



BSS News

The Newsletter of the
Botanical Society of Scotland

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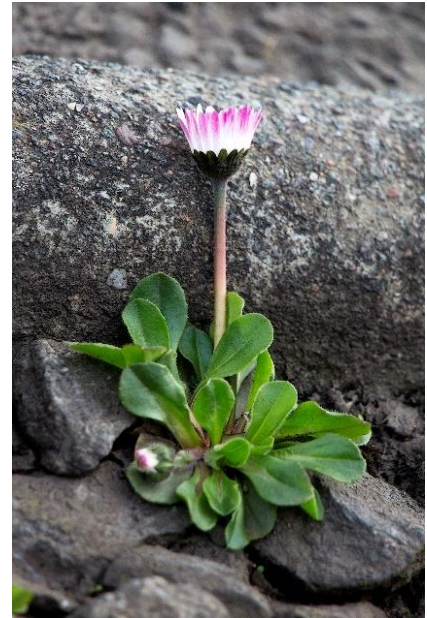


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1) *Bellis perennis* California Photo c Peggy Edwards (p36)



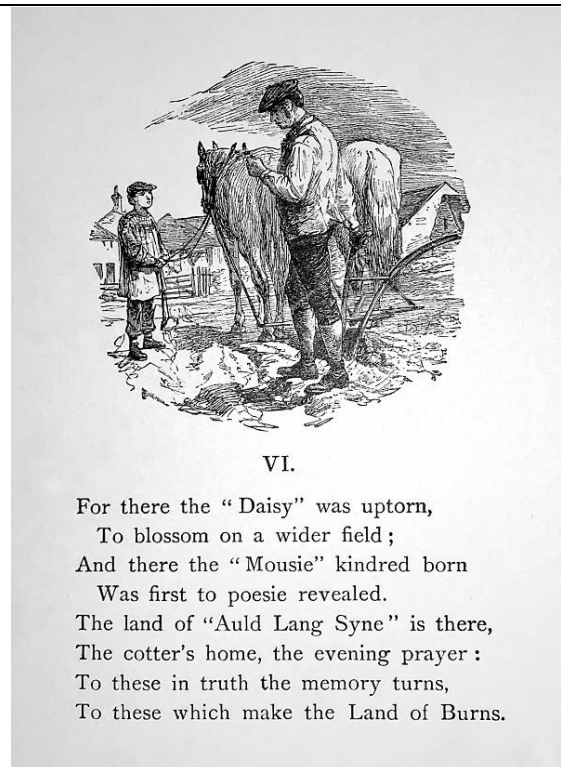
2) *B. perennis* Photo c Peggy Edwards (p36)



3) P *Bellis perennis* 1796 Johann Georg Sturm (p36, CC)



4 *The Land of Burns*, (p36. CC)





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Captions to front cover pictures:

Bellis perennis Common Daisy Gillies Hill Cambusbarron 27-6-11 © Photograph Peggy Edwards. Article p36.

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Front cover inside:

- 1) *Bellis perennis* Common Daisy Scotts Valley California 3-25-17 © Photograph by Peggy Edwards. Article p36.
- 2) *Bellis perennis* Common Daisy Kersebonny, Cambusbarron © Peggy Edwards. Article p36.
- 3) *Bellis perennis* 1796 Photograph by Johann Georg Sturm, Public Domain CC. Article p36.
- 4) Bruce, Wallace, *The Land of Burns*, Daisy Illustrated by James D. Smillie Lee and Shepard, Boston, Mass; Charles T. Dillingham, New York, 1879. VI. Public Domain CC. Article p36.

BOTANICAL SOCIETY OF SCOTLAND

c/o Royal Botanic Garden Edinburgh
20A Inverleith Row, Edinburgh, EH3 5LR
Website: <http://www.botanical-society-scotland.org.uk>
You can follow the BSS on Facebook and Twitter.

Founded in 1836 as the Botanical Society of Edinburgh, the Society became the Botanical Society of Scotland in 1991. Meetings and lectures are held in Edinburgh, and occasionally at the invitation of local societies in Aberdeen, Dundee, Glasgow, Inverness, Perth and St. Andrews. The Society encourages the study of flowering and non-flowering plants. Activities of the Society include lectures, field meetings, symposia, surveys, and an annual Scottish Botanists' Conference held jointly with the BSBI 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. Standard members can also go online and download all of the Society's journals, from papers which have just been accepted for publication in *Plant Ecology & Diversity*, all the way back to the first issue of *Transactions of the Botanical Society of Edinburgh* published in 1844 (instructions can be found on our website).

Applications for membership and subscription payment are best made online via WebCollect through the BSS website at <https://www.botanical-society-scotland.org.uk/content/bss-membership> where we accept payment by bank transfer and direct debit. If you prefer to pay by cheque please send it to the Treasurer, at the address at the top of this page.

Subscription renewals due 1 st October each year. Deadline 25 th December	
Standard rate (with the Journal <i>Plant Ecology & 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

Thank you to everyone that has supported the BSS in the past year and special thanks to those that have attended the 'in person lectures' at the Royal Botanic Gardens Edinburgh. I hope that those that did not manage to attend have looked at the You Tube videos of the lectures. Some lectures were not recorded if the speaker requested this, especially when unpublished data was presented (sometimes we had technical issues!).

The AGM will be held on 16th May 2024, after the final spring lecture. Please see the AGM notice and send any items of business for the meeting to the BSS president and general secretary-noting the new email address for contacting the BSS (BSS-Contact@botsoc.scot). We are also happy to receive your suggestions for new activities that the BSS could become involved in to support plant sciences in Scotland.

We were very pleased by the launch of our new website, which is still undergoing refinements. If you have any requests or suggestions, then please get in touch. Special thanks to the many people behind the technical details and content contributors. See the notices from our President Prof. Jonathan Silvertown, and publicity officer and website administrator Rich Wilson. We also welcome Ellie Bestington as our new student representative, Scott Galloway, as Local Secretary for Glasgow and Dr. Sim Tang who has also joined BSS council to assist our treasurer, Dr. David Chamberlain.

Last year Julia Wilson and Chris Jeffries resigned from BSS council. At our January lecture, we were very pleased to honour them as life members of BSS. See the note from John Grace about their contributions.

Thank you very much to Cameron Diekonigin who stepped down as coordinating editor for the BSS news. I (Jill) thank everyone who has sent articles for this BSS newsletter and to all contributors that have provided wonderful items for the BSS news since I have been receiving editor. I am stepping down from this role, as I believe that new energy is needed. I have really enjoyed my time as editor. It has been great to work with you all, as you patiently answered my questions and considered my editing suggestions. It has been great to 'meet' you although often only virtually. Look out for publicity about new technological ways to submit articles to this newsletter that are likely in the future. Non-members may submit articles to BSS news, especially of Scottish plants and cryptogams.

Jill Thompson

ANNUAL GENERAL MEETING

7pm Thursday 16th May 2024

The BSS Annual General Meeting will be held on Thursday 16th May 2024 at 7 pm, immediately after the final spring lecture. This will be an in person meeting at the Edinburgh Royal Botanic Gardens (RBGE), but please check the BSS web site for updates nearer the time, and look out for email details, in case we are not able to meet in person at the RBGE, or any changes to the schedule.

Further information about the AGM will be sent out by email by 2th May 2024. If you have an email address and are not currently receiving emails from the BSS, then please log into WebCollect and update your details, or contact the membership secretary (see below). If you do not use email and wish to receive further information by post, please contact us in writing at Botanical Society of Scotland, c/o Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh EH3 5LR, UK by 2th May 2023, marking your envelope 'AGM'.

At the AGM we will report on our activities over the last 12 months, present our draft financial accounts, elect members to our governing body (BSS Council) and answer your questions about the BSS. If you have any other business that you would like to add to the agenda, then please inform the BSS general secretary (see below).

The provisional agenda for the AGM is as follows:

1. Chair's welcome, apologies for absence, opening remarks.
2. Draft minutes of the AGM 2023 for approval (they are available in the members' area of our website, and will be circulated in advance of the meeting).
3. President's Annual Report.
4. Treasurer's Annual Report (accounts in BSS members area).
5. Election / re-election of Council Members.
6. Any other Business.

Can you help us to run the BSS?

The BSS is run by volunteers, and we have some vacancies on our Council. We arrange the lecture and field programmes, keep financial accounts, manage membership, publish the BSS News, Plant Ecology & Diversity and our blog 'Botany in Scotland', run a website, organise projects, award student prizes and grants, and sometimes comment on relevant national strategy and planning issues (e.g. Scottish Biodiversity Strategy).

You do not need to be a 'qualified botanist'; an interest in plants, fungi or bryophytes and a willingness to help are all that is required. Our varied activities require a wide range of skills to support them. You will also help to keep the Society relevant to Scottish botany and to our membership. We are currently holding monthly virtual Council meetings by Zoom. If you would like further information, please contact the BSS president Jonathan Silvertown. Applicants to our Council should provide a brief (one paragraph) résumé of their interests and experience, and details of two members of the BSS (a proposer and seconder) who agree to nominate them. If you do not know any other BSS members, please contact us and we will help you to arrange this. Nominations must be received by the General Secretary no later than 19th April 2024.

A copy of the audited accounts for the Society will be uploaded to the BSS members area on the BSS website.

Jonathan Silvertown, President BSS

Liz Lavery, General Secretary BSS

Kevin Gaffney, Membership Secretary BSS

Please use the same email for all communications with BSS:

BSS-Contact@botsoc.scot

NEW SHOOTS APPEAR

Jonathan Silvertown, President of the Society, reports on developments since the last newsletter.

The joint BSBI/BSS Scottish Botanists' Conference held in November was a big success. No news there if you have ever attended this very popular annual event held at the Botanic in Edinburgh. At that meeting, I bared the presidential soul to a patient audience and asked for opinions about how BSS could better serve the botanists of Scotland. I dare say some of the audience thought "Well, if *you* don't know, you shouldn't be doing the job!" but I think it's fair to say that the world has changed more than the BSS since 1836, despite its metamorphosis from the Botanical Society of Edinburgh in the 1990s, and other changes.

The need to ask the question "What is BSS for?" can be illustrated by a Venn diagram representing the activities of the many plant-related Scottish institutions. Suffice to say, there is a great deal of overlap. Two notable answers to my question were forthcoming from the audience, one indicating a deficiency and the other an opportunity for the BSS. The deficiency is that the activities of the Society are very focussed on Edinburgh. The opportunity is that we are better placed than any of our sister organizations to serve the academic, and in particular, the student population. I am happy to report that there has now been progress in addressing both of these points.

On the first point, though we do have members all over Scotland, they are thin on the ground, and we could do more for them. Being an entirely voluntary organization with no paid staff, progress depends on people coming forward to organize local activities and I am delighted to say that we now have such a volunteer for Glasgow. Scott Galloway, who won the BSS Thesis Prize for 2023, is planning a Glasgow local group and we will be giving him full support. Scott has been co-opted to BSS Council.

Elsewhere in this Newsletter you will read an item by Ellie Bestington, the student rep on Council, about the new student group that she and her friends have started. This is based in Edinburgh, but the ambition is that the group will eventually reach all students in higher education in Scotland. It is a big task that will not be accomplished overnight, but the group are energetic, and the Society will support them all the way.

I mentioned in the last newsletter that we were planning a new website. This is now launched at our new web address www.botsoc.scot. There are new email addresses to go with it and we have a new recruit to the role of web and publicity officer, Rich Wilson. All members of the Society will be hearing from Rich by email. Very fortunately for us, Rich is not fazed by the digital complexities of running the BSS which requires mastering some very arcane web applications. We are also very lucky in having the professional support of John Garlinge who continues to run the backend operations and web hosting for us, *gratis*. Iain Bunt designed our new website and I want to thank him, John and Rich for their work behind the scenes.

The new website now incorporates Prof John Grace's very popular *Plant of the Week* and has some other new features. Do visit and take a look around botsoc.scot. Also take a look at the Society's YouTube channel where you will find videos of the lectures recorded at the BSS Urban Flora Conference in September, and our monthly lecture series. Jim McIntosh, who will be known to all readers as the erstwhile face of BSBI in Scotland, is now managing our YouTube channel for us and has curated an excellent resource. I would like to thank Julia Wilson for getting the channel started, as well as running many of the Society's other digital assets for many years.

My apologies if this news item seems excessively organizational and lacking in botanical interest, but everything mentioned here is being done by volunteers in support of botany. This brings me to the punchline. We need more volunteers – can you help? There are many roles, large and small, where you can help the Society. Please drop me a line by email.

Jonathan Silvertown
Jonathan.Silvertown@ed.ac.uk

FROM THE BSS PUBLICITY DESK: NEW FOR 2024

It is a new year – 2024 – and welcome to all our members. But, it is not just a new year, but a new look for the BSS website! The refreshed web site is now up for the world to see at <https://botsoc.scot/> and we trust you find it more interesting easier to view and easier to navigate – do have a look. More updates to come with more lectures, events, and field excursions. The Plant of the Week blog has a presence, and we are migrating the web links to see the older blogs.

It is also a great time to make Scotland more aware of the society and what we offer members. We will be expanding our presence and look forward to welcoming new members in the coming year. In the social media realm, we already have a presence on Facebook, YouTube, and X, and will be expanding to others. Watch for updates on the new BSS website. A new student sub-group, Plant-Soc, has been formed and for an update on those activities, some words from Juliet de Banzie:

“The BSS is spreading its roots at Edinburgh University with the arrival of a new student subgroup! Led by a range of students across the year groups, ‘Plant Soc’ aims to engage new members, hold a variety of events, and grow the presence of the BSS across groups. This will also be coupled with an Instagram account, increasing reach across new social platforms.

Whilst we are currently propagating our visions, some of the standout ideas include houseplant care workshops, foraging walks, pub quizzes, and the addition of a plant mascot!! So, stay tuned for updates and we hope to see you at our upcoming events.”

As a Scottish Charity, we are always looking to improve finances, and welcome suggestions from our members as we looking to provide more benefits and services to our members. So, your suggestions, ideas, and donations are most welcome. Looking forward to an exciting botanical 2024!

Rich Wilson,
Publicity Officer, BSS-Contact@botsoc.scot

TREE IDENTIFICATION COURSE

Thanks to the funding received from the Botanical Society Scotland, I was able to attend the Broadleaf Tree Identification course at Preston Montford Field Centre in Shropshire, tutored by Mark Duffell. The course was held over 3 days with some classroom time and lots of time out in the field. We convened on the Friday evening and began with a quick game, which Mark used to assess our levels of understanding. We then had an intensive evening of learning about the different features on twigs and leaves that would aid our identification skills. By the end of that evening my head was buzzing with new terminology and I worried that I had bitten off more than I could chew!

On the Saturday we had a quick session in the classroom, we received a hand lens, a copy of John Poland's vegetative key and a copy of Clive Stace's Flora of the British Isles and off we set around the grounds of Preston Montford to identify our first trees. We learned how to use Poland's key and our hand lenses and identified at least a dozen species that first day, Mark's relaxed teaching method had us whizzing through them in no time.

On Sunday we went to Dothill Local Nature reserve, some of the group were attending the course as part of their studies with Manchester University, and as such had an assessment to complete. We all attempted the assessment, identifying all manner of trees, from relatively easy oaks to some of the many willows. I tried to keep a leaf off each of the samples to put in a scrap book, as many of them will not grow further north in Scotland and I might never get to identify them again.

I thoroughly enjoyed this course; I hope that the skills I have learned will help develop my prospective career in natural science. I am desperate to get out and practice my skills and cannot wait to get myself a copy of Poland when it comes back into print. Thank you again to BSS for allowing me this opportunity.

Alisa Forgie

LYN JONES THE FLORA OF JERSEY LECTURE 13TH FEBRUARY 2024

Joint meeting of Dundee Naturalists' Society and the Botanical Society of Scotland

Lyn Jones, Emeritus Professor at Dundee University, gave a talk on the Flora of the island of Jersey to this joint meeting. Lyn and his wife have a house on Jersey and have visited on many occasions over the years.

Like the other Channel Islands, Jersey lies off the coast of France. It has many local customs including the Battle of Flowers, where many brightly coloured floats are made up from the Hare's-tail Grass (*Lagurus ovatus*) from Southern Europe, which is not really a native species here.

The island is well known for the Jersey Royal potato, but there is much else of botanical interest there. Description of the island's flora started in 1689 and there have been several lists and floras since then, most recently a checklist in 2012.

Some species reach their northern limit here and Lyn described some of the interesting and important ones. The Jersey or Loose-flowered Orchid (*Anacamptis* or *Orchis laxiflora*) is a southern species at its northern limit. Two meadows, where it usually puts on a colourful display, have been set aside for its preservation.

Another special species is the Jersey Buttercup (*Ranunculus paludosus*), also reaching its northern limit and now only to be seen in two monads. The tiny Jersey Forget-me-not (*Myosotis sicula*) survives in one pond, where it is threatened by the invasive New-Zealand Pigmyweed (*Crassula helmsii*), which poses great challenges to the survival of this Forget-me-not.

The Jersey Fern (*Anogamma leptophylla*), also at a northern limit, is in several places and new sites have been found recently. The Jersey Pink (*Dianthus gallicus*) persists on one sand-dune site, although it is common in France.

Other plants of interest include the Jersey Cudweed (*Laphangium* or *Gnaphalium luteoalbum*), possibly native and now appearing sporadically as a weed. Purple Viper's-bugloss (*Echium plantagineum*), more characteristic of southern climes, is also to be seen in Jersey.

Lyn is fortunate in that his garden lawn in Jersey features the delicate Autumn lady's-tresses orchid (*Spiranthes spiralis*), flowering profusely most years.

Invasive species prove a problem, as in so many places, and the Hottentot Fig (*Carpobrotus edulis*) from South Africa is growing densely in some coastal sites smothering native species. It is colourful, but is a problem, together with several other alien (neophyte) species but raise issues for the survival of native plants.

Some natives are also becoming invasive, as a result of reductions in intensive farming, to the extent that they outcompete rare natives. Problem natives include Gorse (*Ulex europaeus*), Bracken (*Pteridium aquilinum*), Blackthorn (*Prunus spinosa*) and especially Burnet Rose (*Rosa spinosissima*).

Other wildlife on Jersey is also of note, including birds such as Marsh Harriers, Chough, three species of Egret and the Glossy Ibis. The Jersey Tiger Moth is also commonly seen.

Lyn pointed out that Jersey has good flight connections with Scotland, which are quite inexpensive in winter and a climate that is 2-4 degrees Celsius warmer than Dundee. Some of us have never been to Jersey and it sounds like a very rewarding place to visit for its wildlife as well as its other attractions.

Brian Ballinger

SCOTTISH PLANT LORE. GREG KENICER

Dundee Naturalists and the Botanical Society of Scotland 14th November 2023 in the University of Dundee.

This joint meeting between the Dundee Naturalists and the Botanical Society of Scotland heard a talk by Dr Greg Kenicer of the Royal Botanic Garden Edinburgh, on Scottish Plant lore through history.

Greg described the various phases of human civilisation in Scotland, from hunter gatherers up to the present age. Some early introductions (archaeophytes) were probably brought in by the Romans or monks. These included Sweet Cicely (*Myrrhis odorata*) and Bishopweed or Ground Elder (*Aegopodium podagraria*). Plants were imported for culinary or medicinal purposes. There is archaeological evidence of the use of Sphagnum moss in wound treatment in the Bronze Age.

There are written records of the domestic use of plant material in Scotland from the 17th century onwards. There is an account of the medicinal use of Scurvy Grass (*Cochlearia officinalis*) in that period and it

has been a forage plant in the intervening period. Bitter Vetch (*Lathyrus linifolius*) has found medicinal uses over the centuries and was said to help hangovers. Other plants with medicinal applications include Foxglove (*Digitalis purpurea*) for heart failure, and St John's Wort (*Hypericum perforatum*) for Depression. All of these plants can be dangerous if used incorrectly, so please do not use for self-medication.

Plants with for non-medicinal uses include Soft Rush (*Juncus effusus*) that has been used in making baskets, and rush wicks were a source of lighting.

Seaweeds have been used as food in the past and this has continued to some extent. Kelp was burned as a source of minerals for some time, and this was once a thriving business.

Wood has always been a major source of construction material and different woods have different uses. Alder, for instance, has a valuable role in damp situations, with its relative resistance to rot.

Lady's Bedstraw (*Galium verum*) was formerly widely collected from heath for use in houses as a straw because of its fragrance, but this was reported to lead to some coastal erosion.

Other species have magical associations, and some people still grow Rowan (*Sorbus aucuparia*) by their front doors to keep away the evil spirits.

Many of the flowering plants in Scotland have been given different names over the centuries, in different parts of the country. The 250 main flowering plants in the Scottish flora have been given a remarkable 9,000 different names. Marsh Marigold (*Caltha palustris*) and Bramble (*Rubus fruticosus*) each have 25 different names. They are closely followed by Foxglove (*Digitalis purpurea*) and Early Purple Orchid (*Orchis mascula*) with 24 names each. A few plants have similar names in several European languages, such as Poppy and Birch.

Dr Kenicer gave a very interesting tour through the various associations and uses of plants in Scotland over the centuries.

Brian Ballinger

ISLAND BIOGEOGRAPHY SUMMER SCHOOL - UNIVERSITY OF THE AZORES, TERCEIRA

A two-week Theoretical and Practical Course Organised by the Azorean Biodiversity Group

The Azores is a 6-million-year-old volcanic archipelago of nine islands about a third of the way in the Atlantic Ocean from Lisbon to New York. The climate is oceanic, with mild summers and wet stormy winters. Since the archipelago's colonisation by the Portuguese in the 15th century, the native forests have been logged and converted into extensive cattle pastures. Additionally, many plant species were introduced to the archipelago by numerous merchants, explorers, and pilgrims. The mild climate and nutrient-rich volcanic soil created a species-rich terrestrial ecosystem where a Strangler Fig and an edible fig species grow next to eucalyptus, surrounded by *Monstera deliciosa*, large tree ferns and roads lined with hydrangea.

I was originally interested in this course because I had a strong fascination for this archipelago, which I had visited previously on holiday. By meeting local researchers, non-scientists, and enthusiastic students, I was finally able to learn more about the botanic history of these islands and the challenges their unique flora was facing. Especially as a rather old island group, its native and/or endemic species (*Laurus azorica*, *Juniperus brevifolia*, *Picconia azorica*, and *Erica azorica*) are struggling as agricultural lands encroach on native habitats that exist nowhere else, and many invasive alien species (e.g., *Pittosporum undulatum*, *Cryptomeria japonica* and *Hedychium gardnerianum*) introduced by trade and tourism spread rapidly.

Origins of the Summer School

Today, only fragments of native laurel, juniper and *Erica* forests remain. One of the largest fragments can be found on the western coast of Terceira. This forest is subject of intense research by the University of the Azores' Azorean Biodiversity Group. The research group also belongs to the Centre for Ecology, Evolution and Environmental Change (cE3c) based in Lisbon. It is this research group that, for the first time last year, organised the Island Biogeography and Macroecology Summer School.

Structure and Content of the Summer School

Because of its success last year, the programme was repeated in 2023 and during this year's second edition of the Summer School, 13

researchers were invited to lecture on their areas of expertise, introduce the participants to current topics in biogeography and macroecology, and present innovative methodologies to answer complex site-specific, local, regional, and global questions.

The Summer School was organised into whole-day theoretical lectures including question sessions, practicals on analysing data in R Studio, and two field trips.

The theoretical part of the course began with Robert Whittaker introducing us to the history of island biogeography and the associated equilibrium theory. Joaquín Hortal shared his expertise on measuring species diversity with various metrics, and Rosemary Gillespie talked about colonisation, diversification, invasion, and conservation on oceanic islands.

The practicals were led by Pedro Cardoso who explained how to estimate total diversity from incomplete sampling, and by François Rigal who showed how to quantify functional diversity in community ecology.

While some of the content expanded on lecture material I had previously encountered, many topics and applications were entirely new to me and broadened my horizon more than I had expected. There were also parts that I was not able to comprehend during the lecture, but I always had the chance to ask the lecturer further questions and all presentation material was made available to the students.

The course concluded with each participant giving a presentation on their current projects, which ranged from my undergraduate dissertation to Master's theses and almost finished PhDs.

The first field day focused on an introduction on how to survey a plot of native Azorean laurel forest for mosses, ferns, trees, and herbaceous flowering plants following a standard protocol. Rosalina Gabriel, who has been working on Azorean mosses for over 30 years and is one of the lead experts on moss identification in the archipelago, gave an interested group of us an overview of native moss species, their distribution and ecological role.

The second field day included a visit to the course organiser's invertebrate traps in different habitats (e.g., grasslands, road verges, native *Erica azorica* and non-native *Pittosporum undulatum* forests) on the island including applying parts of both the COBRA and BALA invertebrate sampling protocols.

Connection between the Summer School and my Dissertation

I was most delighted to find much overlap between three of the lecturer's content and the analysis I had planned for my dissertation.

Just before the Summer School started, I had collected data for my dissertation on the Kilchoan Estate south of Oban on the west coast of Scotland. The project is aimed at understanding the difference in functional diversity of the understory herbaceous layer between woodlands of different origins. I hope to infer from this research whether planted forests, in the context of rewilding, may ever reach the same functional diversity and perhaps whole-forest functions as semi-natural forests.

Not only was my understanding of functional diversity deepened during the Summer School, but I was also introduced to advanced computing and analytic methods that my data and research questions were suitable for. It was highly beneficial to discuss my project with international researchers and to be met with an interest in Scotland's west-coast Atlantic rainforest ecosystems. I am confident that what I learned in this course will help me understand the difference in the functional diversity of herbaceous understory vegetation between forests of plantation and semi-natural origin.

Writing now, almost three months later, I look back to those two weeks and I feel extremely fortunate that the funding from the Botanical Society of Scotland has made this experience possible. I have met people from all over the world who both valuable contacts for current and future projects and have also become valued friends.

Luisa-Marie Dickenmann, University of Edinburgh
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PLANT FUNCTIONAL TRAITS COURSE IN SOUTH AFRICAN MONTANE GRASSLANDS

My experience, research in Drakensberg mountains, and the future of field courses.

In July 2023, I was awarded a grant from the Botanical Society of Scotland, to support a fieldwork training course to be held in South Africa in December 2023. The Plant Functional Traits Course 2023 (<https://plantfunctionaltraitscourses.w.uib.no/>) consisted of three weeks in the South African montane grasslands in the Drakensberg mountains, around 4 hours south of Johannesburg, bordering Lesotho. This was already the seventh instance of the Plant Functional Traits course, organised jointly by people from the University of Bergen, the University of Arizona, the University of British Columbia, and many others. Most importantly, we were hosted by local researchers from the University of Pretoria, who provided us with an important knowledge of the local flora and ecosystems. Why Drakensberg? There is a very limited trait data from African continent, despite its amazing diversity and importance. The Drakensberg mountains are very diverse and is one of the most understudied mountains regions in Africa.

The course has two main aims, among others. Firstly, to provide a world-class fieldwork experience in plant ecology, specialising in studying plant traits, but also other aspects of plant ecology¹. Secondly, to collect real data that we will use to publish numerous research papers after the course. For me, although not an official aim, was creating valuable connections between researchers from all over the world. We were around 50 plant ecologists working in one place together, looking at plant ecology from various points of view. I thought of it as a three-week-long conference to exchange ideas and build friendships and collaborations for the future. Another important aspect of the course was to learn how to implement the whole data cycle and open science practices in thinking about research. Most trainings and field courses do not complete this data life cycle and just collect but do not curate, reuse, and continue working with the data.

In Drakensberg, we were working along an elevation gradient, from 2000 to 3200m, visiting 5 different sites at different elevations, simulating a temperature gradient. Along this gradient, from almost fifty participants and organisers, we had 5 main groups looking at different aspects of plant traits and plant ecology. At the plots at these sites, we looked at and

measured: 1) botanical and aboveground plant trait data, 2) temperature responses of photosynthesis and thermal imagery of plants, 3) ecosystem functioning variables, 4) spectroscopy data, 5) belowground traits and ground penetrating radar data. With this, we collected microclimate and abiotic measurements as well. Hence, in three weeks, we worked day (and sometimes night!) to try to characterise the ecology of this ecosystem as much as possible, from all these different points of view.

My team was led by Prof Sean Michaletz and a PhD candidate Marcella Cross from the University of British Columbia and consisted of researchers from Spain, Nigeria, Bulgaria, Canada, the USA, New Zealand, and the Czech Republic. We looked at the leaf thermal behaviour and photosynthesis across elevation, hence the temperature gradient. This study was novel, as instead of only looking at elevational gradient, we also looked at the difference between plants on eastern and western slopes.

Firstly, we measured the photosynthetic responses of leaves to temperature (or leaf assimilation-temperature response). We had to dig big turfs of plants in the field and bring them to the lab. There, using the LI-6800 Portable Photosynthesis System, we measured light response curves and then the temperature responses of leaves. Importantly, we collected 125 individual leaves responses in just two weeks of lab work. We would not be able to do this under conventional methods, as we used a Fast Assimilation-Temperature Response: a FAsTeR method², which cuts the conventional time by two thirds. Although we are still analysing the data, preliminary results indicate that the optimal leaf temperature for photosynthesis does not change across the elevation/temperature gradient or aspect of the slope. On the other hand, the optimal temperature for photosynthesis is relatively constant with gradual temperature changes across the elevation.

Secondly, we tried to characterise whether plant physiological responses exhibited homeothermic, poikilothermic, or megathermic behaviours. We wanted to see how leaf temperatures change over the course of the day, and how is their relationship with air temperature. Do leaves track air temperatures, or do they exhibit a different relationship? We tested this using a thermal camera, FLIR, to obtain the imagery. We are still analysing the data to answer this question.

Apart from our group projects, we all learned how to collect and measure plant traits. The PFTC team implemented the so-called “Trait Wheel”, in which we had to all learn the techniques and earn our plant

trait certificate. We did so by collectively teaching each other, supervised by the course organisers. This was to make sure we could actively teach other people once the course ended. Only for plant trait data, we counted a total amount of 18 894 trait observations for 3149 specimens, across 150 species! Another highlight included the visit to the University of the Free State at QwaQwa campus, where we spent the whole day listening to talks from local researchers and the outcomes of their projects and applied consequences of their research for the communities.

As for outcomes, we are planning to publish a data paper with all collected data, and then manuscripts from the individual projects. A good thing is that we are given a lot of freedom regarding what research questions we as students want to ask. The supervisory team helps but it is mostly our projects and responsibility. Plus, I am regularly teaching field courses at my alma mater, the University of Edinburgh, and I already have plenty of ideas of how to implement some of the methods and ideas that I gained in South African grasslands. Ultimately, this course has given me valuable skills that I will use in my PhD project at the University of Edinburgh. I think the future of field courses, apart from learning valuable skills, is to collect real data that can be used with real research questions. If you can have a bit of fun along the way and strengthen international collaborations, that is even better.

Jiri Subrt

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LIFE MEMBERSHIP AWARDED TO TWO STALWARTS OF THE BSS

At our meeting on in January 2024 Chris Jeffree and Julia Wilson were each awarded the honour of Life Membership. Both are long-standing members of the BSS who have contributed very strongly over many years as Council Members and BSS council office bearers. Chris served as President of the Society from 2008-2010 and Julia in 2019-2021. Both were crucial during the administrative transition of the BSS to a Scottish Charitable Incorporated Organisation (SCIO) and the rewriting of our constitution.

Chris Jeffree's work on aspects of the ultrastructure of plants is known internationally. His images of leaf surfaces made during his employment at Edinburgh University are perhaps his highest achievement. He has also contributed to the field of the phenology of flowering plants— an area which he inherited from his father who researched the food for bees long before it became a fashionable topic. In retirement he developed his innovative techniques for the photography of plants and has also pursued an artistic line in glass fusion. In both of these retiral projects he has brought *botany to the people*. Chris' lovely photographs can be seen throughout our website, especially in the Plant of the Week Blog.

Julia Wilson's most important science contributions have been in the context of the UK Centre of Ecology & Hydrology. She has elucidated aspects of the ecology of dryland ecosystems in Africa, often connected to agroforestry, and in the important field of mycorrhizal associations. In the Botanical Society Julia's contributions to Council have *been immense* and always the go-to person when others have wondered how to proceed. Julia's help during the setup of Webcollect to manage the membership lists, and collect subscriptions, and dealing with the restrictions of Covid were essential. Her grasp of detail has astonished her colleagues, and her organisation skills have impressed us all.

John Grace

REPORT OF A CONFERENCE “URBAN FLORAS – A CONTRIBUTION TO BIODIVERSITY”, 21/22 SEPTEMBER 2023.

Over 50 delegates came to our conference on *Urban Floras – A contribution to Biodiversity*, held in the lecture theatre of the Royal Society of Edinburgh. The idea was to bring together researchers interested in how the man-made environment influences plant life. The invited speakers came from varied backgrounds, and it was hoped to facilitate cross-fertilisation of ideas from diverse sources.

The first session was about the physical environment. We were fortunate to have as our opening speaker Professor Sue Grimmond of Reading University, a world leader in the field of the Urban Heat Island. She was followed by Wolfgang Hoffbauer, of the Fraunhofer Institute in Hamburg, who spoke about the colonisation of hard surfaces by plants and other organisms. Both of these talks were most welcome, taking us well beyond our every-day experience of Urban flora field recording. Then came talks by local speakers. Sim Tang gave a superb overview of the history of air pollution in Auld Reekie, and Vladimir Krivtsov presented the multiple benefits of blue-green infrastructure in cities.

The second session considered the characteristics of urban floras. John Grace opened this session with some early results of the Society's urban flora project, then Professor Simon Hiscock, Director of the Oxford Botanic Garden spoke about the origin of the *Senecio* hybrids. The talk was related to the following lecture by Richard Abbott of St Andrews University with the intriguing title *Plant mingling and evolution in urban environments*. Our own David Chamberlain then spoke very entertainingly about the extraordinary bryophyte diversity in the small spaces within Edinburgh.

In the evening a public lecture was held in the main lecture theatre of the Royal Botanic Gardens. It was a chance to stretch the legs, being a short walk from the main venue in George Street. The invited speaker was Kevin Frediani, the Curator of Botanic Garden at the University of Dundee. Having heard Kevin speak, I am sure that many in the audience will be visiting the Dundee Botanic Garden in 2024.

The third and final session (Day 2) was called *The human dimension: biodiversity and people*. The opening speaker was Professor Hamlyn Jones of Dundee University, who demonstrated the use of phone Apps for plant identification. Great progress has been made in the development of this technology, and the audience were amazed to

witness Hamlyn's phone identifying *Polypogon viridis* (plucked from outside his hotel) despite the poor lighting and other constraints of the rostrum. The best of the Apps will be a huge stimulus for botanical recording in Citizen Science projects.

Three related talks came next. Michael Philip came from Glasgow and spoke about 'winners and losers' among urban plant communities. Chris Preston from Cambridge described his work on the turnover of species in Cambridge streets. Brian Ballinger from Tain and Dundee shared his wide knowledge of the flora of walls.

Professor Brian Evans of the Glasgow School of Art, speaking as a landscape designer and urbanist, took us to another dimension with the challenge of blending green spaces with the functional requirements of city design.

The next speaker was Bethan Stagg from the University of Exeter. Bethan works on the phenomenon of 'plant blindness', whereby ordinary citizens fail to notice and appreciate the plant life around them. She was followed by Isabella Cornwell, a postgraduate student from the University of Edinburgh, who told us about the work she is doing on the role of wild flowers as food for pollinators.

Damien Hicks, an old friend of our Urban Flora project and an expert in pollinator abundance and diversity, returned to Edinburgh for this meeting, and gave us some insight into the remarkable work he now does as an analyst.

The *finale* was a panel discussion of the most important questions in urban ecology and management. The questions we discussed were generated on a flip-chart by delegates at the conference, and they covered important issues such as the role of Local Authorities and the frequent use of herbicides on the streets of our towns and cities.

On behalf of the Botanical Society of Scotland we would like to thank staff of the Royal Society of Edinburgh, who organised the meeting for us and made sure everything ran smoothly. Special thanks are due to Lesley-Ann Lamont. The catering was praised by many delegates (lunches and nibbles were outstanding).

The lectures were recorded, and if you missed the conference, you can find most of the talks on our You Tube channel which is <https://www.youtube.com/channel/UC8vz4IELFMp70aOxM6uo2oQ/videos>

John Grace

URBAN AND RURAL WOODLANDS IN EASTER ROSS

We usually associate woodlands with the countryside, and indeed, this is where most of them are. However, apart from isolated trees, there are often wooded areas in urban places, and these may be important for recreation and the environment. These will often be plantations or urban parks, but sometimes older fragments of semi-natural woodland survive, often being surrounded by the expanding built up area.

Goode (2014) describes some areas of ancient woodland that have survived in urban London. The Scotland's Forestry Strategy 2019-2029 recognized the importance of urban woodland.

Easter Ross has relatively small towns and villages, but they do contain some wooded areas, often in public parks. The present study looked at these small wooded places, and compared them with nearby rural woodlands.

Method:

Ten areas of urban woodland in nine different towns were visited on two occasions, once in March and once in June 2023. 100m transects were followed, recording all vascular plants that did not appear to have been planted. The transects began at the first 100m ordinance survey grid line after the woodland entrance.

Ten rural woodland transects were studied in the same way. The woods selected were the first woods with access, in the rural area near the town.

The woods were mainly mixed broadleaved and coniferous, but there was a greater proportion of coniferous trees in the rural woods,

Results:

Table 1 Number of records in March and June in Urban and Rural woods

Month	Number of Urban Records	Number of Rural Records	Total Records
March	252	184	436
June	398	332	730
Total	600	526	
Increase from March to June	58%	80%	

Records:

In March 252 urban and 184 rural records were made. In June 398 urban and 332 rural records were made. The increase from March to June was 58% for the urban woodlands and 80% for the rural. (Table 1).

Species:

In the urban woods 161 species were recorded. In the rural woods 146 species were recorded.

There were 26 Neophyte (alien) species in the urban woods and eight in the rural woods. The commonest urban neophyte species in this sample were: *Acer pseudoplatanus* (Sycamore), *Narcissus* (Daffodils), *Cupressus lawsoniana* (Lawson's cypress), *Pilosella aurantiaca* (Fox and Cubs), *Alchemilla mollis* (Garden Lady's mantle) and *Lamium galeobdolon ssp argentatum*. (Yellow Archangel). The most frequent rural wood aliens were *Picea sitchensis* (Sitka Spruce), *Larix* (Larch), *Acer pseudoplatanus* (Sycamore) and *Hyacinthoides x massartiana* (Hybrid Bluebell).

Some more typical "rural" species were only seen in the rural woods. Examples include *Calluna vulgaris* (Heather), *Carex sylvatica* (Wood Sedge), *Carex panicea* (Carnation Sedge), *Galium saxatile* (Heath Bedstraw), *Luzula pilosa* (Hairy Woodrush) and *Trientalis* or *Lysimachia europaea* (Chickweed Wintergreen).

The commonest species according to the number of woodlands in which they were recorded are described in Table 2.

Table 2 Commonest species in rural and urban woods

Commonest Urban wood species	<i>Aegopodium podagraria</i> , <i>Gallium aparine</i> , <i>Rubus fruticosus</i> , <i>Ranunculus repens</i> , <i>Urtica dioica</i> , <i>Taraxacum</i>
Commonest Rural wood species	<i>Taraxacum</i> , <i>Rubus fruticosus</i> , <i>Cytisus scoparia</i> , <i>Ranunculus repens</i> , <i>Dactylis glomerata</i> , <i>Rumex obtusifolius</i>

Comment:

The urban sites produced more records, particularly earlier in the year. The greater March to June increase in rural sites may possibly be related to the heat island effect in towns or the greater use of herbicides

and other management techniques in towns. Management input may be a factor in influencing botanical diversity, although most of the urban sites did not appear to be heavily managed. These were all small towns with populations of between 1,000 and 10,000, so these findings may not necessarily apply to larger towns and cities.

The greater number of urban species was not statistically significant and could be accounted for by the number of urban neophytes present. The greater proportion of urban neophytes is typical of most urban /rural comparisons and is likely to be accounted for by garden escapes and other human activity.

Most of the woodland sites were essentially plantations, although two urban and one rural site may have been derived from old woodland. None of the woods visited compared to any of the enclosed ancient sites described by Goode and others. Two of the urban sites were part of strips of woodland that extended into the countryside.

Although none of the urban sites sampled contained species of great national significance, they included a diverse set of species and are likely to support conservation and amenity priorities in the area.

Brian Ballinger

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BRIEF NOTES ABOUT SCOTTISH RAINFOREST

The BSS is associated with the Alliance for Scottish Rainforests see recent updates to their projects and how you can get involved. <https://savingscotlandsrainforest.org.uk/projects>. Watch the woodlands trust rainforest Youtube video.

<https://www.youtube.com/watch?v=NzoAxoG3AZg&t=14s>

There is a recent government report (published in December 2023). https://assets.publishing.service.gov.uk/media/656622ad75007400131ded88/Temperate_Rainforest_Strategy.pdf, and see also the blog by Guy Shrubsole about the wider British temperate rainforest <https://lostrainforestsofbritain.org/>

NEW BOTANICAL SOCIETY OF SCOTLAND WEB SITE

Visit the New Botanical Society website and see the super series “Plant of the week”. At the time of writing this shows the Marsh Marigold.

<https://botsoc.scot/2024/03/10/plant-of-the-week-11th-march-2024-caltha-palustris-marsh-marigold/>

See our new web resources.

<https://botsoc.scot/blogs-and-publications/>

Captions to photographs pages 27-30

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1) A part of our photosynthesis team at the highest peak, digging some plant turfs for further examination in the lab. Article p 17 Photograph by: Lilly Draganova

2) Forest trees, Article p14 Photograph Luisa-Marie Dickenmann

3) Our lab setting for the photosynthesis measurements, with turfs outside the lab waiting to be processed, and LI-6800 machine measuring a leaf. Article p17. Photographs Jiri Subrt and Lilly Draganova.

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1) *Primula vulgaris* Common Primrose Castle Tioram. Article p31. Photograph © Peggy Edwards

2) Oxlip *Primula elatior* Photograph Nicolas Weghaupt 1600 Public Domain CC. Article p31.

Page 29

1) Forest in the Azores. Photograph Luisa-Marie Dickenmann. Article p14.

2) Assessing bryophyte cover. Photo Luisa-Marie Dickenmann. Article p14

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Photographs of the designs from the BSS student Cyanotype workshop
All photographs by Juliet de Banzie. Article p45.

1) Photosynthesis team. Photo Lilly Draganova. Article p17



2) Forest trees. Photo Dickenmann. Article p14



3) Setting up equipment photosynthesis measurements. Photos Jiri Subrt and Lilly Draganova. Article p17



1) *Primula vulgaris* Common Primrose – Photo c Peggy Edwards.
Article p31.



2) Oxlip *Primula elatior* Nicolas Weghaupt 1600 Photo CC. Article p31



1) Forest in the Azores. Photo Dickenmann. Article p14.



2) Assessing bryophyte cover. Photo Dickenmann. Article p14.



1) Preparing Cyanotype Article p45.



2) I like my design! Article p45.



3) T-shirt Cyanotype. Article p45.



4) Results of student workshop p45.



THE PRIMROSES OF ROBERT BURNS

An Ancient Woodland in Scotland is a woodland that has existed continuously since 1750. One of the main reasons to preserve ancient woodlands (known as "old-growth forests" in America) is to preserve species such as primroses and bluebells that take decades to become established or re-established in disturbed habitats.

Five species of primrose are native to Scotland: the common primrose - *Primula vulgaris*; the cowslip - *Primula veris*; the oxlip - *Primula elatior*; the Scottish primrose - *Primula scotica*; and the Bird's-eye Primrose, *Primula farinose*, which unfortunately has been extirpated in Scotland.

In his poems Robert Burns mentioned two of Scotland's native primroses, one of which is the Common primrose - *Primula vulgaris*, the most common species of native primrose in Scotland. The flower's Latin name, *Primula*, or "prime," refers to its early spring blooming and the species name, *vulgaris* means "common." This perennial evergreen primrose may be found growing out of direct sunlight in woodlands, on north-facing banks, in hedgerows, coastal slopes and shaded montane cliffs.

In his poem *The Chevalier's Lament* of Charles Edwards Stuart after the Battle of Culloden, Burns mentioned both the common primrose and the cowslip:

The small birds rejoice in the green leaves returning,
The murmuring streamlet winds clear thro the vale,
The primroses blow in the dews of the morning,
And wild scatter'd cowslips bedeck the green dale;
But what can give pleasure, or what can seem fair,
When the lingering moments are number'd by care?

Another of Burns' laments, *Lament Of Mary Queen Of Scots*, was sent to Mrs Frances Anna Dunlop on the date of its completion 6th June 1790. Burns closed his letter to Mrs Dunlop with these words, "To YOU, and your YOUNG LADIES, I particularly dedicate the following Scots Stanzas - "

Now blooms the lily by the bank,
The primrose down the brae,
The hawthorn's budding in the glen,
And milk-white is the slae:
The meanest hind in fair Scotland
May rove their sweets amang;
But I, the Queen of a' Scotland,
Maun lie in prison strang.

In *The Posie* Burns included the primrose among other flowers he would place in a bouquet to his “*ain dear May*”:

The primrose I will pu, the firstling o the year,
And I will pu the pink, the emblem o my dear,
For she's the pink o womankind, and blooms without a peer -
And a' to be a posie to my ain dear May!

In his revision of the song *The Primrose* by Robert Herrick and set to the music of Todlin Hame, Burns wrote:

Dost ask me, why I send thee here,
This firstling of the infant year?
Dost ask me, what this primrose shews,
Bepearled thus with morning dew? -

The following stanzas from the two poems *By Allan Stream* and *My Nannie's Awa'* contain lines describing the primrose as a harbinger of spring:

The haunt o Spring's the primrose-brae,
The Summer joys the flocks to follow.
How cheery thr' her short'ning day
Is Autumn in her weeds o' yellow!

The snawdrap and primrose our woodlands adorn,
And violetes bathe in the weet o the morn,
They pain my sad bosom, sae sweetly they blaw;
They mind me o Nanie- and Nanie's awa.

Written in 1794 both *Behold, My Love, How Green The Groves* and *Lassie Wi The Lint White Locks* mention primroses blooming on a bank.

Behold, my love, how green the groves,
The primrose banks how fair;
The balmy gales awake the flowers,
And wave thy flowing hair.

The primrose bank, the wimpling burn,
The cuckoo on the milk-white thorn,
The wanton lambs at early morn
Shall welcome thee, my dearie, O.

The only extant letter written by Burns in the vernacular was sent to William Nicol on 1 June 1787 from Carlisle. In describing two young women he had encountered Burns wrote:

“I met wi’ twa dink quines in particular, ane o’ them a sonsie, fine, fodge lass, baith braw and bonie; the tither was a clean-shankit, straight, tight, weel-far’d winch, as blythe’s a lintwhite on a flowerie thorn, and as sweet and modest’s a new blawn plumrose in a hazle shaw.”

The second native primrose mentioned by Burns in his poems is the Cowslip - *Primula veris*. Cowslips grow on stalks up to 12 inches tall and have umbels of drooping flowers each with a spot of orange. Attractive to insect pollinators the cowslip prefers well-drained grasslands. It may also be found in scrub, woodland rides and on calcareous cliffs.

After a period of decline due to agricultural improvement of grassland the cowslip has recently been found more frequently on roadsides sown with wild-flower mixtures that have spread it inland from its former coastal range.

Cowslips have been mentioned often in British literature: Virginia Woolf, William Shakespeare, John Milton, Izaak Walton, and John Clare, John Keats and of course, Robert Burns who mentions the cowslip in his poem *The Lass Of Cessnock Banks* that was written for Alison Begbie who rejected his proposal of marriage:

She's stately like yon youthful ash,
That grows the cowslip braes between,
And drinks the stream with vigour fresh –
An she has two sparkling, rogueish een!

Burns also mentions the cowslip in *And Maun I Still On Menie Doat*:

In vain to me the cowslips blaw,
In vain to me the vi'lets spring;
In vain to me in glen or shaw,
The mavis and the lint-white sing.

And again, in his *Elegy On Captain Matthew Henderson*, Burns writes,

Mourn, Spring, thou darling of the year!
Ilk cowslip cup shall kep a tear:
Thou, Simmer, while each corny spear
Shoots up its head,
Thy gay, green, flowery tresses shear,
For him that's dead!

Two additional native primroses that Burns most likely did not encounter are the Scottish primrose found in the far north and the oxlip found in the southeast. The first of these, *Primula scotica*, is endemic to the north coast of Scotland in Orkney, Shetland, North Sutherland and Caithness on well-drained, sometimes heavily grazed, maritime heath near the edge of cliffs. The plant is very small making it difficult to find. Several years ago, I ventured north to Orkney ostensibly to see Skara Brae and the Ring of Brodgar, but in my heart I was going north to try to find the elusive Scottish primrose - with flowers so tiny I almost missed them until I knelt and looked more closely finding them at Strathy Point and Yesnaby.

The Scottish primrose has dark purple flowers with bright yellow throats atop smooth stalks. Each flower has five heart-shaped petals. The base of the plant has oval leaves which are deeply veined. It is on the ICUN's red list and on the Government's Scottish Biodiversity List and is

classified as being 'nationally scarce'. Scottish primrose is fertilised by insect pollinators such as hoverflies, but also can self-fertilise.

A fourth native primrose, the oxlip, *Primula elatior*, is a perennial herb of woodlands on seasonally flooded clay soils in the lowlands. Browsing by deer, the planting of conifers and the cessation of coppicing have reduced the oxlip's numbers. Fortunately, wild stock has been propagated and introduced into former sites.

Occasionally a non-native primrose will appear. I have observed *Primula bulleyana* on the edge of the preserved portion of Gillies Hill, Cambusbarron. This primrose called candelabra primula because of its tiered arrangement of flowers, is native to China and was first introduced to Scotland by the Scottish botanist, George Forrest in 1906. Forrest was one of the first western explorers of China's then remote southwestern province of Yunnan. *Primula bulleyana* thrives in a bright, moist environment, such as beside a pond – indeed the curling pond area is where I first noticed this species, perhaps a remnant of the plantings on the Murray family's Polmaise estate in Cambusbarron.

A common hybrid called "polyanthus" or false oxlip, is a naturally occurring cross between the common primrose and the cowslip. This hybrid resembles the common primrose and has been hybridized with other colourful species from around the world since the 17th century to create the colourful flowers we find in nurseries for planting out in gardens today, some of which have escaped and become naturalised throughout Britain.

Interestingly all four extant primroses in Scotland, except the Scottish primrose, have two types of flowers, some with elongated female styles (pin flowers) that receive pollen, and others (thrum flowers) with elongated stamens to distribute pollen. This process is called heterostyly - styles of different lengths - that let the flowers avoid inbreeding. Observing this Charles Darwin said, "No little discovery of mine ever gave me so much pleasure as making out the meaning of heterostyled flowers."

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ROBERT BURNS' EVERLASTING BEAUTIES

The mountain daisy that Robert Burns' included in several of his poems is to many people the perfect daisy. As with other members of the daisy family, *Asteraceae*, each daisy is in fact a miniature bouquet consisting of a center of petal-free "disk" flowers surrounded by a circle of "ray" flowers, each with one white petal occasionally tipped with a blush of red. The daisy spreads by underground rhizomes, frequently colonizing lawns thus giving it one of its common names, "lawn daisy". The heliotropic flowers that follow the sun's path each day, in the UK from March to October are native to Western, Central, and Northern Europe and have spread throughout North and South America and Australasia.

The daisy's binomial, *Bellis perennis*, is derived from the Latin words "beautiful" and "everlasting." The English name for the flower "daisy", may come from the term "day's eye" due to the flowers' blossoms closing at night and opening in the morning. The daisy is a popular garden plant as are its cultivated varieties, single and double-flowered blossoms ranging from white through pink to red.¹

The mountain daisy is also known as gowan, common daisy, and English daisy. In his letter to Mrs. Dunlop on January 1, 1789, Burns wrote, 'I have some favourite flowers in spring, among which are the mountain daisy, the hare-bell, the fox-glove, the wild brier-rose, the budding birch, and the hoary hawthorn, that I view and hang over with particular delight.'²

I grew up along the central coast of California with its Mediterranean climate. The regularly irrigated lawns at our high school were covered with common daisies and in the spring we girls would pluck the flowers to make daisy chains. We would also pick one blossom and pulling out the ray petals one by one, would recite, “he loves me, he loves me not.” I’ll leave it up to you to guess if he did indeed love me!

Burns used the generic name “daisy” for the flower in the following poems.³

The Vision – 1784-1787

Yet, all beneath th' unrivall'd rose,
The lowly daisy sweetly blows;
Tho' large the forest's monarch throws
His army shade,
Yet green the juicy hawthorn grows,
Adown the glade.

Adown Winding Nith

The Daisy amus'd my fond fancy,
So artless, so simple, so wild:
'Thou emblem,' said I, "o my Phillis" –
For she is Simplicity's child.

And Maun I Still On Menie Doat 1785-6

And when the lark, 'tween light and dark,
Blythe waukens by the daisy's side,
And mounts and sings on flitting wings,
A woe-worn ghaist I homeward glide.

Epistle to Davie, A Brother Poet 1789

In days when daisies deck the ground,
And blackbirds whistle clear,
With honest joy our hearts will bound,
To see the coming year:

Lament Of Mary Queen of Scots 1790

Now nature hangs her mantle green
On every blooming tree,
And spreads her sheets o daisies white
Out o'er the grassy lea;

The Posie 1794

The lily it is pure, and the lily it is fair,
And in her lovely bosom I'll place the lily there.
The daisy's for simplicity and unaffected air –
And a' to be a posie to my ain dear May!

In the following poem Burns referred to the daisy as a "daisie."⁴

The Auld Farmer's New Year Morning Salutation To His Auld Mare, Maggie 1786

Tho now thou's dowie, stiff and crazy,
An thy auld hide as white's a daisie,
I've seen three dappl't, sleek and glaizie,
A bonie gray:
He should been tight that daur't to raize thee,
Ance in a day.

In a few of his pieces, Burns used the term "gowan" for the daisy.⁵ The first known use of the word *gowan* was in 1570. The word was derived from "gollan" which was used for the marsh marigold, *Caltha palustris*, among other members of the daisy family. Gowan was also used for plants other than common daisy when prefixed with a defining term such as guil gowan for corn marigold, horse gowan for ox-eye daisy, milk-gowan for *dandelion*, sheep's gowan for white clover and yellae gowan for the common buttercup.⁶

My Nanie O

Her face is fair, her heart is true;
As spotless as she's bonie, O;
The op'ning gowan, wat wi dew,
Nae purer is than Nanie, O.

Their Groves O Sweet Myrtle 1795

Far dearer to me are yon humble broom-bowers,
Where the blue-bell and gowan lurk lowly, unseen;
For there lightly tripping among the wild flowers,
A-list'ning the linnet, aft wanders my Jean.

Sketch (Poem on Pastoral Poetry)

In gowany glens they burnie strays,
Where bonie lasses bleach their claes;
Or trots by hazelly shaws and braes
 Wi hawthorns gray,
Where blackbirds join the shepherd's lays
 At close o day.

Death and Dr Hornbook 1785

His braw calf-ward whare gowans grew,
 Sae white and bonie,
Nae doubt they'll rive it wi the plew;
 They'll ruin Johnie!

Auld Lang Syne 1788

We twa hae run about the braes,
 And pou'd the gowans fine,
But we've wander'd monie a weary fit,
 Sin auld lang syne.

Lastly, the poet's most well-known daisy poem *To a Mountain Daisy*, was enclosed in a letter he sent to John Kennedy on 20th April 1786. The 'artless maid' is Jean Armour, about to be banished to Paisley to marry a suitor richer than Burns whose child she was carrying. At this time, Burns had decided to emigrate to Jamaica, leaving his troubles behind in the journey's 'billows' and gales.' However, before departing his poems were accepted by the Edinburgh literati, receiving great acclaim, which prompted Burns to stay in Scotland.⁷

To A Mountain Daisy (originally titled, The Gowan) On Turning One Down With The Plough. In April 1786.

Wee, modest crimson-tipped flow'r,
Thou's met me in an evil hour;
For I maun crush amang the stoure
 Thy slender stem:
To spare thee now is past my pow'r,
 Thou bonie gem.

Alas! it's no thy neebor sweet,
The bonie lark companion meet,
Bending thee 'mang the dewy weet,
 Wi' spreckl'd breast!
When upward-springing, blythe, to greet
 The purpling east.

Cauld blew the bitter-biting north
Upon thy early, humble birth;
Yet cheerfully thou glinted forth
 Amid the storm,
Scarce rear'd above the parent-earth
 Thy tender form.

The flaunting flow'rs our gardens yield,
High shelt'ring woods and wa's maun shield;
But thou, beneath the random bield
 O' clod or stane,
Adorns the histie stibble-field,
 Unseen, alane.

There, in thy scanty mantle clad,
Thy snawie bosom sun-ward spread,
Thou lifts thy unassuming head
 In humble guise;
But now the share uptears thy bed,
 And low thou lies!

Such is the fate of artless maid,
Sweet flow'ret of the rural shade!
By love's simplicity betray'd,
 And guileless trust;
Till she, like thee, all soil'd, is laid
 Low i' the dust.

Such is the fate of simple Bard,
On Life's rough ocean luckless starr'd!
Unskilful he to note the card
 Of prudent lore,
Till billows rage, and gales blow hard,
 And whelm him o'er!

Such fate to suffering Worth is giv'n,
Who long with wants and woes has striv'n,
By human pride or cunning driv'n
 To mis'ry's brink;
Till, wrench'd of ev'ry stay but Heav'n,
 He, ruin'd, sink!

Ev'n thou who mourn'st the Daisy's fate,
That fate is thine - no distant date;
Stern Ruin's plough-share drives elate,
 Full on thy bloom,
Till crush'd beneath the furrow's weight,
 Shall be thy doom!⁶⁻⁷

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⁶ The Online Scots Dictionary, <https://www.scots-online.org/dictionary/>

⁷ Sibbald, David, *Robert Burns, A Tribute to Scotland's National Poet*: <http://www.robertburns.plus.com/>

Mr Sibbald's heartfelt presentation of *To a Mountain Daisy* is available at: <http://www.robertburns.plus.com/form.htm>

WILD PLANTS NEAR HOUSES IN DUNDEE

There is a general view that contact with nature improves peoples feeling of well-being and may have some health benefits, although it can be difficult to control all the variables in any formal assessment. Prescribing nature has been advocated and Gartside et al (2023) suggested walking in natural environments, and other outdoor experiences. Many of us spend much of our time in towns, and it was suggested that nature in towns is likely to be associated with beneficial outcomes (Gartside et al 2023).

Trees are very much part of the natural environment and may also produce positive outcomes in terms of wellbeing. Konijnendijk (2023) has developed a 3:30:300 rule that recommends that everybody should be able to see 3 trees from their house, have 30% canopy cover and live within 300 meters of a public greenspace. Nieuwenhuijsen et al (2022) attempted to evaluate this guideline in Barcelona and found that few people in the city met this recommendation, there being a lack of public green spaces, but there was some evidence of a wellbeing benefit from trees.

Wild plants are a feature of Scottish urban landscapes, often arriving uninvited but then thriving in these man-made habitats. This Dundee study assessed the frequency of wild plant species near houses. It is possible that wild plants in towns may also contribute to the benefits of exposure to nature. A very tentative provisional guideline is suggested.

Method.

Ten urban streets in Dundee were studied, these being adjacent streets in the west part of the city. All the streets were residential and most had gardens.

In each street house numbers 7 and 22 were studied. In a few cases where one of these numbers did not exist the nearest number was used. Wild plants that had not obviously been planted were included and species within 20 meters of the property were counted. Most were in the street area, but some in the visible parts of the gardens were included. No householders were approached as no access to the plants was needed. Two visits were made, one in winter (January to March) and the other in summer (June to September).

Results:

A mean of 13.2 species was recorded for each property, varying from eight to 19 different species per site. The summer mean was 9.5 species and the winter mean 5.3 species per address.

A total of 56 different plant species were recorded near houses. The commonest species were *Poa annua* (Annual Meadow Grass) and *Stellaria media* (Chickweed) (Table 1). A further 24 species were recorded elsewhere in the streets being studied.

Ten neophyte (alien) species were recorded, the commonest being *Acer pseudoplatanus* (Sycamore) and *Cymbalaria muralis* (Ivy-leaved Toadflax).

Table 1 Number of Species near the 20 house sites

Number of house sites	Species found at the house sites
15-19	<i>Poa annua</i> , <i>Stellaria media</i>
10-14	<i>Arabidopsis thaliana</i> , <i>Epilobium species</i> , <i>Taraxacum</i> , <i>Senecio vulgaris</i> , <i>Sonchus oleraceus</i>
7-9	<i>Cerastium fontanum</i> , <i>Galium aparine</i> , <i>Sonchus asper</i> , <i>Acer Pseudoplatanus</i>
5-6	<i>Cymbalaria muralis</i> , <i>Erophila verna</i> , <i>Lapsana communis</i> , <i>Rubus fruticosus</i>
3-4	<i>Hedera</i> , <i>Ranunculus repens</i> , <i>Sagina procumbens</i> , <i>Agrostis species</i> , <i>Campanula poscharskyana</i> , <i>Linaria purpurea</i> , <i>Pentaglottis sempervirens</i> , <i>Veronica arvensis</i>

Discussion:

This study demonstrates that wild plants are a widespread feature of the urban environment in this area of Dundee. Experience suggests that this is typical of many streets in urban Scotland. These are heavily managed habitats, and the number of species is likely to vary, depending upon herbicide application and other forms of control. The number of individual plants was not counted, and this might be a feature of a future study.

It is good to see that native species predominate and those occurring most frequently are likely to be able to reproduce quickly, given frequent herbicide and other interventions.

Some neophytes (aliens) also occur, some frequently, but these are usually outnumbered by natives.

Urban wild plants still have an image problem, often being regarded as nuisance weeds, although perceptions may be slowly changing. Many councils are moving towards more wildlife friendly policies and public perception may be slowly becoming more favourable.

No attempt was made to assess any wellbeing benefits of these plants to local inhabitants and any benefit may take some time to develop. Garden plants and urban council plantings are often much enjoyed and may be still more important to people than wild plants that arrive uninvited.

A tentative guideline, similar to the one for trees, is suggested being 5:50:500. This would be 5 wild plant species growing within 5 meters of a house, 10 species within 50 meters and 20 species within 500 meters. This may not be the best formula and would require much more assessment.

We also need to continue to promote the value of wild plants in urban places. Some management of urban habitats will always be needed but it should bear nature in mind.

A similar study carried out in some small Easter Ross towns yielded a similar result with a slightly lower figure of a 11.4 species per house over the year. (Ballinger 2024)

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UPDATE FROM THE STUDENT SECTION OF BSS

News from the new Student subgroup at the BSS see information here:
<https://botsoc.scot/2024/01/05/new-year-new-student-group/>

Botanical University Challenge:

The student BSS entered the Botanical University Challenge (<https://botanicaluniversitychallenge.co.uk/>)

This is similar to the classic TV show University Challenge, but all the questions are themed around plant knowledge. This Challenge competition started in 2016 and is a competition between UK & Irish Universities. The competition involves:

- Knockout competitions where universities go head to head on 14th Feb and 21st Feb. Quarter finals on 28th Feb and semi/finals on 28th August. Eight teams go through to the quarter finals.
- Example of types of question include: Which of these is most likely to be a host plant for toothwort in the British Isles? Willow, hazel, alder, hawthorn or Scot's pine?
- Juliet De Banzie is the team leader for the Edinburgh team named Leaf, Laugh, Love. The team made it through to the second round! However unfortunately did not make it further to the quarter finals. I believe in the first round they came joint 6th with 30 points. In the second round they came 15th and sadly only the top 8 teams get through.

Pub Quiz in Edinburgh on 39 January:

- Questions were almost all botanical apart from one round that Juliet did in the style of "Would I lie to you" about Richard Milne's life (BSS council member and lecturer at Edinburgh University)
- The winning team were called "Guardians of the Garden"
- Prizes included a book prize, sweets and the Guardians were the first people to take home our new BSS plant mascot (picture attached- its a jade plant).

The prize will go to different people depending upon the BSS student activities and photographs of the plant will be posted on our social media.

Workshop using cyanotype for botanical prints:

- Cyanotype has long history of being used to take botanical prints.
- Cyanotype technique was inspired by Anna Atkins, an amazing artist who pioneered the technique in botany.
 - The cyanotype chemicals can be brushed onto paper or onto cloth.
 - The idea for workshop was to go out with people to collect plants they would like to study and making prints with them.
 - The prints are left on windowsill for 30 mins and after washing you see a reversed image! (see examples in photographs centrefold p30)

The workshop went really well and Sophie Hudson, one of the student members wrote the following piece about the experience.

“On the 26th of February, the BSS student sub-group held a cyanotype printing workshop – with anyone welcome, regardless of botanical knowledge! We began in Holyrood Park, where we spent some time collecting different plants that we wanted to use for printing, such as ferns and ivy, from around St Margaret’s Loch. We then met up in the Royal Oak to start on the printing. We first organised our plants on plain white t-shirts to get an idea of how we wanted our designs to look. We then removed the plants and using a sponge saturated the t-shirts with cyanotype dye. We then placed our plants back onto the t-shirt, where the plants blocked out any UV light from contacting the t-shirt and reacting with the cyanotype dye. The results turned out to be stunning – and we all now have inverted prints of plants on clothes; with designs completely unique to us! A super easy, super fun experience – with a chance to combine arts and crafts with a plant identification experience”.

Ellie Besington BSS student rep

NATURESCOT’S HERBICIDES REPORT

NatureScot has published a report that has looked at the issue of herbicide usage in nature conservation and the potential impacts on biodiversity <https://www.nature.scot/doc/naturescot-research-report-1307-> The report was commissioned by Kate Holl from NatureScots

woodland habitat team. Kate recently gave a lecture at the BSS. She has a special interest in grazing, herbicides and the conservation and translocation of widespread native woodland plant species, within new or mature planted broadleaved woodland that has not developed a biodiverse flora.

Kate wrote the following to highlight the publication of the herbicide report.

“I am really pleased to have finally got this report published. Since work began on the report one of the main herbicides that we come across, Asulam, has already been withdrawn from use in Scotland! But glyphosate, which is also discussed in the report, is still very widely used. The report identifies that many wild plant species are sensitive to glyphosate, and that even at a distance of more than 50m from the site of spraying, damage could be possible. Other tests showed that even with drift reducing nozzles and a wind speed of 10mph, a significant amount of the herbicide was found up to 25m away from the site of spraying. How often in Scotland do we have wind speeds of only 10mph? So the chances are that drift, and therefore damage is normally much greater. When the dose is not high enough to be lethal, other effects observed included reduction in flowering, or delays in flowering, and reduction in seed viability all of which of course impact on invertebrates and other species groups.

The report goes on to discuss significant and important impacts on lichens, amphibians, pollinators and soil microbiota and reports on work that shows the herbicide can persist at measurable levels in plants for up to 12 years. “

Jill Thompson

ABSTRACTS FROM THESES SUBMITTED FOR BSS THESIS PRIZE

Krisztian Nemeth, University of Glasgow

Abies nordmanniana in West Scotland: associated *Sternorrhyncha* pests and characterisation of *Dreyfusia* infestation

MSci Molecular & Cellular Biology (with Plant Science)

Abstract

Abies nordmanniana is an important speciality crop and is the main cultivated tree species for use as Christmas trees in Europe (1). The crop's long rotation period creates stability and lack of disturbance which allows a complex of pests to develop (2, 3). Growers in Europe are faced with several challenges related to infestation by pathogenic insect. Adelgids (*Dreyfusia*) pose the most significant threat to crops in the UK (4, 5), with growers highly dependent on pesticide application to prevent damage to crops (6). *Dreyfusia* infestation of *Abies nordmanniana* outside of their natural range has been poorly characterised. *Abies nordmanniana* growers in the UK are under pressure to reduce their dependency on insecticides and utilise more environmentally friendly integrated pest management strategies. Here we provide a resource to aid growers in the identification of Sternorrhyncha pests, allowing for more targeted and specific management strategies. We also identify and characterise a *Dreyfusia* infestation on a plantation in Western Scotland, with the intention of informing future management. Our results demonstrate that larger trees are more likely to be more severely infested by *Dreyfusia*. We also show that the middle portion of the crown is more likely to have a more severe infestation than the lower and upper portions of the tree's crown. We anticipate this characterisation to inform future management practices. For example, targeted application of pesticides focusing on larger trees or targeting the middle crown may be an efficient way to reduce pesticide use while still reducing the impact *Dreyfusia* infestation has on crop yield.

ELIZABETH STROUD, University of Edinburgh

Investigating seed viability and germination success of the slender naiad, *Najas flexilis* (Willd.) Rostk. & Schmidt
BSc (Hons) Ecological and Environmental Sciences

Abstract

Najas flexilis is a rare endangered aquatic macrophyte. It plays vital roles in freshwater systems as food, shelter and a nutrient cyler, but is in decline due to climate change, eutrophication, acidification and competition. The UK distribution of *N. flexilis* is now confined to Scotland, and reintroductions have been unsuccessful due to low germination rates. TTC stain tests and germination trials were carried out to test i) the

effect of seed coat colour lightness on viability and germination success and ii) the effect of natural loch sediment, autoclaved loch sediment, and an autoclaved sand control on germination success. Leaf counts and root/shoot ratio measurements were taken of any successfully germinated seedlings to provide indications of their nutritional status. Sediment microcosms were set up under conditions matching those of the germination trial and the aquatic chemistry compared between the three sediment treatments. Seed colour lightness had no effect on viability or germination, rendering it a useless attribute in propagation and reintroduction practices. Autoclaving loch sediment fostered an anoxic and nutrient enriched aquatic environment which led to increased germination success. The low root/shoot ratio of the resulting seedlings suggests high acquisition of nutrients from surrounding waters, but lowered leaf numbers compared to those grown in natural sediment may be the result of metal toxicity or reduced light levels. The results highlight the potential for deoxygenated environments to be a trigger germination, though long term, environmental parameter focused experiments are required to isolate the cause and long-term effects on plant health.

Zachery Brown, University of Aberdeen

Thermophilization of arctic-alpine plant communities with potential indicator species. MSci Biological Sciences

Abstract

1. Climate warming is predicted to drive a major shift in montane plant communities to high altitudes, risking specialist arctic-alpine populations at their lowest latitudinal limits with extinction. The establishment of novel species interactions magnify the effects of rising temperatures causing a community transformation from cold weather adapted species to species better adapted to warmer conditions, known as thermophilization. The questions here are: is there a link between the terrain (aspect, altitude, and sub-region) and/or vegetation type to the degree of thermophilization? Which vegetation types show the greatest degree of thermophilization? Could there be indicator species for each vegetation type indicating the occurrence thermophilization?

2. Phytosociological plots first described in the south/central west Highlands of Scotland during the 1950s were re-surveyed to assess changes in species composition over a period of 70 years in six broad

high-altitude vegetation types. From calculated thermophilization indicator scores, relationships between terrain (altitude, aspect, and region) and vegetation types were deduced using null hypotheses significance testing. Threshold indicator taxa analysis was used to identify potential indicator species for thermophilization using species change-points along a gradient of calculated thermic indicator scores. Environmental changes inferred from species total percentage cover trends using published data.

3. It was found the greatest degree of thermophilization occurred at higher elevations for all vegetation types, however significant signs of thermophilization were only notable in wetlands and herb communities. Grasslands and heath maintain thermic stability. Indicator species for thermophilization were identified in wetland and herb communities with a general shift to species more tolerant to drier, warmer conditions.

4. There was a clear thermic transformation in the studied arctic-alpine plant communities that are dependent on snow cover and wetter conditions. Over the last 70 years, the upward shift in species from lower elevations risk magnifying the effects of a warming climate on arctic-alpine species. Further research may need to consider the rate of thermophilization at lower latitudinal survey sites.

Scott Galloway, Edinburgh RBGE (Thesis prize winner)

Phylogeny of *Bergenia*: a genomic approach BSc (Hons) Horticulture with Plantsmanship

Abstract

Bergenia are evergreen perennial herbs native to Central and East Asia. Since their introduction they have become popular garden plants and extensive breeding has taken place. Several name changes have caused taxonomic confusion and in response Antonina Borissova and Peter Yeo undertook revisions in the mid-20th century. Since then, molecular research has been focussed on the pharmacological potential of the plants but there has been very little study of their genetic diversity, evolutionary history and relationships. Therefore, a detailed molecular study of *Bergenia* at the species level is long overdue. To address this, plastid data for 16 *Bergenia* species and hybrids was generated using the Angiosperm 353-bait set and complete plastomes were assembled. A comparative analysis shows a highly conserved quadripartite structure for *Bergenia* plastomes, similar in size, gene number and GC content.

To infer phylogenetic relationships, plastid data was combined with five published complete plastomes of Saxifragaceae species available on GenBank. The results present a mostly well resolved phylogeny that recognises *Bergenia* as monophyletic with three main clades. 100% posterior probability support is observed in the Bayesian Inference tree while the Maximum Likelihood tree provides mostly strong support. The position of *B. crassifolia* and *B. cordifolia* does not agree 100% with the treatment of the latter as a synonym. Endemism in China is observed for *B. emeiensis*, *B. scopulosa* and *B. tianquanensis* but the species appear separately in different clades. Unknown species remain unresolved although the phylogenies provide insight into their relationship with other taxa. A biogeographical analysis also shows a North-South, Eastern Himalaya and Western Himalaya distribution for the species with some geographical cross-over for *B. pacumbis* and *B. purpurascens*. Revising and updating the genus is a future goal but it was beyond the scope of this undergraduate thesis due to time restrictions.

SUMMER IN THE TUNDRA

Overview:

This summer I had the incredible opportunity, supported by BSS, to explore tundra vegetation in two unique ecosystems; alpine and arctic. I joined Team Shrub, a research group led by Professor Isla Myers-Smith, in the Yukon for a summer full of learning about tundra plants.

Team Shrub is investigating how tundra plant communities are changing in response to a climate that is warming four times faster than the rest of the world (Rantanen *et al.*, 2022). There are indications of dramatic changes in these fragile ecosystems, including changes in the timing of plant growth as snow melts earlier, and an increase in the coverage of the woody plants that Team Shrub gets its name from (Bjorkman *et al.*, 2015; Myers-Smith *et al.*, 2015). However, because much of the Arctic is extremely remote and difficult to access, study of these changes is often spatially limited (Thomson *et al.*, 2021). Researchers use a variety of technologies to help with this problem, such

as phenology cameras set up to capture the timing of plant growth from the first snow melt until they are buried again in the fall are an important tool.

Another technology that I am particularly interested in is the use of hyperspectral imaging to estimate plant traits. Hyperspectral sensors capture wavelengths beyond what our eyes, or a traditional visible spectrum camera sensor, can capture. Different elements in the plants interact with light in different ways, creating unique light reflectance patterns that give insight into plant traits such as water content, leaf structure, and even chemical composition (Serbin *et al.*, 2019). Traditional laboratory-based measurements of these traits are time and labor intensive, limiting their application in remote settings such as the Arctic (Thomson *et al.*, 2021). This summer, we were working to sample the leaves of three common willow species (*Salix pulchra*, *Salix arctica*, and *Salix richarsonii*). These species are commonly found throughout the North American tundra, allowing us to compare their traits between sites. We collected leaves and brought them back to our makeshift laboratory where we recorded their fresh and dry weights, scanned the leaves to get a measure of leaf area, and captured their spectral signatures with a spectrometer. We repeated this process throughout the summer, capturing both fresh green leaves at the height of the growing season and the golden and red colors of senescent leaves.

By measuring leaves at different phases throughout the growing season, we can evaluate the effectiveness of hyperspectral data to predict plant traits at different times. The growing season in the Arctic is very short; within a just a few months plants green up, flower, and start to drop their leaves. Within this cycle, the chemical and morphological properties of leaves change, along with their hyperspectral signatures. Thus, the timing of measurements can have a big impact on the accuracy of hyperspectral data in predicting plant traits.

My research experience:

We arrived at Qikiqtaruk - Herschel Island, in June 2023, just as the sea ice was leaving the island and snow patches were melting. We spent some time recovering phenology cameras that had been knocked down over winter, by high winds and snow, or by some mischievous musk ox. These hikes gave me an opportunity to practice my plant identification and get more familiar with the tiny tundra vegetation. Once the cameras were upright again (some just for the moment... re-righting phenology cameras turned out to be a never-ending task), it was time to start

sampling leaf spectra. We set up our ‘lab’ in our cabin, with our leaf spectrometer, scanner, and scale on the space available: a bed with a piece of plywood on top. In June, we were aiming to sample fresh green leaves, while the plants were at their ‘peak greenness.’ This meant finding fresh green leaves, and it also meant that our visit coincided with peak flower season. Towards the end of our three weeks on the island, lupins and mountain avens covered the hillsides in bright purple patches, with forget-me-nots, arctic poppies, wooly lousewort, and buttercups adding their colors to the mix. It was hard to say goodbye to such a brilliant landscape, but it was time to head to the mountains.

From Qikiqtaruk, we traveled south to the Kluane region of the Yukon, where the tundra plants were found only on mountain tops and plateaus. Because we were further south, snow melts earlier and the growing season starts earlier, so plants were further along in their growth cycle than those we had seen on the island. Many of the mountain avens for example, had already dropped their petals and gone to seed. However, the elevation gradient of the mountains also created a gradient in phenology; at the top of the plateau, where conditions are colder and snow melts later, we found a few mountain avens still in full bloom. As in Qikiqtaruk, we first re-righted phenocams, and then got to work sampling leaf spectra. We had to hike farther to get our leaves and could only find *S. arctica* at the top of the plateau. A creeping willow, it sticks low to the ground and can’t compete with the taller grasses and shrubs lower down on the mountain. *S. richardsonii* and *S. pulchra* were found a bit lower down, although we still had to hike a ways to get above tree line to find them. The views from the plateau were gorgeous, but after several weeks, legs were ready for the flatter terrain of Qikiqtaruk.

In August, we returned to Qikiqtaruk to ‘winterize’ our cameras (hopefully some withstand the wind and animals this year) and take a few more leaf spectra measurements. By this time, most of the flowers had fallen, and the leaves of *Salix pulchra* had already started to yellow. We focused on capturing the spectral signatures of senescing leaves with their beautiful autumn colors. Although I had enjoyed the freshness of the bright green leaves, the senescent leaves had beautiful and interesting patterns, some bright red, others yellow and some spotted like leopard print.

I learned a lot over my summer in the Yukon, about tundra plants and their unique growing patterns, and about the process of research and data collection in the field. Back in Edinburgh, I’m looking forward to diving

into analysis of the leaf spectra collected this summer, hoping to gain insights into plant traits across the arctic and map changes in vegetation communities as the tundra continues to warm at an astonishing rate.

Else Radeloff

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BSS NEWS – GUIDELINES FOR CONTRIBUTORS

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

Receiving editor: Dr Jonathan Silvertown:

Email bss-contact@botsoc.scot (note this new email address)

All contributions should be sent to the Receiving Editor

Coordinating editor: vacant position.

Aims and scope of BSS News

The 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, for example:

- Reports of field excursions
- Descriptions and recommendations of botanical sites to visit
- Articles of current or historical interest
- Biographical profiles of botanists
- Botanical notes, poems, news, announcements, reports
- Citizen science projects to contribute to etc.
- Book reviews, crosswords and quizzes
- Illustrations, including paintings, photographs and line drawings

Guidelines for Contributors

Please follow the more detailed guidelines and use the template downloadable from

<https://www.botanical-society-scotland.org.uk/content/bss-news-newsletter-botanical-society-scotland>.

The space for colour images is limited to the cover and centre pages, please use black and white and greyscale for items within the text.

Contact the Receiving Editor for help and advice.

The deadlines are 15th January and 15th July each year.

Earlier submission is appreciated.

Captions to back cover photographs

Inside back cover:

1) *Salix dogeana*, world's tiniest willow (finger for scale), found on gravel patches and scree slopes, at the top of Kluane plateau.

See article on the Summer Tundra by Else Radeloff p51

Photograph by Else Radcliff

2) The beauty of senescent tundra vegetation, *Salix arctica* and *Lupinus arcticus* on Qikiqtaruk.

See article on the Summer Tundra by Else Radeloff p51

Photograph by Else Radcliff

3) The home page of the new Botanical Society of Scotland website.

Please go and see it <https://botsoc.scot/> Article by Rich Wilson our publicity officer and web administrator P9.

Outside back cover

Upper photograph 1:

The research station on Qikiqtaruk in June, with sea ice surrounding.

See article on the Summer Tundra by Else Radeloff p51

Photograph by Else Radcliff

Lower photograph 2:

The lupins and mountain avens were in full bloom at the end of our first trip to Qikiqtaruk in July. See article on the Summer Tundra by Else Radeloff p51 Photograph Else Radcliff

1) *Salix dogeana*, world's tiniest willow Article p51. Photo Else Radcliff



2) Senescent tundra vegetation, *Salix arctica* and *Lupinus arcticus*. Article p51. Photo Else Radcliff



3) New Botanical Society of Scotland Website. Article p9



1) The research station on Qikiqtaruk in June, with sea ice. Photos 1 and 2 by Else Radcliff. Article p51



2) The lupins and mountain avens in July Qikiqtaruk Article p51

