

# International Dendrology Society



## Bits 'n Bytes Botanical – October 2021

For those of us living in lockdown, things have eased a little as the governments of NSW and Victoria have given up trying to clear Covid-19 from the community, instead hoping sufficient vaccination levels will ameliorate the impact. Though unfortunately it is inevitable there will be significant pressure on health resources and unnecessary morbidity and mortality, its likely there will be further easing of our restrictions over the coming months. Given the different approaches by the states, its likely to be well into the new year before we can plan any interstate meetings. Still these days its easier to keep in contact and if you have any things of interest for the group, don't hesitate to let me know.

Most of you probably saw this article in the SMH or Age on Camellia Ark and Jim Powell in particular. For those of you who haven't I've attached the following link.

<https://www.smh.com.au/national/nsw/camellias-saved-a-house-from-bushfire-now-the-owner-is-saving-them-20210915-p58ryb.html>

### Feedback.

It was good to receive all the positive feedback on last month's newsletter. For those of us in lockdown I could almost feel the envy of Alistair and Julie's trip to the Australian Inland Botanic Garden. As to the answers for the 2 mystery Eucalyptus

species, I had received two correct answers by 12.30 am. The yellow-flowered one was *E. woodwardii* from the WA goldfields and the red-flowered one, *E. caesia ssp magna*. Larenç Marsol and Tony Curry were both very quick off the mark.

Also, you may have wondered why the picture of the critically endangered species, *Pittosporum tanianum* used was that of a postage stamp. It was the only picture of the species I could find that wasn't copyright protected. Harriet Tupper has kindly provided some pictures of the real thing growing at the Agronomic Inst. of New Caledonia as well as the palm, *Saribus jeanneneyi*.



*Pittosporum Tanianum*. Photo H. Tupper



*Saribus jeanneneyi*, Parc Riviere Bleu, N.C. Photo H. Tupper

### Tree Treats – A possible new Kauri.

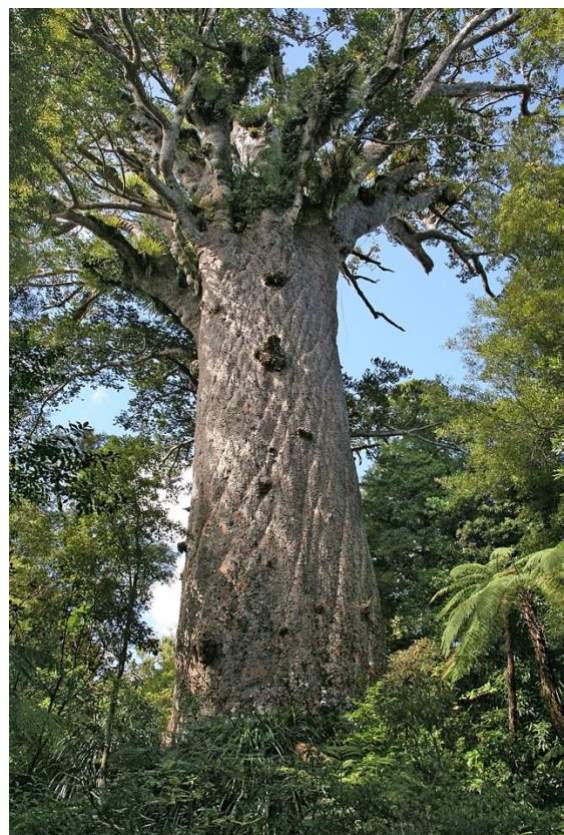
Of all the thousands of trees and shrubs we have growing at Coombe Wood in Mittagong, by far the most questions we receive concern two Queensland kauri (*Agathis robusta*). Obtained as small plants from a now closed forestry commission outlet just over 30 years ago, they have now reached 24 m, standing out from the other shrubs planted around them and showing off their lovely bark.



*A. robusta*, Mittagong 2021. Of note the local species *Eucalyptus* (centre front) died during the recent drought yet the *Agathis* were minimally affected. Photo R. Grant

Since becoming a member of IDS, I've had the opportunity to visit several fine collections of kauris (we are lucky in Australia and NZ to have such good collections) though it was sad to read in

David Mabberley's 2009 IDS Yearbook report on the *Agathis* collection in RBG Sydney, that mid 19<sup>th</sup> century plantings of *A. moorei*, *A. lanceolata* and probably now *A. macrophylla* (*A. silbae*) from Vanuatu have been lost from flying fox damage. Nevertheless, seeing kauri growing in the wild is an entirely different experience. Though many grow to impressive heights, they often have a relatively small footprint when young and blend in amongst other trees. That is until they reach massive proportions and dominate the surrounding forest. There can't be many people who have not been overawed at the sight of the giant bull kauri (*A. microstachya*) on the Atherton Tableland of North Queensland or the immense Tane Mahuta or Te Matua Ngahere (both *A. australis*), north of Auckland. Tane Mahuta (AKA God of the Forest), with a girth of 15.44 m is the 3<sup>rd</sup> largest tree by wood volume after *Sequoiadendron* and *Sequoia*.



Tane Mahuta, Waipoua Forest, NZ. Unfortunately, now at risk from introduced *Phytophthora*. Even larger trees were recorded in the past. Photo W. Bulach Wikicommons.

A couple of months ago, Peter Teese told me the story of one of his contacts, Reuben Wertz, who whilst working in Papua New Guinea as a Mechanical Supervisor on Lihir Island in New Ireland Province, made a journey to confirm the sighting of an *Agathis* sp growing on an island where they had not been recorded. Reuben had previously been alerted to the presence of the *Agathis* trees growing on the island of Lavongai (New Hanover) by Geoff Stocker who had worked as the Professor of Forestry at the PNG University of Technology. Later in this newsletter, there is an account of the trip Reuben made in search of them together with some pictures of what may be a new species of *Agathis*. But first a little information on the genus.

*Agathis*, together with *Wollemia* and *Araucaria* make up the monophyletic family *Araucariaceae* with *Wollemia* the most primitive of the extant genera. *Araucariaceae* is an old conifer family, peaking in diversity during the Jurassic/Cretaceous periods, a time when the supercontinent Pangaea had only just begun to separate. Though widespread through future Northern Hemisphere regions (fossils and petrified wood of *Araucariaceae* have been found across the Northern Hemisphere), most disappeared from there in the Cretaceous-Paleogene extinction event. Today of the 41 species, only a handful (all *Agathis*) are found north of the equator, confined to Malesia, south of 19°N. *Agathis* and *Wollemia* differ from *Araucaria* in having winged seed. *Wollemia* seed has symmetrical wings whereas *Agathis* seed is markedly asymmetric. In keeping with their ancient origins, a specific pest, *Agathiphaga* is the second most primitive living lineage of moths.

The name *Agathis*, which was first used by Richard Salisbury in 1807, is Greek meaning *A ball of thread* and refers to their globose-ovoid seed cones.



Immature seed cone of *A. australis*. Photo Kohuroa, Wikicommons

The type species, found growing over a wide area of Malesia, was initially named by Georg Rumphius in 1741 as *Dammara alba*. For reasons I've been unable to determine, this pre-Linnean name was considered invalid though *Dammara* was at times used for other species until *Agathis* was settled upon. Kauri, the Maori name for *A. australis* has become the common name for the genus. Dammar, a synonym for copal, is an extracted resin (also from other genera) previously used in the production of varnishes and of linoleum. Throughout its range, however, *Agathis* was primarily sought after for its timber leading in many cases to over-exploitation and threatening the survival of some species

The genus *Agathis* today ranges from the Malay peninsula through Indonesia, the Philippines, New Guinea, New Britain, Vanuatu, Fiji, New Caledonia (N.C.), Queensland, and the northern part of the North Island of New Zealand.





*A. ovata*, the scrub kauri from N. C. showing decussate leaves. In mature trees the leaves are ovate to almost spherical.

Adding to the difficulty differentiating the species, the leaves tend to be larger in juvenile trees (most of the specimens we see in collections), and juvenile leaves may differ in shape from those on adult trees such as is exemplified by *A. australis* (see photos). Leaves near the crown also tend to be smaller. The pollen cones that appear mostly on larger trees, are cylindrical and range from 1-2 cm diameter up to 10 cm in length. The characteristic globose-ovoid seed cone is wind pollinated and matures over 2 years. They measure up to 15 cm diameter and disintegrate at maturity releasing their seed.



*A. robusta* has relatively large elliptic leaves. The characteristic longitudinal veins are easily seen.



*A. robusta*. bark of a 35-year-old tree. A scar from where a branch has abscised can be seen top left.



*A. australis* juvenile foliage top, adult foliage bottom.

Because of overlap in their appearance, Whitmore and Farjon have developed keys based on pollen cone microsporophyll characteristics to separate the species. The pollen cones have reduced leaves called microsporophylls. Pollen sacs are borne on their lower surface. There is a summary of those features online at <https://www.conifers.org/ar/Agathis.php>

They are of little value to most of us. The pollen cones too high to reach and felling the tree as John Bidwell did in 1849 to collect a single cone from the first *A. robusta* he found, is no longer acceptable. With that in mind, I have developed two alternative identification sets of keys.

#### A. For trees in cultivation

1. Examine the surrounds including any stakes, etc for identifying features. Absent - go to 2
2. Examine the leaves and branches especially for areas that may hide identifying features (labels). Absent - go to 3
3. Ask the owner.

For those trees in the wild, I have based an approach on that suggested by Conifers.org "*Identification of the species of Agathis is most easily performed using a map.*"

#### B. For trees in the wild

1. Turn on Garmin GPS. – go to 3  
Battery flat. - go to 2
2. Unfold a map. - go to 3
3. Where are you? - go to 4
4. Except for Borneo or New Caledonia, the species should now be clear.

This reflects that many of the species are geographically separated. There are exceptions however and conversely populations of the same species can be significantly spread apart. The two populations of *A. robusta* in Qld for example are separated by about 1500 km. (from around Fraser Island and near Cairns). But geographic separation and different environments often leads to speciation.

Which brings us to the exciting possibility that somewhere there still could be a new species or subspecies of *Agathis*, not previously known. The following is a report of such a possibility. The people involved were Dr Geoff Stocker, (who sadly died in January this year), a person who had a

long interest in tropical forests and subsequently, his friend Reuben Wertz, an interested amateur. Geoff after working in the Northern Territory and Qld in tropical forests including with CSIRO, went to PNG as Professor and head of the Forestry school at the University of Technology in Lae, on the north coast of PNG. As is mentioned in the following report it was there that he first heard of the possibility of some kauri on New Hanover, known by the locals as Lavongai. Reuben, a mechanical supervisor working in a gold ore processing plant, a keen amateur has developed his interest in tropical conifers whilst collecting a variety to plant on his family farm. A friend of Geoff Stocker, he was working in the region and had the opportunity to travel to the island of Lavongai and the following is his account.



Bismarck Archipelago, PNG. New Hanover (Lavongai) is centre top, Lihir is top right and Lae bottom left. The larger central island is New Britain.

#### Do we have a third species of *Agathis* in Papua New Guinea?

By Reuben Wertz

*The possibility that there may yet be an undescribed species of **Agathis** in PNG came to light earlier this year while discussing tropical conifers over a coffee with Geoff Stocker at his home on the Atherton Tableland in North Queensland, Australia. Geoff is a specialist in tropical forestry and spent several years in PNG as the Professor of Forestry at the PNG University of Technology and as Director of the PNG Forest*

Research Institute. He mentioned that towards the end of his contract with the Institute (February 1996), he was asked by officers of the Forestry Department to investigate reports from local staff that an **Agathis** species was being logged on the island of Lavongai (New Hanover) in the far northwest of New Ireland Province. The Department had no previous records of **Agathis** from this island and its presence was somewhat unexpected. Administratively the report was of significance since the export of all conifers (and several other high value species such as Ebony) in round log form was banned country wide and the Asian logging company's licence was only valid for log exports.

At the time of Geoff's visit to check the reports from Lavongai, two *Agathis* species had been recorded for Papua New Guinea. **A. labillardieri** had been found in small, scattered stands in the west of PNG and in neighbouring West Papua. **A. spathulata** (previously **A. robusta ssp nesophila**) occurs in small stands through the eastern part of the mainland and on the island of New Britain.

Geoff provided me with the following account of his visit to Lavongai.

Geoff chose a senior program leader at the Institute, Tom Kosi to accompany him on what was to be a flying visit. They flew from Lae to Kavieng on the northern tip of New Ireland. Here they were met by Forestry Department employees with an outboard-powered aluminium dingy. The following morning, they set off through a maze of reefs and islets to the forestry camp on the north coast of Lavongai. Next day Geoff travelled with some forestry employees in a 4-wheel drive along a logging road which ended midway up the mountain range. Overnight Tom had met some of the local villagers and decided to access the mountain via traditional tracks from the other side. They arranged to meet near the summit later that day. From the end of the road Geoff followed snigging tracks and soon located a stand with scattered trees of **Agathis**. Tom's journey was far more arduous, and he didn't join up with Geoff until mid-afternoon.



The Lavongai **Agathis**. Photo R. Wertz

Geoff concentrated on trying to determine the approximate extent of the stand and thought it was probably confined to a relatively small area a hundred metres or so below the summit. Most **Agathis** trees in the stand appeared to have escaped logging. Unfortunately, Geoff was unable to collect decent botanical material to accurately determine the species. A few fragments including a wood sample were lodged in the Lae Herbarium. Geoff recalls that the wood sample (cut from the stump of a felled tree) was very light in weight. Tom and Geoff returned to Kavieng the next day.



Lavongai **Agathis**, Photo R. Wertz

I contemplated Geoff's account for a few days, referring to maps and satellite photos trying to pinpoint the place he encountered the **Agathis**. Over a few more conversations I picked his memory for every detail. My research had revealed

a paper by T.C. Whitmore published 1980 (*The New Phytologist*) which declared **Agathis** absent from nearby New Ireland mainland, so Geoff's discovery grew even more intriguing. The geographic isolation from other occurrences suggested a strong possibility it would be distinct from known species. By August 2019 I had acquired enough information to mount a search. The island is only 260 km from a mining operation where I spend a few months each year. Some of my national crew were familiar with the area or had wantok (relatives) who could help me out, so while on break I flew to Kavieng to start my journey.

Clem Anton and John Sumaien met me at the hotel, and we formulated a plan for travel to the island. Based on Geoff's recollections it appeared the easiest way to access the mountain range was from a coastal village on the remote western side. Next morning, we bought fuel and provisions, hired a boat and embarked. Some hours across the water we arrived at a village named Baungnung. It was there we found Peter Vani, a knowledgeable local elder and ex-military man who immediately recognised what we were after from my collection of photos and botanical sketches. Moments later a boy brought over a branchlet which was clearly **Agathis**. He led me to a small specimen growing in a garden nearby and described how it began life as a seedling under the big "Munem" tree on the mountain until his wantok transplanted it here some time ago.

A subsequent tour of the village gardens revealed larger planted specimens with DBH 25-30cm and their crowns breaking through the canopy of the coconut plantation. Peter explained that these now sapling trees grew from seedlings collected over 20 years ago by villagers who were with Geoff Stocker the day he stopped the logging operation. Geoff had expressed the importance of these trees, so a number of locals took it upon themselves to transplant seedlings for perpetual preservation. He certainly made an impression here and was well regarded by those who remember. I was showed some more garden conifers which originated from local forest. One was likely to be **Retrophyllum filicifolium** and the other was a species of **Podocarpus**, with a close similarity in appearance to **P. grayae** which has a wide distribution over North Queensland as well as a Western Arnhem Land occurrence. From the coastal village we proceeded upriver by boat as far as was navigable then humped swag up hills to a village with a lovely view where the local Pastor was kind enough to accommodate our party for the night.

On 30<sup>th</sup> August when the rain eased, we set out for the mountain. It was disappointing to see all the forest on the foothills destroyed. Three years ago, an Asian logging company clear-felled the area under the auspices of a Special Agriculture Business Lease (SABL), a loophole utilised by logging companies to avoid adhering to the sustainable forestry practices required under the government-issued logging permit system. The SABL allows forest lands to be clear-felled for agricultural development and has systemically failed to protect communities' interests and indigenous land rights. In this case, after exporting every last tree the logging company planted seedlings for a rubber plantation then abandoned the area. Without management the plantings quickly disappeared under bracken fern and raspberry bramble leaving the locals with nothing to show for the loss of their forest, plus the additional burden of now having to walk kilometres to source bush material for their thatch homes.



Seed cone damaged and discarded by a parrot. Photo R. Wertz

Near the end of the logging road, we turned off the ridge and followed a footpath down to a valley of undisturbed closed-canopy rainforest. After crossing a flooded creek, the path followed a steep and narrow mountain spur. The heavens opened up again and the muddy track became a slippery boggy mess. It was prudent to first secure a handhold before taking the next step. Climbing ever upwards we passed under some massive *Dipterocarps* and other giants of which I could only guess the genus. As we gained altitude the gradient eased, and the mountain engulfed in cloud. The first **Agathis** was spectacular, around 1.5m DBH with straight bole and wide spreading crown. Here I was able to find some freshly fallen branchlets (courtesy of marauding parrots) with leaves and pollen cones attached. Searching within the dripline turned up a solitary female cone and plenty of scattered scales indicating seeds were

already in dispersal. The forest floor was thoroughly combed for seedlings with about twenty recovered by locals for transplanting in their gardens (everybody wanted one now!)



Lavongai **Agathis** pollen cone. Photo R. Wertz

We continued up the mountain passing one smaller **Agathis** and in another 10 minutes the anticipated giant loomed grey through the mist ahead. Towering over the track was the largest “Munem” tree. Generations of ancestors must have revered this behemoth on the well-trodden footpad between villages as it bore not a single scar from an indifferent bush-knife. I had packed a rope to measure the circumference, but it fell short. An enterprising young man sourced a length of cane from a Calamus palm which proved sufficient to calculate the DBH to approximately 2.2m. There were no cones or seedlings found under this tree which did not surprise the locals at all. This was the “Father” tree they told me - the “Mother” was the first one we passed. However, I soon found scales from last year’s cones in the leaf litter and delivered an impromptu lecture on *Agathis* reproduction to a fascinated audience. After taking the necessary photographs as per instructions from Geoff, and with everyone now wet and cold from ceaseless rain, it was time to make our way down the mountain. We arrived back in the village late afternoon.

There was much discussion that evening. The locals were pleased that somebody was finally taking an interest in their big tree and wanted to know the implications if their “Munem” turned out to be an undescribed species as suspected. What will it be named? To the best of my knowledge, I explained the necessity of collecting a type specimen and getting it intact to a taxonomist, a person with the appropriate expertise who could give their tree a description in botanical terms and introduce it to the world.

“What would you like it to be called?”

There was a brief discussion in language which Peter Vani summarised for me afterwards. They concluded the species name should recognise that the Lavongai **Agathis** bears a name in local dialect which has already been in use for many generations.

“Munem” he said. “Call it *Agathis munem*.”



A young Lavongai **Agathis** showing juvenile foliage

The rain wouldn't stop so next morning I reluctantly left the village to continue my circumnavigation of Lavongai and eventually return to Kavieng. The three large **Agathis** I encountered were clearly not part of the same stand that Geoff had described to me which we had concluded were in the proximity of 400m elevation. My sighting was on a steep ridge at around 200m above sea level on the western slope of the mountain range where the forest remained undisturbed. We did not continue higher to link with the logging road that Geoff had traversed from the north coast. I was able to determine from aerial photos that we were at least two km distant from his 1996 sighting. It was comforting to know that the species is likely dispersed over a much larger area than was suspected at the time of Geoff's expedition.

After examining my photos Geoff suggested that this **Agathis sp.** was almost certainly not **A.**

*labillardieri* as the male cones of this species are generally no longer than 2 - 3cm. whereas the fresh ones found on the forest floor suggest a male cone length of 5 - 6 cm. For the species encountered on Lavongai, *A. spathulata* is a possibility as well as an *A. robusta* ssp. however it is impossible to tell whether we have a new species without access to a range of herbarium material which we will endeavour to obtain in the near future.

Reuben Wertz 2021

Time will tell if it is indeed a new species, a subspecies or a disjunctive population of one of the known kauris. Either way they look magnificent trees. Of the known species, *A. spathulata* (AKA *A. robusta* ssp *nesophila*) is growing closest. It is found in PNG, in pockets in the Eastern Highlands, Owen Stanley Range and central New Britain. Of interest, de Laubenfels in his 1988 Flora Malesiana, separated those growing in the Eastern Highlands as *A. spathulata*, from those growing in the Owen Stanley Range and New Britain which he considered a disjunctive population of *A. robusta*. Perhaps with further examination, there could be 2 new species.

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fossils. *International Journal of Plant Sciences* 174(8):1153–1170.



*Agathis atropurpurea*, the 3<sup>rd</sup> Australian species. Photo R. Wertz

Keep safe and best wishes,  
Simon Grant V/P IDS Australia.