

# New Caledonia



A study-tour report for the Merlin Trust

by

Tom Christian

Merlin 720

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### Explanatory note

This report has been prepared in fulfilment of the criteria of a bursary offered by the Merlin Trust. Similar reports have been required by the International Dendrology Society and the RHS, and so there is, naturally, great similarity between the three.

## INTRODUCTION

Flying north-east over the Coral Sea I consulted the programme for the 'Tree Lovers Tour' that had been sent in advance by Noumea Discovery. Our party of 25 had been assembling itself piecemeal over the past few days, converging on an archipelago that I was surprised relatively few of my non-botanical friends had heard of.

Guesses usually placed New Caledonia in sub-Arctic North America. When this occurred I politely explained – in a way that could perhaps have been misinterpreted as bragging – that it was in fact nestled on the western fringes of the South Pacific Ocean, with all the clichés of white sandy beaches, balmy temperatures, tropical breezes and, most importantly, 80% floristic endemism.

Only this latter quality was not in evidence as my plane descended to land in Noumea. Indeed, the view generated that slightly disappointed mood that is affected by the agri-industrial surroundings of most of the world's airports. Bhutan's Paro is perhaps an exception, as of course is the 'airport' on the island of Barra in Scotland where the wide beach doubles as the runway.

Faith was restored on the drive to Noumea city itself in the company of Steve Sillett and Marie Antoine – famous for their work in the canopies of redwoods in California - who pointed out the punishing ridge they had climbed earlier that same day, ascending into "beautiful cloud forest" which it was just possible to glimpse from the road. Also on board were two other 'ids' (an unofficial acronym for members of the International Dendrology Society, 'IDS' in uppercase being the official acronym for the organisation).

I was joining this IDS tour to New Caledonia courtesy of a very generous grant from the IDS itself, and bursaries from the Royal Horticultural Society Coke Trust Bursary Fund, and the Merlin Trust. Having been an 'id' myself for several years, I masochistically glance the tours newsletter each year to see where they are off to next. Iran, Chile, China, Bhutan, otherwise inaccessible private collections in Europe and North America, the great gardens of Italy, France, Spain, marathon multi-week tours of the USA, New Zealand, South Africa - the lists are as enticing as the costs are eye-watering. Applying for bursaries had crossed my mind before. Parts of the world I have longed to visit such as south west China came and went, but I kept my powder dry, knowing that one day a tour would come along that would be simply irresistible.

The allure of New Caledonia first established itself in my mind courtesy of its extraordinary diversity of conifers. My interest in conifers was fostered in the historic estates and designed landscapes of Perthshire, and I recall fascination on arriving at the Royal Botanic Garden Edinburgh (RBGE) as a student in 2006 and learning that this group was well represented in the tropics and not just throughout the temperate zones of the world.

At this time, RBGE had recently completed a relatively intense suite of fieldwork in New Caledonia. Several visits had been made over a period of a few years, and there was much material in the research glasshouses to look at. Conifers quite unlike any I had seen before filled the benches and rose nearly to the roof. I learned that the famous Chilean monkey puzzle had no fewer than 13 New Caledonian cousins, and that these and every other conifer occurring here was endemic to the archipelago. I resolved, the way one does at 19, to visit one day.

## A UNIQUE ISLAND

Endemism – the natural restriction of a biological entity to a single geographic area – is a phenomenon throughout the natural world, but there aren't many places with such extraordinary levels of floristic endemism as New Caledonia. There are many reasons that it occurs, and for the benefit of readers who aren't familiar with New Caledonia, we should discuss for a moment the circumstances that led to the archipelago containing such a wealth of botanical diversity and such high levels of endemism in the first place.

When the supercontinent Gondwana broke up modern day New Caledonia remained a part of continental Australia until ca. 83 Ma. It was long thought that the archipelago's flora could be explained by the combined effects of its Gondwanan origin and many millions of years in isolation. More recently, though, analysis of the area's complex geology, together with biogeographic and phylogenetic studies, has suggested that after separation from Australia the land-mass was subject to at least one subduction event – a geological phenomenon that occurs along the boundaries of tectonic plates. The geological evidence supports a theory that the land mass spent an extensive period submerged in deep water and reemerged following an obduction event only taking place ca 37 Ma.

These violent events have resulted in a complex geology, with various implications for the archipelago's biodiversity. Principal amongst these is that although elements of the modern flora are doubtless Gondwanan in origin, these elements could not have survived the long period of submersion following the subduction event. Biotic colonisation, therefore, can only have begun up to 37 Ma, and the theory continues that the archipelago owes its biotic (and especially floristic) diversity to multiple radiations from nearby floras, especially from Australia, Malesia and New Guinea but also with additional elements from other Pacific island groups and from Asia.

Furthermore, the soils throughout the archipelago are highly metalliferous – the main island has extraordinary reserves of nickel and copper - and low in nutrients. Such harsh conditions will have influenced the 'selection' of those elements that would go on to become major constituents of the flora. Finally, the diversity of floristic influences from many radiations, the climate, the complex geology and topography, and relative isolation, will have all contributed to high rates of speciation in the flora as groups adapted to succeed in highly demanding niches, consequences of which include the very high levels of floristic endemism in general, but also the presence of so many 'micro-endemic' species – species confined to three or fewer localities – throughout the archipelago.

**DAY ONE – Monday 30<sup>th</sup> October 2017;**

**OUEEN TORO & GRAND SUD**

There is a certain irony in that although New Caledonia is home to c. 7% of the global conifer species, conifers only account for a little under 1.3% of the archipelago's flora. The flora's overall level of endemism is generally placed somewhere between 75% and 80%, and besides the thousands of endemic species there are many endemic genera and endemic families, too. The programme for our tour, put together by the travel company Noumea Discovery and thoughtfully entitled 'The Tree Lovers Tour', attempted to capture as much of this as possible, and was designed to give a broad overview of the flora in general and the main habitat types on the main island, whilst picking up certain must-see highlights along the way.

Our first visit then was to Ouen Toro, a rare surviving patch of dry-forest just outside the city. As elsewhere in the world, dry forest is a very rare habitat in New Caledonia. It was once much more widespread, covering areas of the plains in the western lowlands of the main island, but many have been lost due to land conversion by early settlers to the island and more recently by forest fires and continued land use change. Many of those that remain, like Ouen Toro, have been modified at various times and these days must be managed in order to conserve priority species from the encroachment of non-native species.

It is estimated that only 2% of the original extent of New Caledonia's dry forest remains, and as such this contains highest proportion of threatened species of any habitat-type on the archipelago. At Ouen Toro a recent survey found over 50% of all plant species occurring in the forest to be endemic.

Romain – our botanist-guide - had worked extensively in advance of our tour to produce a daily "remarkable plants list" – lists of notable species found in each locality we would visit. One highlight at Ouen Toro was *Santalum austrocaledonicum* from which an essential oil is distilled. Most of the production is based on extractions from natural populations rather than plantations, and this is a valuable industry. Figures available for 2008 suggest the total export value of essential oils was US \$1M, with almost all of this going to the perfumeries of Paris. Other notable trees here include the iron wood tree from which the hill gets its name, *Casuarina atriplicifolia*; *Acacia spirobis*, one of the more dominant tree species in the forest; *Polycias crenata*, a striking member of the Araliaceae, and; *Melaleuca quinquenervia*, a small tree with beautiful bark exfoliating in longitudinal strips, characteristic of the myrtle family to which it belongs.



*Melaleuca quinquenervia* commonly known as 'paperbark', at Ouen Toro dry forest

After this gentle introduction to the flora we boarded our coach again and drove about 90 minutes south to Bois du Sud. On arrival at the park we met one of the archipelago's most striking trees, the endemic *Cerberiopsis candelabra*. We were fortunate to see this tree in flower – it is monocarpic – and our tour seemingly coincided with a mass-flowering event.

We enjoyed a picnic lunch which served to remind us that although we were in the South Pacific, we were also in France. New Caledonia is a French territory and as such benefits from the subsidised import of French wines, cheeses, and other essential items of cultural identity including an excellent range of pastries: Our chocolate éclaires were exquisite! Looking around after lunch we spotted *Gymnostoma*, a tree strikingly similar to *Cassaurina*, and 'an *Araucaria*' – there being general confusion as to its identity:

"Not *columnaris*" declared Romain.

"What then?" chimed several of us. "*berneri*" suggested somebody.

"Rubbish!" an anonymous retort. "*subulata*?" ventured a brave newcomer.

"Too far north" said a morose dendrologist.

Such exchanges would continue and were to become a familiar event usually taking place at least twice a day. Rarely would there be absolute certainty as to the identity, and '*Araucaria* fatigue' would affect us all at some stage. We left the mystery behind and drove on to Chutes de la Madeleine reserve, which covers some 400 ha and is home to ca 168 plant species, an extraordinary 95% of which are endemic to the reserve.

The soils here, as across so much of the southern part of the main island are ultramafic. The vegetation growing on them has adapted to the toxic, nutrient-deficient soil, and to the very high concentrations of metals in the substrate. Around Chutes de la Madeleine we saw several conifers: the micro-endemic *Dacrydium guillauminii*, a member of the Podocarp family, which together with another conifer, *Retrophyllum minus*, occupies an extraordinary niche growing on the banks of rivers and lakes with its 'feet' often submerged.

Other conifers here included *Dacrydium araucarioides* which we would see frequently in the south, and a member of the Cypress family, *Neocalitropsis pancheri*. Nearby we also saw the orchid *Megastylis gigas* and the insectivorous *Drosera neocaledonica*.



*Cerberiopsis candelabra*; we were fortunate to see a mass flowering event of this endemic, monocarpic tree



Chutes de le Madeleine – a biodiversity hotspot within a biodiversity hotspot



The micro-endemic conifer *Dacrydium guillauminii* in riparian habitat



*Megastylis gigas* seen near the Chutes de la Madeleine

## DAYS TWO & THREE - 31<sup>st</sup> October - 1<sup>st</sup> November

### GRAND SUD

The next day we departed early from the Kanua Tera Ecolodge and drove to La Parc Provincial de la Rivière Bleue, an extensive protected area of rainforest and home to many botanical treasures. Our journey took us back past something we had passed the previous evening: the grotesque, gargantuan industrial complex of a giant nickel smelting plant, built between 2002 and 2012, representing an investment of over US \$6 billion, so Romain told us. We heard depressing stories about the spillage of acids into the lagoon.

It had been perversely fascinating the previous evening, in the dark, lit by hundreds of thousands of lights making the whole thing look a bit like a space ship that had landed to repair a flat tyre, but in the light of day it was too much. I turned and looked instead at the worried forest on the other side of the road.

We seemed to be collectively suffering from the visual trauma, so as soon as the vegetation looked sufficiently plentiful we halted the bus and leaped out, exploring to see what else we could find in amongst the mass of 'toothbrush trees' (*Grevillea exul* ssp. *rubiginosa*). Marie Christine de Laubarede found an exquisite *Gardenia*-like bloom in a roadside ditch, which excited Romain sufficiently for him to take a specimen for the herbarium. It was later determined to be *Tabernaemontana cerifera*.



*Grevillea exul* ssp. *rubiginosa* – the 'toothbrush tree' was very common in the south

With this in the bag we carried on to the park itself where we were met by park manager Joseph Manaute and his colleagues. Our first port of call was the 'palmetum', a small area with a circular walk, planted with many of the palms native to the archipelago, which total 37 species in 16 genera, some are abundant, while others are narrow endemics such as *Pritchardiopsis* (syn. *Saribus*) *jeanneneyi* which is known from a single location and represented in the wild by only ca 22 individuals. After the palmetum we drove many kilometres further into the park until we were in dense forest and the realm of the Kaori, *Agathis lanceolata*. We stopped at the Pont du Kaori to observe a large tree of *Dacrydium balansae* which sadly we found to be near death, but we were compensated by a sighting of another endemic species, this time a bird, the extraordinary flightless Kagu!



*Pritchardiopsis* (syn. *Saribus*) *jeanneneyi*; one of the world's most threatened palms

Romain pointed out individuals of *Pycnandra* and *Planchonella*, two representatives of the Sapotaceae, before we carried on further to pay homage to 'the' giant kauri, a gargantuan *Agathis lanceolata* of great size and an essential photo opportunity. We stopped for lunch 11km downriver from Pont Germain and Romain explained that we were in a relatively young bit of forest, full of pioneer species. He pointed out *Codia*, a genus belonging to the important Southern hemisphere family Cunoniaceae that is represented in New Caledonia by six genera, two of which (*Codia* and *Pancheria*) are endemic.

Although we had already seen several representatives of the Gondwanan flora, for me there was something special about seeing *Codia*. It wasn't a genus I had longed to see in the wild – indeed I had never heard of it – but having undertaken fieldwork in Chile on two occasions, and having encountered there other Cunoniaceae such as the two native *Eucryphia* spp., *Weinmannia trichosperma* and *Caldcluvia paniculata*, I was struck by how instant the recognition had been when Romain held up a shoot of *Codia*.

Perhaps it was because I didn't know *Codia* already, or simply that even after sitting through lectures and reading books and articles, there is an emotional response when one can add to that knowledge the evidence of one's own eyes? Not unlike seeing a famous painting, place or landmark for the first time.

Here we also saw a species of *Nothofagus* - bearing little resemblance to the temperate species but still just recognisable, and not soliciting the same response as *Codia* - and down near the riverbank we saw *Pycnandra acuminata* - the tree known for exuding blue-latex due to the extraordinarily high levels (ca 25%) of nickel citrate which the tree accumulates.

We later reached the Pont Germain - as far as we were to go - turning around just beyond the bridge as it began to rain. Re-crossing the bridge we were treated to an amazing view of the slopes on the other side of the valley: the forest, rising from the river up the slopes in a kaleidoscope of greens, was punctuated here and there by the emerging canopies of the candelabra tree (*Cerberiopsis candelabra*) in full flower.

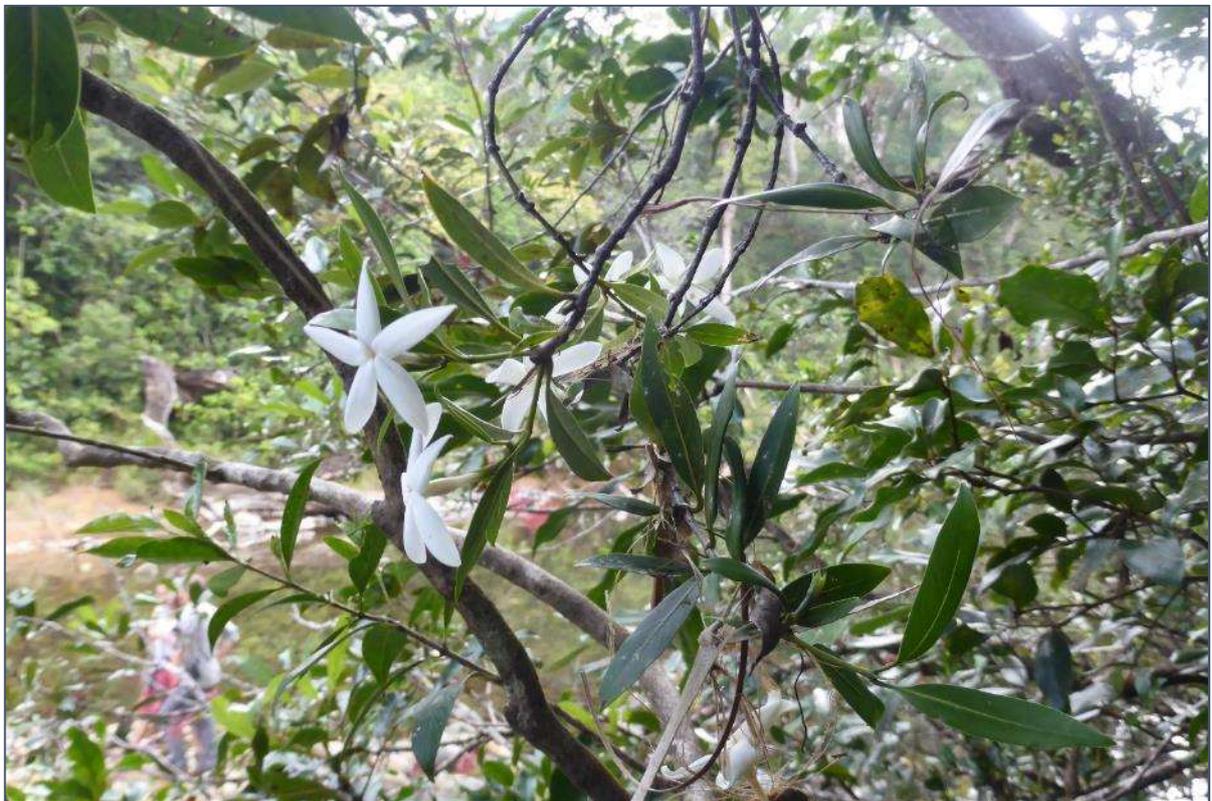
It was just after re-crossing the bridge that we paused briefly and two further conifers were found: *Libocedrus yateensis* of the Cupressaceae and *Falcatifolium taxoides* from the Podocarpaceae. This latter species caused great excitement, as it is the host plant of the only known parasitic conifer, the elusive *Parasitaxus usta*. This bizarre conifer is extremely rare and may only be found sporadically in dense forest. To find it's host was exciting, not least because the hope of seeing *Parasitaxus* was a considerable draw for many of us to join the tour in the first place. Indeed, Rolf Zumbunn was on his third visit to New Caledonia and in spite of his great knowledge of, and passion for, the flora in general, this single aim clearly eclipsed all others. Rolf, like the rest of us, was to be disappointed as we drove back to Kanua Tera that evening, not having seen the elusive, almost legendary parasitic conifer. We weren't about to give up, though.



The group in front of one of the largest remaining *Agathis lanceolata*  
(image: D. de Treglode)



The Kagu; an endemic, flightless bird who's numbers are slowly increasing after having been pushed to the brink of extinction



*Atractocarpus* sp. found growing in dense forest overhanging a river

Next morning we set out along 'the convicts path' which leads along the headland from Kanua Tera. As its name implies, it was constructed by some of the many convicts sent from France to serve their sentences on New Caledonia. Romain led the way, and quite early on we experienced a rare treat: the definitive identification of an *Araucaria*! *A.nemorosa* has a very restricted distribution along this extreme southern coast around Port Boisé and is distinctive from *A.columnaris* in its profile as a mature tree.

Along the path Romain pointed out the mangroves below us on the shore, and above us the buttress-base of a *Canarium sp.* We saw *Pandanus tectorus*; an unexpected member of the willow family *Casearia silvana*; *Cerberus manghas* which occurs in coastal regions in the Indian and Pacific Oceans; the attractive woody climber *Atractocarpus heterphyllum*; a member of the spurge family *Fontania pancheri*; as well as a species of *Garcinia* with translucent pink young growth; a *Schefflera*; a *Cryptocarya*; an *Endiandra*; a *Fagraea*; and a small-flowered *Syzygium*, to name but a few. Romain later reported that his inventory for this walk counted 79 species in 78 genera!

We returned to Kanua Tera for lunch and later departed for the journey back to Noumea. Our drive featured a diversion to Col de Yaté where *Agathis ovata* occurs at higher elevations. We stopped here for a while to admire the trees that remained after successive fires, their slow rates of growth and relatively large girth are together suggestive of great age. Here we also saw *Melaleuca pancheri*, a *Dracophyllum sp.* and *Cymbopogon citratus*, the citronelle plant that was used to make the tisane that had been served at breakfast each morning at Kanua Tera.



*Crossostylis grandiflora* at Kanua Tera



Degraded habitat of *Agathis ovata* on Col de Yaté



*Agathis ovata* foliage detail

**DAY FOUR –2<sup>nd</sup> November;**

**RETURN TO BLUE RIVER**

Today was a day for us to enjoy some of the cultural aspects of Noumea. Visits were made by various members of our number to the aquarium, the museum, and to the Tjibaou cultural centre, a celebration of the indigenous Kanak culture in the form of a striking building by Italian architect Renzo Piano. However, some of us had other ideas.

Seeing this opportunity within our schedule, a band of us resolved to make a second attempt to see the enigmatic conifer *Parasitaxus usta* and planned a return to Blue River. Steve Sillett undertook to make the arrangements, and together with Marie Antoine, Rolf Zumbrunn, Hans-Peter Stutz, Dominique de Treglode, Philip and Lada Hartstein, Karl Heinrich Zur Mühlen, Sylvain Meier, and myself, we hired a minibus and returned to the Blue River park, consulting again with Joseph Manaute who provided us with a guide. We drove again to the Pont Germain and this time beyond it.

How richer the forest was only a little further on from where our coach had turned around two days earlier! We passed large trees of *Libocedrus yateensis* before our minibus could go no further, we disembarked and began our trek up the forest road. Each twist and turn revealed a new view and new treasures. *Nepenthes* pitcher plants were numerous, and the banks of the roadside dripped with ferns - the Gleicheniaceae again recalled Chile to my mind.

Compared with the lower part of the valley where we had been two days ago *Agathis lanceolata* was relatively abundant here. I chugged behind Dominique admiring his sun hat, in the same hue of blue as the berets and helmets of United Nations peacekeepers - it occurred to me I hadn't a clue what was going on elsewhere in the world. Up up up we went, views down to the valley sweeping away below us, the weather on our side. We left the road and started on a trail, climbing more steeply now, pushing the vegetation aside.

Our efforts were rewarded when after a two-hour trek and some searching in dense forest, we finally found it: only a meter or so tall, with thin, wiry shoots, quite congested in the upper half of the plant; the scale-like foliage was devoid of chlorophyll, with very light stomatal markings and coloured like a ruby that had been left to gather dust in Aladdin's cave. We paid our respects to this peculiar plant, between us taking many hundreds of photographs before making our way back to the minibus, contemplating how many people alive today have ever seen *Parasitaxus usta*, and rejoicing that the figure had just increased by 9!



On the hunt for *Parasitaxus usta* – its habitat is the dense forest higher up the slopes



Found at last! *Parasitaxus usta* being photographed by Sylvain Meier

## DAY FIVE – 3<sup>rd</sup> November;

### MONT KOGHIS

Mt Koghis forest is unusual in the southern province of New Caledonia in that it is still privately owned. It is also for sale: 92ha for €4million. Romain led us a short distance across undulating terrain until very soon we were in a dense, enchanting forest.

Giant ferns, tree ferns, palms, figs, and an assortment of enormous forest trees stretched out around us. Rocks, stems, branches and fallen logs were covered in smaller ferns, mosses and liverworts. We went as far as a pair of *Sloanea kogiensis* growing close together, their giant buttress-based stems overlapping with one another, and canopies extending up as far as the eye could see. Through the understorey we glimpsed several plants of a palm with a red leaf, a species of *Chambeyronia*, an endemic genus. Beneath them and closer to us were many plants of a massive fern, *Marattia sp.* A distinctive fruit found on the ground belonged to *Planchonella wakere*, one of the important native timber trees in New Caledonia.

We retraced our steps and then took an alternative path, observing *Dysoxylum roseum*, *Codia montana*, *Geniostoma sp.*, *Zygogynum sp.*, and various *Ficus spp.* In an area dominated by a steep scree of large boulders the dominant tree was *Macaranga sp.*, and scattered here and there amongst the boulders were plants of a *Solanum sp.* We returned to the rendezvous for lunch and were once again treated to the labours of the patisserie with which 'Noumea Discovery' clearly has an excellent relationship. Chouquettes all round – a delicious choux pastry with a rich custard filling.

The mood was full of fun as we climbed back into our minibuses – our coach was elsewhere today – Graham Briton from Australia pulled out his ukulele and serenaded us with renditions of classics such as 'yellow submarine' and 'Non: Je ne regretted rien'. At dinner that evening we wished Jonathan Cork a very happy birthday, and as if the chouquettes from lunchtime hadn't been enough, we helped him demolish his birthday cake.

**DAY SIX – 4<sup>th</sup> November;**

**TREE FERN PARK**

We departed early from Hôtel Le Lagon in Noumea this morning - our two hour drive to ‘Tree Fern Park’ near Farino was to be punctuated by an important diversion. We have already established that this relatively small archipelago is quite extraordinary for any number of reasons. We were about to discover one more.

*Amborella trichopoda* is another endemic species. It is also monotypic: one species in one genus in its own (endemic) family. It has generated great interest in recent years since phylogenetic analyses have identified it as a basal lineage of the angiosperms and as such it represents a very early manifestation of ‘the flower’. This is of great significance to scientists working to unravel the evolutionary history of flowering plants and how flowers appeared in the first place – a question Darwin famously referred to as an “abominable mystery”.

Unfortunately, *Amborella trichopoda* itself isn’t terribly much to look at. An ordinary-looking understory shrub, like a *Callicarpa* gone wrong. We paid homage nevertheless, acknowledging its evolutionary significance, and we were all very grateful to Rolf Zumbrunn for guiding us to the spot where we could see it.



Fruit of *Amborella trichopoda*

Romain introduced the park on our arrival, which covers 4500 ha of which only 1200 ha is available for public access. The soil here is different from many of the areas visited so far and the forest type is not technically 'rainforest' due to the lower precipitation. As a result, many of the trees will have smaller leaves to conserve water. We were to take a circular walk of several hours through the forest. Near the beginning we met with a medium-sized tree covered in large lime-like fruit. Romain identified it as *Fagraea berteriana*, a woody member of the Gentian family.

Nearby were *Meterocideros laurifolia*, and *Calophyllum neocalidonicus* with apricot-coloured, sweetly scented flowers. As we dropped downhill away from the exposed sunny ridge, the forest became denser and cooler and soon appeared to be dominated by palms and tree ferns. They create an enchanting effect, the tree ferns especially. Romain gathered us together to explain more about these two groups. Globally, there are ca 2500 species of palm in 200 genera and here in New Caledonia there are 37 endemic species in 16 genera. Of the tree ferns, two families occur on the archipelago, Dicksoniaceae (5 species in 2 genera) and Cyatheaceae (8 species in 3 genera).

As our eyes accustomed to the ferny kingdom around us we began picking out the other major constituents of the forest. *Elaeocarpus angustifolius* soared overhead, as did an *Araucaria* which general opinion believed was probably *A. biramulata*. After some time the forest changed again, and soon was completely dominated by the paperbark *Melaleuca quinquinerva*. This member of the Myrtle family is a pioneer species and had colonised this area after a forest fire. The effect was reminiscent of high-altitude forests in Japan where *Clethra barbinervis* can dominate the understory.



Tree Fern Park

**DAYS SEVEN & EIGHT – 5<sup>th</sup> – 6<sup>th</sup> November;**

**BOURAIL & MONT DO**

A short drive from Hôtel de Poe was another fragment of surviving dry forest. This forest, in the community of La Roche Percée, has survived close to where La Nera river meets the sea. The general consensus amongst the group seemed to be that dry forests are perhaps, a bit dull. This is a great shame as they are a fascinating habitat type found across the tropics and sub-tropics and they are everywhere under severe threat. Romain did his best to convert the skeptics, showing us *Diospyros* spp., *Cupaniopsis pennelii*, *Mimusops elengi*, *Polyalthia nitidissima*, and the elegant *Acropogon bullatus* which we had already seen without realising, planted as a street tree in Noumea!

Those of us favoured by the mosquitos couldn't loiter in the forest for long, and as the group kept stopping for long discussions, we went back to the coach which was separated from an exquisite beach by a slither of woodland. Knowing that our insect-proof colleagues would remain fascinated by the dry forest and surrounding mangrove a while longer, some of us snatched an opportunity to swim and/or botanise - Derek Spicer found a pair of coning cycads which were much admired.

We drove next the short distance to Bonhomme de Bourail at the end of the bay, a former sea-arch now reduced to a rock outcrop that we could climb to admire the views. Sea turtles were spotted, and more exciting still, a mysterious Dugong! A few of us went on a bit further, descending a path beyond the headland into an amazing population of *Araucaria columnaris*, which grew out of the steep slopes at all angles, looking like a bizarre arrangement of gigantic pipe cleaners.



One of a pair of coning cycads seen on the beach at Bourail



The flowers of *Acropogon bullatus* seen at Bourail, and its foliage, below.  
This attractive tree is being increasingly planted as a street tree.





*Araucaria columnaris* population just beyond Bonhomme de Bourail

Next day we visited Mont Do, an isolated mountain in the middle of New Caledonia. On a clear day it is possible to see the ocean off both the eastern and western coasts from the summit. Our coach took us as to a rendezvous where we had to decant into two minibuses. These smaller lighter vehicles were able to take us much further than the coach, to within a half-hour walk of the summit.

Close around us, as we ascended the mountain in our buses, all appeared well; native vegetation extended over great distances. At about 680m altitude Romain points out *Tristanopsis sp.* and *Grevillia exul* as they slip past the window. Nothing here can be more than 2 or 3m tall at the very most, and yet this 'forest', we are told, is 50 years old, having begun its long recovery following a devastating fire. It is a sobering reminder of how harsh the conditions are here for plants – principally on account of the toxic soils - and that even though they have evolved to cope in such an environment, they are not endowed with fast rates of growth.

Mont Do is just north of the main area of ultramafic soils that dominate the southern quarter of the island, but the soils are still highly metalliferous, and nickel has been mined here in the recent past. There are no active mines left on Mont Do – the miners have taken what they could and have made crude attempts at restoring the vegetation after capping the mines. The mining, and the destructive action of numerous fires, have reduced the original forest to a threadbare patchwork.

Small isolated fragments remain, often on very steep slopes, and it was in such habitats at a little over 700m altitude that we would begin to see two *Araucaria* species coming in. Both *A. biramulata* and *A. laubenfelsii* occur here, and outwith the isolated fragments of forest where older trees have survived, new generations are seeding themselves between the shrubs and young trees that have come back after the fire. We also began to see *Nothofagus codonandra* now, a genus familiar to most of the group from the temperate southern hemisphere, but in fact with its centre of diversity in the montane-tropic forests of New Guinea and represented in New Caledonia by 5 species.

It was in a fragment of old-growth *Nothofagus/A. laubenfelsii* forest that we would see plants including *Prumnopitys ferruginioides*, *Podocarpus sp.* and *Phelline confertifolia* (of another endemic family, the Phellinaceae). But the dirt road up the mountain can be treacherous in the rain, so minutes after we had all dispersed into this intriguing forest, we had to dash back to the vehicles as rain began to fall. We risked two quick stops on our way back down: first to admire the attractive *Hibbertia altigena* growing in the company of *Ilex sibbertii*, *Montrouziera sphaeroidea*, and *Geissois pruinosa*; secondly for Romain to obtain for us a flowering branch of the candlenut tree *Aleurites moluccanus* which we had seen only from a distance over the past two days.



*Araucaria laubenfelsii* on Mont Do, and again, being photographed by Rolf Zumbrunn, below





Flowers of *Geissosis pruinosa* seen on the descent from Mont Do



*Codia* sp. on Mont Do

**DAY NINE – 7<sup>th</sup> November;**

**AROUND NOUMEA**

After breakfast we made a short journey just beyond Noumea to the South Forest Centre at the New Caledonian Agronomic Institute. We met Guillaume who runs a small nursery that produces batches of plants used in projects to restore former mining sites. The nursery works in partnership with mining companies and undertakes research as part of its remit. Guillaume showed us ongoing experiments including trials to test the remaining viable seed bank within top soil samples from different locations throughout the South Province.

Most of the plants produced in the nursery are grown in the same highly metalliferous soils that they grow in naturally. No compost or soil improver is used as this would result in transplanting shock and failure to establish. Based on the same site is the organisation Sud Foret, a public-private forestry company that manages existing forests in the South Province and with an additional remit to establish new plantations to reduce the dependency on timber imports. We toured their facilities including a small nursery, noting the contrasts in method and approach between this facility and the less well-resourced South Forest Centre.

After concluding our visit here we drove on to a ‘lost’ arboretum in Païta. Among the species growing in large blocks were, of course, most of the native *Araucaria* and *Agathis* species, and others including *Araucaria huntsteinii* from Papua New Guinea, and gargantuan specimen trees of *Albizia saman*. The origins of this amazing collection are a mystery. The land is owned by the agricultural department, but there is neither knowledge nor record of this collection and its history. It is an extraordinary resource and greatly deserves attention and maintenance.

An extraordinary tropical rainstorm forced us to beat an early retreat from Païta. We returned to Le Lagon and changed before visiting the nearby herbarium of the French Institute of Research. The herbarium is home to ca 85 – 93k specimens representing ca 90% of the indigenous flora. There are 818 isotypes, with the holotypes being held in the national herbarium in Paris.



Horticultural experiments at the agronomic institute



*Araucaria huntsteinii* from Papua New Guinea cultivated at the Païta arboretum



Air-pots being trialled for the production of plantation trees at the Sud Foret nursery

## DAY TEN – 8<sup>th</sup> November

### ILES DES PINS

We took an internal flight from Noumea down to the famous Isle des Pins, flying over much of the terrain we had explored over the past few days. It was originally named by Captain Cook, who was inspired by the towering *Araucaria columnaris* ‘pines’ that he saw all around the coast when he discovered the island in 1774. These days the ‘Isle of Pines’ is extremely appropriate: As we came into land we flew for miles and miles over little else but monoculture plantations of *Pinus caribaea*; a sad monument to the loss of so much biodiversity.

Driving to the Oure Tera hotel Romain told us that ca 16% of New Caledonia’s flora may be found here on the Isle des Pins, but through historic land-use change such as the creation of monoculture plantations, and ongoing development to support the growing tourism industry, many native species are threatened with extinction. Three micro-endemic species from the Isle des Pins have not been found in the wild in over 50 years.

It was all too easy to overlook this sad reality as we spent a day of “R&R”, walking in native forests, enjoying the hotel facilities, and botanising by sea-kayak, before taking a late lunch together. It was here that we were to say goodbye, as about half the group had arranged to stay a night or two on Isle des Pins, whilst the rest of us were to head back that evening to Noumea and then homeward. Our last official function together was celebrating Graham Briton’s birthday as a final, extraordinary cake was conjured from the hotel kitchen – a fitting end to an extraordinary tour!



One of the Iles des Pins famous beaches, with *Araucaria columnaris* in the background

## EPILOGUE

My visit to New Caledonia simply would not have been possible without the generous support of the IDS, the RHS and the Merlin Trust. My applications to all three organisations had explained how a visit to New Caledonia is an almost obligatory pilgrimage for anyone with a serious interest in conifers, and that I saw this trip as an opportunity to expand my knowledge of the ecology and conservation of this remarkable group of plants to the benefit of my continuing professional development. I certainly feel my attendance on the tour achieved exactly that.

I reflected on this over the two and a half weeks following my departure from Noumea on 10<sup>th</sup> November. I had flown to Auckland, where rather than connecting to a return flight to the UK as I had envisaged at the time I began planning the trip, I cleared customs and went to stay with a friend – a former flatmate from Edinburgh who had since returned to her native New Zealand.

Thanks to my friend's generous gift of the use of her old car, I spent two weeks happily touring the North Island of New Zealand, a country I had not visited before. Friends I had made in New Caledonia had shared tips with me and had made introductions to gardens and gardeners I 'must' visit and meet. I was welcomed everywhere I went, beds, meals, seeds, cuttings and books were offered almost daily. I visited extraordinary gardens, arboreta, and native forests, and I encountered innumerable plants that I had never encountered before.

I remember clearly the palpable excitement I felt when, walking in the native forest adjacent to Auckland botanic garden at the beginning of my New Zealand visit, I saw trees of *Podocarpus totara*, *Libocedrus bidwillii* and the famous silver fern *Cyathea dealbata*. I made a pilgrimage to visit 'the' giant Kauri, the tree of *Agathis australis* known as Tane Mahuta, which looks as though it has been wrestled from the ground, turned upside down and planted again by giants. More Cunoniaceae, of course, and *Nothofagus* again, more familiar this time.

The New Zealand Christmas tree *Metrocideros excelsa* was beginning to flower in the north, and across the island gardens offered so many 'double-take' moments, such as seeing a Japanese cherry in a front garden with companion planting of red *Callistemon*, both in full flower, or the thriving population of *Cardiocrinum giganteum* in Paloma gardens near Wanganui, brilliantly matched with enormous tree ferns, palms, and closer to the ground, endless *Cymbidium*.

Both New Caledonia and New Zealand were fascinating reminders of the fact that we can learn so much by seeing plants in their natural habitats. As horticulturists we can suddenly understand more about their requirements, and as conservationists we can appreciate the more subtle factors affecting their survival. New Zealand, though, added something else. It added to this sensation the importance of seeing plants *outwith* their natural habitats. Many of New Caledonia's Araucariaceae cropped up in New Zealand collections, and I wondered when I encountered them how great a role these gardens have yet to play in the conservation of New Caledonia's remarkable flora, not only in terms of their usefulness in *ex-situ* conservation, but in helping us to understand what might be possible *in-situ*, with a little ingenuity.

## ACCOUNTS

<b>Income</b>	£
IDS grant	3500
RHS	750
Merlin	750
Personal contribution (original figure)*	550
	<b>5550</b>

<b>Expenditure</b>	£
IDS tour fee	3802
Flights	1699.67
Insurance	51.05
Personal expenses not covered by the tour fee (estimate)	300
	<b>5852.72</b>

<b>Total</b>	<b>-302.72</b>
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\* (NB: any deficit in the net figure was met by increasing the personal contribution from the figure given under 'income')

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