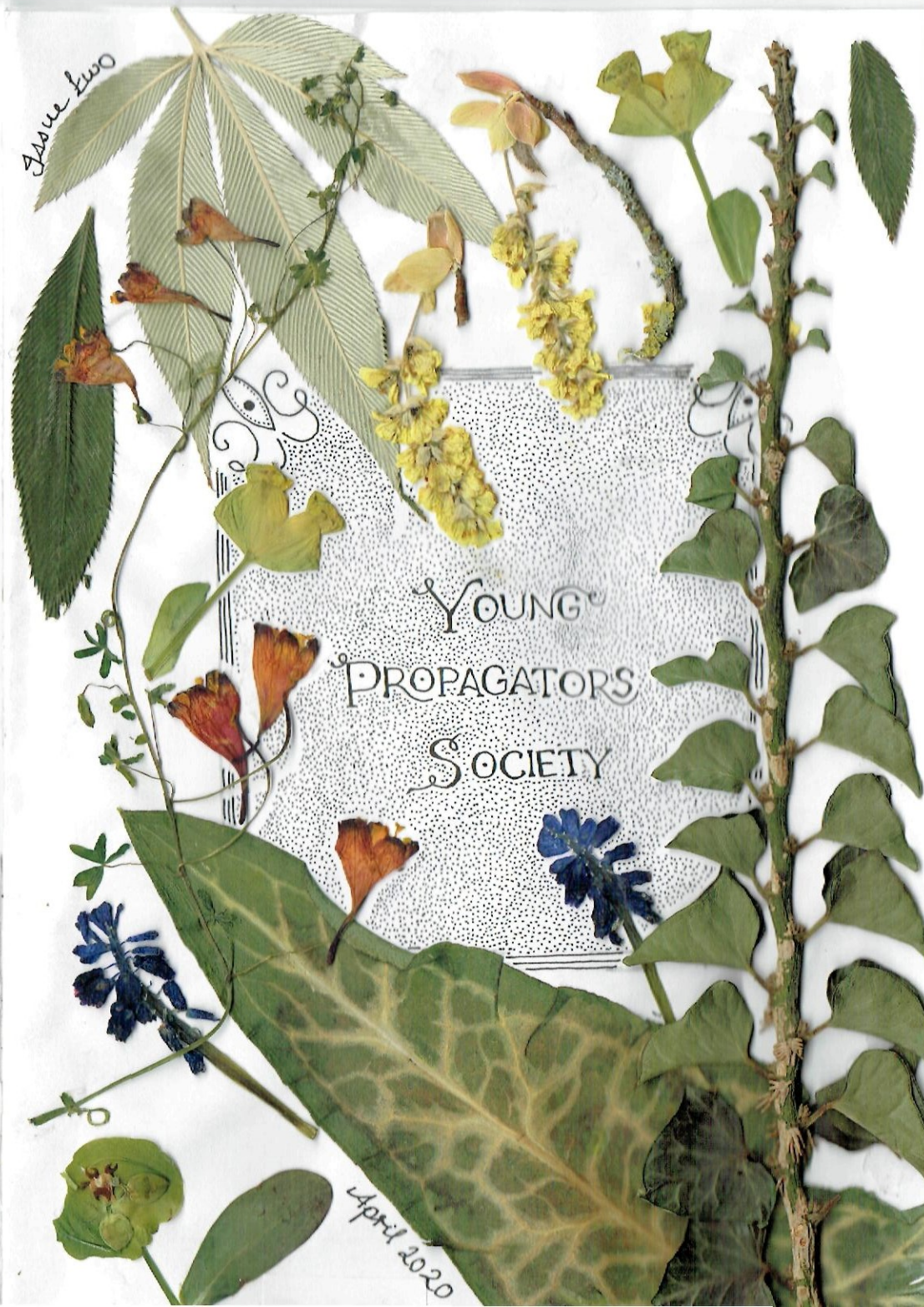


Issue Two

YOUNG
PROPAGATORS
SOCIETY

April 2020



The Editors

**Sophie
Cook**

Working abroad and observing the outdoors occupied my early twenties, until I began a BSc in Environmental Science focussing on ecology and soil microbiology. This was the beginning of almost a decade of perpetual studentship, pursuing scientific fact behind the everyday, moving between ecology, biochemistry, horticulture, propagation and sustainability. I am now Assistant Nursery Manager at Great Dixter Nursery where I continue to observe and learn from all that surrounds me. Follow me @sophiecharlottecook

**Ellie
Pay**

I started my professional career in nursery work when I got the position of Nursery trainee at Great Dixter. I then went on to work at De Hessenhof, got a studentship at RBG Kew and now work at Crûg Farm. These have been some of the best years of my life as I am constantly learning every day and meeting the most interesting people. It's why I'm excited about YPS so I can keep learning and meet more interesting people. Follow me @elliekatepay

The Young Propagators Society Manifesto

The society was formed with three intentions; to aid the dissemination of knowledge through the generations; to encourage more young horticulturalists into propagation and nurseryman-ship roles; and to inspire learning of all areas of the natural world. Our focus is on smaller scale but specialist and scientific knowledge of propagation. Alongside the YPS zine, we will also have a facebook group for discussions on propagation, and we hope to have an annual symposium of workshops and talks.

Illustration by Jamie Todd

In light of the covid-19 pandemic, we would like to support independent nurseries who are providing a mail-order service. We would also like to take this opportunity to thank all our contributors for their time & expertise, and to those who have supported us by requesting, reading & giving us feedback. We send you good health & happiness!

Blooming Wild Nursery Mail order plant list available online. Free delivery service within a 10 mile range of nursery, and small delivery charge outside of this. Bloomingwild.co.uk

Burnham Orchids Orchid growers with a great mail order service. Orchids.co.uk

Charles Chesshire Lots of unusual shrubs, perennials and Itoh peonies.

Symondsburyestate.co.uk

Crûg Farm Plants Exciting plants from around the world delivered to your door. Our mail order catalogue has thorough info on each plant, and help at hand only an email away.

Mailorder.crug-farm.co.uk

Edulis A small nursery specialising in unusual edibles and shade-lovers. Over 2000 plants – most available for mail order but not all on website. Many plants collected from plant hunting trips in the '90s and '00s. Edulis.co.uk

Great Dixter Nursery A small and traditional nursery specialising in rare and familiar plants, many from the garden. Greatdixter.co.uk/nursery.

Growild Rare and unusual plants and seeds online. Specialities include hardy plants from Asia. Growildnursery.co.uk

Harts Nursery Fifteen times gold medallists at Chelsea Flower Show and specialise in lilies and spring/summer bulbs. Hartsnursery.co.uk

John Cullen Gardens Plants for pollinators and *Achillea millefolium* national collection. Exhibits at Chelsea. Johncullengardens.co.uk

Kevock Garden Plants Specialist of alpine, bog and woodland plants and bulbs. Kevockgarden.co.uk

Mac Plants Central/southern Scotland's largest growers of herbaceous perennials, alpiners, ferns and ornamental grasses. Macplants.co.uk

Marchant's Hardy Plants New website and mail order service. Herbaceous perennials and ornamental grasses. Marchantshardyplants.co.uk

Monksilver Nursery Offering a huge range of rare and unusual plants. If you're searching for a particular plant then please email with your full details and we can see if we've got what you want. Monksilvernursery.co.uk

The Plantsman's Preference At PlantPref we propagate all our own plants. Peat free and plastic free mail order. Plantpref.co.uk

Prenplants Family run, peat free nursery that grows plants for wholesale. Prenplants.co.uk

Special Plants Mail order seeds, seedlings and plugs of interesting varieties. Specialplants.net

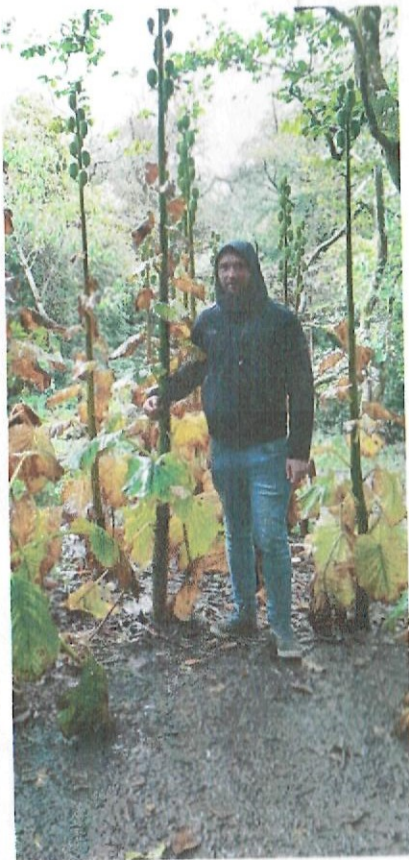


YOUNG PROPAGATOR FEATURE

Paul Symth. Follow him @paultsymth

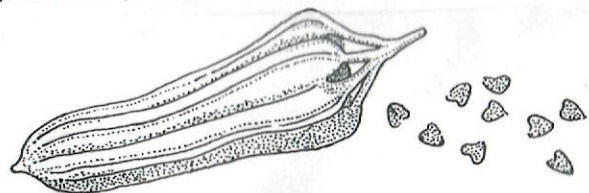
Propagation wasn't exactly a calling from birth but something that has evolved over time to being a major interest. I grew up in rural

South East Ireland on my family's farm. Veg growing was my first passion and I guess inadvertently the propagation had started at this stage. Veg growing is a great introduction to gardening; a fantastic way both to learn and confidence build for a propagator.



I studied in Waterford Institute of Technology only wanting to grow veg on my first day; by the end of the three years and having being immersed in plant ID, husbandry and propagation I had a very different outlook. I spent a year working for Irish landscape architect and gardener Angela Jupe in her garden 'Bellefield', where my interest in plants escalated as did my desire for propagation. On one of my last days there Angela mentioned twin scaling to me, a propagation

method for bulbs which happened to be her passion, in particular snowdrops and tulips.



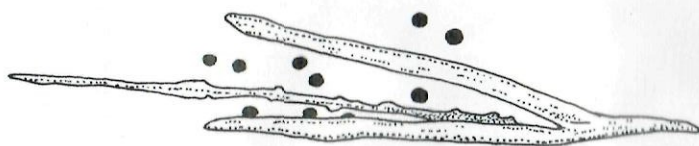
This innocent conversation led to me doing two research projects on twin scaling as part of my degree and, through Angela, meeting Tom Mitchell, an ex-banker and plantsman who was running Evolution Plants in Wiltshire. Tom had and still has a *Galanthus* collection like no other and it was my responsibility to record, organise and then propagate it ready for him to launch a Snowdrop mail order nursery. The method I used, twin scaling, is basically taking advantage of a bulbs defence mechanism in the event of them being damaged. So I spent months inside chopping up bulbs in a semi sterile environment, creating what we estimated was 50,000 bulbs. In the meantime I went to a show in Battersea Park with Tom and his plants called 'Grow London'. Here I came face to face with the renowned Crûg Farm. Tom later that summer decided to sell his nursery, so just as the fruits of my scaling were forming bulbs I found myself unemployed. A good friend in Crûg contacted me via Twitter and soon I found myself winding my way on a dark Monday bank holiday evening through the A5 into the heart of Snowdonia. The landscape got wilder and the houses fewer as I asked myself what was I doing...

My time at Crûg is definitely where my plant knowledge was tested honed and vastly improved. I started as the gardener and progressed eventually to propagator. For anyone who hasn't been it is well worth a visit, but be prepared to feel out of your depth. It took me well over a year before I was giving tours, listing off plants to perplexed visitors,

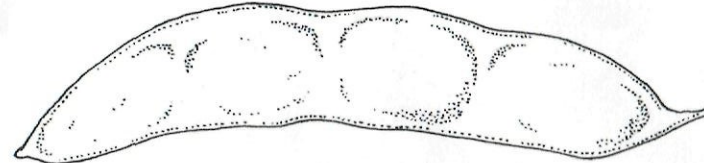
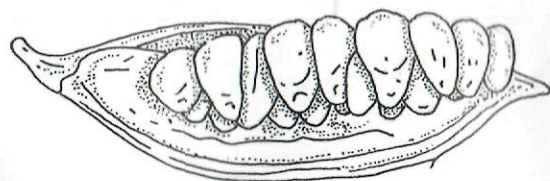


Holboellia brachyandra seed cleaned



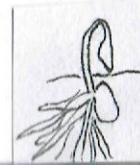
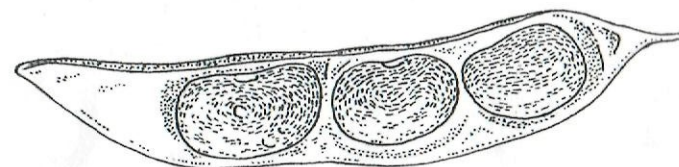


in the same way I was on my first day. The collection of plants amassed there is incredible and the variety is impressive. When I took over the propagating job, the responsibility of the potted stock came too, as did the realisation of the complexities of managing such a unique collection. The most exciting (and equally terrifying) part was the challenge of propagating this collection, many of which weren't in cultivation and quite often, when consulting propagation manuals, the genus was hardly listed and in some instances neither was the family! Back to basics is the answer in this case and observing growth habits, the type of growth and timing are all important. As is experimentation and just taking the chance. In some cases this is easily done, but often you are faced with a plant that yields one cutting a year, so an educated guess needs to be well calculated. That for me though is the joy of propagation and since leaving Crûg my opportunities for propagation plants has been limited but I find myself being less reliant on text books and more on my gut feeling from looking at the material I have and what I can do with it. The experimentation aspect and the thrill of cracking a particularly hard plant is definitely what keeps me going. I have been known to occasionally (when something went particularly right) to run excitedly into Crûg office with the rooted or germinated plant in hand. When you can hold in your hand the largest known population of a particular plant outside of its native habitat it humbles you, but also reminds you of the importance of plant propagation and the skill that you have mastered, as well as the importance to get that information into the public domain so all can benefit from it. That was easily my favourite part of the job, talking to others propagating and sharing your tips with them and vice versa. People are generally more than willing to pass the information as long as you ask and have an interest!



Seed Cleaning

Since leaving Crûg, I have been taken a totally different approach for a while, working for a garden designer as his plantsperson, having responsibility for some interesting jobs. While I miss the experimentation of propagation and the challenges it faces, my new role has allowed me to use plants for the first time in my career, considering them into their maturity and not just focus on producing them. While at some point I'd like to go back into that area of horticulture, for now I'm 26 and still figuring out exactly what I want to do and I'm not quite running out of time just yet! There is a plan to open an indoor plant shop in London offering talks and courses, where I'm sure I will lean heavily on propagation skills, if that happens. For now I'm back in Ireland for a while and gardening again at my parents in my free time, trying new things and open to what the future may bring! To keep up to date with what I'm at see my Insta: @paultsmyth.



Outdoor Seed Propagation

Jonny Bruce is a talented young plantsman working at De Hessenhof nursery in the Netherlands. He is also the gardener for Derek Jarman's Prospect Cottage in Dungeness East Sussex, ensuring it's legacy for the future.

You can follow him on Instagram @j.bruce.garden

At De Hessenhof we propagate almost everything ourselves and around 40% of it from seed. Few things get sown in pots as we prefer sowing directly into plug trays - no matter how skilled a propagator pricking out always takes longer than sowing. Another important source of plants are our outdoor seed beds and it is a shame that this once common nursery practise has become somewhat unusual.

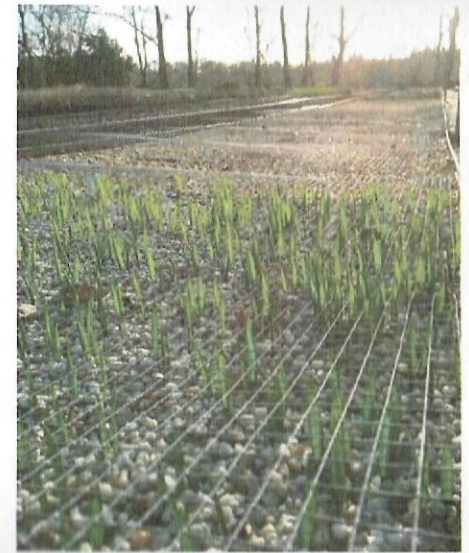


The great struggle of seed growing is there always too much. Firstly we save too much. Once this excessive seed has been sorted it seems a desperate shame not to use it so we all too often sow far too thickly. Come spring innumerable seedlings cry to be pricked out as they stretch in crowded pots in an increasingly hot glasshouse. The open ground allows the seedlings room to grow, from the moment of germination, exposed to the elements. The result is tougher plants, never

checked by the stress of being torn by the cotyledons and stuffed into a plug tray in which they invariably stay far too long.

By allowing outdoor seedlings to grow large enough to be directly potted is not only more time/cost efficient but reduces stress to the

plant. Automated irrigation ensures the beds do not dry out in the summer months and with a small amount of regular weeding, these beds are relatively low maintenance. Weeding seed beds is a fiddly business best executed with a thin knife to reduce disturbance. Once germinated these seedbeds also act as holding pens for large numbers of plants which would consume far too much space potted.



The key to the perfect seed bed is drainage. By keeping the beds narrow we can reach across without stepping on them and preventing compaction. We also always cover our seeds with grit which then gets turned into soil when we come to lift the seedlings. The level of the bed drops as the seedlings are lifted allowing for an important fresh layer of sowing compost free of weed seeds.

At Hessenhof we let most of the seedlings grow for the whole season before being lifted in late Autumn. We set apart what we need for potting while an excess list is made to be sold bare root to other nurseries. This provides a welcome source of income during the lean months of winter when we are closed to customers. As growers there is a fine line between 'caring' and 'cossetting' and while greenhouses will always be necessary, we shouldn't forget that outdoor seed sowing is a great way to just let the plants get on with it.



Quick Questions with Paul Seaborne

Paul has run Pelham plants for far too long to remember and now also runs Marchant's Hardy Plant nursery in his spare time. He has few friends and hope one day to pass away unnoticed at the potting bench, slumped over a particularly woody Sanguisorba.....

What's your most useful tool?

PS - A bucket of water. Dunk divisions and root cuttings to reveal the detail. Or a knife sharpener?

The most important piece of advice for successful cuttings.

Practice little and often. It's the failures that teach us about technique or timing.

Name your technique for cleaning seeds.

Comfortable seat with a beer.

What medium do you use for cuttings?

Proprietary mix of coir and perlite.

Your most proud moment as a propagator

Pride comes before a fall. Numerous times I've thought I have 'cracked it', only to fail later.

How did you get into propagation?

Need. I wanted a garden but had little cash.

What is it that keeps you hooked?

The small, incremental successes. "I'll do it better next time."

What's the hardest thing you've ever had to propagate?

It's all the things I don't specialise in: those that I don't practice and resolve. Fern spores and bulb twin scaling are things I have failed at and not taken time to retry.

What are your thoughts on rooting hormones?

Don't know them. Is it a rock band? Probably less important with herbaceous?

Do you use bottom heat?

Yes especially in Spring and Autumn. A nurseryman needs to extend the productive season.

Do you have advice for successful seed germination?

Don't over water. Don't sow too densely. Don't blame yourself. Don't give in.

Do you prefer seed or vegetative propagation? Why?

I love them for different reasons. The mass germination of seed is always a thrill. Especially if it gives you an unusual hybrid! The rooting of softwood cuttings, in a few days sometimes, blows my mind....

Do you use chemicals at any point in your propagation process?

No. Greenfly and slugs sometimes get a few choice words....

One piece of advice for someone beginning their career in propagation and nursery work.

Ask yourself 'why?' Take brief notes. Notice when plants are root active.

Do you clean your pots before reusing?

Cleanliness at propagation stage helps rule out a few reasons for failure.

What we're reading, listening to and watching...

Books

'The Farm as Ecosystem' (Brunetti) – suggested by Sophie Cook

'Seeds: Ecology, Biogeography, and Evolution of Dormancy and Germination' (Baskin and Baskin)

'Animal, Vegetable, Miracle' (Barbara Kingsolver) – suggested by Ellie Pay

'Weeds and What They Tell Us' (Ehrenfried E. Pfeiffer) – suggested by Sam Hollick

Podcasts

In Defence of Plants – suggested by Coralie Thomas

Infinite Monkey Cage – suggested by Sophie Cook

Horticulture rising – suggested by Ellie Pay

Youtube

Weed Suppression Using the Soil Food Web – suggested by Michael Wachter

Liziqi channel – suggested by Ellie Pay

Fantastic Fungi: The Magic Beneath Us (on Vimeo) – suggested by Sophie Cook

Please email us at youngpropagatorsociety@gmail.com if you would like to suggest something!



Reconstructing past environments from radiocarbon dating preserved moss

Heather Bell is currently carrying out PhD research in geosciences in the Arctic Circle while living on the archipelago of Svalbard, Norway. You can follow her here @heather.adventures

The technique of radiocarbon dating is a cornerstone of many studies into past climate change. Readers might be more familiar with the principle of radiocarbon dating from archaeology. This technique has been used to date the Shroud of Turin, the origins of Stonehenge from a piece of charred wood found on the site, and even seeds from the tomb of the King Tutankhamun. In this way, radiocarbon dating can also be used to date environmental change by sampling dead organic matter found preserved in the environment. All dead organic matter can be dated by radiocarbon dating

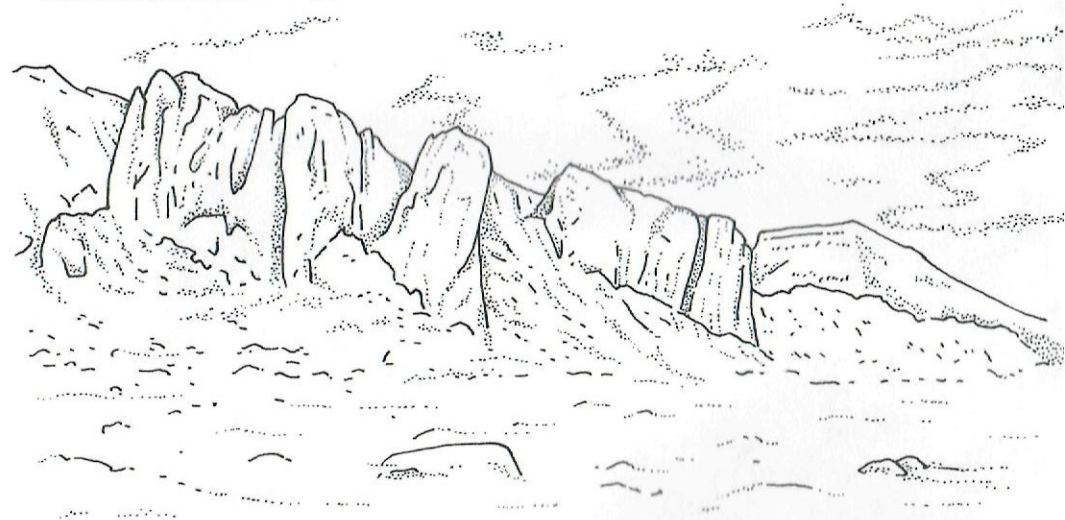
with varying degrees of success, up to a limit of approximately 45,000 years BP.

The principle of radiocarbon dating is based on the radioactive decay of different isotopes within an element. Carbon has three isotopes of which one, carbon-14 is in an unstable form and therefore radioactive. We know the half-life of carbon is about 5,730

years, after which about half of the sample will have decayed into carbon-12 and carbon-13 as new isotopes. Therefore, if we know the atmospheric ratios of carbon-14 over time, in order to calibrate our dating method, we can calculate when organic matter was last alive.



Moss is a commonly dated plant used to help reconstruct past environmental change. This is particularly the case in cold regions such as the high-arctic where plants are very slow growing and finding enough organic matter to date can be a challenge. Moss is often the most abundant organic matter found preserved within lake sediments for example, and quite often, researchers are left with only mixed fragments of preserved moss and little other organic material to date. There are some interesting complications to dating moss in particular which scientists need to take into account when it comes to reconstructing past environmental and climate changes.



Moss can be so slow growing at the high-latitudes. For some mosses found in Antarctica, the dates originating from the base of the plant have been dated to be up to five hundred years **older** than those obtained from the top. This is because as mosses take carbon dioxide in from the atmosphere to use for photosynthesis, the carbon becomes fixed in the cells of new growth. Being non-vascular plants, this carbon remains locked there until the plant finally decomposes. Therefore, scientists would preferably aim to find other organic material to date, such as leaves or diatoms, but they are often only left with moss.





Such slow growing mosses can therefore cause uncertainty in dating on decadal to centennial timescales. This is because it would be improbable to know which part of the plant you are sampling from in the broken and mixed samples which are often preserved in sediments. To further complicate the matter, some mosses have been shown to survive in situ cryptobiosis after six centuries of burial under glacier ice. In other words, some mosses have been shown to return to a metabolically active state and remain alive after being frozen underneath ice for

hundreds of years.

Paleoclimatologists from the University of Colorado Boulder take advantage of moss for radiocarbon dating by 'hunting' for mosses which are melting out of the base of cold-based glaciers. These glaciers have no water running at their base and are only moving very slowly by deformation so they are non-erosive to the surfaces they flow over. So at the base of such cold-based glaciers, mosses can be well preserved at their growing site. If they are found within a year or so they can usually be radiocarbon dated to show when they were last alive (assuming that they did not undergo cryptobiosis during multiple glacier advances and retreats). For parts of Canada's eastern Arctic, it has been shown from radiocarbon dating mosses that they may have been buried for between 45,000 to 115,000 years. This means that glaciers which had covered these mosses since the last ice age are now retreating due to a warming climate, suggesting that the summer in the Arctic is hotter now than it has been for at least 45,000 years.

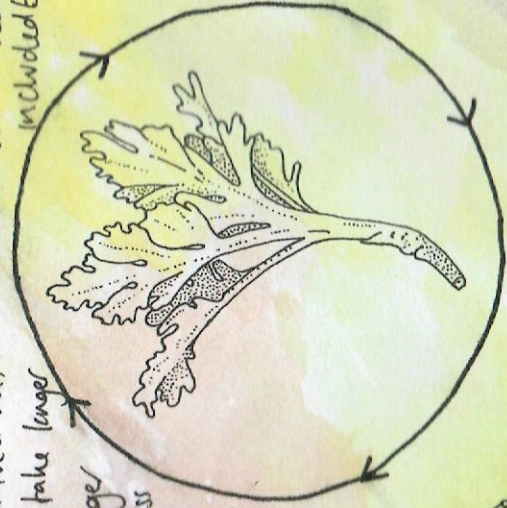
Basics Feature - The Seasonality of Cuttings by Sophie Cole



Basal cuttings - uses material that has fully matured & lost flexibility. Can take longer to rot but cutting is given a longer length to counter-balance this. Less likely to rot & kept at cooler temperatures. E.g. Populus, Sambucus.



Semi-ripe cuttings - material has some flexibility but it has matured & become woody further along the stem. Usually done mid-summer to autumn. A wide range of plants can be propagated in this way.

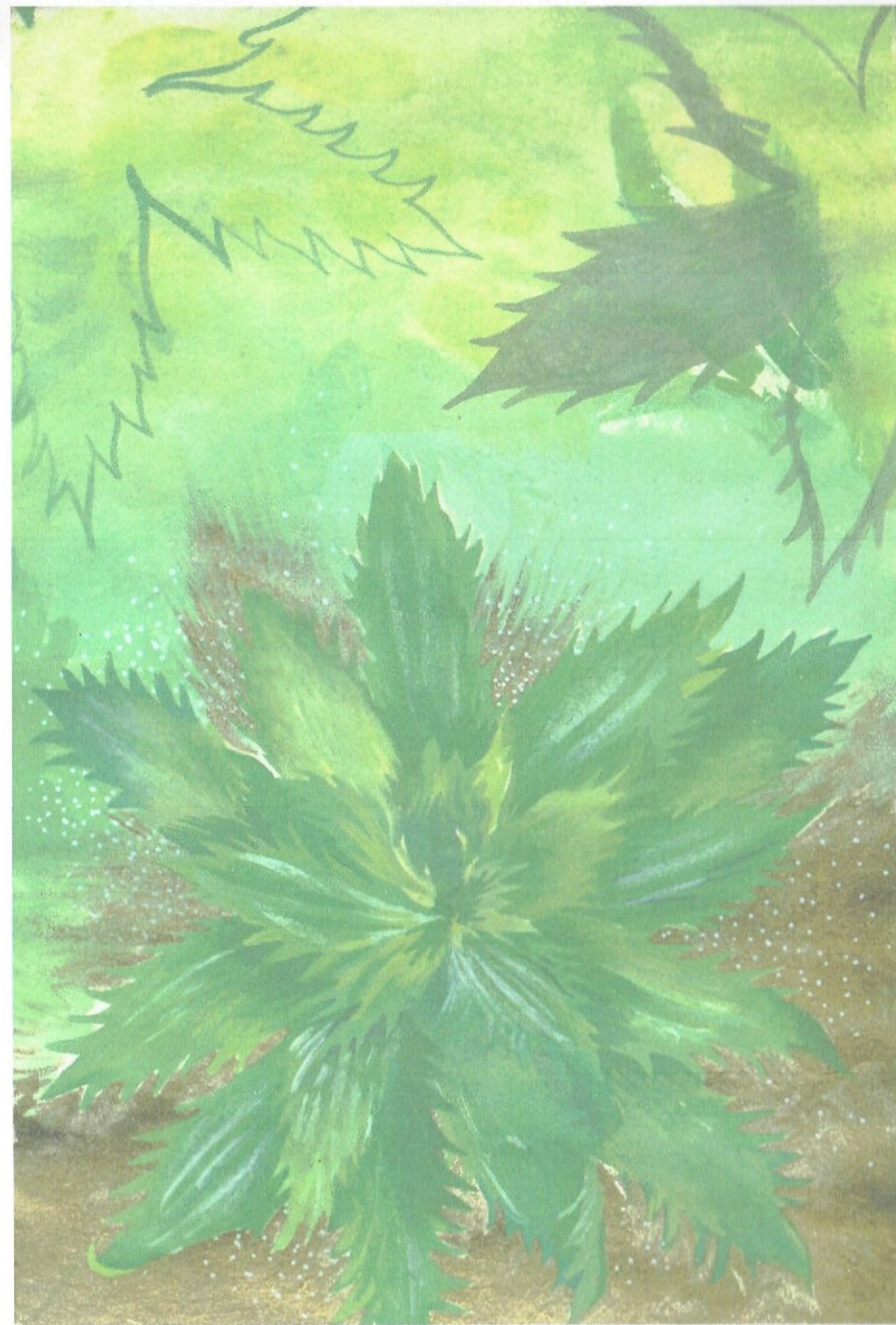


Basal cuttings - uses material from the first flush of growth in early spring. Material is very soft; a small amount of woody material where the shoot meets the base of the plant should be included to avoid rotting. E.g. Lupin, Phlox, Aster.

Softwood cuttings - material makes use of the soft extension growth in spring and summer and is very flexible. One of the best rooting potentials but can also rot easily. E.g. Fuchsia, Salvia.



Material used is from the current season



Artwork by Chloe Greenfield, @c_greenfield. @c_greenfield follow her



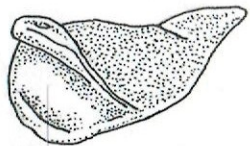


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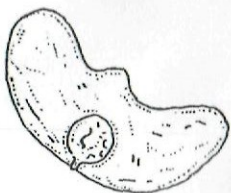
D. Carlton

Lino print by Dean Charlton

Available to buy online at [etsy.com/uk/shop/DeanCharltonPrints](https://www.etsy.com/uk/shop/DeanCharltonPrints)

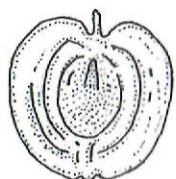


Diversity in Horticulture



It is a well attested fact that horticulture is not an ethnically diverse field. People of colour are poorly represented amongst members of staff, volunteers and garden visitors. A common response to this inequality is to wonder what it is about people of colour that prevents them from engaging: is it lack of exposure over the course of their lives, or inadequate academic preparation at school, or have they failed to integrate into Britain's vaulted gardening culture by dint of historical accident? No doubt there are many intersecting factors at play, from socio-economic status to geographic separation and poor infrastructure connectivity. However, in the course of this article I would like to suggest that the aforementioned inequality is in part a product of the cultural identities that are embodied and reproduced in garden spaces themselves.

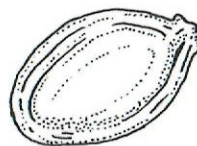
Landscape, culture and identity are deeply interwoven. To take a quintessentially English example, consider the work of William Wordsworth. Whilst his frolicsome poetry might suggest a whimsical dandy to the uninitiated reader, the fanciful verse belied an underlying resolve to shape contemporary culture. Wordsworth was one of the founders of English Romanticism, which had at its heart a rejection of Enlightenment values of rationality and order. Instead, the Romantics valorised the rural peasant embedded in their native landscape. Thus, as he committed the vales and hills



of the Lake District to poetry, Wordsworth was engaged in a self-conscious project to represent the 'true' spirit of England in opposition to the increasingly materialistic culture of the Industrial Revolution. In so doing, the poet laureate constructed a powerful image of England and Englishness that many sought to enact as tourists. Indeed, Wordsworth's vision of rural idyll resonated so deeply with the nature-starved urban elite that his *Guide to the Lakes* was the most lucrative work in his lifetime.

Wordsworth was followed by a number of literary notables who also lamented the threat that industrial production posed to an idealised rural hinterland in which the country's pre-industrial spirit could still be glimpsed. John Clare, John Ruskin, Edward Carpenter and others were instrumental in constructing an image of English identity that eschewed global industrial society in favour of rural self-sufficiency and agrarian communalism. It was amongst this cultural milieu that the National Trust was born.

The National Trust was founded in 1895 by a group of late-Victorian social reformers with the intention of providing access the nation's natural and cultural heritage for the working poor. Among the founders was a woman named Octavia Hill, whose early friendship with John Ruskin inspired in her a belief in self-sufficiency and the value of rural pursuits. These have remained guiding principles in the development of the National Trust to this day, and as a result

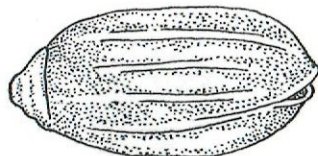




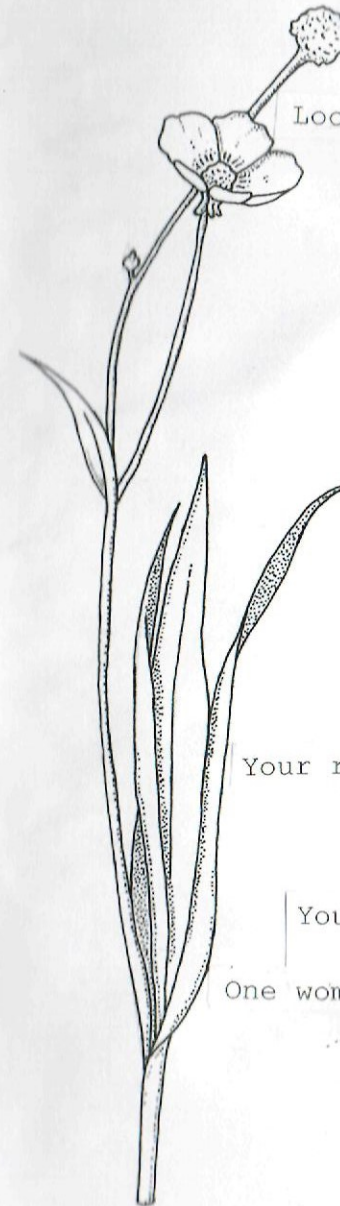
we have access to a wealth of opportunities to witness and participate in a Romantic vision of English history.

And herein lies the problem: these evocative landscapes alienate people of colour by definition. Whilst there is great value in the Romantic call for a life lived in sympathy with nature, we must also acknowledge that this vision is inherently White. Where in this vision do we find space for the children of empire who arrived on these shores as a result of Britain's globalised industrialisation? What is there for people of colour to identify with in a landscape premised on a rejection of globalisation? I would like to suggest that public gardens will only become inclusive spaces by confronting and critiquing these tensions. Perhaps, rather than a Romantic vision of pastoral nativism, what we need most in the current climate is a celebration of cultural interconnectivity and transfer that might overcome parochial interests and unite diverse groups in the shared stewardship of our environment.

Richard Choksey is a Kew Diploma graduate, currently researching the influence of holistic Hindu philosophy on Darwin's evolutionary theories for an MA in Global History. Read more of his work on his blog: <https://richardchoksey.wixsite.com/variationsonmonism>



Weeds



Gloves on. Prepared.
I breathe in the air and smile.
Looking out, I think of where to begin.
Endless possibilities.

Yet my eyes betray
me and sneak a peek at you.
I know you're there.
Always waiting.
Even come the frost.

I tell myself:
One day I will get rid of you.
I will buy the right tools,
And speak to the experts.

For now,
You're just a seedling.
If left,
Your roots will creep deep under the soil.
Again.

Perhaps I must accept,
You will always be a part of my garden.
One woman's weed is another woman's flower.

By Charlotte Houghton

If I were a seed

/Written and photographed by László Máté Tálas/ follow him @theturquoiseturtleplants

Few years ago, I was unable to think as a seed. Today I know a bit more from my personal interest and experience.

I like to do things simply, including life, but also seed collecting trips and sowing sessions at home. In the last few years I felt I should really get out to the mountains and plains of my native Hungary – and further into the Carpathian Basin and the wider Balkans – to see plants, collect their seeds, and translate those experiences into practical knowledge. My motivation kicked me out of the door onto the road. I would like to share some of my thoughts with you about how I am understanding the natural growing conditions of plants.

I think the most important lesson for me was to start reading the landscape, the climate, the geology and the habitat of the plant. As a gardener, I wanted to learn from the ecological processes and utilize the knowledge back in the garden, carefully and responsibly, to lead me to a more sustainable way of gardening.

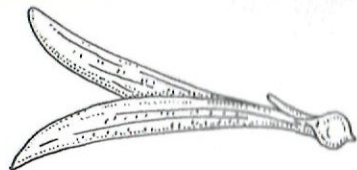
I think we are all good at daydreaming and wondering. This is what we should do in the case of seeds as well. Imagine: everything has a reason, so most importantly we should ask questions, think, research, and discover answers.



I would like to highlight some of my most frequent discoveries for you.

What kind of seedpod or fruit do we have?

I always imagine these magnificent seed cases, which are very variable and are responsible for protecting, nurturing and spreading the



seeds. As I understand, seedpods and fruits can be dropped to the ground, can hatch in dry conditions, holes can open, lids can pop up, they can take wing, catapult, or can be eaten by other creatures and so on.

Plants are clever. Not all the flowers open at once, so the seeds can ripen over a period of time. It is true on a single plant and in a population too. The type of seedpod can also delay the seeds' departure. In-built timers determine when, how and how far the seeds can travel. Some seeds, for example on the top of a capsule, drop early due to their position closer to the exit. They can stay dormant on the surface of the ground, or if the conditions are optimal, let's say after warm autumn rains, germinate immediately, even though some of their brothers and sisters remain in the capsule. We can look at this situation from two different angles. On the one hand, we can be happy that the early ones dropped and germinated so they are going to be mature earlier. On the other, perhaps they may be the losers, because they are going to be killed by the severe frost a month later. And perhaps in that case the ones which stayed and dried in the capsule are the winners, because the strong winter winds will shake them out much later, or the heavy snowfall will flatten the stems, so they reach the ground in unfavourable times, which gives them a chance next spring.

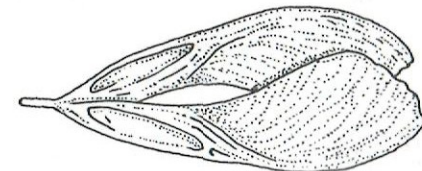


Where are the seeds going to fall?

I am always curious about this question. Look at the habitat and read it. First of all, where does the water go and where does it stay, in relation to the regional climate?

Is it a woodland floor? Which kind of woodland floor? What are the canopy species? How big are

their leaves? Are they hard or soft leaves? Do they decompose easily or takes years?



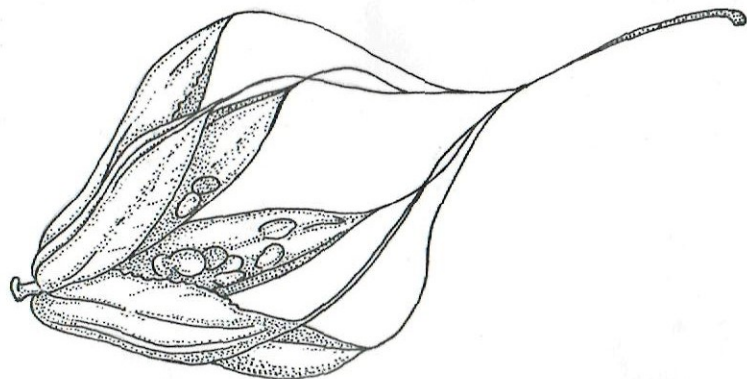
What is underneath the fresh leaves? Leafmould? Baserock? Soil? When are the seeds dispersed? Before or after the leaf fall?

Is it a rocky habitat? Is it vertical or horizontal? Which kind of rock is it formed from? Are they volcanic, metamorphic or sedimentary? How are they eroding? Is there any organic matter accumulating on the surface or is it pure scree?



Is it a grassland? Is the habitat an open or closed vegetation type? If closed, and all the niches are occupied, where will the new seeds get a chance to grow? Are there any disturbing factors around, such as animals, human activity, erosion, fire and so on? I think molehills are the best places in a

meadow setting, I love them. They are freshly dug and cultivated pioneer surfaces, ready for seed sowing. Of course, they are not for people with precious and well-manicured green lawns. I think moles should be respected more for their work in gardens, aerating the soil, not to mention the molehill as a perfect resource for potting mixes. If the grassland is open so you can see the soil, why is it open? Maybe the conditions are too harsh, the soil is constantly moving like windswept sand dunes, or simply the succession of the vegetation is just at that stage?

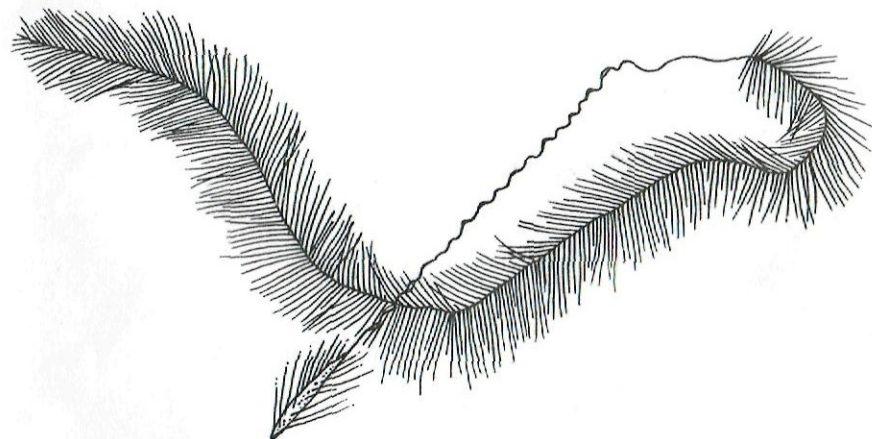


Which kind of seeds do we have?

Recalcitrant (ones that lose their viability if they dry e.g. acorns, chestnuts and hazels) or **orthodox** seeds (ones which can be dried and stored e.g. peas, salvias and cornflowers)? Do they have wings, elaiosomes (we call it 'ant-bread'), hooks or hairs? How big are the seeds? Consider their shape in relation to the surrounding ground. For example, *Stipa* seeds are very narrow, pointed and the long hair on them twists when it is drying out. If the seeds land and spear into the sandy ground, later gets some moisture again and the twisting moves of the hair propel the seeds into the ground. The same phenomenon can be experienced with *Pulsatilla* seeds, they do move.



I always try to answer these questions, documenting the site and then trying to recreate similar conditions in my seed sowing pots. I think the most important thing is to keep experimenting with the sowing mixes, times, treatments and so on. I prefer to sow everything fresh as it mostly happens in nature, however keep back some for later sowing. Many times I have had to wait years to have success with some seeds: do they just have deep dormancy or I am simply failing to nurture my seedlings into a reasonable size?



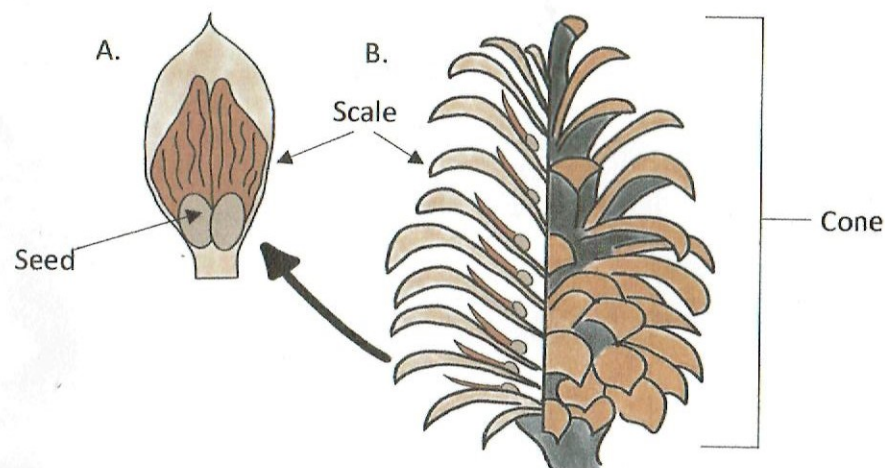
Introduction

Plant propagation takes two distinct forms; clonal or sexual. Both are utilised by wild plants and exploited by humans. Through a series of articles, we will focus on the methods and uses of sexual plant propagation from seed. To consider the nuances of seed propagation in full, this first article will briefly define the classification of seed-bearing plants and outline their morphology. It is worth noting that these two subjects alone could cover several textbook volumes, therefore concepts have been simplified and technicalities excluded. The aim is to equip the reader with a basic understanding of seeds. Further articles will discuss their germination, applying this information to practical scenarios of use to propagators.

Seed Bearing Plants: An Overview

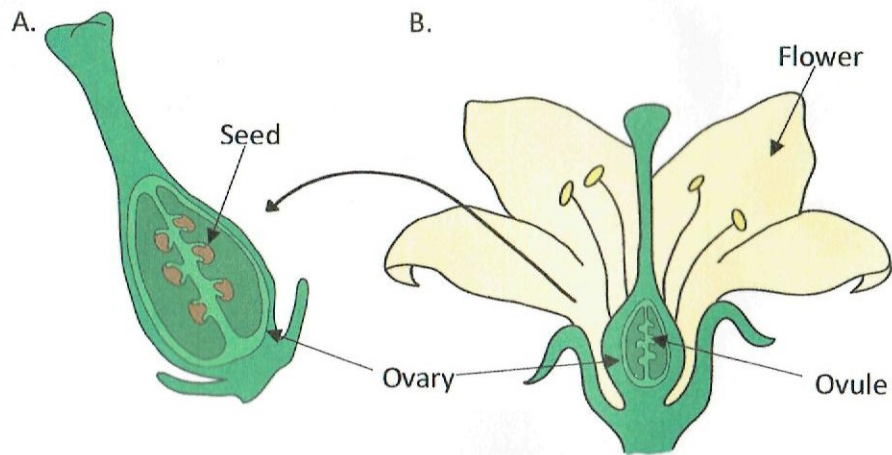
Seed bearing plants are collectively known as spermatophytes. They can be divided into two major evolutionary groups, gymnosperms (includes conifers) and angiosperms (flowering plants). The gymnosperms are the older of these groups, estimated to have evolved around 400 million years ago. During the Mesozoic era (252 to 66 million years ago) gymnosperms experienced their heyday. The Mesozoic era is often referred to as "the age of conifers", with gymnosperms colonising most terrestrial habitats and exhibiting incredible diversity. Today there are only about 1000 extant gymnosperm species. Many of them are woody plants, though some unique forms persist. One noteworthy example is *Welwitschia mirabilis*, a monotypic herbaceous gymnosperm from extreme desert climes. Surviving for

over a thousand years, *W. mirabilis* produces just two leaves in its lifetime which elongate up to four metres. Such extant relict species offer a glimpse of the gymnosperm's previous morphological diversity. The term gymnosperm means naked seed in Greek, this relates to the unenclosed condition of the seed. Gymnosperm seeds develop from ovules mounted upon scales which are typically arranged within a cone. Mature seeds sit openly on the scales of the cone. The production of cones is well known from the Pinophyta (conifers) but occurs in most gymnosperms, including *W. mirabilis*.



Above: A typical Pinophyta cone, cut to show a cross section (B.) An expanded view of two mature seeds on a scale (A.).

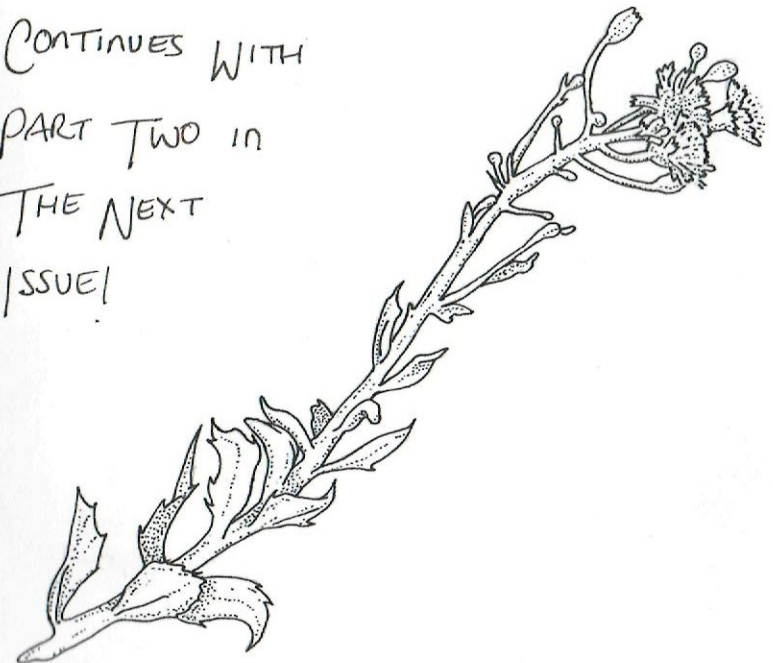
Compared to gymnosperms, angiosperms evolved much more recently, appearing around 140 million years ago. Despite their later arrival, angiosperms boast far greater speciation than the gymnosperms, with over 260000 species currently known to science. Darwin described angiosperms conquering of earth as "the abominable mystery". Still today we don't understand why angiosperms became so diverse whilst gymnosperms declined. Angiosperms produce seeds from ovules which are enclosed in an ovary. Upon fertilisation of the ovule the surrounding ovary typically swells to form a fruit, seeds remain enclosed by the fruiting structure until they are shed or the structure decays. The term angiosperm is derived from the Greek for seed within a receptacle.



Above: A basic unfertilised angiosperm flower with multiple ovules in an ovary (B.). An expanded view of seeds forming from fertilised ovules still enclosed in the ovary

In review, the key difference between the two groups of spermatophytes is the production of seeds that are unenclosed (naked as in gymnosperms) or enclosed (within receptacles as in angiosperms). Angiosperms further differ from gymnosperms in their production of flowers. Despite this, both groups utilise animal assisted pollination and seed dispersal methods, affording them equally competitive reproduction and dispersal mechanisms. While most seed-bearing plants are angiosperms the less diverse gymnosperms are well represented in the horticultural industry, through Pinophyta (conifers) and Cycadophyta (cycads). Therefore, the seed structures and germination behaviours of both groups have relevance in horticultural propagation.

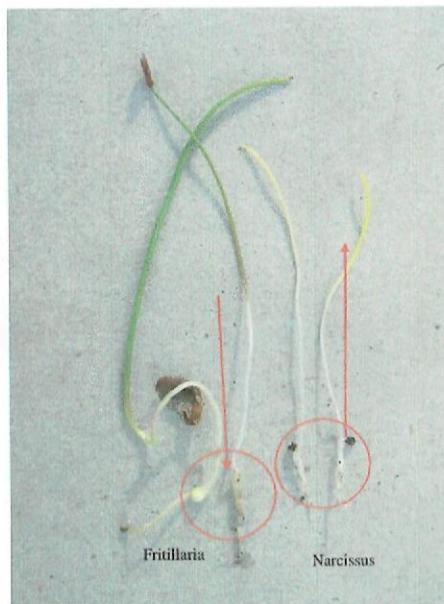
CONTINUES WITH
PART TWO IN
THE NEXT
ISSUE!



Bulb Propagation from Seed

Ian Young has a vast amount of knowledge on growing bulbs, which he shares freely in his Blub Log Diary. He has written these weekly logs for the past 17 years, and each one is posted on the Scottish Rock Garden Club website. This article is a small excerpt from Nov 13th 2019.

Understanding the way Fritillaria seed and narcissus seed develop at



germination along with knowing the method of natural seed distribution will help you understand the optimum depth at which to sow the seeds. You will find that in Fritillaria the root growth pushes down deep into the compost with the bulb forming at the end of this tip. Take that knowledge, along with the understanding that this type of seed has evolved to be wind distributed and so land on the surface, this guides us to sow all this type of seed on the surface with just a light covering of gravel.

With Narcissus and similar types of seed, the young bulb forms beside where the seed was sown with only the roots penetrating down into the compost - take that with the fact that narcissus seeds have elaiosomes evolved to attract ants to carry them off to an underground store, leads to sowing them deep. Look how deep these first year Fritillaria bulb seedlings, seed of which was sown on the surface, have taken themselves in their first year of germination - one is even escaping



through the bottom of the pot. Learn this lesson from the bulbs and never be afraid to plant small bulbs that bit deeper - they will be able to get their leaves up to the surface.



If the Narcissus seed is sown on the surface and covered with a thin layer of gravel that is where the young bulbs will spend their entire first year of growth - in subsequent years the bulbs will form contractile roots which, combined with it forming an elongated shape, will over a few years work its way down to its preferred depth. On the left are a group of first year seedling bulbs of Muscari which have a similar type of seed to Narcissus - these were sown on the surface with just the covering of a

layer of gravel. As soon as the leaf growth died back at the end of the first spring I tipped the gravel off revealing exactly how vulnerable and exposed a position these young bulbs will be in for more than another twelve months.

Compare that to these first-year Narcissus seedlings sown around 5 cms deep - these bulbs were both larger and were in a much more stable growing environment. I also found the black shrivelled now empty seed shells from which they emerged beside the young bulbs. Sowing seeds of this type deeply not only saves them from having to pull themselves down but also places them in a much more stable environment where they are less likely to dry out or be attacked by pests.



Christopher Lloyd Scholarship

The scholar spends a year working in the garden at Great Dixter and learning from Fergus and the team. They are asked to complete a diary, horticultural projects and regular plant IDs.

Visit

greatdixter.co.uk/learning/student-placements/ for more info.

Closing date 14th April 2020

Many Thanks to our Contributors

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International Plant Propagation Society 6-Pack Award

This award gives six 'new to the industry' horticulturists the chance to attend the IPPS European Region Annual conference, free of charge, taking place this year in Edinburgh, Scotland on 7th to 9th Oct. Visit eur.ipps.org/members/awards/6-pack-award

for more info

Closing date 29th May 2020.

Fundraiser for Dave Bull. Help Dave raise funds for treatment for chronic Lyme disease. 'All I want is to regain my health and return to doing what I love most – propagation and growing of plants'. **Donate here: shorturl.at/wxTWX**

The YPS zine is self-funded - help us to continue by contributing at our crowd funding page
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