

Wollemi Pine: Living Fossil from Jurassic Landscape

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As recently as 1994, the dinosaur of the plant kingdom, Wollemi pine (*Wollemi nobilis*) has been discovered in its site of origin, the Wollemi National Park, 150 km from the city of Sydney, Australia. This giant grows to a height of 40m with a trunk diameter of over 1m. All possible steps have been taken to conserve this giant in its own World Heritage Area. It is also being exploited to grow commercially to be released to the public by the year 2005. With increasing human interference on the environment, the rate of extinction of species is exceeding the rate of origin of new species. The tragedy is that many species including the giants of the living world might disappear even as efforts are on to discover yet-to-be identified species.

It was on one of the sunny winter afternoons in 1994, David Noble, an officer of National Parks and Wildlife Service, New South Wales found a rare species of plants that was a big tree and looked like a tree fern. This rare plant was restricted only to one rain forest gorge in the Wollemi National Park. This forest is about 150 km north of Sydney in Blue Mountain range. The word *wollemi* is believed to have been derived from an aboriginal Darkinjung word meaning 'Look around you' or 'Watch your step'. Hence this rare plant got its name *Wollemi nobilis* after the location and the finder. David Noble could not relate the plant with any of the present forms and hence took the plant to Mount Tomah Botanic Gardens for identification.

Wollemi nobilis was identified and was included in the family Araucariaceae. Araucariaceae includes Kauri pine of New Zealand, pines from New Norfolk and the Hoop pine of Queensland. The new plant could not be placed in any living

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Wollemi pine seedling grown in a pot.

genera though it belonged to the same family. Then started a search for its fossil record.

The Jurassic and early Cretaceous periods were the age of Conifers and Cycads. These were the ruling plants along with the ruling Dinosaurs of the animal world. Just as this period is called 'The Golden Age of Reptiles' it could also be called 'Golden Age of Conifers and Pines' from the phytopaleontological point of view.

If one wishes to get a glimpse of the Jurassic landscape, the place to visit is the Antherton Tableland region of Queensland in Australia. There are huge kauri pines (*Agathis sps*) along with other conifers, cycads and tree ferns in this forest. The Jurassic forest must have looked like this modern Kauri pine forest. Cycads and tree ferns form the lower storey whereas the pines make the upper canopy.

Conifers and cycads belong to the group Gymnospermae of the plant kingdom. This word was given by Theophrastus, one of the pupils of Aristotle, in his book '*Enquiry into plants*'. The word Gymnosperm means gymno = naked, sperma = seeds, which was aptly used for this group as early as 300 BC. This group of plants is a connecting link between the two major groups of plants, Pteridophytes and Angiosperms. This is a small group in the plant kingdom having only about 70 genera and 725 species. The living members include cycadales, ginkgoales, coniferales and gnetales. Cycads and *Ginkgo* of ginkgoales are grown as sacred trees in temple groves in China and Japan. Now they are cultivated as ornamental plants in many parts of the world.

The members of the Coniferales are the most dominant and conspicuous of gymnosperms. There are about 54 living genera and more than 500 species. In India coniferous forests are seen in Himalayas. Conifers are ancient group and thus their fossil history dates back to the late Carboniferous period of about 300 million years. Presently the members of the group are placed under 7 families, most being represented only as fossils. Coni-

fers could be divided into Northern and Southern Hemisphere groups. This classification is related to the period of two major land masses that were separated along the east-west running Tethys sea. During Jurassic and Cretaceous periods, the members of Araucariaceae were predominant in Northern Hemisphere but later became mostly extinct, and hence are confined to a limited area today.

Seven Families of Conifers

1. Pinoids
2. Taxodiaceae
3. Araucariaceae
4. Cupressaceae
5. Taxoids
6. Cephalotaxaceae
7. Taxaceae

The monkey puzzle tree family (Araucariaceae), red wood family (Taxodiaceae) extend back to the Jurassic period that is about 195 million years and the pine family (Pinoids or pinaceae) at least to the lower Cretaceous, which is about 135 million years.

The hunt for the living fossil thus started at the end of 20th century and nearly about 40 pine trees were traced at the bottom of the deep gorge in Blue Mountains. Division of Archeology of Natural History Research School of Pacific and Asian Studies examined the pollen of the Wollemi pines. The result of such findings enabled to trace its ancestors. Australian Geological Survey and Royal Botanical Gardens at Sydney made a thorough investigation of the leaves and cones from this plant. The leaves are very much closer to the leaves of conifers called Araucarioids. Araucarioids were found in the sediments of New Zealand and Tasmania, and estimated to be 50 to 65 million years old. The pollen matched with that of the pines of about 90 million years ago. This clearly shows that the *Wollemi nobilis* must have been a part of the landscape of the Jurassic period, where Dinosaurs

Female cone of wollemi pine with mature leaves.





Juvenile wollemi pines.

roamed about. The pollen testing is a reliable marker. The petroleum exploration data provides a clear picture of the fossil history of the plant.

Since only few plants of wollemi pine were found, the first plant was planted in the Botanical Gardens at Sydney. It has become a great attraction to the students of Natural sciences as it was thought as extinct till 1994. *Podocarpus macrophyllus* belonging to the same family as *Wollemi nobilis* and which is a member of Southern conifers is also planted in the same garden. This species is distributed in southern China, Burma to Japan and Taiwan. It was later planted in many Botanical Gardens in the country

Horticultural research has shown that under favourable conditions the wollemi pine seeds germinate readily. Vegetative propagation is also possible through cuttings. They can be grown in pots. The forest site where it was collected has only the adult trees and many small seedlings on the forest floor but there are no juveniles. It is somewhat like having only adults and children in a population and not teenagers. This situation may be due to the fact that the seedlings get a chance to grow and mature only when the adults die and clear the canopy. Another fact is that this particular living fossil has restricted distribution within a small area and has not spread through the forest though the environmental conditions are the same.

At Mount Annan Botanical Gardens, about 1000 wollemi pines have been raised as a measure to reintroduce this species in the event of any environmental catastrophe. With the prevailing global warming and cooling this living fossil has survived in the Australian soil. It could grow to a height of 40 m with a trunk diameter of over one meter. The trunk has distinct knobs on the bark. Its survival till today clearly shows that the plants are highly adapted to the changing environment.





A fossil relative of wollemi pine.

Conifers are an economically important group, which provide wood for furniture, cedar wood oil and turpentine from species of *Cedrus* and *Pinus*, respectively. Canada balsam used as a mountant or resin in histochemical preparations for microscopy is obtained from *Abies balsamea*. The amber which is a fossilised terpenoid resin in which several insects, spiders and lizards have been trapped as intact fossils is a secretion by *Pinus*. A unique feature found was where the *Wollemi nobilis* is growing, around the site, a particular type of fungus is also seen. This fungus is supposed to produce the anti-cancer drug called taxol.

Cultivation of wollemi pines on a commercial scale has already started by some private agencies in Queensland. It is hoped that the plants will be released to public by the end of 2005. A scientific network also has been established for the exchange of information about this unique living fossil.

The astonishing fact is that this prehistoric plant was hiding to be discovered in 1994 though it was just at the doorstep of the city of Sydney populated by nearly 4 million people.

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“Mathematical beauty cannot be defined any more than beauty in art can be defined, but which people who study mathematics usually have no difficulty in appreciating”.

– Dirac

