

## Some Members of the Araucariaceae

This week's short note takes us back in time. If we were to step out of the Tardis we would find large trees quite similar to some of those mentioned here. It would be a very frightening experience as far from being concerned about something as small as a Corvid 19 virus we would be faced with very large and very ferocious reptiles. Members of the *Araucariaceae* were growing over most of the world long long before *Homo sapiens*, indeed before mammals. The family reached its maximum in the *Jurassic* and *Cretaceous* periods. Of course we know this from the fossil record. This was not something which one could have said with impunity when some of the early botanists were describing species collected in places such as Australia. Today the extant species are largely confined to the Southern Hemisphere.

It also takes me back to one of my earliest memories. When I was very small we would walk past a house with a large Monkey Puzzle tree in the front garden. It was unusual as the South Wales Coalfield is not known to be a place where such trees grew, particularly in small gardens. Also the unloved school gym where the apparatus was made from Parana Pine devoid of knots, splinters, and my interest.

The comments made in the introduction to the earlier notes apply here namely that I have not included references as it is a quickly written piece for the times. There are no photographs as they are easily obtained by the reader on the net using your favourite search engine.

### **Araucariaceae**

The Family was named by Johann Baptist Henkel (1815-1871) and Wilhelm Christian Hochstetler (1825-1881) in 1865

It is derived from the Araucani Indians who live in the Arauco district of Chile.

There are 41 species mostly in the Southern hemisphere. The greatest diversity is found in New Caledonia with 18 species. We should note here that New Caledonia is a 'hot bed' of speciation for some reason.

Others are found in Australia New Zealand, Chile, Brazil, and Melanesia.

This geographic spread reflects the long history of the Family. As the mighty continent of Pangea split into two forming Gondwanaland and Laurasia and the very successful reptiles suddenly ended their domination due to some sort of cataclysmic event, (probably an asteroid) so too did the *Araucariaceae* undergo dramatic change. The fossil record is an interesting one with a significant amount of work done on the fossil trees found around the world.

The species in the Family are generally large with clear boles and useful wood. A fact that has rendered many to be under some threat. There are plantations of some species which provide wood for many purposes. Some caterpillars of moths in Australia feed on the trees including *Achaea janata*, *Mocis trifasciata*, *Hieromantis ephodophora*.

A major symposium was held by the IDS in NZ in 2002 on the family. The proceedings were edited by R.L. Bieleski and M.D. Wilcox and published by the IDS in 2009.

There are three genera in the Family

- **Agathis**
- **Wollemia**
- **Araucaria**

### ***Agathis***

*Agathis* was named by *Richard Anthony Salisbury* (1761-1829) in the *Transactions of the Linnaean Society* London 8 1807. The name is derived from the Greek for a ball of thread, which he claimed the female cone looked like. Salisbury was a most unpleasant person and was shunned by other botanists at the time.

The genus consists of 16 species found in Australia, New Zealand, Fiji, Malaysia and the Philippines. 3 of which grow in Australia. 2 are endemic. One species *A. silbae* is found only in the mountains on Vanuatu. The Type specimen was collected in 1986 from a cultivated tree on the coast near Tasmalum in South Santo.

However the name is not accepted by everyone as it may be the more common *A. macrophylla* which has smaller seed cone peduncles, and larger pollen cones.

Chris Borough tells me that he once saw huge Kauri Pine growing behind the mangroves at Pomio a district of East New Britain Province in PNG which has a rainfall said to be about 4000mm/a

### ***Agathis robusta***

*A. robusta* occurs in two separate parts of coastal Queensland. One between Tewantin and Maryborough including Fraser Island and the northerly occurrence between the Herbert River and Big Tableland near Cooktown. It is also found in New Guinea.

Queensland Kauri is a large slow growing monoecious tree which can reach heights of 50m. Trees of 2.5m dbh were said to have been cut in the past. Some large trees are growing in botanic gardens. One in the Albury Botanic Garden was measured in 2010 2.1m dbh and 37m in height. The species has a smooth bark and a branch free bole. The wood is light brown to cream and the heartwood and sapwood indistinguishable. It is easy to work and useful for many purposes including boatbuilding, furniture, and face veneers. For these reasons it was heavily exploited in the past and the very large trees are now largely gone. In the past the Queensland Forestry Department had a difficult task in stopping the unauthorised poisoning of trees which when dead were allowed to be harvested up until the early 1960's.. Although its conservation status is least concern (LC) the subspecies *A. nesophila* which grows in PNG is considered vulnerable due to over exploitation.

### ***Agathis atropurpurea***

*Agathis atropurpurea* was named by *Bernard Patrick Matthew Hyland* (1937-) in 1978. He is an Australian botanist who spent 45 years working on Australian Tropical Rainforest plants. It is a rare species. The type specimen was collected in 1972 from the Bellenden Ker Range. It usually grows on granite derived soils on ridge tops in mountain rain forest. The common name is Black, Blue, Mountain and many others, Kauri. The timber is similar to *Araucaria cunninghamii*.

## ***Wollemia***

The story of the discovery of the Wollemi Pine in 1994 is so well known it need not be covered here. Material has been disseminated around the world. As a general observation many plants purchased from nurseries soon join their ancient ancestors and the dinosaurs which have played a large part its sales. The fossil record indicates a wide geographic spread during the Mesozoic.

It will take some time to establish the parameters in which *Wollemia nobilis* will thrive.

## ***Araucaria***

The genus was named by *Antoine Laurent Bernard de Jussieu* (1748-1836). He was a Frenchman born in Lyon who made a very significant contribution to the system of naming plants. His work *Genera plantarum* 1798 used a different methodology to Linnaeus but kept the binomial system.

*Sydney Howard Vines* said of him in remarks about the natural system

*“The glory of this crowning achievement belongs to Jussieu: he was the capable man who appeared precisely at the psychological moment, and it is the men that so appear who have made, and will continue to make, all the great generalisations of science.”*

It is a genus of 18 species, 2 occur in Australia, and 2 are cultivated, 2 in New Guinea, 1 on Norfolk Island, and 13 in New Caledonia.

*A. columnaris* Cook Pine which is native to New Caledonia, and *A. heterophylla* Norfolk Island Pine are frequently planted in parks and beach fronts but are not planted for wood product. Norfolk Island Pine can be seen all along the South Coast of N.S.W.

## ***Araucaria bidwillii***

*A. bidwillii* was named by *William Jackson Hooker* (1785-1865). in 1843. In 1841 Hooker became the Director of Kew. His son

succeeded him at Kew. *Joseph Dalton Hooker* the son, met *John Carne Bidwill* in Australia in 1841 and was impressed by his knowledge. Bidwill took a live specimen to London; something of a feat in those days.

Bunya Pine is well known in Australia as a large tree with useful wood characteristics which grows to 45m and a DBH of 1.5m. It occurs in south-eastern Queensland and a lesser area in north Queensland around Mount Lewis.

The very large cone (The largest I have seen was 8.5kg and can be seen in the FACTT newsletter) is shed whole and disintegrates on the ground into many large edible 'nuts'. The aboriginal people of the area valued the high protein seed which was often roasted at large gatherings of people. It is said that there was a degree of ownership of individual trees.

The well known tree in Canberra at the top of Kings Avenue commemorates the visit by Duke and Duchess of York in 1927. There are several trees in Westbourne Woods with a small plaque recognising the work of Dr. Robert Boden. There is a tree behind the Forestry School building in Yarralumla. The National Arboretum has a plot planted with the species and surprisingly a small number of young trees are to be found on private land on the coastal side of the Tallaganda State Forest.

### ***Araucaria cunninghamii***

*A. cunninghamii*. was named by *William Aiton* (1731-1793) He was a Scottish botanist who travelled to London in 1754 and became the superintendent of the Chelsea Physic Garden later the director of Kew in 1759. It honours *Alan Cunningham* (1791-1839) An English botanist who travelled widely in Eastern Australia.

The species grows near the coast from the Macleay River to Shelburn Bay Cape York. with heights of up to 50m and dbh of 2m.

*A. cunninghamii* var. *papuana* is found in New Guinea and possibly a third *A. cunninghamii* var *glauca* on Magnetic Island

The common name Hoop Pine refers to the shed bark remaining on the ground in hoops. The surface of the bark in the bole has clear rings. Dr. Kevin Harding drew my attention to the question as to

what is going on in the cambium layer at these regular points around the stem. where it appears the growth is regularly discontinuous in direction.

It is widely planted in Australia in urban landscapes and plantations for timber. The wood varies from light brown to cream, is plain without annual rings or grain. Ideal for plywood manufacture and in the past butter boxes and fruit boxes and strong enough for masts and spars.

Seed production is low with up to 10 years between crops of the wind pollinated seed.

There is one tree in the grounds of the old CSIRO Division of Forestry on Wilf Crane Crescent Yarralumla. It can also be seen on the conifer trail at the ANBG.

### ***Araucaria angustifolia***

*A. angustifolia* Latin narrow-leaved was named as *Columbea angustifolia* by *Antonio Bertoloni* (1775-1869) an Italian physician and botanist in 1819. Later as *Araucaria angustifolia* by *Otto Kuntze* (1843-1907) in 1898. Kuntze traveled the world and edited his botanical collection of some 7,700 specimens, in part at Kew. His approach to taxonomy 'put the cat amongst the pigeons' and meant he was ignored and doors closed to him. It created a schism which came to a head in the 2nd International Botanical Congress in Vienna in 1905.

By the way the 13th Congress was held in Sydney 1981 and the 18th in Melbourne in 2011 when English or Latin was accepted for descriptions from 2012 and electronic publication permitted. A commendable system of modernisation that national constitutions could well emulate.

Parana Pine is a dioecious tree which grows to 40m with a flat top as it ages. It grows in many states of Brazil but the best stands were in Parana. Of the estimated 20m ha in 1900 only 500,000 or so remain due to over exploitation and replacement with plantations of eucalyptus and pines. Logging is now banned and the species on the Critically Endangered list and export not allowed. The wood was clearly very useful and in demand and as

so often happens over-exploited. It is also true that the land is very productive and is being given over to crops which are in demand to feed the burgeoning world population.

### ***Araucaria hunsteinii***

*A. hunsteinii* has been assigned many names but taxonomists have settled on that given by *Karl Moritz Schumann* (1851-1904) in 1889.

Schumann was a German botanist. He was the curator of the *Botanisches Museum* in Berlin from 1880 to 1894. He was also the first chair of the German Cactus Society. Quite appropriate that this prickly species was named by him. The species is named in honour of *Carl Hunstein* (1843-1888) a German ornithologist and plant collector who worked for the German New Guinea Company from 1885 until his untimely death in a tsunami which hit the coast of New Britain. In New Guinea he is commemorated by the Hunstein Mountains,, Hunstein Forest and several plants.

Modern molecular, morphological, and fossil analysis puts the species in the same clade as *A. bidwillii*

Fast growing, long lived, monoecious Klinki Pine grows to 80m and exceptionally to 90m with a dbh of 3m. It is native to N.E. PNG. The wood is ideal for plywood manufacture and ice cream spoons (small but a lot of them). Its value for these and other purposes has caused over exploitation; habitat loss due to population pressures, and feral pigs increases this concern. It is listed as near threatened by IUCN Plantations outside PNG have been established to provide this useful timber as natural stands are no longer logged, but for commercial purposes it has to compete with other species which provide similar wood.

### ***Araucaria araucana***

*A. araucana* is best known as the monkey puzzle tree. This name is said to be coined when a young tree in Pencarrow garden in Cornwall was commented upon by Charles Austin that "It would puzzle a monkey to climb that."

It was named by several botanists until *Karl Heinrich Emil Koch* (1809-1879) finally gave the present name in 1873. Koch was a

German botanist who traveled in the Caucasus and never visited South America.

This usually dioecious tree grows in Chile and the western part of Argentina. It is the toughest of the genus and is found growing as planted trees in many parks and gardens around the world with temperate climates and high rainfall. It is the national tree of Chile. The appearance of being primitive is evocative of the geological past and these days the interest of children in dinosaurs. Its seeds are edible but the trees do not produce seed until they are about 35 years old. Therefore although the trees can grow in many unlikely places such as Britain its potential for commercial nut growing is uneconomic.

It is listed as endangered and was protected by law in 1971.

Letters to the editor

Hi Steve,

A year or so ago we had a Chinese researcher come here and work on a *Allocasuarina verticillata* project. I helped with some field work for a few days. We were up on Isaacs Ridge (I think) doing some leaf sampling and there was a large lump eroding out of the ground on a slope. I pointed it out and my colleague said it was a *Frankia* nodule. I was surprised how big and woody it was. I never saw another one.

Nigel England

Some notes from Dennis Nicholls:

**Management of fallow species composition with tree planting in Papua New Guinea**

The following paper highlights the use of *Casuarina oligodon* in subsistence in the highlands of PNG (going back to 500 AD and possibly farther back). The highlands became devoid of people, following volcanic activity on an island to the north of New Guinea, around the 1670s - any villager in the highlands would tell of the time the land turned white and all subsistence gardens were destroyed; most people died and the survivors went bush for a long while; clan memories were long and accurate, as modern day

archaeologists have found. When people returned to the highlands they brought sweet potato with them (the Portuguese having introduced that central American food plant into, what is now, West Papua) and the population of the highlands grew rapidly. A number of the other tree species used (in the paper) are colonial imports. The *Albizia* sp named grows much larger than the *Albizia* sp in the Arboretum.  
Dennis

## **Resource Management in Asia-Pacifi**

### **Working Paper No. 5:**

#### **Management of fallow species composition with tree planting in Papua New Guinea**

**R. Michael Bourke**

Department of Human Geography  
Research School of Pacific and Asian Studies  
Australian National University  
Canberra, ACT 0200, Australia

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#### **Abstract**

In response to increasing population pressure and demand for food to feed pig herds, villagers are intensifying land use in Papua New Guinea (PNG). Managing the species composition of fallow vegetation is one intensification technique used. The most important species used is *Casuarina oligodon*. Minor species include *Parasponia rigida*, *Schleinitzia novo-guineensis*, *Albizia* spp. and *Piper aduncum*. *Casuarina* is a multi-purpose species grown throughout the highlands that provides timber for fencing, firewood and house construction. In four regions of the highlands, villagers transplant self-sown seedlings into food gardens towards the end of the cropping phase to enhance soil fertility. These grow to form dense stands of trees which dominant the fallows.

About 1.3 million people plant some casuarina trees and about one fifth of these manage fallow species composition with casuarina. The technique is most commonly used over an altitudinal range of

1400-2100 m where slopes are steep (over 20°), the landform is hills or mountains, the lithology is sedimentary, vegetation is grasslands, and the annual rainfall is relatively low (2000-3000 mm). Land use intensity in these locations is very low to low. Limited soil analysis indicates that casuarina increases levels of nitrogen and carbon in the soil.

In two of the four regions where casuarina is used most intensively, the practice has been adopted since the 1920s. In another, it has increased greatly since the 1930s. Pollen evidence indicates that casuarina planting increased after 500 AD in parts of the highlands. It is suggested that this represented limited planting to provide timber as nearby forest was depleted, but not widespread fallow management. It is hypothesized that the management of fallows by casuarina planting has been adopted more recently, probably over the past 150 years. It is concluded that there is potential for adoption of the technique in other locations in the PNG highlands. Many aspects of the tree and its use are poorly understood and deserve further systematic study.

Steve Thomas  
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