

President's Message

A lot has happened at the Gardens since August when I moved into the role of president. With the bitumen paths in place in the Sensory Garden, planting has been carried out along the northern and southern boundaries to give shade and wind protection. Two raised gardens have been constructed. A very handsome shelter in the north east corner has been erected and four large wooden benches have been acquired. The main earthworks around the pond have been completed and work is now starting on the Mosaic Path. Mosaic pavers have been made by the Village Artists – three of whose members are volunteers at the Gardens - as a feature of this pathway. One of our Friends has lodged a grant application for a Commemoration Garden with the Department of Veterans Affairs. And that is only a start. The education team has worked with many groups of children, we have had two groups of Japanese visitors. We've participated in the Art v Science event, the Big Scrub Environment



Wednesday work group members Will and Don starting work on the mosaic path in the Sensory Garden. The second raised garden, also their work, can be seen in the background. The Wednesday group is the life blood of the Gardens.

Day, the Waste Facility Open Day and had guided walks around the Gardens. We've had a sale of plants at Lismore Central. As well as that we have had our Sunday and Wednesday work days. The Propagation team has been busy propagating and maintaining plants for future planting and sale, and people on the Watering Roster were busy before Christmas keeping young plants alive. Work on the

data base continues, permanent labels are being positioned, new greeting cards produced and additional information brochures prepared. And as well there is all the behind the scenes planning and researching that is essential for the development and functioning of a Botanic Gardens. This group of volunteers work amazingly hard and anyone visiting the Gardens after a break can't help but be impressed by the progress so far achieved. I know I am. *Peter Bundock*



New shelter, new seats and new plantings are all helping to create a lovely cool shady space in the Sensory Garden.

Work Mornings

Sunday Group usually last Sunday of each month starting at 7.30 in the warmer months

Contact Denis 0431 223340

Wednesday Group meet every Wednesday starting 8am

Contact Ros 6628 2909

Propagation Group every Tuesday at the nursery, starting 8am
Contact Rose 0402 789122

Wear protective clothing and bring insect repellent, sunscreen ... and something for morning tea.



Young tree in our Uncommpn Plants Garden collection. P. Gould

Description: *Citronella moorei* is a large tree growing to 50 m tall with a trunk diameter up to 2.0 m. The trunk of mature trees is seldom round, often prominently and irregularly channeled, twisted or fluted and they are easily identified by their often leaning, crooked and twisted form. The bark is fawn or grey, corky and finely fissured. Leaves are simple, entire and alternate, edges not wavy, ovate or lanceolate to elliptic in shape and 5–15 cm long by 2–5 cm wide. The apex is bluntly pointed, the leaf base tapered. Both surfaces are soft, slightly glossy green and have prominent veins. There are occasional small domatia mainly in the vein angles along the midrib. The small creamy green flowers

appear from May to September in slender panicles.

The fruit is a black fleshy drupe about 2 cm long, eaten and dispersed by Catbirds, Wompoo Fruit Doves and Topknot Pigeons (amongst others).

It is endemic to Australia and is found in Subtropical Rainforest and Warm Temperate Rainforest from Araluen in NSW (35° South) to Mossman in Queensland (16° South).

The timber is soft, close grained, and a pale grey colour with prominent rays.

References:

Floyd, A.G. 1990, **Australian Rainforests in New South Wales, Vol's 1& 2**, Surrey Beatty & Sons, Sydney NSW.

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 Harden, G.J. (ed) 1993, **Flora of New South Wales, Vol 3**, New South Wales University Press, Kensington, NSW.
 Harden, G., McDonald, B. and Williams J. 2006, **Rainforest trees and shrubs: a field guide to their identification**, Gwen Harden Publishing, Nambuccca Heads, <http://plantnet.rbgsyd.nsw.gov.au/AustralianTropicalRainforestPlants> http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Citronella_moorei.htm



This giant *Citronella moorei*, growing on the Allyn River, Barrington Tops is 50m tall with a diameter of 2m.

(source Wikipedia)

Ground orchid pops up in Room 4

Family ORCHIDACEAE

Epipogium roseum

We have been surprised by the appearance of a few scattered clumps of a strange ground orchid. The Drooping Orchid (*Epipogium roseum*) is a remarkable, small, rootless, saprophytic (feeding on dead matter), ground orchid that lives out most of its life cycle



underground. It is able to survive completely underground for up to nine years without any above ground sign of its presence. The inflorescence—a short stem with scale like leaves and flower heads - appears above ground occasionally. When flowers do appear they are generally very short lived. This orchid has two unusual features. It lacks roots depending on a symbiotic relationship with fungi to obtain nutrients from decaying vegetable matter, and it doesn't rely on chlorophyll.

References:

<http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Epipogium~roseum>

Harden, G.J. (ed) 1993, **Flora of New South Wales, Vol 4**, New South Wales University Press, Kensington, NSW.



Epipogium roseum – rhizome and flower



Visit to Lismore Rainforest Botanic Gardens

Toby Golson, senior horticulturalist, living rainforest collection, Australian National Botanic Gardens

It was with great anticipation that I arrived at LRBG early in October with my colleague from the Australian National Botanic Gardens (ANBG) nursery, senior horticulturalist, Julie Percival. I have been custodian of the in-ground rainforest collection at the ANBG for almost 15 years and any readers who have had the pleasure of spending a winter in Canberra will appreciate the challenges that our site by Lake Burley Griffin provides to the plant cultivator. So it is with some envy that I arrived at your garden in the midst of the sunny subtropics.

The visit was prompted initially by our renewed effort to diversify the genetics of our nationally listed threatened rainforest holdings and followed on from contact I had established with Pat Offord to transfer genetic material (principally seed) from your collection where that material is excess to your needs and is able to be traced to wild collected parentage with secure provenance. This endeavour highlights for me the pivotal role that regionally based gardens such as yours can play in the continuing development of secure ex situ collections of threatened flora through 'spreading the risk' by holding genetic material in dispersed locations in different forms (seed, in-ground plants, tissue culture). Your local access, connections and on-the-ground knowledge provide a wealth of opportunity unavailable in the main to us capital city folk.

In stark contrast to LRBG, the rainforest gully at the ANBG is entering a stage of maturity that 50 years of growth has provided even with our short and challenging growing seasons and impoverished soils. I was very impressed both with the layout and presentation of your garden especially given its youth and reliance on all your hard

working and enthusiastic volunteers.

Unfortunately Pat was unable to make it on the day, so Peter Gould very kindly provided us with thoughtful background information and pointed us to the plants we had come to sample as well as giving us an informative tour.

Pat had furnished us with data on the makeup of your threatened species holdings and with the abundant growth provided by the season's early start (and some good rain prior to our arrival) we were able to collect good cutting material from the following: *Davidsonia jerseyana*, *Davidsonia johnsonii*, *Diploglottis campbellii*, *Elaeocarpus sedentarius*, *Elaeocarpus williamsianus*, *Fontainea oraria*, *Macadamia integrifolia*, *Macadamia tetraphylla*, *Myrsine richmondensis*. We are growing all of these species already in Canberra except *E. williamsianus*, however we currently have only cultivated clones of *Davidsonia jerseyana* and *Macadamia integrifolia* and only one wild collected clone of each of the remaining six. For these latter species, it is hoped that adding to the diversity of our clonal holdings will ensure a more representative sample of the taxons' genetics. We also collected cuttings from *Archidendron muellerianum* and *Xylosma terra-reginae* which are species we are not currently growing. Cuttings are now in the propagation houses at the ANBG nursery and, all being well, I hope to plant out those that strike in late summer or in spring 2016.

As an employee of a large capital city institution, I would like to thank and commend all those involved with your garden. Such endeavours not only bond and invigorate local communities but can become vital cogs in the safeguarding of our nation's floral heritage. I would also like to thank our Friends group here



Toby Golson at the Gardens

in Canberra who provided half of my travel costs to make the trip. Finally, I also hope to provide follow up communications regarding the progress of the plants and that we at the ANBG can continue to provide well into future a site for maintaining a conservation collection that includes many of the magnificent rainforest gems of the Lismore area.

Seeing with new eyes!



Recently a stranger lifted my spirits when I met him along Rainforest Walk. He said it was his second visit - he had come many years earlier. He praised the great growth of the plants, the new paths and the shade, where once there was a degraded weed-infested paddock. He congratulated us on what had been achieved. Then he really caught my attention when he referred to the new environment the Friends had created. He pointed out the small wrens darting around downstream of Sunny Slope. He said that once, this area had been ruled by the large birds. Now the Friends and Mother Nature had put in place a whole new, cool, shaded and protective environment that had encouraged the timid and small colourful birds. He enabled me to see the place with new eyes. The Friends have made a difference. We should all take a bow!

GEOFF WALKER

Wren image Wikipedia

Hoop Pine Forest at the Gardens

By David Cameron, a retired research forester with experience in QLD., CSIRO, SIDA & FAO of the UNO

Last year, I had my first real look at the Hoop Pine (*Araucaria cunninghamii*) forest on the eastern side of Lismore Rainforest Botanic Gardens. The most striking aspect of the stand for me was the large number of well-formed, healthy trees. And this was quite unusual.

I believed that the stock for this planting must have come from a Queensland Department of Forestry Seed Orchard. The reason for this is that when routine plantations originating from seed collected from un-improved trees are examined, the variation in form, taper, foliage type and overall performance is clearly obvious. For instance, there will be trees of poor form, some with double leaders, some with very large branches, some with large or very short inter-whorls, and some with rapid stem taper. This was not the case with the Botanic Gardens' planting. Trees there are generally of good form, they have acceptable taper, the branch characteristics are acceptable in that few have steeply angled branches with most generally at right angles to the stem. Besides these facts, whorls are regular, there are no unusual crown formations and foliage is generally normal.

There were a number of 'runts' and that is normal in most plantations. Runts are really ineffective trees, they contribute virtually no volume, or basal area to the stand and are not competitive with the other

much larger trees in the stand. The poor traits mentioned above were seen regularly in Queensland Department of Forestry plantations up until the 1970s and then there was a change.

Change

The reason for that change is an interesting story. Hoop pine was accepted as a candidate for plantation development in Queensland in the 1920s when it was clear to early foresters that the supplies of natural hoop pine would run out at some time in the future. In the Mary River valley, two species were in consideration for plantation use but Hoop Pine was placed ahead of the alternative Mexican cedar (*Cedrela odorata*). Both had grown well and it is likely that the indigenous species, with timber products well known to the community and industry, would have an advantage over an exotic with no real local experience in growing it, processing it or selling it.

Hoop Pine was highly sought after in Queensland and in northern New South Wales as a general purpose housing and furniture timber. In fact it was generally sought after following the removal of the high value Red Cedar (*Toona australis*), White Beech (*Gmelina leichhardtii*) and several other attractive cabinet-

wood species which were removed by logging of coastal forests.

Hoop Pine occurred in dry and moist rainforest stands as an emergent above the lower growing mixed stand of rainforest species and was found as scattered individuals or as clusters of trees. These tree



David Cameron giving his talk at recent Hoop Pine workshop at the Gardens

groupings had very high basal areas and this indicated that in plantation the species could maintain high stocking rates and achieve very high volume production.

Nurseries and plantations were established in several districts where Hoop Pine grew naturally. As far as possible, local seed was used to develop the plantations in the reasonable belief that such material would be well adapted to local conditions. Early collections of seed for establishing plantations were from native trees that were being felled for milling. Instructions were also given to collecting cones from the very best trees harvested so that there was a gradual improvement in the quality of the resulting plantations. Records were kept of where the seed came from (provenance) and later it became clear that there were some that performed better than others. It also became clear that native stands were becoming much more difficult to find and that seed would eventually have to be collected from plantations. Such collections began in the 1960s.

Another factor that was very important was that the Department had a policy of producing 'quality timber'. This meant that thinning in the plantations was practised to remove the poorer stems and also pruning was carried out to allow the production of clear knot-free boards and peeler logs that attracted higher prices. Clear timber had the advantage of being easier to work



The Hoop Pine Forest

with less defect in the boards and veneers and this was beneficial in all. So the high initial stocking rates, and the need to thin also encouraged the Department to commence a breeding program. It was clear that if superior stock from seed orchards were planted, then a wider spacing could be used, reducing the number of trees planted and the need for high-cost non-commercial thinning.

Breeding of a tree species introduces a very different time scale to that of breeding non-tree horticultural crops that have relatively short life cycles, allowing changed directions in the breeding after just a few years. With forest trees where the end crop is timber, a breeding strategy has to be effective for 30 or more years. A final harvest in a Hoop Pine plantation could be after 50-60 years. Besides the growth and form traits, the quality of the timber must be evaluated as another key factor in a breeding program.



Walking in the Hoop Pine Forest

With these thoughts in mind the selection of 'candidate' superior trees is a necessary starting point for a breeding program. In plantation management the first stage of the selection is made early in the plantation life when trees are chosen for the first 'ground' pruning when 8-10 m in height. The selection is based on form, vigour,

health, taper and branch characteristics and about one quarter of the total number of trees are selected for pruning to a branch height that can be reached from the ground. Another selection is made about 5 years later and this is for a 'ladder prune' and again the number is reduced to about one quarter of the remaining stand. As the compartment is searched for this pruning and for general health, any outstanding trees are marked for consideration for inclusion in the breeding program. Screening of the selected trees is carried out by the Tree Breeding Officer with several of his colleagues.

However, when it comes down to the final trees to be included in the breeding program, a more critical evaluation is carried out by the Tree Breeding Officer(s) together with the Senior Research Officer as well as several of the most senior Departmental staff. Besides very careful measurement of the diameter, height, branch angles, foliage health, taper, the other most important measurement is on the wood characteristics. Samples are taken near the base of the tree and laboratory measurements made to provide confirmation that the wood is of the required standard (suitable wood density and minimal spiral grain) for inclusion in the breeding program.

The most practical way to produce a large amount of seed, giving stock with substantially improved growth and quality is to establish the best trees selected in the breeding program as grafts in seed orchards designed to minimize self-pollination. The first such orchard was established at Imbil in Queensland in 1965. Other orchards followed, the most recent in the early 2000s, as more knowledge was gained and more superior trees were selected, some within progeny trials of the earliest selections. Most orchards included grafts of 20-30 trees and later orchards provide the opportunity for upgrading of their

composition as well as providing security against threats such as fire.

Another important step in a breeding program is the testing of the selected trees for performance of their progeny. This is done via progeny (or family) trials identifying the truly superior parents for retention in seed orchards, and the best families in which to select superior trees of the second generation – for new seed orchards and further breeding.

The progeny trial may be from open-pollination of controlled-cross pollination. The genetic improvement program with Hoop Pine in Queensland recently reached the stage where all seed requirements for the modest annual planting program are produced by controlled crossing of grafts of the very best trees.

It is estimated that stock from the first seed orchard exhibited a gain in plantation volume production at age 35 years of 30% and in average tree straightness score of 40%. By the mid -1980s all planting stock in Queensland was raised from orchard seed and this supports the view that the Lismore Botanic Gardens Hoop Pine stand also originated from seed orchard seed.

Hoop Pine Forest

The stand of Hoop Pines at the Gardens was planted in 1984 by the NSW Department of Agriculture and Lismore City Council as a demonstration plot to show farmers that Camphor Laurels could be controlled by poisoning and then replacing them with a local rainforest species, in this case Hoop Pines. In time, the new trees could be a cash crop. In October last year we had a workshop at the Gardens to help us learn more about our Hoop Pine Forest. The presenters were Rob Dyason, who was involved with the original planning and planting, Peter Stace who worked the in later management of the site, and retired forester David Cameron.

Dr. Calder Chaffey: *my favourite botanist, though we never met*

It was 2012 when Southern Cross University's Medicinal Plant Herbarium received the collection of the late Dr. Calder Chaffey.

The dried plant collection, made up of plants he'd collected all around Australia, was the basis of my employment as a Herbarium Technical Officer. It was my job to catalogue and digitize the entire collection. Little did I know at the time that I was about to embark on a journey of discovery, detective work and making acquaintance with a botanist I'd never met but would soon develop a bit of a soft spot for.

Calder's collection arrived in large boxes loaded with specimens in binder folders, pressed in newspapers, stacked in drawers or lovingly enveloped. The collection contained over 2700 specimens, including over 1300 eucalypts, over 500 fern specimens, a multitude of rainforest plants; and several collections documenting plant growth in locations such as Lord Howe Island (Figure 1), New Caledonia, Heron Island and Broughton Island. Calder even went as far as to provide location maps and detailed descriptions and lists of the plants found on these expeditions.

The first task in the Calder Chaffey project was cataloguing, which involved entering each specimen's details into the SCU Herbarium Database (latin name, common name, collection date, locality, habit). Most plants were already mounted on herbarium sheets by Calder himself, so thankfully the digitization process could begin straight away.

Using a flashy 21 megapixel Canon EOS 5D Mark 2 digital SLR with a beautiful set of lenses, the digitization process began. The photographic setup consisted of the camera being attached to a copy stand pointing down at the table beneath; a set of high-powered flash units either side of the table; and a cable connecting the camera to the nearby computer (see Figure 2). With a click of the mouse, each specimen was photographed individually; the image instantly appearing on the computer screen. After tweaking slightly to adjust for colour balance, sharpness and cropping, the images were backed up onto a large external hard drive.



Figure 2. The digitization setup

and enthusiastic individual. His attention to detail and the keeping of thorough records of all the specimens has certainly developed my appreciation for such dedication and persistence. Although Calder Chaffey is no longer around to grace us with his boundless enthusiasm for Australian plants and botany, his spirit remains intricately bound within his work, and shines through his precious collections.

Visitors are welcome by appointment at the SCU Medicinal Plant Herbarium. Come explore Calder's collection and the rest of the Herbarium to discover the fascinating array of botanical snapshots in history!

By Vic Szabo

Herbarium Technical Officer, SCU Medicinal Plant Herbarium
For appointments to visit the Herbarium, email: vic.szabo@scu.edu.au



Figure 1. *Leptopteris moorei*, a rare fern collected by Dr. Chaffey on an expedition to Lord Howe Island in 1993.

The final step was to upload the images onto the Atlas of Living Australia, where people the world over could access the images online; a marvellous educational resource.

(See <http://collections.ala.org.au/public/show/co195>)

During my undertakings it was interesting to learn that Dr. Chaffey was, in fact a GP for over 40 years before retiring to immerse himself in his passion for botany. This was also when he became a founding member of the Lismore Rainforest Botanic Gardens; and with good friend Geoff Walker, plotted the GPS co-ordinates of the trees in the gardens.

Through the process of sorting, cataloguing and digitizing Calder's collection, it became apparent to me that he was indeed a meticulous, logical

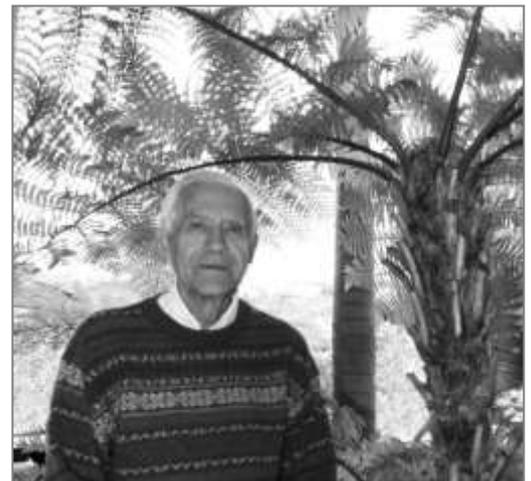


Figure 3. Calder Chaffey, my favourite botanist!

Our Work Groups

Ros Little, Works Organiser

It has been a very busy year for our Volunteer workers. Our numbers have increased on Wednesday to 15 regulars. Two of our new members have had considerable experience in woodwork, building and construction and this has been a great help in establishing the new Sensory Garden.

After the hard paths were laid for the Sensory Garden we started with the Sunday group planting a row of *Acmena 'Firescreen'* along the Anniversary Pathway on National Tree Day. This was followed up by planting a large bed of ground cover plants behind the Firescreen. Then a row of alternate White Cedar and Brown Kurrajong along the northern road. All these plants have flourished even though we had a very dry Spring Work was done on the pond with a weir put across allowing a bog garden in front of the outlet pipe. We will be starting to plant around this area soon.

The middle bed in the Sensory Garden now has a raised block wall at either end and we will put in trailing plants to spill over. At present we are constructing a paved area and pathway in the middle of this bed. We have been able to purchase four garden seats for the Sensory Garden and we also have a canopy which will keep off the rain while visitors can enjoy the view. While doing all this work we still have been keeping the rest of the Gardens watered, weeded and maintained. We could not do it without having a great group of willing and friendly and enthusiastic workers doing a great job.



Some of the Wednesday group enjoying a well earned morning tea break

Saving the Wild Wollemi Pines



The Wollemi pine (*Wollemia nobilis*) is one of the rarest and oldest trees in the world. Although the trees are now common in nurseries around the country, the remaining wild trees are under threat from the soil pathogen *Phytophthora cinnamomi*, which causes root rot. Scientists are urgently trying to find new ways to fight this root-rot pathogen, as well as identify new locations to set up future populations in order to prevent the ancient trees from becoming extinct. And it turns out that soil could be the key to both.

"They're an iconic species and there are fewer than 100 left in the wild," says Jessica Mowle, a PhD student at the Hawkesbury Institute, who is leading a project on how the Wollemi pines affect the soil environment they're planted in. "We're extremely interested in keeping them alive."

Mowle's research suggests that the soil environment the trees are planted in could play a big role in the species' survival, and might even help to fight off root rot. It also suggests that the trees can actually attract beneficial bacteria and fungi to their roots in order to create a good soil environment - which might help explain why they've been so good at surviving for 65 million years.

A growing body of evidence suggests that the balance of these soil environments could help to keeping pathogens away and a range of plants to grow. It's a similar situation to the gut bacteria environment in our own stomachs,

which are necessary to keep us healthy.

"Part of my previous research showed that when Wollemi seedlings are planted in soil under their own parent trees, they gather different fungal communities and grow better than when they're planted in soil further away," says Mowle. "You'd expect that the trees would do more poorly underneath their parents because of a build-up of natural enemies around the adult trees, but these results suggest there's something beneficial around their adults," she adds. "We believe the adults are gathering a beneficial microbial community under them."

The research team at the Hawkesbury Institute for the Environment is now working with the Australian Office of Environment and Heritage, the Royal Botanic Gardens and the University of Melbourne to try to find the ideal location for a new wild population of 190 Wollemi pines.

"I want to understand if there's a particular soil environment where Wollemi do best, and whether they can gather a specific microbial community to them in these new locations," says Mowle.

The ultimate goal now is to identify which environments and also which soil microbes can help the trees fight off *P. cinnamomi*.

Adapted from article in Science Alert November 2014

<http://www.sciencealert.com/less-than-100-of-these-trees-are-left-in-the-wild-now-fungi-could-help-save-them>
Image University of Queensland

Making the rainforest key

Rainforest Plants of Australia – Rockhampton to Victoria

By Nan Nicholson

A computer-based interactive identification key to rainforest plants seemed like a good idea in 2001. Terry Tame, whose concept this was, had experience with making interactive keys; Gwen Harden, Bill McDonald and John Williams had all the information and drawings already in their “red book” *Rainforest Trees and Shrubs* and “green book” *Rainforest Climbing Plants*; and Hugh had many of the photos from our books *Australian Rainforest Plants I-VI*. It should have been easy and quick.

However, by the time the key actually emerged in late 2014 the project had blown to 10 times the original size. The number of species, photos and amount of detail all grew relentlessly as we kept raising our own bar. Our credibility on predicted completion dates was shredded, along with, on occasion, our nerves, incomes and relationships. We lost two of our members – John Williams passed away in 2005 and Terry Tame had to withdraw through illness.

It was an exhausting 13 years with a mind-numbing number of hours spent screen-staring. Just the scoring of species characters, with 1139 species, 160 features and several states for each feature, involved 1,291,626 boxes to be ticked, all by Gwen Harden.

Gwen attended to most of the hard slogging detail, and re-drew all of the original illustrations while adding many others. She also master-minded the entire project, researched much of the additional information and generally kept the rest of the team on track.

Bill McDonald provided, from his encyclopaedic knowledge of the Queensland flora, information on the Queensland species which no-one else could have supplied.

Hugh prepared over 12,000 photos, most of which he took himself, as he and I travelled to hundreds of patches of rainforest from north of Rockhampton to far southern Victoria and west to Mt Kaputar in NSW and to the central highlands of Queensland. I collected thousands of specimens which now form a large herbarium and enable me to answer challenges on identification.

Gathering these photos was the best part of the project for us. Finding new and beautiful places, meeting the plants and the local

experts, immersing ourselves in learning – these gave us a rich sensation of privilege and gratitude. We even managed to stay enthusiastic in some of the scrappy impoverished vine scrubs, pushing through lantana and gathering ticks, because we knew how lucky we were. We were collaborating with the best botanists in Australia and we were contributing to collective human knowledge. Fortunately our existing book business allowed for long absences and, in the first few years, our daughter Terri was living nearby and could run the farm while we disappeared into the wild.

The hard bits were: deciding on the limits of the project and then justifying them; driving long distances to collect photos of rare plants that turned out to be not there, not alive or not photographable; reading, checking, re-reading and re-checking a manuscript with hundreds of characters, no story line and an absence of emotional thread. The dread that we might never finish was always lurking.

Now that the key is finally being examined by others and is receiving healthy reviews we can enjoy seeing people marvel at the complexity and beauty of rainforest plants. It makes all the effort worthwhile.

Non-botanical people using it have reported that they can key out Blue Quandong (*Elaeocarpus grandis*) with only the following information: a very large tree, with buttressed roots and old fallen leaves turning red, in the NSW-Qld border region. These features bring the choices down to just three species which can easily be separated by looking at the photos.

On the other hand, professional botanists can find a level of detail that has not been collated in any other publication. For the floral descriptions in particular, Gwen Harden gleaned information from many sources including countless herbarium specimens. Her descriptions are



Gwen Harden, Bill McDonald, Nan & Hugh Nicholson

supported by Hugh’s close-up photos showing the specific features that will clinch identification.

One of the advantages of interactive keys is the ability to play around with multiple questions, eg: which weed species occur between Rockhampton and Gladstone in dry rainforest? Or, which rare or threatened species in Victoria occur in cool-temperate rainforest?

Rainforest Plants of Australia – Rockhampton to Victoria is primarily a means to identify rainforest plants but it is much more. The general information on rainforests includes copious details on the different types and their locations. This is supported by a huge illustrated glossary with hot-linked examples of species, and an enormous reference list of publications and related websites.

Many times during the 13 years we wondered whether to give up but now we can look back and say the journey was worth it because the end result will help many people take joy in the natural world around them. Hopefully they will fight to protect and regenerate what is left.

For information about the key or to order a copy - or for information re their photos and books go to: www.rainforestplantsofaustralia.com www.rainforestpublishing.com.au or www.facebook.com/rainforest.publishing?ref=hl

Did you know that a researcher in Norway has discovered that medication for mental health patients dropped by half after they participated in a program that introduced them to taking regular walks in the woods?

Northern Star Oct 2014

Art v Science event in Lismore a success



person using the microscope and adults looking on, and Margaret had little people in their little chairs creating lovely art work with foliage. Rose was not just selling plants but demonstrating how to pot them up. I had noticed that Rose had her granddaughter Maia with her. What I did not realise till later was that Maia was not just her grandmother's helper, but she had taken on a role as our very own ambassador to children. Young people were not just tagging along with their parents but they were being assisted by an expert from their own peer group. At our next committee meeting

The big event last August billed as Art v Science had been scheduled to take place in Lismore's Riverside Park but unseasonal torrential rain prompted a relocation to the City Hall. For us this ended up being a real bonus. With our new site we had easy, level access and not only did we have paving underfoot but we had shelter as well. The weather improved and we did not really need the shelter. But we arrived to find that a large pop-up tent had been provided for our use. We had various activities to organise.

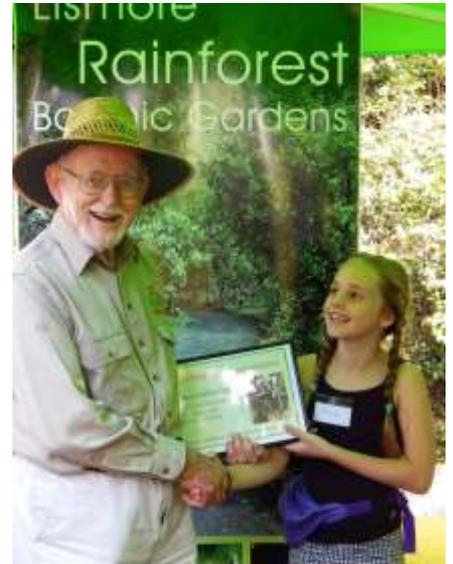
Ros was setting up plans for the Sensory Garden and getting people to contribute ideas. She had full size colour image of the design for a mosaic path to be installed in the Sensory Garden. Rose was soon on top of setting up her plant stall and Margaret and Rosemary organised their Education activities despite the hitches in getting power for the computer with microscope.

It was all very new to us and I wondered how things would work out. But whenever I looked during the day, Rosemary had a young

it was decided that Maia should be presented with a certificate to show our appreciation, and that certificate was formally given to her at the Big Scrub Field day when we were able to see her in action yet again, at times taking charge of our plant stall. Many of us had the opportunity to be amazed at the competence and confidence of this nine year old treasure. The certificate was presented by our most venerable volunteer, Geoff Walker, to our youngest, Maia Bellmaine. *Denis Matthews*

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OUR HOOP PINE GREETING CARDS

They are perfect to have on hand as birthday, thank you or 'making contact' cards. The beautiful line drawing by FLRBG member Kerry Harvey, is printed on rich ivory card. No message inside. Gardens info on the back.

Packs of 5 with envelopes \$10

To place an order, email friendslrbg@bigpond.com and we will give you banking details and where you can pick them up



Feral bee hive at the Gardens

Tennyson wrote that in spring a young man's fancy turns. I am not sure what Tennyson thought a young woman's might do, I assume the same. And not only young humans. Plants do it, and the birds and the bees do it. A beekeeper knows it is spring when the phone calls start with, "there are all these bees!" So no surprise when Margaret Hildebrand rang about bees at the Lismore Rainforest Botanic Gardens.

Honey bees reproduce by swarming. About half the bees in a hive leave, generally with the old queen, to start a new hive. They leave a potential queen behind. She is a virgin and has yet to mate. Mating occurs at special places called drone congregation areas. A bit like a nightclub for bees. The problem is that the virgin may be taken by a predator during one of these mating flights. The new queen would become the mother of all the bees in a hive, so should she not return, the hive will eventually perish as the bees die off.



Typically the swarm leaves the parent hive and settles on some convenient spot nearby, a branch, thistle, fence post etc. From here scouts set off to find a new home. This may take a few hours, or even days. Sometimes they will move some distance away and have another look around. Should they be unsuccessful in finding a suitable new home, the swarm will occasionally settle for a spot that has low light levels. Such as the place where a swarm recently settled at the Gardens.

These desperate measures tend to fail in the long run. Trees shed leaves, branches grow. What today

may be OK, tomorrow is exposed to the sun and rain. In the case at the Gardens, the swarm was attached to small branches and hive structure,

wax, bees and honey became too heavy for them to support, and it crashed to the ground.

That beehive was probably from a swarm that established there last spring. The weather since had been fairly benign for a hive that was not in a cavity. It was well protected from above by a good thatch of leaves. When I first inspected it I felt it was almost certain to collapse, and on the very day when I returned to photograph it, it had.

Because it had been some two to three metres off the ground and was quite big I thought I would need a scaffold of some sort or a front end loader. The idea was that because of its size – one metre approximately - it would have to be cut into small pieces. Once it had fallen to the ground this was still the tactic. I figured two people would be better than one and called fellow apiarist Brian Window to give a hand.

A normal beehive was placed beside the fallen hive which we proceeded to cut it into manageable pieces. The attached bees were then shaken into the prepared hive. Pieces of comb containing honey and brood were placed in a large container for later attention. Brood refers to the eggs, larvae and pupae that will replace the adult bees. The structure incorporated a number of prickly stems of a vine that made it somewhat difficult to cut up, but on the plus side it had supported the hive during its crash to the ground so that some structural integrity was maintained. This meant that



most of the adult bees were undamaged.

A large number of bees returned to the spot where the hive had been. Once they had settled into a nice compact cluster I used a plastic downpipe to gather them. Because the pipe is only about 100mm across, the bees cannot fly up and out and the sides being slippery they tend to fall to the bottom. It is then easy to pour them out where convenient.

We had placed a small amount of the brood comb in the new hive hoping to encourage the bees to either go inside or for the ones we shook in to stay there. This was not very successful and most of the bees were clustered on the ground in amongst the lomandra. It appeared to me that they were probably hiding the queen. The chances of finding her in that situation were slim, so we decided to leave them overnight to sort themselves out and for Brian to bring a frame of eggs, larvae and pupae from home next morning. The original was probably too damaged to be attractive to the bees, and the fresh lot would help the hive to appear normal.

This started to work and when I arrived later I was able to move the hive further away and to use some smoke to get them moving into the hive. By the evening they were settled and Brian, with help from the gardener Damian, was able to move the hive. At last report the bees were doing well in their new home.

Geoff Manning

Children's activities at the Gardens

During 2014 we have organised guided walks for 17 different school groups, including preschool, primary and high school students. We work in conjunction with Danielle Hannigan, the Recycle and Recovery Education officer.

Ten schools attended the World Environment Open Day and seven other schools visited throughout the year involving approximately 500 children.

FLRBG also set up an activity area for the Science Hub Festival Sunday 24 August, which included children's activities.

At the Gardens we try to organise each guided walk according to the group's interest and age range.

Generally we aim to help develop children's understanding of

- trees (trunks, leaves, flowers, seeds)
- the diversity amongst trees and other flora
- the eco system of a forest
- the importance of trees to people
- the development of the Botanic Gardens

We try to organise a selection of activities for each group that appeals to different learning styles and encourages children to explore activities in small groups rather than simply take the large group for a walk and talk. This seems to engage children well and we have had appreciative feedback from teachers about the activities.

Some of the activities

Children can choose from a selection of leaves and flowers, be

an artist making an arrangement on black felt mats or be a scientist and study with a magnifying sheet.

The children can explore a collection of branch off-cuts

to match barks to nearby trees and count the growth rings to estimate the age of a tree.

Others explore the leaf litter and begin to get an understanding of the eco system. Using tongs and torches young children really enjoy working in specifically marked areas looking for the bugs that are busily breaking down the litter to make new soil and nutrients.

Sit and Ponder Place

At our "Sit and Ponder Place" in the Hoop Pine Forest we can quietly sit enjoying the atmosphere in the shady forest noting the height of the trees or the number of seeds packed tightly in a Hoop Pine Cone etc.

In the **Useful Plants Garden** each small group can take a small shopping bag of plant items e.g. Banksia brush, Bull Rush leaf, Wattle seeds, Sprig of Lemon Scented Tea Tree to find the matching tree then read the different signs about the plant uses, including uses by local Aboriginal people.

We include similar suggestions in the self-guided leaflets for parents and children visiting during



weekends and school holidays.

Moving into 2015

We look forward to extending our activities in 2015. Two more members are coming on board to help with school groups – Susan and Tracey. We are better streamlining our organisation so that preparation for any one activity can be reduced to a minimum. It will be all set up and sitting in the office waiting for us to pick it! It has been a busy time but we love it! **Margaret Hildebrand**



ENVIRONMENTAL FILTERING AND PLANT DIVERSITY.

For decades, ecologists have studied soils to understand why some patches of vegetation contain more plant species than others. Researchers at the University of Western Australia's School of Plant Biology and the Smithsonian Tropical Research Institute in Panama have now found an answer to this long-standing question. According to a study published recently in *Science*, competition for soil resources among plants does not explain variation in plant diversity along soil fertility gradients, contrary to the predictions of prominent theories. Rather, variation in plant diversity along such gradients simply reflects the filtering of species from the regional flora based on local environmental conditions. Lead author, Assistant Professor Etienne Laliberté, said that while previous studies had evaluated those different hypotheses in isolation, this was the first time multiple hypotheses had been considered simultaneously. Assistant Professor Laliberté said, "South-Western Australia's distinctive geological setting and exceptionally species-rich flora provided a unique natural experiment to address this key question. This shows global biodiversity hotspots are not only important for conservation, but also for advancing ecological theory." The ground breaking research is part of a broader study exploring how changing soil fertility during long-term soil development affects plant biodiversity and ecosystem functioning. <http://phys.org/news/2014-09-unravels-links-soils-biodiversity.html#jCp>

Flowering at the Gardens

28 Nov 2014 Birth Notice

We are pleased to announce the pregnancy of a Black Bean, *Castanospermum australe*, in our Gardens - 12 metres south of the Grandis Creek Picnic area. The 10 metre mum is thrilled and has splendid orange and yellow pea-shaped flowers. Birth of the fulsome pods are expected in April next year.



That message came from Geoff Walker! And the Black Bean was of many of the Gardens' plants that have come into flower this year – many for the first time. Here are just a few.



Round leaved Tea Tree
Leptospermum rotundifolium



Blueberry Ash
Elaeocarpus reticulatus



Hairy Alectryon
Alectryon tomentosus



Pink Laceflower
Archidendron grandiflorum



Visitors from our sister city in Japan with Peter Bundock, Geoff Walker and Mayor Jenny Dowell

DVA Grant Application

A grant application to Department of Veterans Affairs has been lodged by North Coast Legacy for the establishment of a Commemorative Garden at Lismore Rainforest Botanic Gardens. This will be a unique and nationally significant project which aims to 'Salute the Service' of Australian military personnel, and highlight their ingenuity in the use of plants for food, medicine and other purposes in times of conflict.

The project plans require capital investment to build a robustly constructed wheelchair accessible public space, including a raised timber lookout and display area within the Sensory Garden. It will provide shaded seating, rockwalled planters and paths. The project will feature plants used in war zones or their local equivalent.

Interpretative signs and printed material will present the stories behind the plants with information coming from the Australian War Memorial and ongoing research by the Friends of Lismore Rainforest Botanic Gardens, local botanists and students of Southern Cross University. There will stories of the uses of 'bush tucker' locally and links by Legatees of FNCL with the Veteran community locally and nationally throughout Australia. The project aims to have a strong educational focus for the many school and university groups who visit the Gardens.

Special thanks must go to Hazel Bridgett who chased up people and information and prepared the grant application for submission. A huge amount of work! Also to the people of Far North Coast Legacy for their time and interest in this project; and the professional and trades people who have volunteered their time, knowledge and expertise to help get this project off the ground. Results of the application should be known by April.