

Where the old things are: Australia's most ancient trees

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Wollemia pine pollen cone. Wollemia pines (found in the wild only in Australia) are one of the most ancient tree species in the world, dating back 200 million years. Credit: Velela/Wikipedia

They say that trees live for thousands of years. Like many things that "they" say, there is a germ of truth in the saying (even though it is mostly false).

The vast majority of trees that burst forth from seeds dropped on the

Australian continent die before reaching maturity, and in fact most die within a few years of germination.

But depending on how you define a tree, a very select few trees can live for an astoundingly long time.

What are the oldest trees?

If we define a "tree" as a single stemmed woody plant at least 2 metres tall, which is what most people would [identify as a tree](#), then the oldest in Australia could be a [Huon Pine](#) (*Lagarostrobos franklinii*) in Tasmania, the oldest stem of which is up to 2,000 years old.

However, the Huon Pine is also a clonal life form – the above-ground stems share a common root stock. If that common root stock is considered to be the base of multi-trunked tree, then that tree could be as old as 11,000 years.

But if you accept a clonal life form as a tree, even that ancient Huon age pales into insignificance against the 43,000-year-old [king's holly](#) (*Lomatia tasmanica*), also found in Tasmania.

Once you accept that a common, genetically identical stock can define a tree, then the absolute "winner" for oldest tree (or the oldest clonal material belonging to a tree) must go to the Wollemi Pine (*Wollemia nobilis*). It may be [more than 60 million years old](#).

The Wollemi pine clones itself, forming exact genetic copies. It was thought to be extinct until a tiny remnant population was discovered in Wollemi National Park in 1994. The trunk of the oldest above-ground component, known as the [Bill Tree](#), is about 400-450 years old. But the pine sprouts multiple trunks, so the Bill Tree's roots may be more than 1,000 years old.

There is also substantial evidence that the tree has been cloning itself and its unique genes ever since it disappeared from the fossil record more than 60 million years ago.

How do you date a tree?

If no humans were around to record the planting or germination of a tree, how can its age be determined? The trees themselves can help tell us their age, but not just by looking at their size. Big trees are not necessarily old trees - they might just be very healthy or fast-growing individuals.

A much more reliable way to determine age of a tree is through their wood and the science of [dendrochronology](#) (tree-ring dating).

Many trees lay down different types of [cell wall](#) material in response to seasonal patterns of light, temperature or moisture. Where the cell walls laid down at the beginning of the growth season look different to those laid down at the end of the season, rings of annual growth can be seen in cross-sections of the tree.

This map of growth patterns can also be cross-dated or correlated with major events like multi-year droughts or volcanic eruptions that spewed material into the atmosphere to be incorporated into the wood of the tree. But the cell walls are more than just calendars.

Why so old?

Individual tree stems can live for so long because of the structure of the wood and the tree's defence mechanisms. The woody cell walls are very strong and resist breakage.

In fact, scientists have recently discovered that these walls contain a structure – [nanocrystalline cellulose](#) – that is currently the strongest known substance for its weight.

Wood can, however, be broken down by insects and fungi. Even though there is little nutrition or energy in wood, there is some – and there are plenty of organisms that will try and use it.

But trees are not defenceless, and can fight back with physical barriers or even chemical warfare. When one tree is attacked by these destructive forces, individuals may even [signal to other trees](#) to be aware and prepare their own defences to fight off death and decay.

The death of trees

So why don't all trees live for centuries or millennia, and why do so many die before even reaching maturity?

Seedlings and young trees may die because they have germinated in an area where there's not enough water, nutrients or light to keep them alive as adults. Young trees also haven't had much time to develop barriers or defences against other organisms and may be browsed or eaten to death.

Some trees simply fall prey to accidents: wind storms, fires or droughts. This is just as well, because there is a vast number of plants and animals – including humans – which rely on the wood and other components of these dead trees for their food and shelter.

But increasingly we may see trees dying because the environment is changing around them and they may not be able to cope. This is not just [due to climate change](#); urban development and agricultural expansion, pollution and even too much fertiliser acting as a poison – [even our most remote environments are subject to these changes](#).

But that doesn't necessarily mean we will have no more very [old trees](#). The Wollemi Pine's genes have already survived over millions of years, multiple ice ages and warming periods and even the fall of the dinosaurs and rise of humans. And now, people have deliberately spread Wollemi Pine trees all around the world so they are living in a wide range of countries and climates, meaning that the risk of them all dying out is substantially reduced.

Maybe we can [do the same for other trees](#), ensuring that [trees](#) will outlive us all.

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