation of suitable habitats by vegetative propagation. However, the extent of variation generated by sexual reproduction will depend on the amount of genetic heterogeneity and heterozygosity in the initial introduction.

A. paradoxum var. paradoxum is aggressively invasive. The vegetative bulbils are small enough to be carried by water down slopes or along stream banks and road sides. The bulbils can colonise readily if they reach disturbed ground, but bulbils can also establish within existing vegetation. The new populations expand with time and produce for a period of about two months early in the year a dense blanket of leaves, which suppresses all other small plants and can even interfere with the early development of larger herbaceous plants. In this way, *A. paradoxum* can form dense populations of clonal material over a large area within suitable habitats. At such sites, the native early-flowering species are likely to be suppressed or even eliminated. Larger and later-flowering species are less directly affected, although the large number of dormant bulbils and bulbs must 'lock-up' significant amounts of the soil's resources. In my experience, in a garden, this species is one of the most pernicious of all weeds even though it is invisible for much of the year; after about 30 years since it first appeared in my garden, it now completely dominates several areas for 2-3 months. Even the RHS, at

their Wisley garden in Surrey, are currently struggling with an invasion of this troublesome weed. Pioneer individuals limited to a small area can be eliminated by hand-weeding or chemical treatment before bulbils are released but, once established, it is very difficult to contain, let alone eliminate, even in regularly cultivated borders. Repeated annual hand-weeding during the growing season will have an impact but this is difficult amongst other plants and impractical over large areas. More aggressive methods, such as herbicide sprays or long periods of light exclusion, might work but at the cost of other adjacent plants. For much of the Spring, therefore, borders become a solid carpet of *A. paradoxum* leaves. Other Spring bulbs and small plants like Anemones are smothered and eliminated; other herbaceous plants are not visible until the *Allium* dies away in June. The older, larger bulbs of *A. paradoxum* are several inches below soil level but large numbers of small bulbils lie in the surface layers and it is difficult to avoid spreading them during normal gardening activities, including making compost and leaf-mould. *A. paradoxum* will spread into, and gradually dominate, not only in cultivated borders but also in undisturbed wild-flower meadows and established deciduous woodland. It will even invade lawns and grass paths, a demonstration of the competitive ability of the bulbils, though regular mowing will keep it in check.

For the same reasons, control of established naturalised populations in the wild is all but impossible in practice. In an attempt to minimise the rate of spread, in 2005 *A. paradoxum* was added to the list in Schedule 9 (of the Wildlife and Countryside Act 1981 for England and Wales) of plants to which Section 14 of the Act applies. This makes it an offence "to plant or otherwise cause to grow any plant in the wild at a place outwith its native range". In Scotland, this is covered by the 2011 amendment to the 1981 Act, the Wildlife and Natural Environment (Scotland) Act. Despite this restriction on intentional introductions into the wild, it is difficult to think of any reason why *A. paradoxum* will not in time spread to all accessible suitable habitats even though I can find no instances of it being currently offered for sale. Even where 'Few-flowered Garlic/Leek' is advertised, it is nevertheless the many flowered var. *normale* that is for sale.

Beauty: *Allium paradoxum* var *normale* Stearn. (In both illustrations, the flowering umbel is shown bottom right, together, in the colour plate, on the newsletter cover with some details.)

Allium paradoxum var. *normale* Stearn also is native in the Caucasus, as recorded in the Flora URSS of 1935 (vol.4, pp. 254-5). Mrs Zinaida T. Artiushenko (Alpine Garden Society Bulletin 30, p.119, 1962) describes the white flowers looking like orchids from a distance in the Talysh Mountains of south-east Azerbaijan and north-west Iran. However, it arrived in Britain long after its bulbiferous relative. In 1987, in Curtis's Botanical Magazine (vol. 4, pp.194-7), W. T. Stearn wrote of the species that "Until recently, gardens knew it only in its bulbiferous state.". In this article, Stearn describes the plant and validates the name '*A. paradoxum* var. *normale* Stearn'. It is difficult to know what common name to apply to this plant, as 'Few-flowered Garlic' does not seem appropriate for this form of the species. Stearn states that several collectors had previously obtained specimens for herbaria but credits Rear Admiral Paul Furse with the first introduction of live plants to England, in 1966. Furse collected it at sea-level under trees 32 km north east of Gorgan in northern Iran, near the south-east tip of the Caspian Sea, in March 1966. Furse donated plants to Mrs Felicity Baxter of Brook House, Ardingly, Sussex, who with her husband accompanied Furse on some of his collecting expeditions. Mrs. Baxter exhibited the plant at the Alpine Garden Society who gave it an Award of Merit in March 1981, noting that it was 'admirable for naturalising in semi-woodland conditions'. It was Mrs Baxter who provided Stearn with the plants he described in the Botanical Magazine; the accompanying illustration by Victoria Goaman was of plants grown at Kew. The line drawing includes an umbel of var. *paradoxum* for comparison; unfortunately the labels 'A' and 'B' have been transposed, which makes the caption confusing. I received a few bulbs of var. *normale* from Peter Davis sometime in the 1970s, perhaps originally from the same source; at the time, I was told that it was not available commercially. It can now be purchased from several nurseries, including Kevoek Garden Plants, Lasswade. According to Artiushenko, in 1962, it was being harvested in the wild and sold in large quantities in markets in the Caucasus for use as a condiment.

Allium paradoxum var. *normale* is an attractive dwarf *Allium*, all the more welcome in the garden for being earlier than most other *Allium* species. Its gleaming white petals make it stand out in the rock-garden or front of border. Each umbel contains 3 to 17 hanging closed-bell flowers, which rarely show abnormal development, and no bulbils. It is otherwise generally similar to var. *paradoxum*, though with a maximum height of about 30 cm, it tends to be shorter. Most ripe capsules contain

six viable black seeds, two in each locule; each seed has an oil-bearing appendage and is probably dispersed by ants. In the garden it forms expanding clumps, which could be easily controlled if necessary, but after some 40 years in my garden it has spread quite widely, even into relatively undisturbed areas in semi-shade under trees and among its (unfortunately) widespread bulbiferous relative. Because it is attractive, I have made no attempt to control it in the more informal parts of the garden. I have not seen any intermediates (with several flowers sharing an umbel with some bulbils) so there is no indication that the two forms do hybridise.

As another instance of its potential to naturalise, it was reported in 2010 that it had become well established in the churchyard of All Saint's Church, Westbury, Wilts, where it had been planted by Mrs Baxter. Stace, in his 2010 flora, comments that there are as yet no reports of var. *normale* being naturalised outside gardens but it cannot be excluded as a possibility in the future. Accidental distribution of seeds by human activities, or even the wanderings of an adventurous ant, could result in a garden escape. Any planting in the wild in Britain (i.e. outwith its native range) is presumably prohibited under the Wildlife and Countryside Act even though the listing of *A. paradoxum* in Schedule 9 was aimed at the much more invasive var. *paradoxum*.

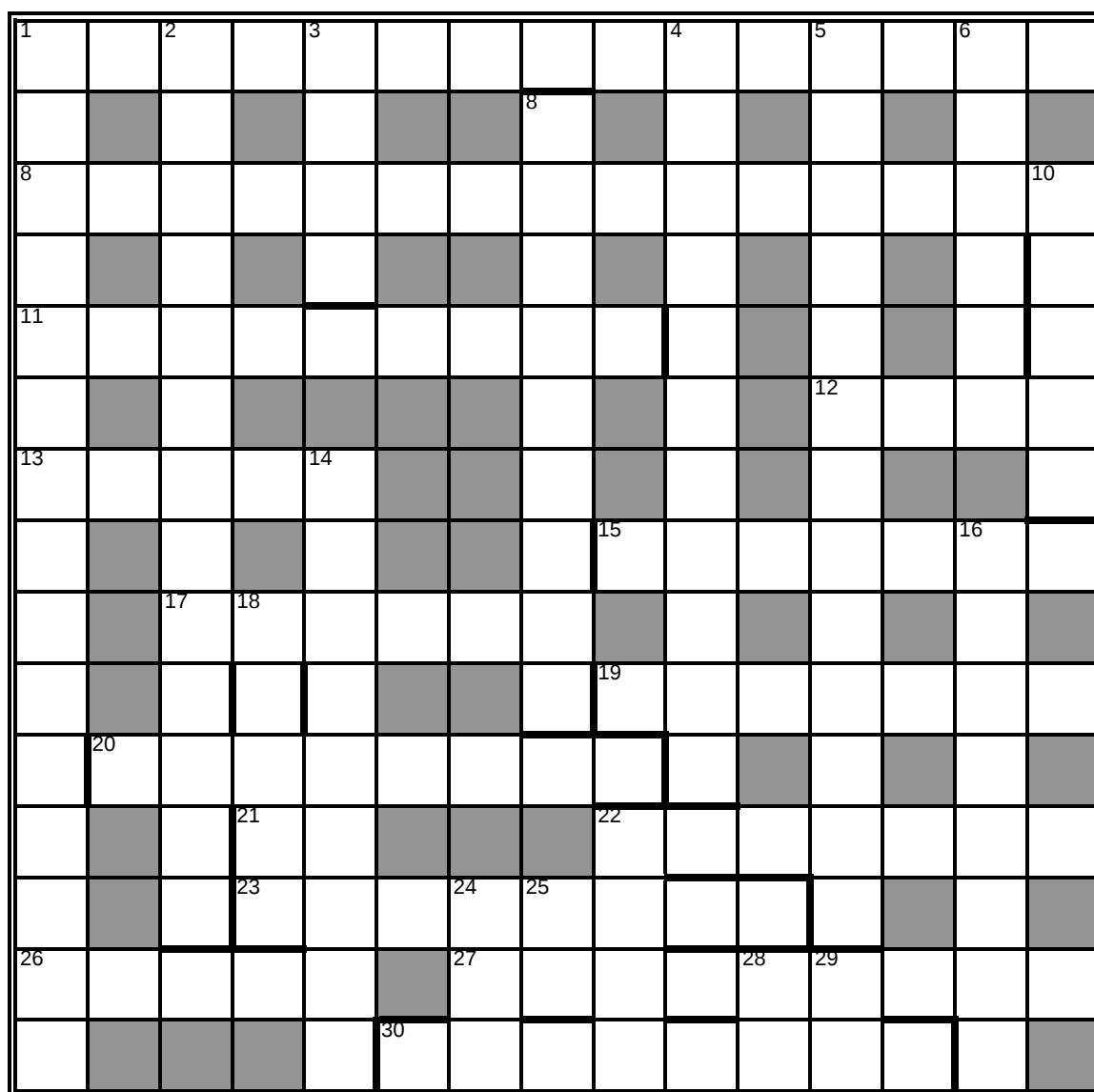
Adrian Dyer



Beauty and the Beast: the main illustration is of the Beast (*Allium paradoxum* var. *paradoxum*), with details bottom left, the smaller drawing lower right, shows the flowering umbel of the Beauty (*Allium paradoxum* var. *normale* Stearn). Line drawing by Janet Dyer.

Phytolexicon cruciformis B.S.Scot ex Word

XWord 17. The solutions to clues are mostly botanical names of families, genera or species and including some cryptogams. There are also words from botanical glossaries and some non-botanical English words, marked (English). Two-letter chemical elements are given as clues where they happen to occur. Solutions do not enter grey squares or cross thick lines. Further guidance is to be found at <http://www.botanical-society-scotland.org.uk/xwordhelp>



ACROSS

- 1 Jail a slim pair? Ba! Humbug reveals wonderful shrub, flowering at 1600hr. (Nyctaginaceae). (9,6)
- 9 Axe, fall on another evening plant after depleting N₂ (*Primula*, but Onagraceae!). (9,6)
- 11 Sir, no hope of bryophyte here. A coccoid green FW alga (Oocystaceae). (9)
- 12 Particle of culture conveyed by me, twice (English). (4)
- 15 Tree flees back from sun, it occurs with smoke (Anacardiaceae). (7)
- 17 A gala I confuse with tropical tree genus (Meliaceae). (6)
- 19 Sounds like someone silly consumed something fringed with small hairs. (7)
- 20 and 6d. Gem swallowed elements 92 and 1 with pea soup, producing dusky crane's bill. (8,6)
- 21 Element 43 found in the middle of *Litchi*. (2)
- 22 Constrictor drank liquid without identification: result, a vine that cures eye infections! (Lardizabalaceae). (7)
- 21 Liver, leaf having seven Institutes for Contemporary Arts perhaps? (Ranunculaceae). (8)
- 26 See d4
- 27 Rock-breaker; strawberry has sex but is deprived of rhenium. (9)
- 30 Family has tea when the Ace, aerial champion, takes them in. (8)

DOWN

- 1 O my, so it's a reminder: don't forget me for a second time, you creep! (Boraginaceae). (8,7)
- 2 Family of pet cow perhaps raced ahead of male relative to United Arab Emirates with chartered accountant. (12)
- 3 Plant consumed by tribe, tasting of Russian soup. (4)
- 4 and 26a. Sounds like one U.S. President preceded another. Bush? No, but related to several (Berberidaceae). (11,5)
- 5 Million lose element 49 (not out!), gain element 92, becoming stiff; rye-grass ensues after a pause. (Poaceae). (6,7)
- 6 See 20a
- 8 Crown jewel, circular (but not Roman Catholic) is indeed circular. (9)
- 10 Wood found in foxy *Lemna*? Of course – not! (5)
- 16 Iago; lust for sex? For smut, anyway. Genus of ~200spp parasitic on grasses (Basidios/Ustilaginaceae). (8)

- 18 Of trees, often measured at chest height if you latch trigger back (English). (5)
- 22 Source of annatto; nine in degree. (4)
- 24 Tree burnt for singular cricket trophy. (3)
- 25 Element of the Territorial Army. (2)
- 28 Element found in *Chironia*, briefly in *Mangifera*, and always in haematite. (2)
- 29 Element Marie Curie extracted twice from *Arabis petraea*. (2)

NOTES FROM A SELECTION OF FIELD MEETINGS

ABERNETHY, MID-PERTHSHIRE, JOINT BSS & PSNS MEETING, SATURDAY, 29TH APRIL, 2017

Following last year's successful joint meeting of the Botanical Society of Scotland and Perthshire Society of Natural Science in Perth, we were fortunate again to be guided by David Chamberlain in our identification of bryophytes. The aim of the meeting was two-fold; to record for the Urban Flora of Scotland project and to identify and record bryophytes. Brian Ballinger kept us right on the geographic extent of what he considers urban, and David marked the records of bryophytes he considers urban from the locality of NO 1916. Recording in NO 1915 and NO 1815 were in rural settings and an abandoned quarry.

Ten of us gathered on the urban fringe of Abernethy; Brian recorded some vascular plants, but attention soon turned to bryophytes. A garden appeared to offer interesting possibilities as its gravelly nature supported patches of different bryophytes. After having attracted the attention of a neighbour we asked if we could have a look in the garden. We were invited in and found a few common species. These included *Polytrichum juniperinum* (Juniper Haircap) with its spiky shoots and *Funaria hygrometrica* (Common Cord-moss) with its usual fertile display of many setae (stalks) attached to large capsules, bent over at the ends and looking like rustic walking sticks.

Other neat little cushion formers included *Tortula muralis* (Wall Screw-moss) and *T. truncata* (Common Pottia). The first has long silvery hairs at the tips of the leaves; the capsules of the second are goblet-shaped following dispersal of the spores, preceded by the loss of capsule lids and protective calyptrae (caps).

In most moss species, spore dispersal is controlled by the peristome, an arrangement of teeth-like projections covering the exposed capsule opening. The peristome is sensitive to changes in humidity and opens when the spores are ripe and the air is dry. The distinctive twisted peristome of *Barbula unguiculata* (Bird's-claw Beard-moss) was visible under a hand-lens.

David pointed to the drum-skin like arrangement of *Atrichum undulatum* (Common Smoothcap), which holds the peristome teeth together in the centre, to form a pepper-pot type arrangement for spore dispersal around the edge of the capsule. This large moss with horizontal undulations on its leaves was encountered often throughout the day. This is an acrocarp moss with capsules arising from erect shoots.

Pleurocarp mosses produce shoots that are strongly horizontal and capsules arise from the spreading shoots. A common pleurocarp is *Brachythecium rutabulum* (Rough-stalked Feather-moss), which has a bright red, roughened seta, a character visible under a hand-lens. The deep green foliage of this moss contrasts strongly with the olive-green colour of *B. albicans* (Whitish Feather-moss), which has paler shoot tips. *Calliergonella cuspidata* (Pointed Spear-moss) looked a little out of place on dried out soil. The leaves at the shoot apices are rolled tightly together to form points: the stems of the shoots are red; both features are diagnostic characters.

Our exploration moved to disturbed ground next to garages. The silvery shoots of *Bryum argenteum* (Silver-moss) attracted attention and neat cushions of *Grimmia pulvinata* (Grey-cushioned Grimmia) packed with leaves ending in silvery hairs. The setae and capsules of this moss spread and curve downwards as if trying to bury into the leaves.

Moving from the disturbed soil debris around the garages we explored a mortared wall beside an old lane. *Amblystegium serpens* (Creeping Feather-moss) was one of the pleurocarp representatives, which has narrow shoots and curved capsules on red setae. Spreading on the face of the wall was *Homalothecium sericeum* (Silky wall Feather-moss) with its shining, long-pointed leaves in tones of green and brown. This was encountered later on the bark of a tree and purely green.

The damp surroundings of the burn at the end of the lane provided *Brachythecium rivulare* (River Feather-moss); its basal leaf angles are decurrent on the stem. The flattened shoots of *Platyhypnidium*

(*Rhynchostegium*) *riparioides* (Long-beaked Water Feather-moss) were immersed in the burn. *Thamnobryum alopecurum* (Fox-tail Feather-moss) produces creeping stems beside water that give rise to aerial stems with a single layer of appressed leaves, but the stems are much branched and leafy above and collectively appear like a forest in miniature.

Three similar looking pleurocarps have been included in the genus *Eurhynchium* and are now treated separately. *E. striatum* (Common Striated Feather-moss) has stem and branch leaves of a similar size with longitudinal pleats. *Oxyrrhynchium hians* (Swartz's Feather-moss) is similar except that the leaves have no pleats and are shinier. *Kindbergia praelonga* (Common Feather-moss) has stem leaves much larger than branch leaves. *E. striatum* and *Kindbergia praelonga* were in urban habitats and *Oxyrrhynchium hians* was found in the quarry south of the village.

The quarry provided a range of pleurocarps; *Isothecium myosuroides* (Slender Mouse-tail Moss) growing on tree bark; the curly shoots of this moss have leaves with protracted, acute tips. By contrast, *I. alopecuroides* (Larger Mouse-tail Moss) has leaves with abrupt, obtuse tips.

Brachythecium (Sciuro-hypnum) populeum (Matted Feather-moss) grows in the soil below the quarry face. In this moss the leaf has a long tapered apex and nerve extending to the tip. *Plagiothecium succulentum* (Juicy Silk-moss) sharing the same habitat has flattened shoots. *Sanionia uncinata* (Sickle-leaved Hook-moss) was a charming addition; its leaves are tightly curled into a series of loops under spreading shoots.

Quarry faces can be rich in *Fissidens*, but the rock was not as basic and wet as expected. However, it did provide *Fissidens adianthoides* (Maidenhair Pocket-moss). To make up numbers, *F. taxifolius* (Great Pocket-moss) had been recorded on the lime-mortar wall and *F. bryoides* (Lesser Pocket-moss) was recorded later on a bank of soil under trees. The latter has bordered leaf margins unlike the two larger species and of these two, *F. adianthoides* has relatively large irregular teeth at the leaf apex and 3 - 4 rows of paler cells on the leaf margins.

The favourite liverwort of the day was *Ptilidium ciliare* (Ciliated Fringewort) growing with other vegetation on the quarry floor. This

liverwort has translucent, red scale-like leaves fringed with fine projections that provide an attractive display.

There was a good range of commoner mosses for comparison in and beyond the quarry. Three *Rhytidiadelphus* species were on display, each has red stems: *R. squarrosus* (Springy Turf-moss) with erect shoots and reflexed leaves at the tips; *R. triquetrus* (Big Shaggy-moss) a robust species with spreading, broadly triangular leaves and *R. loreus* (Little Shaggy-moss) more sprawling, with smaller, narrowly triangular curved leaves.

Pleurozium schreberi (Red-stemmed Feather-moss) also has red stems, but its form is simpler. When wet and fresh the stems of *Hylocomium splendens* (Glittering Wood-moss) are also red, but dull on ageing and drying. Its shoots are similar to *Thuidium tamariscinum* (Common Tamarisk-moss) but this species has much smaller leaves, which are packed tightly together on more pinnate shoots. A member of this bryophyte flora is *Dicranum scoparium* (Broom Fork-moss) a robust acrocarp, which produces colourful setae in late spring, yellow above and red below.

Margaret Chapman and Alison Davies made an exciting find of *Cryphaea heteromalla* (Lateral Cryphaea) on Elder (*Sambucus nigra*). *Cryphaea heteromalla* is a smallish pleurocarp with the shoot of the main axis curving downwards with secondary shoots spreading below and sessile capsules among them. Margaret and Alison were amused to see a hand-lens applied to a field guide. Its use was to see a distribution map more clearly, as few records were showing for the east coast of Scotland north of the Forth. David explained this species is expanding its range, as it recovers from previous losses. The *Atlas of British & Irish Bryophytes* puts this down to reduction in atmospheric SO₂. The strongly southern distribution in Britain, presence throughout Ireland and scattered records up the west coast of Scotland must reflect its "Submediterranean-Subatlantic" distribution.

David pointed to the neutral pH of Elder bark making its surface suitable for colonisation by different species. Here and on trees we found a number of epiphytes. Four members of the genus *Orthotrichum* were recorded: *O. affine* (Wood Bristle-moss) forms small loose patches on bark, the capsules are persistent for some time after spore release and are distinctly furrowed. By contrast the capsules of *O. striatum* (Shaw's Bristle-moss) are smooth and *O. diaphanum* (White-tipped Bristle-moss) has leaves tipped with white hairs. *O. pulchellum* (Elegant

Bristle-moss) forms neat cushions and although the capsule is a little shorter than other species, the seta is proportionately longer which holds the capsule a little higher than the leaves. Its calyptra is furrowed and at the bottom of each furrow is a small orange-reddish patch.

We encountered two species of a genus with similar habit, *Ulota crispa* (Crisped Pincushion) and *U. bruchii* (Bruch's Pincushion) which form cushions on bark like many *Orthotrichum* species. The noticeable differences with *Orthotrichum* are the longer seta and longer, narrow capsule held well above the leaves when mature. The capsule is ribbed, reaching into the end of the seta and the calyptra has many spreading-erect hairs. In *U. crispa* the capsule has parallel sides and is slightly constricted below its opening; the capsule of *U. bruchii* curves slightly outwards to the middle and tapers slightly to the mouth. Patches are worth a second look to check on the species present.

Tree epiphytes included two *Metzgeria* species and other liverworts. *M. furcata* (Forked Veilwort) grows as patches on the boles of trees, formed from small, yellowish-green, strap-like thalli that divide at the tips into Y-shaped projections. The thalli lie flat and their mid-ribs are prominent. The margins of *M. violacea* (Blueish Veilwort) are rolled under and the tips of the Y-shaped thalli bear many gemmae (vegetative propagules). Colour as the name suggest is not obvious; the synonym *M. fruticulosa* is more descriptive.

Radula complanata (Even Scalewort) shoots are formed from a series of small, overlapping leaves like scales. Antheridia are frequent within pouch-like bracts from which four-valved spent capsules hang on short stalks. *Frullania dilatata* (Dilated Scalewort) is one of two similar species that form reddish-brown spreading patches on the boles of trees. Ash (*Fraxinus excelsior*) is a favoured species and there is a strong contrast with its pale bark. This liverwort has a scale-like growth pattern and can withstand considerable exposure.

By contrast with *Frullania dilatata*, *Porella cordaeana* (Cliff Scalewort) was found in moist conditions under trees by the Ballo Burn. Its growth form is also scale-like and is dark green in colour. On the final stretch of the burn we found *Plagiochila porelloides* (Lesser Featherwort). Its leaves are inserted closely together and alternately in a row on each side of a thickish stem that protrudes outwards. The leaf margin is entire, but has very small teeth, smaller than other members of the genus have.

In all, we recorded 69 taxa, in a range of habitats, which provided an excellent lesson on the identification of bryophytes and whetted our bryological appetites for more.

Alistair Godfrey and David Chamberlain

FUNGI RECORDS ON FIELD VISIT TO AUCHTERTYRE SRUC FARM. LOWERMOST SLOPES OF CAM CHREAG. JUNE 25th 2016.

Fungi were found in the following locations. The number of each location is given next to the species names below:

1. Hay Barn to Railway Bridge
2. Bridge to stile to Picnic table
3. Woodland around Picnic area
4. Grassland, boggy areas to Railway Underpass
5. Railway Underpass to Wigwams

A successful trip with several new records for the area and indeed some for Scotland, although there was little which could not have been expected. The records of Apple Canker and Apple Scab on Rowan (*Sorbus aucuparia*) might represent a new host for the latter species or might prove to be new species? Both were associated with another canker-causing fungus – *Dothiora* sp. It was rather sad to see Ash Die-back (*Chalara* die-back) on a young, probably volunteer, tree, by the Bridge showing typical symptoms of shoot death caused by *Hymenoscyphus pseudoalbidus*. The fungus itself was not seen and no culture work was undertaken. The tell-tale spots on *Succisa* where found signifying the presence of *Septoria scabiosicola* but, as usual, I was unable to find the fruiting structures to pin the id. The collections made by Cameron Diekonigin who accompanied me (Roy Watling) have been incorporated into the list presented below.

Basidiomycotina:

Agaricales - Mushrooms and Toadstools

Strophariaceae: *Kuehneromyces mutabilis* on old *Betula* stump (5); *Psilocybe* (*Deconica*) *coprophila* on cow droppings (2); *Stropharia semiglobata* on dunged soil; several pops. (1-2) some with rather shortened spores.

Psathyrellaceae: *Coprinus leiocephalus* on dunged soil (2); *Panaeolina foenisecii* 2 pops. (1 & 2).

Hygrophoraceae: *Arrhenia gerardiana* (= *Omphalina sphagnicola*) in Sphagnum (4) *Hygrocybe coccineocrenata* in Sphagnum by flush, two populations. *H. helobia* on wet peaty soil (1) and on bank edge of track on peaty soil (2).

Hymenogastraceae: *Galerina paludosa* in boggy area (3); *G. pumila* in mosses in wet area (4); *G. sphagnorum*, two populations in Sphagnum (4).

Polyporales - Bracket Fungi

Coriolaceae: *Fomes fomentarius* on standing Betula before (5); *Piptoporus betulinus* on standing Betula before (5).

Pucciniales - Rust Fungi

Melampsoraceae: *Melampsora caprearum* on living leaves of *Salix caprea* (5). *Melampsora epitea* on living leaves of *Salix cinerea* agg. (1)

Phragmidiaceae: *Phragmidium rubi-idaei* on living leaves of *Rubus idaeus*.

Pucciniaceae: *Melampsoridium betulinum* on living leaves of sapling Betula (1); *Milesina dieteliana* on living young frond of *Dryopteris filix-mas* (5).

Puccinia calcitrapae aecidial stage on leaves of *Centaurea nigra* (4); *P. fergusonii* on leaves of *Viola palustris* (3); *P. poarum* aecidial stage on leaves of *Tussilago farfara* (5); *P. urticata* aecidial stage on living stem of *Urtica dioica* (5).

Raveneliaceae: *Triphragmidium ulmariae* enveloping shoot of *Filipendula ulmaria* (5).

Ascomycotina - Microfungi:

Pezizales:

'Humariaceae': *Cheilymenia stercoraria* on cow dung (2)

Ascobolaceae: *Ascobolus furfuraceus* on cow dung, (2)

Ostropales: *Stictis friabilis* on Myrica gale twigs (3)

Sphaeriales:

Amphisphaeriaceae: *Paradidymella tosta* on last year's stems of *Chamerion angustifolium* (3)

Phyllachorales:

Phyllachoraceae: *Phyllachora (Endostroma) junci* on old stems of *Juncus conglomeratus* (1) onwards

Sordariales:

Lasiosphaeriaceae: *Cercophora caudata* on very rotten *Piptoporus* sp. between (4 & 5)

Diatrypales:

Diatrypaceae: *Diatrype stigma* on *Corylus* pole; *Diatrypella favacea* on *Corylus* branch (5)

Diaporthales:

Diaporthaceae: *Diaporthe arctii* on forming blackened areas on old stems of *Angelica* (3)

Gnomoniaceae: *Gnomonia alni-viridis* (=setacea sensu lato) on old water-soaked *Betula* leaves (3)

Dothideales:

Leptopeltidiaceae: *Leptopeltis filicinus* as anamorphic coelomycete *Pycnothyrium litigiosum* on last year's fronds of *Pteridium* (fern/ bracken) (2-3)

Dothioraceae: *Dothiora pyrenophora* on *Sorbus* (Rowan tree) shoots causing canker in small trees (3).

Hypocreales:

Hypocreaceae: *Hypocrea citrina* on old *Piptoporus betulinus* basidiome (5)

Pleosporales: *Rhopoglyphus pteridis* widespread on old *Pteridium* (2-3)

Leotiales:

Hyaloscyphaceae: *Belonidium mollissimum* on old *Chamerion angustifolium* stems (2); *Brunnipila clandestina* on last year's stems of *Chamerion* (2); *Fuscolachnum pteridis* on old rachis of *Pteridium* (2); *Hyaloscypha flaveola* on *Pteridium* rachis (2); *Microscypha grisella* on last year's fronds of *Pteridium* on colony floor (2); *Lachnum apalus* on old lower stems of *Juncus* (2); *L. nudipes* on last year's stems of *Chamerion* (2).

Helotiaceae: *Crociocreas (Cyathicula) cyathoideum* var. *pteridicola*, on last year's stems of *Pteridium* (2); *Heterosphaeria patella* on last year's stems of *Angelica* (3).

Dermataceae: *Mollisia pterigena* in axil of *Pteridium* frond (3).

Fungi Imperfecti:

Hyphales: *Cladosporium magnusianum* on old scapes of *Narthecium ossifraga*; *Cylindrocarpum heteronemum* – supposed anamorphic stage of *Nectria galligena* on dying tips of *Sorbus aucuparia*; causal agent of fruit tree canker – not cultured (3); *Ramularia destructiva* pale pinkish areas on lower surface of brown spots on living leaves of *Myrica gale* (2); *R. pratensis* on living *Rumex acetosa* and *Rumex conglomeratus*, widespread (1 & 5); *Ramularia rubra* on living leaves of *Rumex obtusifolius* (1); *Spilocaea pomi* anamorph of *Venturia inaequalis*, the causal organism of Apple Scab, (3); *Sporidesmium folliculatum* on *Sorbus aucuparia* (Rowan tree) twig (3).

Sphaeropsidales: *Fusicoccum aucupariae* on dead twigs of *Sorbus aucuparia*, (3); *Phoma nebulosa* in swarms of minute fruitbodies on the old stems of *Epilobium* and forming a greyish haze (3).

Peronosporales:

Peronosporaceae: Downy Mildews: *Plasmopara nivea* on living *Angelica sylvestris* (5).

Cameron Diekonigin's identifications.

Cheilymenia stercorea, *Ascobolus furfuraceus*

Lachnum apalus on *Juncus* sp; *L. nudipes* on *Epilobium* sp.

Phialina flaveola on *Pteridium*.

Crociocreas cyathoideum var. *pteridicola* on *Pteridium*.

Fuscolachnum pteridis on *Pteridium*.

Yellow coloured *Dasyscyphus* with hairy excipulum on *Epilobium*.

Podospora-like thing on *Piptopous betulinus*.

Erumpent ascomycete on *Myrica gale* peeling back bark sp. 24-27 x 1.8 µm, upper ends of paraphyses twisted.

Black spots on *Sorbus*, multicelled fruitbodies containing conidia up to 11 µm long, fusiform with single septa, similar to *Chaetosphaeria* spores.

Roy Watling

PERTH LADE: DUNDEE NATURALISTS AND BOTANICAL SOCIETY OF SCOTLAND 18TH JULY 2017

This evening meeting was devoted to the flora and other wildlife of the Perth Lade. It was organised jointly by the Dundee Naturalists' Society and the Botanical Society of Scotland (BSS), aiming to contribute to the BSS Urban Flora project and also to review other wildlife. The Perth Town Lade is of considerable antiquity being in place by the 12th century, when it was used to drive watermills, as a water supply and as a defensive moat.

Our members gathered in the nearby Asda car park on a warm sunny evening and made their way to a point about mid-way along the Lade. More than 100 vascular plant species were noted, a mixture of natives and introductions.

Along the banks *Epilobium hirsutum* (Great Willowherb) was prominent and *Solanum dulcamara* (Bittersweet) was frequent. *Geranium* species seen included *G. dissectum* (Cut-leaved Cranesbill) and *G. molle* (Dove's-foot Cranes-bill).

The white stars of *Stellaria graminea* (Lesser Stitchwort) shone out and *Solidago canadensis* (Canadian Goldenrod) was growing in several places.

Some less welcome plants were present, including *Heracleum mantegazzianum* (Giant Hogweed) and *Impatiens glandulifera* (Indian Balsam), but fortunately not in any quantity.

We were not able to reach some *Ranunculus*, *Myosotis* and *Mimulus* plants seen in the waterway in order to identify them.

As usual plants were not the only wild life interest and we had good views of a rat lingering in the *Phalaris arundinacea* (Reed canary-grass) close to the path. A Tree Bumblebee, scarce in the area, was in a good position for photography. Fourteen bird species were identified, including juvenile moorhens, a magpie and a willow warbler.

This was successful outing to a location little known outwith Perth.

Colin McLeod and Brian Ballinger

NORTH KESSOCK INVERNESS BOTANY GROUP AND BOTANICAL SOCIETY OF SCOTLAND, 20TH MAY 2017

A small group met at the car park by the slipway at North Kessock. Others appear to have been deterred by the weather forecast which proved to be very accurate – it rained nearly all day.

However, suitably clad, we had a fruitful day, looking at the urban flora along the sea front at North Kessock in the morning, when we were recording mainly for the Botanical Society of Scotland's urban flora project. Here the shore by the path displayed a mixture of natives and neophytes, some of which were probably garden escapes or throw outs. *Cerastium tomentosum* (Snow in summer), *Lotus corniculatus* (Birdsfoot Trefoil), *Vinca major* (Greater Periwinkle) and *Sedum acre* (Biting stonecrop) were prominent. Interesting finds were *Allium schoenoprasum* (Chives) and *Sisymbrium altissimum* (Tall Rocket), both very unusual in Easter Ross. One or two non-natives defied identification on the day. An otter was glimpsed by the life-boat station.

We returned to the local hotel for a snack lunch and some warmth before the afternoon walk.

In the afternoon we went along the coastal path towards Kilmuir, now recording for the Botanical Society of Britain and Ireland's atlas. We passed through three tetrads (2 x 2km squares) finding 74, 63 and 100 different species in turn.

All along there was a wonderful display of *Hyacinthoides non-scripta* (Bluebell or Wild Hyacinth) together with *Stellaria holostea* (Greater Stitchwort). The path was bordered in places by remarkable quantities of *Claytonia perfoliata* (Spring Beauty) and there was a large clump of the hybrid saxifrage *Saxifraga x polita* (False Londonpride).

There were several new species records for the 10km square NH64 to help with the Atlas. I was very grateful to have my waterproof notebook and umbrella with me, on what was an enjoyable day in spite of the weather.

Brian Ballinger

FORTROSE BSS/BSBI 24TH JUNE 2017

This meeting was devoted to the Botanical Society of Scotland's urban flora project and the Botanical Society of Britain and Ireland's Atlas.

Seven of us assembled at the car park by the long closed railway station in the small Black Isle town of Fortrose. The strength of the wind was remarkable for June and there were warnings out to be wary on the local bridges.

We started by looking at the "weeds" on the car park aided by Hamlyn Jones' identification app. The party then walked through the grounds of the ruined cathedral where the grass cutters had just beaten us to it. However some plants had survived including *Malva sylvestris* (Common Mallow), *Trifolium dubium* (Lesser Trefoil) and *Veronica filiformis* (Slender Speedwell). The street outside yielded a large patch of *Geranium lucidum* (Shining Cranesbill) and an old wall nearby supported *Fuchsia magellanica* (Fuchsia), *Asplenium ruta-muraria* (Wall-rue) and *Cymbalaria muralis* (Ivy-leaved Toadflax).

Some of the group then went down the steep steps to the sea wall overlooking the stormy waves, whereas others were more cautious and examined the plants at the top. The slopes were covered by a carpet of *Hypericum calycinum* (Rose of Sharon) in full flower and at the base lurked *Malva neglecta* (Dwarf Mallow). Near the top *Calystegia silvatica* (Large bindweed) was spotted and alongside Fortrose Academy *Trisetum flavescens* (Yellow Oat-grass) shone out on the verge.

Lunch was then taken at the car park overlooking the sea in the shelter of the hedge rather than on the wind-swept tables.

The cliffs in the area are covered with *Brassica oleracea* (Wild Cabbage) of rather obscure origin and by the shore alongside the caravan park plants included *Silene uniflora* (Sea Champion). *Anthyllis vulneraria* (Kidney Vetch) and the locally scarce *Teesdalia nudicalis* (Shepherd's Cress). A patch of waste land was covered in *Fumaria* species including *F. capreolata* (White Ramping Fumitory) and there was plenty of *Viola arvensis* (Field Pansy) and *Thlaspi arvense* (Field Penny-cress).

Returning by the path alongside the Academy we noted *Galium album* (Hedge Bedstraw) and *Silene flos-cuculi* (Ragged Robin) in the

grassland. The roadside was bordered by *Oxalis exilis* (Least Yellow-sorrel), the first record of this in Easter Ross for many years,

To the west of the town centre the path verge featured *Carex leporina* (Oval Sedge), the only sedge of the day and there was a bright dense patch of *Dactylorhiza purpurella* (Northern Marsh Orchid). A single plant of *Linaria maroccana* (Annual Toadflax) was growing by the kerb.

An unofficial muddy path led us to the disused railway line bordered by woodland flowers, such as *Anemone nemorosa* (Wood Anemone), *Allium ursinum* (Ramsons) and *Sanicula europaea* (Sanicle).

In all 185 species were recorded in the urban area and we felt we deserved our tea, coffee and cakes in the local cafe.

Brian Ballinger and Mary Dean

ARBROATH DUNDEE NATURALISTS SOCIETY AND BOTANICAL SOCIETY OF SCOTLAND 13TH JUNE 2017

A few drops of rain were in the wind when 14 of us met at Victoria Park, Arbroath for this evening outing. This was a joint event between the Dundee Naturalists' Society and the Botanical Society of Scotland (BSS). We were looking for information for the BSS urban flora project and also observing and recording all forms of wildlife.

Unlike most trips to this area, we turned west towards the town, rather than east into the Scottish Wildlife Trust reserve. The path along the ridge was bright with early summer flowers, including a display of Ox-eye Daisy (*Leucanthemum vulgare*). Going along the path we were struck by the remarkable abundance of an onion just coming into flower, identified as Sand Leek (*Allium scorodoprasum*), not often seen in this area. Many other flowers shone out on this overcast evening, including Birdsfoot Trefoil (*Lotus corniculatus*) and Kidney Vetch (*Anthyllis vulneraria*).

The flora became less varied as we left the park, but going down to the shore a new range of species appeared, including Sea Rocket (*Cakile maritima*), Hemlock (*Conium maculatum*) and Sea Sandwort

(*Honckenya peploides*). Then, under the sea wall, the find of the evening, Sea Kale (*Crambe maritima*), which appears to be new to Angus, although it is seen in Fife. One large plant had a few white flowers left on it and there were two seedlings nearby.

Intermittent rain did not help recording, but 74 vascular plant records were made.

A brief foray onto the slippery rocks led to the identification of 10 seaweed species, these being included in the urban flora project.

Those that stayed on the higher path were rewarded by the sight of dolphins by the shore. There were good bird recording opportunities and 29 species were noted, including whitethroat, willow warbler, and linnet.

Few insects were flying but a plume moth was spotted.

Brian Ballinger

ALVA: PERTSHIRE SOCIETY OF NATURAL SCIENCE AND BOTANICAL SOCIETY OF SCOTLAND 11th May 2017 (Led by Liz Lavery and Brian Ballinger)

Our small group met at the deserted Alva Glen car park on a fine sunny day. We admired the view of the hills to the north, home to the beautiful *Lychnis viscaria* (Sticky Catchfly), but on this occasion, as this was primarily an urban meeting, we turned in the direction of the small town of Alva.

We walked alongside the burn in our first 1km square examining the flora by the water, by the road and on several derelict sites. This limited area proved to be remarkably rich in plant life, yielding 100 species. *Asplenium ceterach* (Rustyback) was just hanging on, although its main site had been destroyed by wall repairs. A range of native species was present including plentiful *Allium ursinum* (Ramson's) together with neophytes including *Berberis darwinii*, *Aquilegia vulgaris* and *Leycesteria formosa*.

We treated ourselves to a snack lunch in a rather hidden cafe and then proceeded to the western tetrad (2km square). There were some interesting plants growing on walls, including *Corydalis cheilanthifolia* (Fern-leaved Corydalis) and *Lonicera pileata* (Box-leaved Honeysuckle).

For a small town, Alva has a remarkably large park, which was hosting a funfare, fortunately not in operation when we were there. Some areas were dull but the strip along the wall was good and we debated the *Myosotis* (forgetmenot) species, concluding that they were *M. arvensis* and *M. discolor*. Over 70 taxa were noted here.

Later in the afternoon we ventured a few miles east to Tillicoultry, where we spent a useful half hour. We walked alongside the burn that runs through the town and then crept through a hole in a fence to visit a large derelict area, presumably a former industrial site. There was profusion of *Fragaria vesca* (Strawberry) plants and an unusual *Saxifrage* presumably of garden origin. *Sedum spurium* (Caucasian Stonecrop) was also present. In all 80 species were found in our short visit to Tillicoultry, bringing a successful trip to an end.

Brian Ballinger

DUNDEE NATURALISTS' SOCIETY AND BOTANICAL SOCIETY OF SCOTLAND TEMPLETON WOODS AND CLATTO 9TH MAY 2017

This was a joint Dundee Naturalists' and Botanical Society of Scotland evening visit looking at urban flora (we were just inside the Dundee city boundary). We also took an interest in birds and other wildlife.

We managed to fill the car park at Templeton Woods and set off to follow a circular route of about 2 miles to the Clatto wood and reservoir, returning by a more northerly path along the city boundary. A running event was being held on the same evening and we were overtaken by large parties of breathless athletes. We opted for a gentler pace. The keen eyes of our party noted a good number of vascular plants including 24 species in our limited passage through the first 1km square and 55 in the second 1km square to the east.

There was a good display of typical woodland plants such as *Oxalis acetosella* (Wood-sorrel) *Silene dioica* (Red Campion), *Ficaria verna* (Lesser Celandine) and *Galium odoratum* (Woodruff). A patch of *Circaea* (Enchanter's Nightshade) was not in flower but was probably the species not the hybrid. A good find by the northern path was a large patch of *Alchemilla xanthochlora* (Pale Lady's Mantle) and it was good

to see *Pyrola minor* (Common Wintergreen) just inside the north end of Templeton Wood.

The birds were not neglected and species seen included Great Crested Grebe, Coot, Tufted duck and three species of gull on the reservoir.

It was not the optimum time for fungi but Jim Cook identified 9 species – Turkey Tail (*Tremetes versicolor*) was particularly common.

Your leader (Brian Ballinger) was pleased to arrive back at the car park at exactly 9pm, keeping to schedule and beating the sunset.

Brian Ballinger

1	M	I	2	R	A	3	B	I	L	C	S	4	J	A	5	L	A	6	P	A
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11	O	O	N	E	P	H	R	I	S	E		U		U		L				
	T		C					C		R		12	M	E	M	E				
13	I	N	U	L	14	A			U		S		R				M			
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	A				E	30	T	H	E	A	C	E	A	E	O					

Solution to *Phytolexicon cruciformis* 17

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 News

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

Scope of the newsletter

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

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

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

Guidelines for contributors

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

File name for email submissions and web uploads

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

Text

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

Illustrations

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

Submission

Please send your contributions to the Receiving Editor by:

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

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

The LAST deadline for the next issue will be 15th January 2018. Earlier submission would be appreciated.

The Botanical Society of Scotland SCIO Financial Statement for the Year to 30 April 2017

Financial information

The surplus for the year is £6,972.44. Cash assets at 3 May 2017 stood at £77,120.49. The general unrestricted funds of £71,720.43 were available to the Society on that date. It should be noted that the promotion of the Society's Journal and the printing of the Newsletter are now treated as falling within the stated activities of the Society and associated costs are therefore legitimately expenditures in pursuance of its charitable aims. The Treasurer will make adjustments to the account when it is deemed that there is sufficient stability in the financial markets to increase the revenue earned.

Reserves policy

The Society maintains its unrestricted funds, which are free reserves of the Society at a level to provide sufficient funds to cover management and administration costs.

Membership

The number of members of the Society remained by and large the same during the year.

Taxation

The Society is a charity and is recognised as such by the Inland Revenue for taxation purposes. As a result there is no liability to taxation on any of its income.

Dr. D.F. Chamberlain, 18 May 2017 Treasurer

Notes to the Statements of Receipts & Payments

Note 1 Accounting Policies

Receipts and Payments

The accounts are presented on the basis of receipts and payments.

VAT

The Society is not registered for VAT exemption and accordingly expenditure includes VAT where appropriate.

Unrestricted funds

Revenue

The Revenue Fund represents the unrestricted funds of the Society which the Council are free to use in accordance with the Association's objects. Any unrestricted revenue surplus is transferred to the unrestricted capital fund.

Note 2 Council members remuneration

Council members do not receive any remuneration in their role as council members

Note 3 Taxation

The Fund is recognised by the Inland Revenue as a charity and no charge for taxation arises on the results for the year

Note 4 Commitments and contingent liabilities

There are no contingent liabilities at the year end (2015/16 and 2016/17 £nil). Editorial Subventions provided by the Publishers, Taylor & Francis, for 2014/15 and 2015/16 & 2016/17, totalling £10,038.00, are available to cover costs of the Journal Editor, including the promotion of the Journal at International Conferences. Notice is given that there will be significant expense incurred during the 2017/18 period.

The Botanical Society of Scotland SCIO
Financial Statements for the Year to 30 April 2017

Statement of Receipts and Payments	Accruals	Accruals
Year	2017	2016
	£	£
Incoming resources:		
Voluntary income:		
Subscriptions	5,833.96	6,458.94
Donations	290.00	95.00
Total	<u>6,123.96</u>	<u>6,485.52</u>
Incoming resources from charitable activities:		
Editorial Subvention	3,363.00	3,346.00
Royalties,- Journal (Taylor & Francis)	5,129.67	3,650.83
Sale of Merchandise	25.00	57.00
Miscellaneous (incl. excursion donation)	-	17.00
Contribution to a lecture	-	253.00
Total	<u>8,517.67</u>	<u>7,323.83</u>
Interest (& Stock Redemption – 2016)	<u>194.38</u>	<u>225.77</u>
Total receipts	<u>14,836.01</u>	<u>14,103.54</u>
Payments:		
Costs of generating funds:		
Printing Members' Copies of Journal	<u>4,353.85</u>	<u>5,508.00</u>
Charitable activities:		
<i>Directly allocated to activities:</i>		
Lecture Expenses	534.60	1,195.55
Printing Newsletter	1544.90	1,216.92
Student Essay Prize	200.00	200.00
Student Grants	-	200.00
Urban Flora Project (data-base development, etc.)	-	-
Total	<u>2,279.50</u>	<u>2,812.47</u>
<i>Support costs:</i>		
Committee Room Hire	62.50	-
Stationery & Postage	159.09	-
Printing	41.30	-
Insurance	-	140.38
Web page	84.00	192.00
Total	<u>346.89</u>	<u>332.38</u>
Total - Charitable Activities	<u>2,626.39</u>	<u>3,144.85</u>
<i>Governance costs:</i>		
ICO (Data Protection)	35.00	-
Subscription Rebates	99.00	40.00
Accounting Fees - 2015-16	140.00	140.00
Annual Meeting Costs	500.00	-
Secretary's Expenses (incl. postage)	109.33	1102.29
Total – Governance	<u>883.33</u>	<u>1,282.29</u>
Total Net Resources expended	<u>7,863.57</u>	<u>9,935.14</u>
Expenses pending	<u>-</u>	<u>-</u>
Gross Expenses	<u>7,863.57</u>	
Gross Surplus for the Year	<u>6,972.44</u>	<u>4,168.40</u>

Statement of Balances		
Year	2017	2016
	£	£
Bank and cash in hand		
Closing balances at Bank	26,752.93	19,906.45
Cash at Paypal	-	68.42
Opening balances at Bank	-19,906.45	-16,032.24
Stock Redemption & CCLA Interest	-	225.77
CCLA Interest	194.38	-
Less Paypal carry-over from previous year	-68.42	-
Surplus for the year	6,972.44	4,168.40
Closing balance		
Cash at Bank	26,752.93	19,906.45
Cash in CCLA reserve fund	50,367.56	50,173.18
Net Assets (see note 4)	77,120.49	70,148.05
Reserves		
Designated funds		
Symington Grieve Trust Fund	500.00	500.00
Sir W. W. Smith Lectureship Fund	300.00	300.00
Urban Flora Project	2,342.00	2,342.00
Botany of the Lothians Fund	2,258.06	2,258.06
Total	5,400.06	5,400.06
General (unrestricted) funds	71,720.43	64,747.99
Total Funds	77,120.49	70,148.05
The financial statements have been approved by Council.		
DF Chamberlain Treasurer		
18 May 2017		

Independent Examiner's report to the council members of *Botanical Society of Scotland*

Respective responsibilities of trustees and examiner

The charity's trustees are responsible for the preparation of the accounts in accordance with the terms of the Charities and Trustee Investment (Scotland) 2005 Act and the Charities Accounts (Scotland) Regulations 2006. The charity trustees consider that the audit requirement of Regulation 10(1) (d) of the Accounts Regulations does not apply. It is my responsibility to examine the accounts as required under section 44(1) (c) of the Act and to state whether particular matters have come to my attention.

Basis of independent examiner's statement

My examination is carried out in accordance with Regulation 11 of the Charities Accounts (Scotland) Regulations 2006. An examination includes a review of the accounting records kept by the charity and a comparison of the accounts presented with those records. It also includes consideration of any unusual items or disclosures in the accounts and seeks explanations from the trustees concerning any such matters. The procedures undertaken do not provide all the evidence that would be required in an audit and, consequently, I do not express an audit opinion on the accounts.

Independent examiner's statement

In the course of my examination, no matter has come to my attention

1. which gives me reasonable cause to believe that in any material respect the requirements:
 - to keep accounting records in accordance with section 44(1) (a) of the 2005 Act and Regulation 4 of the 2006 Accounts Regulations, and
 - to prepare accounts which accord with the accounting records and comply with Regulation 9 of the 2006 Accounts Regulations

have not been met, or

2. to which, in my opinion, attention should be drawn in order to enable a proper understanding of the accounts to be reached.

D. Millar, Edinburgh 2017

Back cover pictures

Inside

Top left: Algal Bloom and picture of the App. See Bloomin' Algae on page 17.

Top right: Examples of different types of algal blooms displayed by the App.

Photos by Laurence Carvalho. See article on page 17.

Centre: Botanising on the beach with Dundee Naturalists' Society. Photo by Brian Ballinger. See article on page 68

Bottom : Mary Dean's photograph of the field excursion to Fortrose. See article on page 67.

Outside

Photographs of Giant Sequoia by Peggy Edwards. See article page 30.

Top left six cones of Sequoia at Stirling University, *Top right* Sequoia at Stirling University, *Bottom left* Inchtute Rows.

Bottom Right Photograph of the Sculpture of William Brand, provided by Leoni Patterson. Page 20.

