

Fagus

May 2024

The Quarterly Magazine of the Friends of the Royal Tasmanian
Botanical Gardens



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Public Officer: Lee Cole, 0478 611560

Membership Office: Anne Crawford, 0418 517968

Publications Editor: Fran Alexis 0439 518520

Events Coordinator: Elizabeth Haworth

0488 291311

Committee Member: Phil Watson, 0419 012162

Andrea Gerrard

RTBG Liaison: Joe Pickett

Bookings for Garden Tours

Please contact the Gardens office on 6066 0451

Contributors to this issue

Fran Alexis; Lee Cole; Aina Dambitis;

Yann Gagnon; Elizabeth Haworth; Kristy Lark-Booth;

David Reid and Phil Watson

Our Cover

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Typesetting and Design

Kay Hayes

Friends email address:

info@rtbgfriends.com.au

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Friends of the
Royal Tasmanian
Botanical Gardens

From the Editor's Desk

Autumn is putting on a good show at the Royal Tasmanian Botanical Gardens and on these crisp sunny days it is a joy to be out and about among the trees. Many people are making the most of the settled weather to take a walk, a picnic or book to the Gardens. As the trees throughout the city lose their leaves, the buildings regain dominance in the city-scape, giving it an aspect very different from the green leafy summer view.

In this edition of *Fagus*, the director, Yann Gagnon, reports on plant events and ongoing garden projects as well as planned upgrades to the infrastructure of the Gardens, as does the president of Friends, Lee Cole.

Davis Reid pays tribute to Anne Griffin, who retired in December 2023 after working for 28 years as a senior horticulturist with the Gardens and points out the significance of Anne's contribution as mentor to other staff members.

Kristy Lark-Booth 2019 Churchill Fellowship recipient writes an interesting article about how to establish Physic & Apothecary Gardens, to illustrate the diverse nature of Gardens through the ages.

Elizabeth Haworth, after a visit to The Arid Garden at Port Augusta writes how it was established to research, conserve and promote appreciation of Australia's arid zone flora.

The relationships of plants with their pollinators forms the background for the series of articles Phil Watson writes, exploring the lifestyles of insects and how they interact with plants.

Aina Dambitis continues her great series about the home gardens of the horticulturalists at the RTBG, people who tend their own gardens and who do such a great job to keep the collections of plants at the RTBG in the state of excellence which stimulates admiring comments of tourists.

I thank all those who have written articles; without you we would not have a magazine. As always, I urge every one of you to consider putting your thoughts and insights together for future editions of *Fagus*. Anything botanical that strikes you as interesting as you travel, or even in your own garden, especially if accompanied by photos or images to illustrate, would make a great contribution to our magazine,

The cut-off date for inclusion in the August edition will be 19 July 2024.

Fran Alexis

Director's Report

Hello Friends,

As autumn graces our Gardens with its vibrant hues, a spectacle of colourful foliage is once again delighting visitors at every turn. Amidst this seasonal splendour, a remarkable event unfolded in the Carriageway, where a bunya pine (*Araucaria bidwillii*) captured our attention with an unexpected abundance of mature cones. With roots tracing back to the mid-1800s, this large tree had remained dormant in cone production for over a decade, until this year's astonishing crop.

Reports from staff confirmed the rarity of this occurrence, as the tree yielded a staggering total of 23 mature cones, some weighing up to 3 kilograms each. To ensure safety around the tree, a skilled climbing arborist undertook the delicate task of harvesting the cones in mid-April. This pre-emptive measure prevented any potential hazards posed by the weighty cones. The seeds nestled within these pineapple-like cones have been meticulously collected and planted in our nursery to soon become the next generation of bunya pines in Tasmania.

Speaking of pineapples, I would like to take this opportunity to acknowledge the diligent work from our Gardens staff in the renovation works of the new Pineapple House and Arid Garden area. The planting in these new displays is almost complete with over

forty pineapple plants, papayas, turmeric, dwarf bananas, cardamon and more to come. Along with updated signage and plant labels, finishing touches will soon be completed and our visitors will be invited to learn about the history of pineapple cultivation and its significance in our Gardens' heritage. I would like to acknowledge and thank the generous contributions of our donors, including the invaluable support of the Friends of the Botanical Gardens.

Regarding another important project at the Gardens, we are excited to be undertaking some major upgrades in 2024 as part of the Visitor Experience Project. Here is a status update on some of the key areas undergoing construction and renovations.

Welcome Point

Architectural concept drawings have been drafted for a new gift shop building situated close to the Main Gate. Alongside the creation of a new retail space, the reconfiguration of the access pathway near the Hub has been pinpointed as a crucial focus to enhance visitor safety and arrival experience. Plans are underway for a redesigned pathway and landscaping extending from the Main Gate entrance, encompassing the Gatekeeper's Cottage. This includes the integration of lighting and the introduction of a new arch structure to support the wisteria vine.



Visitor Centre building

You may recall that we shared design concept images for the Visitor Centre refurbishments in the February 2024 *Fagus* edition. These refurbishments include interior and exterior paint, fixtures upgrades, new floor coverings, decking replacement, bathroom facilities refurbishments, a new improved entrance awning, new patio, new staircase and upgrades to the Main Toilet Block. A development application for these upgrades was submitted to City Council in March 2024. Pending approval of our submission, these works are expected to commence mid-year. During these works, the onsite restaurant and kiosk will not be available, instead there will be a range of food and beverage options provided by visiting food trucks.

Access and Carriageway Improvements

To improve site accessibility, safety enhancements are planned for the Carriageway. These upgrades will entail the establishment of a dedicated pedestrian pathway, repair of damaged bitumen sections, reconfiguration of parking spaces, installation of bollard lighting, implementation of a raised crosswalk, incorporation of traffic calming measures, and the creation of a safer footpath along Lower Domain Road on Council property. A development application for these improvements is scheduled for submission in May 2024, with tentative commencement of the work planned for next spring.



New Collections

As part of this initiative, the project incorporates new botanical collections, including expansions to the Pinetum Collection and the extension of the Australian Fernery Collection within the Mediterranean Collection area. This will feature a striking showcase of tree ferns and native Tasmanian rainforest species, enhanced by a new water feature. These additions will not only enhance this beloved section of the Gardens but also offer visitors another captivating and distinctive entrance experience.

Draft Strategic Master Plan

The Draft Strategic Master Plan received the Board's approval during the February 2024 meeting and will be submitted to the Minister for Parks for consideration now that the Caretaker Period has concluded. Upon official endorsement by the Minister, the finalised Strategic Master Plan will be publicly released and distributed to all staff, volunteers, and Friends. I am looking forward to sharing the outcomes of this planning process with you and advancing our strategic goals.

This concludes this *Fagus* Director's Update, wishing everyone a happy autumn!

Yann Gagnon

Director

Royal Tasmanian Botanic Gardens



President's Report

We could be forgiven for thinking summer was still with us over recent weeks, however, a walk through Hobart's leafier suburbs would tell us otherwise. How lucky we are to have such extensive plantings across the city in streets, parks and playgrounds adding to the ambience and beauty of our city. Needless to say, the Gardens remain an oasis of calm and beauty as it moves into autumn!



Our drier summer has resulted in some plantings turning earlier and colouring up across the city and beyond. When did your "inner child" last scuff through the carpet of fallen leaves or indeed throw handfuls into the air, watch them fall or tumble back to the ground? It is a perfect time to take a stroll through Gardens, soak up the atmosphere, admire the work of the teams whose tireless endeavours

ensure we all enjoy the walks and vistas and to watch Autumn unfold across the lawns. Keep an eye on planned developments for the Café and kiosk area with an external new paint scheme, as well as refurbishment of the deck and toilet facilities. The cactus garden is coming to fruition as is the Pineapple house.

The Tasmanian Arboretum, outside Devonport celebrates 40 years since its beginnings and is on our events/ outing list for later in the year. When we visited recently change was afoot and the autumn colour was well worth a look and indeed a photo or two. If you are in the vicinity, take some time to enjoy

a walk across the site, spot a platypus or two or visit their website and Facebook pages which have some fabulous images.

Recently I spent the morning on top of the domain with other members of Cornelian Bay Landcare group and HCC Bushcare team member Sonia Stallbaum removing the last of the weedy casuarina seedlings on the grassland area on the northern end below the top loop car park. For some time, there has been ongoing management of this grassland reestablishing and replanting grasses and small ground covers which originally grew over the area. Many of you will be aware that the domain was more open and grassier than we see today. The sheoaks have taken a greater hold and as a result the understory of grasses and plants has reduced over time.

Volunteers from Landcare and Bushcare teams, as well as City council teams over time have gradually been able to remove the weedy species which have impacted on the original grassland, thus returning it to a more open area with fewer trees. Now a grassy section falls away on the northern end of the top carpark towards Joggers Loop and we can see how the area once looked and indeed was managed by the original owners of the land.

At our last general meeting, James Wood as guest speaker took us into his world of collecting, discovery and the magic of the plant world.

Hope to see you at our next meeting where we will have another speaker to spark our interest.

Lee



Anne Griffin

In December 2023, we farewelled Anne Griffin, after working for 28 years as a senior horticulturist with the Gardens.

For the most part, Anne was the Team Leader of the Eastern horticulture team, leading a small team of staff who were responsible for a diverse group of plant collections and displays in the eastern section of the garden.

Anne's skill and expertise in horticulture was highly regarded, and to witness the Mixed Border in early summer was possibly the best way of appreciating and comprehending Anne's aptitude and talent for ornamental horticulture.

Anne originally worked as a horticulturist at the Gardens in 1985 after completing the Kew Diploma in Horticulture at the Royal Botanic Gardens, Kew in London. After three years Anne chose to move to Melbourne where she worked at the Royal Botanic Gardens Victoria. Returning to Hobart in the mid 1990s, Anne rekindled her relationship with the RTBG, where she continued until retirement late last year.

Anne has a wonderful knowledge and understanding of the cultivation of exotic plants from all over the world, and this was displayed in the Mixed Border. Here Anne created stunning displays of roses, perennials, ornamental trees and shrubs, and more recently experimented with grasses throughout the display, to complement other plantings. Involvement in the layout and design of the Mixed Border was an important role that Anne played in each stage of the development of this collection.



Anne helping out the nursery.
Photo by N Tapson

Anne was a wonderful mentor to younger horticulturists and students and went to great lengths to plan and prepare work, to ensure they always received a rewarding and meaningful learning experience. This commitment to the teaching and sharing of horticultural skills and knowledge was a standout trait of Anne's, and her passion for plants was a clear driver to achieving some outstanding results.

Anne contributed to the RTBG in many other ways, including regularly acting in a higher management role when required, as well as extending her skills into other areas to support the Garden Operations unit, and to expand her learning. An example of this is Anne's willingness to manage the RTBG tree collection and coordinate arboriculture contractors for the regular maintenance and emergency management of trees across the garden. This important work was carried out with minimal fuss and plenty of foresight.

Anne's participation in other areas included involvement in field trips for the Tasmanian Seed Conservation centre during the peak collection periods.

As leader of a team of horticulturists, Anne was a great advocate for professional development and regularly sought opportunities such as requesting attendance at botanic gardens congresses and organising trips to other gardens, both locally and interstate. These requests always included the involvement of her staff to ensure that as many staff as possible benefited from these events, and shared these learning opportunities. Anne successfully applied for a Friends of the Gardens' grant in 2014 on behalf of her team, organising a multi-day trip to Victoria and NSW to visit public and private gardens. These trips are such valuable exercises that every horticulturist should do, so that they continue to evolve as gardening professionals. Anne possessed a great understanding of the importance of this activity and ensured that the experience translated back into her work.

I am told that Anne is thoroughly enjoying her new lifestyle, filling her days with kayaking trips, bushwalking, and of course, gardening.

From all the staff at the RTBG, we wish Anne all the very best in retirement.

David Reid

How to establish Physic & Apothecary Gardens in Australia specifically for distillation, education and tourism

Kristy Lark-Booth

2019 Churchill Fellowship recipient

Physic and Apothecary gardens have been used for centuries in Europe in monasteries, estates and farm houses. Many of the plants grown in these gardens were distilled and used for the health and wellbeing of those around. With the knowledge I have gained I plan to establish a traditional apothecary garden for use in distillation, education and tourism. A place where people can learn about various plants and how to use them in distillation to create safe and delicious spirits and how to set up their own apothecary gardens.

Plants have been utilized for various purposes throughout history, including medicine. The divide between science and spirituality in herbalism can be bridged, as seen in the monastic attempts to unite physical, spiritual, and psychological aspects through alchemy.



Centuries ago, medical assistance was primarily sought from monasteries, friaries, convents, priories, and local healers. Monasteries had their gardens for herbal remedies, reflecting monks' roles as herbalists, pharmacists, and physicians. Alchemy, philosophy and herbalism were integral to monastic studies (fig. 1), making abbeys centres for botanical learning. However, the Dissolution of Monasteries in the 1500s, initiated by Henry VIII, saw over 900 religious houses destroyed, dispersing knowledgeable individuals involved in medical aid.



The establishment of the Royal College of Physicians by Henry VIII further regulated medicine practice throughout the UK. The subsequent witch trials resulted in the loss of herbal knowledge, as many accused women, often midwives and healers, were executed. The accused often had "simples gardens" or herb gardens, reflecting their understanding of nature for healing. Many monasteries visited displayed pagan elements, such as the Green Man (fig. 2), indicating a connection to nature. In France, the French Revolution led to the overturning of churches, exile of over 30,000 priests, and the destruction of wealth, impacting knowledge. Despite this, some recipes and knowledge, such as those of Chartreuse and D.O.M Benedictine, were hidden and retained.



Throughout the UK and Europe, evidence of the monastic way of life can still be found, despite many monasteries being destroyed. Before the dissolution of monasteries in England and the French Revolution, Carthusian monks established monasteries including medieval features like enclosed spaces, produce gardens, medicinal gardens, herb gardens, orchards, and mazes can still

be visited and experienced. The gardens have many similar design features including symmetry and symbolism, incorporating water features for irrigation and religious significance. The sensory experience in these gardens stimulates visual, auditory, olfactory, tactile and taste senses. Monasteries sought to recreate the Garden of Eden with garden beds shaped like squares representing the Christian cross and the four elements of nature. Symmetry and symbolism were crucial in monastic gardens, designed as tranquil places for prayer and meditation. Fountains symbolized cleanliness and regeneration, aligning with religious references. Monastic gardens were often organized geometrically, with medicinal herbs near the infirmary to treat monks and villagers.

Physic gardens, established before the Dissolution of Monasteries, also hold historical significance in Europe and the UK. The Oxford Botanical Gardens (fig. 4) founded in 1621 is the oldest botanical garden in the UK, it mirrors monastic garden designs, featuring square beds divided into four sections. Plant identification tags highlight medicinal uses, and special areas like the "Gin Border" focus on plants used in distillation for flavouring gin. Another more modern site is The Royal College of Physicians' gardens in London. Head gardener Jane Knowles dedicated eight gardens to plants from the *Pharmacopoeia Londinensis* (1618). The garden layout reflects cultural regions, and plant tags provide botanical and medicinal information. The Inner Temple Garden in London, originally the Knights Templar simples garden, promotes biodiversity subtly. Wildflower meadows, daily "Plant of Interest" (fig. 5) boards, and small carts with picked flowers enhance education and environmental awareness. While the central pond symbolises a connection between heaven and earth.



Many of the other gardens visited highlight sustainability and biodiversity and are evident through meadow flowers, wild plant areas, and traditional uses of natural products like willow and hazel that are used as living fencing and growing structures. Diverse gardens incorporate cultivated plants, 'weeds,' and meadows for pollinator support, companion planting and scented botanicals minimise the use of synthetic pesticides. These gardens also emphasise collecting seeds for future use and to protect species that are found less and less in the natural environment.



Historic gardening practices, planting methods and wildlife support strategies are showcased at many of the gardens visited. Each highlighting various garden elements with an emphasis on biodiversity, "right plant, right place" philosophy, and use of sustainable gardening practices. Sites like Canons Ashby in Northamptonshire, managed by the National Trust, demonstrate efforts to restore 18th-century terraced gardens with a commitment to biodiversity. Companion planting and minimal chemical use reflect gardening practices from the 1700s. Tourism at such properties generates income for upkeep and encourages visitor interaction.

The connection of life and environment that is mirrored in monastery and abbey gardens can also be seen at places like The Eden Project in Cornwall.

(figs. 7 & 8) Soil health, educating visitors on the balance needed for healthy plants, food and a thriving ecosystem are featured in their open-air gardens, giant biomes, and resource areas. Similarly, The Lost Garden of Heligan, also in Cornwall connects visitors to the land's past, combining history, agriculture and tourism while maintaining a commitment to preserving pre-1910 plant species and using traditional farming methods.



Many herbs and plants cross over from medicinal uses to the spirits industry and with a greater number of distilleries being established in the last 10 years it is important to ensure the sustainable use of those botanicals. The best way to do this is by growing your own plants. Space should not be an inhibiting factor; herbs can be grown in pots that can be used in distillation or in the presentation of drinks through garnishes. Additionally, growing plants on a larger scale is an effective way to reduce carbon footprint, enhance soil

health, support pollinators and biodiversity and educate visitors about the cultivation process and its role in distillery production.

Many distilleries in Scotland and the UK, are committed to sustainability, environmental responsibility, and unique visitor experiences. Distilleries such as Strathisla, Glengoyne, Warners, The Secret Garden, and Arbikie Highland Estate are just a few that are emphasising practices like on-site botanical cultivation, biodiversity initiatives, ecological balance and community engagement. However, the focus on sustainable practices extends beyond traditional distilleries to include newer establishments like Inchdairnie Distillery and The Oxford Artisan Distillery (TOAD) both of which emphasise regenerative farming and the use of heritage grain varieties, contributing to a more environmentally friendly approach within the distilling industry. This also includes the broader industry, with conferences addressing the importance of sustainability and biodiversity. Alongside the efforts by winemakers to adapt to climate change and the perfume industry's use of botanicals and the debate surrounding real versus synthetic aromas and sustainability practices.

health, support pollinators and biodiversity and educate visitors about the cultivation process and its role in distillery production.

Other Key Findings include:

- * Importance of the evolving focus on sustainability in the spirits industry
- * Historical significance of alcohol in medicinal practices, particularly in monasteries, and the continuity of herbal traditions in modern spirits like Chartreuse
- * The importance of sustainable botanical sourcing, including foraging and growing one's plants
- * The significance of agritourism, promoting a direct connection between consumers and botanical products
- * Understanding of plants and local conditions and how that might impact growing and cultivating
- * Different farming practices like permaculture, bio-dynamics, regenerative farming etc;
- * Challenges include adapting international learnings to the Australian context, choosing suitable botanicals and growing methods, and addressing water scarcity



Fig. 9 Glenmorangie Distillery: Kristy in the Still House

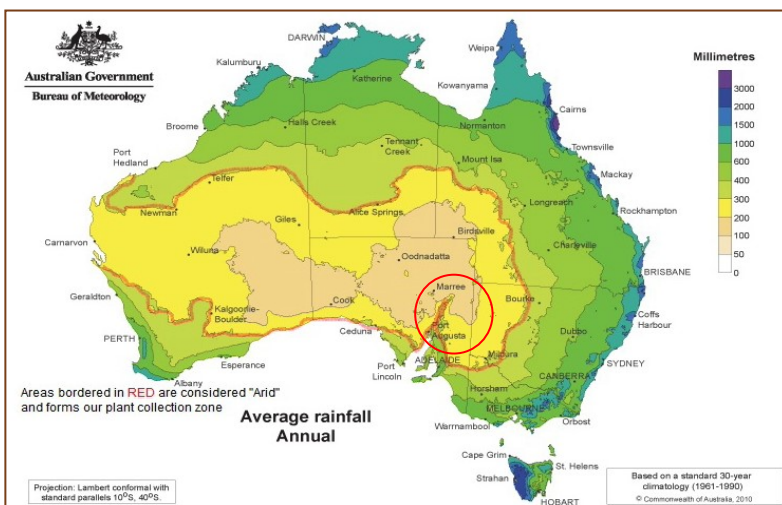
Intended audience includes but is not limited to: the Australian distilling industry, herbalists, naturopaths, monastic groups, and individuals interested in growing produce for personal use.

Australian Arid Lands' Botanic Garden, Port Augusta

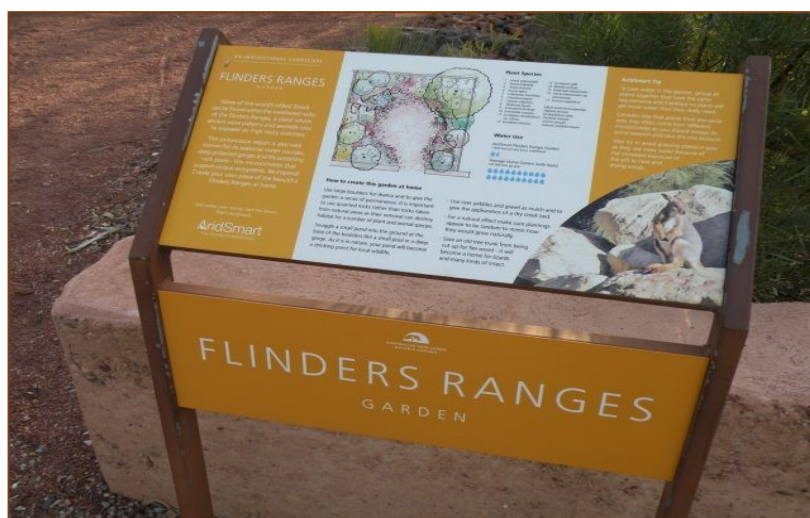
Elizabeth Haworth

Although Australia's arid lands are fragile and may often seem lifeless, in fact they are home to thousands of highly evolved plants, adapted to thrive in an environment where temperatures may be extreme, and drought can last for decades.

"Arid" is defined to have an average rainfall of 300mm per year (or less). On this map, which shows arid Australia outlined in red, you see Port Augusta in South Australia (circled), which is just over 300 km north of Adelaide. It is situated on the upper shores of Spencer's Gulf with spectacular views of the Flinders Ranges. As well as its flora, the Garden includes a biologically rich marine environment dominated along its coastal areas by mangroves and samphire. Its annual mean rainfall is 209.7mm.



The Arid Garden at Port Augusta was established in 1993, and officially opened in 1996, to research, conserve and promote appreciation of Australia's arid zone flora. It covers about 250 hectares and has an extensive collection of plants native to arid and semi-arid regions of the world. It is arranged in themed sections, each representing different ecosystems. The Garden includes walking trails, and interpretative signage which shows a plan and provides a plant list for each section. This for the Flinders Ranges was most apt.



Near the Visitors' Centre is the Eremophila Garden, which houses the collection of 155 species. *Eremophila* is a genus of the figwort, *Scrophulariaceae* family, all of which are endemic to mainland Australia and commonly known as Emu bush.

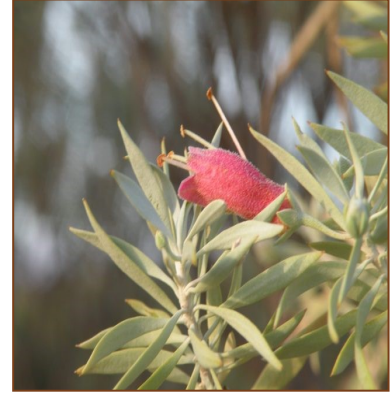
Three species that particularly appealed to me (as a non-botanist) are shown here.



Eremophila recurve



Eremophila macdonnellii



Eremophila pterocarpa

The Red Sand Garden which replicates the flora of Australia's red desert landscape is also nearby, with Sturt peas, *Swainsona Formosa*, in flower in its picture below.



As you might expect, the Arid Garden also includes eucalyptus trees.

The fruits of *Eucalyptus youngiana* and the flowers of the *Eucalyptus kruseana* appeared spectacular to me.



Eucalyptus youngiana



Eucalyptus kruseana

The Port Augusta Arid Garden has an excellent visitors' centre and café. The South Australian Government, local council and the active Friends are to be congratulated for their beautiful garden which is a sanctuary for plants, birds and unusual artworks, and well worth a visit if you are travelling in this part of South Australia.

April 2024

Footprints in the Pollen

Phil Watson

It is easy to forget the real importance of plants and their colourful blooms beyond their value as attractive garden ornamentals and food crops. We are all also aware that groups of plants are the basis of vegetation communities which provide habitat (homes and food) for our wildlife including our furry, feathered, fungal and leathered friends as well all our diverse insect populations.

Significantly, flowers are nature's tool in the mating game, designed to be as flamboyant as possible with alluring scents and bold colours refined over millennia of evolutionary change to attract their pollinating insects. Their nectar and pollen rewards ensure that their pollen is transferred to fertilise their species.

The relationships of plants with their pollinators will be the basis of an intriguing series of articles exploring both the insects' lifestyles and their intimate relationships to the plants they interact with. The series begins with a two-part article written in first person from an ant's perspective called *Ants in Your Plants*

Ants in Your Plants

Ant colonies, superorganism, cleanliness and pollination

We maybe tiny in stature and unassuming in our daily activities, however on a global scale ants impose an unrivalled footprint on most of the world's terrestrial ecosystems.

We live a busy and challenging lifestyle within our grassy woodland ant colony due to our desire to constantly modify our ecosystem through our collection of nectar, seeds and plant parts along with establishing and maintaining our foraging trails and nest sites. Additionally, we are kept busy with our pastoral activities involving milking our herds of caterpillars and various sapsucking insects in exchange for ensuring their protection and breeding activities.

We are continuously altering the soil's profile as part of our nesting activities during which we turn over and mix the soil, concentrate nutrients, form water courses and exchange gases through our nests vast network of tunnels and chambers.

All these activities are driven by our colonies dogged commitment towards caring for our queen, our brood and our fellow workers. When our colony finally dies or moves on, our nest and our surrounding region of influence will once again become accessible for natural regeneration of local plants and recolonisation of local fauna.

Ants are everywhere

Except for Antarctica we are everywhere. Worldwide we may not have many different species relative to other insects such as beetles, however our numbers are prodigious, with our biomass (the amount of living matter) approximately comprising a staggering 15% of the terrestrial animal biomass, with the greatest biomass occurring in the tropical Amazon. Actually, there is the same mass of us as there are humans with over a million of us for each human being.¹ The estimate for our species known in Australia is over 6500, with only one in five of us being described. Due to the vast variety of habitats, Queensland has the highest diversity of ants in the world, with more than 1,400 known species,² whilst Tasmania has around 100 species. In our dry grassy woodland patch, there are over 30 different ant species and hundreds of colonies all of which are competing for food supremacy and ultimate survival.

As members of the *Hymenoptera* order, our relatives include sawflies, bees and wasps from which we evolved. Broadly speaking the bodies and lifestyles of ants have evolved to display distinct differences resulting in ants being grouped into primitive ants, modern ants and tropical tree ants. Although termites are mistakenly considered our close relatives, they are a cellulose-eating cockroach and not related to us.

Modern Ants

As meat ants from the *Iridomyrmex* genus we are from an evolutionary perspective more modern. Our colonies teem with tens of thousands of half-sister worker ants, all derived from the same mother or queen ant. Our home is in the soil amongst rocks and decaying timber with local plant matter being crucial part of our nest building process. Our nest extends deep underground in a vast labyrinth of chambers and interconnecting tunnels and galleries with several entrances surrounded by raised mounds of soil. Sometimes we are called meat-ants due our pungent scent and when threatened we can inject with our hypodermic needle-like stingers painful doses of formic acid.

Our colony survival is reliant on our worker ants constantly searching for food such as dead insects, flower nectar or honey dew from aphids and mealy bugs (sap suckers) or milked from caterpillars. If we exhaust food supplies in proximity to our nests, we are prepared to move our home and build a new one. This requires a massive logistics operation!

Primitive Ants

We share our woodland patch with our ancient, but well-known primitive cousins including jack jumpers, inch-men, bluebottles and hopper ants (*Myrmecia* sp.). As the most dangerous animal in Tasmania (even worse than the tiger snake), we avoid their crater-like nests which are mounded on the soil surface. Being carnivores, these *predatory* ants are armed with large and powerful mandibles which when wielded in anger grab, sting and pull apart prey such as cockroaches, crickets and disturbingly, small ants like us.



Jack-jumpers mandibles: Courtesy of <https://au.pinterest.com/simpleslave/jack-jumper-ants/>

They are real acrobats as we often see jack jumpers run and leap energetically at flies and other insects which are just relaxing on shrubs or tree branches. We know to keep well away from them!

Tropical Tree Ants

Our tropical Australian tree ant cousins, such as the green tree ants *Oecophylla* sp. use their larva to extract silk thread to spin leaves together to form nests in trees. Some arboreal ants or glider ants *Cephalotes* sp. are particularly impressive being able to jump out of tall trees and employ wing-like appendages to control the direction of their descent.

Life in a Superorganism

Life for us is pretty simple! We each selflessly contribute in our own minuscule way to the wellbeing of our ant colony, described as a superorganism, with total disregard for our individual needs.

Our ant colony is equivalent to an organism like a wallaby or human with individual ants equating to a society of cells. Like the trillions of cells in a human body each of us do very little as an individual, but collectively we can yield amazing results, just like a fully functioning human. We ants work together to keep the “organs” in our superorganism “body” healthy and stable with trails serving as our nervous system being used to gather food as well as knowledge and to calculate choices.



Queen ants with young workers: Courtesy of www.livescience.com/images/i/000/008/410/original/queen-ant-workers

With mindless brilliance we procure meals, fight off invaders and grow ‘fat’ or expand our colony using our excess food. We engineer our environment to suit our needs and over time, spin off successors in the form of winged females and males that breed true through generations before finally dying.

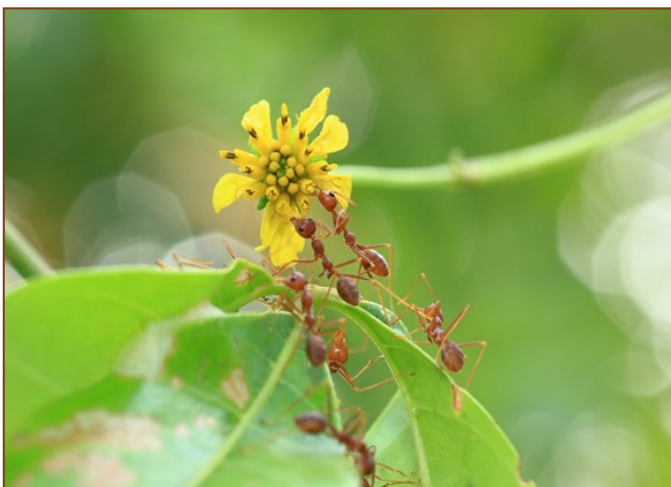
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We never retreat from any task, dangerous or not, to save ourselves when subduing prey or defending the nest as, just like a machine, all my nest-mates display what is best described as a “psychological numbness” ensuring that we all have a bewildering devotion to duty.

It is somewhat embarrassing to admit that like all my half-sisters we have the smallest number of chromosomes of any creature, being just one pair! However, our minds are still capable of continually striving to understand daily challenges such as dimensions, cleanliness and how to assist in catching, retrieving and storing food.

We love nectar but not pollen

Once the rays of sun warm up the soil and rocks, we boldly scramble through the understory following scented trails towards flowers laden with energy rich nectar pools. We like to visit inconspicuous, low growing plants which have flowers close to the stem. Some of our favourites include the sweetly scented ant’s delight, honey pots, *Acrotriche serrulate*, common heath *Epacris impressa*, the tubular bell-shaped flowers of native cranberry and pine heath *Astroloma humisfusum* and *A. pinifolia*, and the dainty peachberry heath *Lissanthe strigosa*. We often try to raid the nectar pools in the bases of the white tubular flowers of the bearded heath, *Leucopogon* brushing aside the protective hairy fringes at the tops of the corollas. We inadvertently collect pollen but our drive for cleanliness soon gets rid of any pollen unintentionally attached to our bodies.



Nectar being sucked up by foraging ants: Courtesy of www.harvesttotable.com.

We love being clean!

We are very finicky about our cleanliness mainly because detecting scent is impossible with dirty antennae. Without scent we cannot find nectar bearing flowers nor stay in touch with each other. In fact, we would just wander around aimlessly unable to navigate. Consequently, we spend a lot of time cleaning our antennae using the comb-like bristles on our bent back legs. These are just wide enough for the hairs of our antennae to scrap through but not the dirt and pollen. We always follow up with our mouths to sanitise our leg bristles ready for the next cleaning. Additionally, we (also our larva) secrete a natural antibiotic exudate from our *metapleural* gland which rapidly kills not only bacterial and fungal infections that could cause havoc in our nests but also pollen grains.

We are poor pollinators

Although our workers are very poor pollinators this is not true for our large wood eating ant cousins, the carpenter ants *Camponotus sp* which survive high in the arid Californian Sierra Nevadas, where very few other pollinating insects subsist. Here they have evolved to have no *metapleural* gland. Curiously, the flowers attract their male ants with no *metapleural* glands by releasing female sex pheromones tricking the pollen carrying males into moving between flowers in expectation that he will be mating with a queen. This allows them to take on the vacant pollinator role for this alpine ecosystem.

Another pollination role carried out by other ant cousins involves the alpine orchid, *Chamorchis alpina*, whose flowers are specially designed to allow the pollen to stick to the ant’s forehead which also happens to be well away from harmful secretions issued by ant’s *metapleural* glands.

Our Queen is the source of colonies vitality

Our large and sluggish Queen remains the heartbeat of our nest with her sole job being to ensure the reproductive future of the nest by acting as an egg-laying factory. In doing so, she rhythmically pumps out fertilized eggs from her 20 ovaries at the rate of one every 15 minutes. She lays in her royal chamber at the bottom of our subterranean nest nearly one and a half metres below ground or 400 ant lengths. In terms of human scale terms colony is the same as 200 below-ground stories with an additional 50 stories of raised soil mounds above ground.

Our Queen may not be the head of our miniature city, but she has been the source of all our energies and development, which is the real reason for our success.

We have no established leader and if I was asked to “take me to your leader” I would not go to our Queen knowing full well that her primary purpose in life is to lay eggs without coordinating anything. Neither do any of our workers inspire, cajole or force our colony to take a line of action. This contrasts to most other creatures including humans who are accustomed to supervision and chains of command at every level.³

The crucial single-mindedness efforts of all our half-sister workers are to ensure that the Queen continues to deliver more self-sacrificing workers. We know that one or a thousand of us could die in battle, but the colony would go on, restoring it as required. However, the early demise of our Queen, hopefully 20 years away, would be disastrous. Once our Queen finally dies the worker population will nose-dive making us an easy target for invading colonies.

We vary significantly in size and carry out different tasks.

As nest mates, we also have a strong separation of labour with various workers carrying out different tasks within our nest. Generally, the young, newly emerged workers remain in the nest to look after the brood composed of eggs, pupa and larva. These nursemaids are very attentive to our brood stock and often move them several times a day to ensure constant warmth. Generally, at night and early in the day the brood is located under rocks in the bush understorey.

Later on, when the heat becomes too much, they carry them down to cooler underground passageways within the nest.⁴ During dry periods or heatwaves, they gather up brigades of our workers to regurgitate mouthfuls of water around the nest for evaporative cooling. The nursemaids are scrupulously hygienic staying inside the nest as long as possible to minimise exposure to outside microbes. They also house the brood away from the nest’s food storages whilst constantly cleaning the eggs using their own antibiotic *metapleural* glands secretions to kill pathogens. The nursemaids leave it to our forager half-sisters to find our food, but they

themselves act like mothers pre-masticating then predigesting the food before regurgitating it as tenderized mash to our larvae. Our half-sisters vary in size and strength in proportion to how much they are fed as larvae and young adults.



*Brood tendered by nursemaids: Courtesy
www.pesthelp.com.au/attachments/Image/antswhitefooted.jpg*

Our old hands become builders, diggers and foragers.

As we get older, we either take on cleaning tasks such removing old seeds, seed husks, waste and even dead bodies to our midden heaps. Mostly our older workers take on tasks that are more dangerous, normally becoming foragers or ant colony defenders who roam throughout our woodland. As older workers we have constructed the nest, risked our lives in our daily search for food and are not frightened to fight to the death in defence of the colony or ant food trails. Our older soldier ants are much bigger and stronger than our workers with most being heavily armoured by thickened and toughened exoskeletons to allow them to fiercely protect our entrances.

Amusingly, whilst human societies send their young men to war, most of our ant colonies send their old ladies. Not all of our older workers are less valued than our younger nest mates, since a few of our older workers have deservedly earned an elite status due to their exceptional hard work and task instigation. They are key individuals and act as architects and builders whose job it is to not only construct the nest but also to stimulate others to join in. If our elites are removed productivity plummets – something which clearly has commonality with human societies.

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Digging dense networks of tunnels and interconnecting chambers requires sharing our labour and helping each other to bring in materials such as leaf litter. Once built work does not stop, as our nest will need to be maintained and then enlarged whilst the queen continues to pump out eggs.

Some 2 years after our Queen's nuptial flight our colony will reach its ultimate size. By then we would have reared winged virgin queens and winged males (drones) which if conditions are favourable will give rise to new colonies elsewhere in our woodland patch.

Our remarkable *Ant-web* communication relies on chemical messages.

With the high level of organisation in our colony comes the development of a sophisticated communication system. As we live significant portions of our lives in underground darkness, rather than relying on sight and sound we communicate using the chemical language of pheromones based on taste and smell using many different chemical signals picked up by constantly smelling each other with sweeps of our antennae. We are essentially walking bunches of secretory glands permitting us to emit up to 20 different pheromones each one of which has its own significance. Our winged virgin queens will emit pheromones to attract winged males (drones) who together will alight in a nuptial flight hoping to overcome immense dangers before successfully starting a new colony.

Our workers produce pheromones for marking territory, enlisting sisters or warning us to danger as well as identifying our sisters whilst detecting and harassing strangers. A scout who discovers a nectareous flower will summons up assistance from our sisters to make harvesting more efficient. Our scouts leave chemical trail behind them so they are able to retrace their steps and strengthen the trail on their return for others to follow. Once the helpers begin to move backwards and forward with harvested nectar, honey dew or food chunks they soon intensify the concentration of the pheromones along the path which immediately attracts more workers.

Nectar, honey dew, eggs and springtails help sustain our colony

As forager specialists we travel up to 200 metres from the nest seeking out food to supply the colony. We feed mostly on liquid foods (nectar, honey dew, etc.) as well as liquids we extract from the bodies of our prey such as caterpillars, beetles, foreign ants and wasps. We also feed on *Arthropoda* eggs laid by millipedes, centipedes, scorpions, woodlice and spiders, or bodies of springtails, *Collembola*, which live in decayed wood as well as fungi and fungal spores.

We will also expend huge amounts of energy trailing high up into tree or shrub canopies to collect honey dew from aphids, mealy bugs, scale insects, psyllids and other sap sucking insects (*hemipterids*) attached to the foliage.



Honey pot ants storing excess honey using repletes within the nest: Courtesy of http://smrt.ccel.ca/files/2013/04/HoneyAnt_cropped.jpg

Some of the trees are so tall that our daily treks into the tree canopies are equivalent to height gained when humans climb Mt. Everest.

As workers we store our hard-won nectar and other fluids in our crops (upper part of our digestion system). When we return to our nest, we often regurgitate a portion of our stored fluid to younger workers. Alternatively, to ensure the colony has emergency supplies during tough periods we often transfer some of our liquids to our honeypot ants (repletes) who act as a 'social stomach' existing as living storage receptacles which remain perpetually on tap within the nest.

We are soil engineers

In summary, because of our huge numbers of ants busily carrying out nest construction, gathering and breaking down organic matter or building nutrient rich middens from our waste and old seeds, we impose a profound ecological footprint in our bushland ecosystem. This substantial enrichment of the bushland soil permits us to think of ourselves as ecological or soil engineers. The second part of this article will be in the next edition of *Fagus* and which will cover captivating facts about their farming endeavours, their close relationships with wattles and their tropical ant-house plants.

Endnotes

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A Garden Surrounded by Orchards

Aina Dambitis

Have you ever wondered what the Staff at the RTBG do when they go home? Do they have dream gardens, grand designs, terracing and topiary? Do they weed and prune obsessively until night falls? Or have they given up on annuals and barely have the energy to water the patch of lawn out the back under the clothes line?

Well, Horticulturist Chris Lang drives home to an acre block in the area of orchards towards Huonville. Chris is the Curator of Tasmanian Flora and we have seen him working in the Tasmanian section for many years. He has helped create that area which displays our endemic flora to the many visitors who come to the RTBG. These days he also has oversight of the Subantarctic House. Friends will have chatted with him as he works outdoors and we have also heard him speak in more formal settings.

I always enjoy being in the Tasmanian section so I'm looking forward to this visit.



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Chris and wife Michelle, who also worked at the RTBG for many years, liked the area south of Hobart and 28 years ago bought a block with an almost derelict cottage and moved in. Gradually the house was repaired and rebuilt and the garden planted. The soil is mudstone and not particularly fertile. They use a bit of seaweed-based fertiliser and slow-release low phosphorous pellets for the native plants. A light covering of double cut gum mulch is spread over the beds. The prevailing winds come from the north west and south west and sweep over the paddocks. Winter fog seems to keep most of the frost at bay. There is plenty of water for gardening. Occasionally a wallaby or pademelon wanders through the property, blackbirds scratch up seedlings but there are no possums! The presence of commercial orchards nearby might have something to do with this.

I visit in summer. The paddocks are golden brown, the orchards netted, the unsealed road is dusty. Thick, bushy plantings along the fence lines trap the dust, hide the house and the world inside. The narrow driveway pushes through the thicket and then suddenly I have arrived. The drive way opens up into an area of sheds and parking areas with a house beyond. All this is hidden from the road. I have driven past Bottlebrush, *Melaleuca pallida* and *Melaleuca pustulata*. They are big and bushy and thriving. The latter, the warty paperbark, is endemic to Tasmania and found in the dry heath lands of the east coast and not often found in cultivation. So, I am clearly about to visit people who are experts and are willing to grow the kind of plants you won't find in Bunnings.

Fruit trees shelter behind the first line of bushes. Apples, plums, pears of all kinds are laden with fruit. There is a hope that there will be the time and energy to make cider again soon. Beyond the rows of trees are raised beds for vegetables.



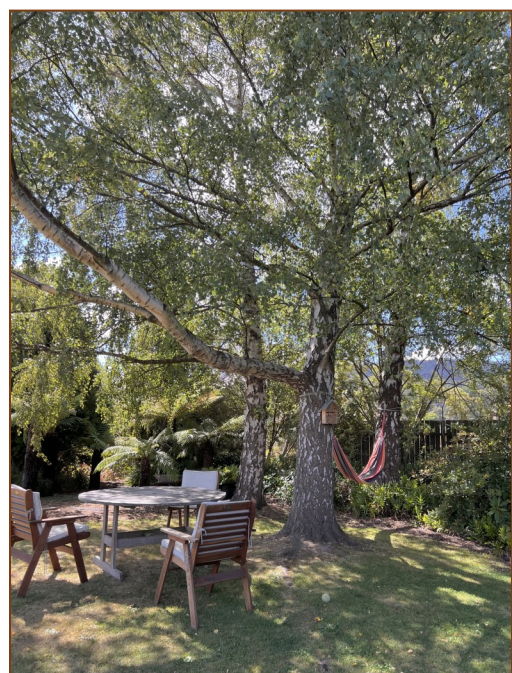
And then the big parking area with an imposing Magnolia in it, *Magnolia* "Star Wars". There are some big dark pink buds which hint at the burst of colour which must come from this tree when in full flower

The first impression is of green, thick vibrant green. The dusty summer is forgotten. Here it is cool and green. Lawn curves around the house. A tall conifer dominates one side of the house. It is *Athrotaxus x laxifolia*, a cross between Pencil Pine and King Billy Pine. It grows into a tall conical tree which contrasts with the smaller, drooping Huon Pines nearby. This section is watered with irrigation lines which spray water around the pines.

The Huon Pines are a homage to the original owner of this land. Henry Longley came to Australia from Maidstone in Kent and worked as a piner. Much of what we know about the everyday life of a piner comes from his meticulous diary entries. Some of those are included in *The Huon Pine Story: a history of harvest and use of a unique timber* by Garry Kerr and Harry McDermott. Henry's son built the original house which was known as Maidstone.

Eucalyptus vernicosa is hidden in between the Huon Pines. This is a small tree, more like a tight shrub, with glossy green leaves, often known as the varnished gum or shining gum because of the shine on the leaves. It is endemic to the mountainous areas of the west and south west and first described by Hooker, probably seen near Mt Arrowsmith. It is rarely cultivated.

Nearby is a cluster of tall birch trees providing dappled shade for a table and chairs.



There are tree ferns beyond this. *Pittosporum bicalor*, the cheesewood, found in shady damp gullies spreads upwards. It too was first described by Hooker in 1834. Its dense mass of light green leaves mixes with the fine needle-like leaves of a willow needlewood, *Hakea macraena*.

The lawn sweeps around the house to another sitting area, newly created. Here is the only outward looking distant view which happens to be of the Sleeping Beauty range.



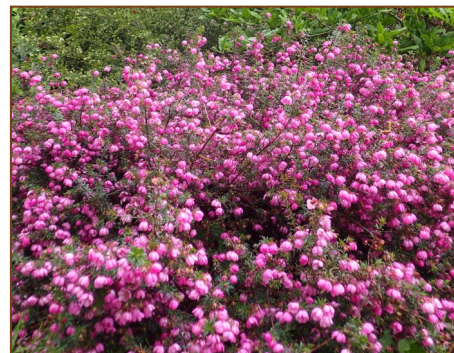
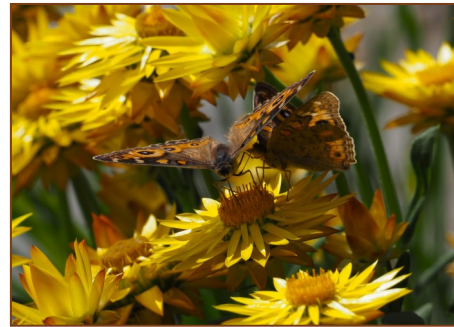
Trees and bushes and many big banksias block out the sight lines everywhere else. They hide neighbouring houses, various sheds and the occasional roof and create the feeling of privacy.



Yellow paper daisies edge this circular new space. There is prostrate *Correa alba*, some dwarf forms of *Banksia marginata* grown from seed, *Eucalyptus pauciflora* "Little snowman" which is a dwarf form of our cabbage gum and another small tree, this time the mallee, *Eucalyptus preissiana*. The plantings are low and varied, the focus is on the centre of the circle, the fire pit. The rocks, the paving, the bricks have been sourced from the property and Chris is quietly satisfied with the result.

The spring flowering is long past so most of the colour comes from *Bauera rubiodes* "Trial Harbour pink", some correas and the daisies. A young maple, *Acer griseum*, is beginning to develop the characteristic papery brown stem and promises to have scarlet leaves later in the year. Lots of banksias are flowering and some of the gums and there are patches of yellow and pink underneath the big trees.

Another example of horticultural magic is a weeping birch, *Betula youngii*, which has been grafted low, near the ground, and so has grown up with a single trunk and branches which hang down to create a little room inside the wall of leaves.



The Langs have been here long enough to see their trees grow to impressive heights. They have been here long enough to redo sections. The vegetable beds have been rebuilt and the pathways paved. The irrigation system is being extended. Malingering plants have been shifted to more suitable sites. Native grasses have gone because they caused too much work. They self-seeded too enthusiastically and needed trimming. They both weed continually. One corner is still a bit of a feral wilderness but the rest of the place is immaculate.

This is an elegant garden. Careful grouping of trees by size and foliage and habit blocks out the neighbours and winds. Choices have been both adventurous and informed. This garden could only have been created by skilled, knowledgeable people.

I've had the masterclass I was expecting.

Friends' News

Benefits of Membership

In addition to knowing that you are kindly supporting and promoting the Royal Tasmanian Botanical Gardens (RTBG), you will also receive our quarterly magazine, *Fagus*. We have four meetings each year with specialist speakers on gardens and plant-related topics, and opportunities to participate in outings and activities.

You can receive discounts on *Neutrog* garden products during our twice yearly offer; and free entry to the RTBG Tomato Sales (normally \$10).

Available **only to single/joint membership** and not affiliate members, discounts are also offered on selected purchases at participating plant nurseries, garden centres and retail outlets. It is essential that you show your RTBG membership card at the time of purchase.

Botanical shop – RTBG – *10% discount*

Chandler's Nursery – 75 Queen St, Sandy Bay – *5% discount*

Greenhill Nursery – Leslie Vale – *10% discount*

Julie's Nursery -- 2273 Huon Highway, Grove – *5% discount*

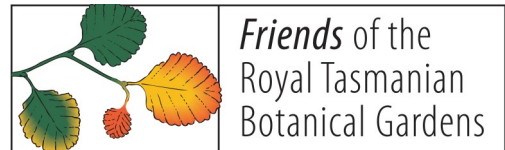
Stoneman's Garden Centre – 94 Grove Rd, Glenorchy – *5% discount on full priced stock*

Wildseed Tasmania – 91 Weston Hill Rd, Sorell (0429 851 500) – *10% discount on tube stock only*

Woodbridge Nursery – 3 Llantwit Rd, Woodbridge (open Fri and Sat only 9.00–5.00pm) – *10% discount*

Neutrog Australia Pty Ltd—Order twice a year through Friends when notified

Show your membership card and save!



If you know anyone who wishes to join Friends or you would like to give a gift subscription to someone, you can email membership@rtbgfriends.com.au or ring Anne Crawford on 0418517968 and a membership form will be forwarded to you.

At the **Friends' General Meeting in March**, we were entertained and informed by James Wood, who spoke about his work at the Tasmanian Seed Collection Centre at the RTBG. He had recently returned from a field trip where he collected seed from wild populations of rare and endangered species. He described the difficulties of this part of his work as well as the follow-up work of drying the seed and storing them for conservation purposes. The seeds have to be tested for viability by cutting and some are then germinated to ascertain the conditions needed for successful use of stored seed. He spoke at length on the variations between seeds of both germination requirements and the problems of dormancy in seeds. James was willing to answer the many questions his presentation sparked. His talk was so engrossing, I neglected to take photos of the event.

Fran Alexis

General Meeting Dates

June 1, 2024

September 21, 2024 (AGM)

December 7, 2024

At this stage all meetings will be held in the Banksia Room commencing at 10 am

Our Next Issue: August 2024