SKETCHES by BEACH HISTORIANS

PREHISTORIC MISSION BEACH

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Published by
Mission Beach Historical Society Inc.
Document S008 Version 1.
Website: mbhs.com.au

First published by MBHS Inc., in 2024.

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A record of this title is held at the National Library of Australia (eBook) and the State Library of Queensland (Print and eBook).

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Cover Image

Top: Volcanic eruption depiction, near the sea. Bottom: Mission Beach district aerial image.

OUR GEOLOGICAL HISTORY

The Queensland World Heritage Wet Tropics area spans much of the Queensland coast, from Rossville just south of Cooktown, down to Paluma north of Townsville. The Wet Tropics Management team published a paper on the geology of the region, explaining it well in layman's terms.[1] That makes much sense and provides much of the basic information needed for this sketch.

Our geology is young beside most of the Australian continent. Some rocks elsewhere in Australia have been dated back 3,000 million years with pieces of rare zircon crystals being up to 4,400 million years old. However, the oldest rocks in the Wet Tropics are only up to 420 million years old.

Australia was part of the Gondwana continent 420 Mya (million years ago) and it splits off fully from Antarctica at c. 38 Mya. In the 60 million years after 420 Mya, silt from rivers gradually created a 160 km wide lowland ribbon on the coast. This silt was heat-compressed 360 Mya creating huge mountain ranges of metamorphic rock and that rock base still exists today. These mountains eroded and are now small.

In the period 310 to 260 Mya, molten rock pushed up from the Earth's core into the crust. In places, it cooled and did not reach the surface, so formed bodies of granite. In other places, the magma erupted as volcanos. Eruptions occurred again in the period 120 Mya to 60 Mya, and this created huge rock blocks. One of those blocks now forms the floor of the Coral Sea.

Between 140 and 99 Mya, sea levels rose and much of the Australian content was submerged. The coastal lands of the Wet Tropics were submerged at that time.

Looking closer to Mission Beach, at around 1 Mya, Stephens Island was an erupting volcano. This island, along with Sisters Island and Clump Point, was covered in volcanic ash. This ash compressed and became 'tuff' which is the predominant rock found in the area. Sometimes bands of basalt rock can be seen now cutting through the layers of tuff.

Some say that Clump Point is the only example of a basalt headland in the entire Wet Tropics. It may be the only extensive basalt headland, but there are many places where basalt bands protrude through the base rocks. Some of these rock reefs are under the sand on beaches and others are on beach headlands.

Brookes Beach, for example, has rock formations on both headlands with basalt pushed up through the tuff. It also has large boulders of basalt lying on the sand, like those at Clump Point. The geology of Brookes Beach is incredibly diverse and the stones that intermittently surface on the sand are of many rich colours. I am no geologist, yet anyone can see the incredibly complex web of intertwining rocks in the area, some tuff, some silica rich rocks and some smooth black basalt.

The soils formed from years of erosion of basalt rock are alkaline and rich in minerals that are available to plants. Soils formed from rocks rich in silica, such as granite, are acidic and form poorer soils because the nutrients are locked in by the acids and unavailable to plants. In those soils the forest trees rely on fallen leaves and rotting wood for their nutrients.

[1] *Wet Tropics Geology* Stella Martins, editor Tropical Topics, EPA, No. 63, September 2000, accessed online at: https://www.wettropics.gov.au/site/user-ssets/docs/63WetTropicsGeology.pdf

OUR ANCIENT FORESTS

Sometimes, our impressions of history are formed from statements that people repeat which are merely their guesses about the past. That is, assertions, rather than facts, can form beliefs and shape our perceptions of history. Enthusiastic supporters of Daintree National Park seem to believe that if they tell the world often enough that their forests there are the oldest in the world, then it will eventually become an established fact. Various claims about the age of the forest are made, from 120 million years old to 180 million years old.

Yet, what is the basis for these claims?

Finding conclusive scientific evidence for an event that far back is not an easy task. The Queensland Government Department of Environment and Science states in its promotional webpages that the Queensland World Heritage rainforests are estimated to be 180 million years old and are the oldest continuously surviving rainforests on Earth. The rainforests from Ingham to Cooktown are what they're talking about, not just Daintree. This large forest tract includes the rainforests at Mission Beach. It is entirely reasonable to assume that the entire Wet Tropics forest is of similar age.

Is the forest actually that old? It's a wild guess. People make claims but do not cite any references to the science they are basing them on. It's all verging on fantasy when you consider that the continent named Gondwana only began to split up 180 million years ago (Mya) and Australia and Antarctica only separated fully approximately 38 Mya.

Since then, Australia has undergone significant changes, with its forests expanding and contracting continuously during the ice ages from 2.6 Mya to 11,700 years ago. At that time, a large portion of north Queensland was submerged in the sea.

Estimating the age of the rainforest is currently largely guesswork. Instead of relying on web statements about the age of our forests, I contacted some botanists, including academics who are well-respected in this field of research. Our local botany guru, C4 President Peter Rowles, provided some wise observations:

> *This response is very much off the top of my head. Remember that our WT forests are a mix of Gondwanan and Asian species (later arrivals through PNG). Most Gondwanan forests are further south (eg SE Qld/northern NSW). I have ongoing concerns every time someone claims they have 'the oldest' when so much is unknown, unknowable or overlooked. I prefer to acknowledge that something is very old and should be respected and protected for that.*

Peter added that most of the forest is made up of flowering plants (angiosperms) and they did not evolve until 100 million years ago. It's crucial to mention that angiosperms comprise more than 99% of the plants in the NQ rainforests. To further complicate matters, however, recent research published in *Nature* in 2021[2] suggests that flowering plants may have originated before 145 Mya. The evidence for that is not strong, but the situation is becoming more complicated and there is more to learn and know.

The university botanists I sought advice from said that Professor Darren Crayn from JCU was the researcher who would know the most about the age of Queensland's rainforests. Darren's view significantly differs from the online chatter and is quite unambiguous.

> *To my knowledge, there is no direct evidence of the antiquity of the Daintree/Wet Tropics rainforests older than about 1.5 million years. By direct evidence, I mean fossils. The claim that we live in the oldest*

[2] Danielle Silvestro, Christine D. Bacon, Wenna Ding, Qiuyue Zhang, Philip C. J. Donoghue, Alexandre Antonelli and Yaowu Xing, *Fossil data support a pre-Cretaceous origin of flowering plants*, *Nature Ecology & Evolution*, 5, PP. 449-457, 2021.

rainforest on Earth is hyperbole based, as far as I can tell, on two very tenuous lines of evidence – namely (1) geomorphological evidence for the existence of an eastern escarpment (providing an orographic effect) for the last 180 million years, and (2) the highly unusual concentration of representatives of ancient plant lineages. But, even if it may have been wet here for 180 million years and potentially able to support rainforest, there is no evidence that any of those plant lineages (or any others) have grown here longer ago than about 1.5 million years. Indeed, many of these ancient plant lineages are known to have been growing in Victoria 30 million years ago, based on fossils from La Trobe valley coal measures – so they can get around!

The lowland forests in north Queensland were researched by Len Webb and Geoff Tracey in the 1970s. One of the first ecologists in Australia was Len, and he and Geoff were both employed at the CSIRO. Len was a close friend of Bingil Bay (and Bedarra Island) resident John Busst. John was the Reef activist who successfully led the 1960s, international campaign to save the Reef from mining and oil exploration. Busst also worked on rainforest politics with Len, who often stayed with Bussts when he was doing his forest research.

Len and Geoff made a breakthrough in their research when they were able to find fragments of rainforests in sediments dating back 75 million years. Their research turned the world's view of Australia's tropical rainforests on its head by demonstrating that the northern forests contained the world's greatest concentration of ancient flowering plant families. This research showed us that many of the species in our forests were the ones that evolved into the other flowering plants across the Australian continent and perhaps across the planet.

Webb and Tracey mapped the flora to demonstrate the incredible value of the remaining tracts of lowland rainforest in north Queensland. Their research did not focus on the Daintree area, but rather on the entire Wet Tropics. Len and Geoff were instrumental in obtaining the final World Heritage listing.

Daintree enthusiasts used the re-discovery of one ancient plant species, the idiotfruit tree (*Idiospermum australiense*), to make their 'We're the oldest' story stick. The problem with that assumption is that the idiotfruit was discovered in three areas, a northern section of Daintree NP as well as the Bellenden Ker Range area and on Mt Bartle Frere – areas well south of Cairns, near Babinda and Innisfail. Furthermore, the idiotfruit is merely one of so many ancient lineage tree species that are found in the Wet Tropics.

Many of the ancient lineage species of the Wet Tropics are growing today in Mission Beach, such *as Eupomatia laurina* (bolwarra), *Myristica globosa* (nutmeg tree), and many more. The Cassowary Coast Regional Tourism team could claim that rainforests in this region are the oldest on Earth just as legitimately as the Daintree marketing team has done in their area.

The Wet Tropics area has several large National Parks located within its boundaries, such as Girringun National Park (3,000 km2), Daintree National Park (1,166 km2), and Wooroonooran National Park (1,149 km2). There are five National Parks in the Mission Beach district, Djiru National Park, Clump Mountain National Park, Family Islands National Park, Hull River National Park, and Maria Creek National Park. They are all ancient and special places, even if they are not promoted as vigorously as Daintree.

The answer to the question, "How old is the rainforest at Mission Beach?" is:

The available scientific evidence indicates that it has been around for more than 1.5 million years, which is the same age as all of the Wet Tropics rainforest. It has many ancient lineage species within it that evolved many millions of years ago, but the science does not support the leap of faith that suggests that the forest's birth dates back to the year of their evolutionary origin.

Looking at a picture of these forests online, one could be forgiven for believing that they looked this way 100 million year ago and have not changed much since. However, their appearance has changed over time. Penny Oosterzee in *Cloud Land* reminds us of another factor that dramatically changed the way rainforests look, revealing that closed forests with dense canopies only emerged after the dinosaurs disappeared 66 Mya and were no longer around to trash the canopy.[3]

From the geological history, outlined earlier, we know that the coastal lands of north Queensland were submerged for many millions of years. The forest still existed on high ground but would have covered a far smaller area at that time. Volcano eruptions destroyed large tracts of rainforest for extended periods, as we know. Furthermore, there were ice ages when the forests retreated, and it is probable that at the peaks of these icy periods, the forests were limited to small, protected glades. Although the forest's ancient species were able to survive, the overall forest almost disappeared.

The north Queensland rainforest also suffered severe devastation with the arrival of European timber gatherers and farmers, who destroyed large tracts of this unique and precious natural asset. We can be grateful for the energy and persistence of Len Webb and Geoff Tracey and others following them, who made the case for stopping that mayhem and leaving Australia and the planet with some forest fragments to savour and learn from.

Claims on the Internet of oldest forests in the world get bolder and bolder and, in a recent BBC story, the Catskill Mountains forest in New York State, USA, was said to be 385 million years age. How exact! How believable? Scant evidence is provided, but it makes a good headline.

Placing out feet firmly on the ground once again, we can comfortably say that the amazing rainforests of Mission Beach are just as precious and ancient as those found elsewhere in Queensland's Wet Tropics. One day, as science progresses, we may uncover evidence that the forest is many millions of years old, but let's not gild the lily. We must remind ourselves that 1.5 million years is an amazingly ancient forest even if most of the plants living in it today are probably not more than 1,000 years old.

Further reading:

Penny van Oosterzee, *Cloud Land: The dramatic story of Australia's extraordinary rainforest people and country*, Allen & Unwin, 2023.

[3] Penny Oosterzee, *Cloud Land: The dramatic story of Australia's extraordinary rainforest people and country*, Allen & Unwin, 2023, PP. 60-61.