

Metasequoia glyptostroboides Dawn Redwood



Metasequoia glyptostroboides Dawn Redwood, GBG: From left: Feb 2016, May 2015, Jun 2016. Photos: DJ

The Dawn Redwood is an attractive symmetrical conical tree which is now found in most botanic gardens. In the wild it is endangered, and now survives only in wet lower slopes and montane river and stream valleys in the border region of Hubei and Hunan provinces and Chongqing municipality in south-central China. The Dawn Redwood is a fast-growing, endangered deciduous conifer, the sole living species of the genus *Metasequoia*, one of three species in the subfamily Sequoioideae. The *Sequoiadendron giganteum* is in the same sub-family, Sequoioideae.

Its leaves are opposite, 1–3 cm long, and bright fresh green, turning reddish brown in autumn. The pollen cones are 5–6 mm long, produced on long spikes in early spring; they are produced only on trees growing in regions with hot summers. The cones are globose to ovoid, 1.5–2.5 cm in diameter with 16–28 scales arranged in opposite pairs in four rows, each pair at right angles to the adjacent pair. They mature in about 8–9 months after pollination.

While the bark and foliage are similar to another closely related genus of redwoods, *Sequoia*, *M. glyptostroboides* differs in that it is deciduous. Older trees may form wide buttresses on the lower trunk. It is a fast-growing tree, exceeding 35 m in height and 1 m in trunk diameter by the age of 50. The bark is vertically fissured and tends to exfoliate in ribbon-like strips.

Conservation

Since its discovery, the Dawn Redwood has become something of a national point of pride, and it is protected under Chinese law.



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From the left: Pollen cones (enlarged); Female cones; Seed with female cone. Photos: Jebulon, Wikimedia commons, Public domain; Reedj, Wikimedia commons, Public domain; Meneerke bloem, Wikipedia, CC BY-SA 4.0

The Fossil Record

The fossil record would suggest that *Metasequoia* first evolved about 100 million years ago in eastern Russia. It spread out to Japan and across the Bering land bridge to North America, travelling as far south as New Mexico and southern Japan. By 60 million years ago it had colonised northern Europe and northern North America, maintaining its distribution elsewhere. Changes in the temperature of the earth during the period 40 – 45 million years ago caused *Metasequoia* to retreat and advance again into northern latitudes and spread out further into lower latitudes. By the end of the Miocene period (5 million years ago), *Metasequoia* had vanished from the fossil records in Eurasia and North America. The fossil record indicates that *Metasequoia* is relatively new to central China having come from Japan less than 2 million years ago

Re-discovery dramas

Metasequoia has long been found in fossil form across the Northern Hemisphere from North America to Russia to Japan. When uncovered, live, in a remote corner of Sichuan Province in the 1940s, the tree was thought to be as extinct as the dinosaurs with which it once co-inhabited the earth. Its live discovery led scientists to re-examine the redwood fossils collected to date in North America and Asia that had been called *Sequoia* but were, in fact, *Metasequoia*.

1941: The genus *Metasequoia* was reported by paleobotanist Shigeru Miki (1901–1974) as a widely distributed **extinct genus based on fossils**.

Unraveling *Metasequoia*'s complicated history has been challenging. Scientific records and research materials went missing amid China's fight against Japan during World War II, its subsequent civil war, the fleeing of Chiang Kai-shek's government to Taiwan, and the Communist takeover. Later, what materials remained, especially letters and handwritten manuscripts, disappeared during the Cultural Revolution.

Since the "Living Fossil" was discovered from central China in 1940s, the story has been told over and over again around the globe. While there's only one true account, the stories have varied considerably. Among the arguments, who discovered the 'Living Fossil' first, especially in China, and who introduced the seeds into USA, especially in the United States, have been most hotly debated in the past more than half century.

1943: Wang Zhan was administrator of Central Forestry Experiment Institute's new forestry survey department. In 1943, he left Chongqing to explore the botanically rich forest area of Shennongjia. A sudden bout of malaria forced him to stop in the river town of Wanxian. There, he heard about an unusual tree, growing 50 miles southeast of Wanxian in the village of Modaoxi. The locals called it shuishan and had built a small mud-and-tile temple at its base in deference to its height and perceived protective properties. A village leader told them that tea brewed from the tree's bark and prayers to the tree god had saved his daughter's life. According to other villagers, the thickness of the tree's foliage and the quantity of its seed cones predicted the region's crop fertility.

Wang gathered more than 10 tree specimens—needled branches and 10 stemmed cones, the latter collected from the temple's tiled roof. He was unable to identify the tree.



Metasequoia area

The leaves are opposite and pinnate, with opposite leaflets. Photo: Reedj, Wikimedia commons, Public domain. Wild *Metasequoia* are only found in the south west of what is now Hubei Province of China. The *Metasequoia* area is an isolated valley, just above 1000 m, surrounded on all sides by mountains, with its river leaving the area through limestone caves. The area is botanically diverse with more than 550 species, 301 genera and 127 families, excluding the palms and grasses. The area contains 18 species of gymnosperms in 15 genera, including the only known wild *Ginkgo biloba*. Map of Chinese provinces: Toby Simkin, Flickr, CC BY-NC-SA 2.0.

1948: Hu Xiansu, of the Fan Memorial Institute of Biology in Beijing, with help from Zheng Wanjun, a dendrologist at the National Central University, solved the mystery of the unknown tree by matching Wang's specimens to the photo of a five-million-year-old fossil. They named it *Metasequoia glyptostroboides* in a paper published in 1948, but there was no mention of Wang.

The omission of Wang's contribution sparked an immediate furore inside China's botanical circles in the late 1940s. Power and class differences may have caused it: Hu and Zheng were prominent, well-established scholars who had earned their PhDs abroad, Hu in the United States and Zheng in France. The 35-year-old Wang had been born in a remote village in Manchuria, had not studied overseas, and was 'an ordinary teacher'. But not crediting Wang Zhan for his crucial role in the *Metasequoia* discovery was seen as "a very dishonourable thing."

1948: More drama ensued with a series of despatches from San Francisco Chronicle science writer Milton Silverman, who accompanied Chaney, the paleobotanist, on a harrowing trek into China to see live *Metasequoia* in situ, a few years after its discovery and identification by Chinese botanists. Chaney and Silverman, believed to be the first Western men to see the newly discovered tree, between them lost 65 pounds on the mountainous trek, which took 10 days across 220 miles, during which their guards shot one bandit, and one porter nearly fell to his death. Silverman claimed credit for the common name, Dawn Redwood.

Silverman's series ran across the country and hit national TV news, and it was believed that Chaney himself had discovered the tree. Chaney never made that claim within scientific circles. But the press coverage and resulting visibility sparked what Silverman called "a seven-year transcontinental barrage of misunderstandings, denunciations, attacks, vilification, innuendos, libel, slander, and outright lies".

1949: Establishment of the People's Republic of China. Collaboration between western and Chinese botanists ceased.

1983: The first Westerners revisited the *Metasequoia* area since 1948. A group of ten delegates selected by the Botanical Society of America visited a variety of locations of botanical interest and worked to re-establish ties with their Chinese colleagues which were severed years before.

2002: Ma Jinshuang, a Chinese botanist, found Wang's original specimens. At the bottom of a cabinet in a dark, moist, long-abandoned herbarium in Nanjing, perched unprotected on top of the conifer specimens, lay a barely intact cluster of twigs and needles. The *Metasequoia* specimen, its typed label noting it was collected by Wang Zhan on July 21, 1943, ended up in that dank storehouse after a tangle of geographic moves and institutional mergers that characterized China's decades-long journey through war, political upheaval, and a change of government systems. Ma's discovery involved expenditure of three years, plenty of guanxi (human network capital), and an unstated amount of what he calls "fees" to gain access to the three-story building he suspected held one of Wang's original specimens.

The Jiangsu Forestry Academy has now taken steps to better preserve the Wang specimen. Other, functioning herbaria have offered to take it, but the academy won't part with it now.

Summary

Family: Cupressaceae

Sub-family: Sequoioideae (with 2 other species: *Sequoiadendron giganteum* and *Sequoia sempervirens*)

Genus: *Metasequoia*

Species: *glyptostroboides* = Like Chinese Swamp Cypress *Glyptostrobus pensilis*

Common Name: Dawn Redwood

Description: Deciduous conifer

Distribution: South Central China (see map)

Conservation status: Endangered

References

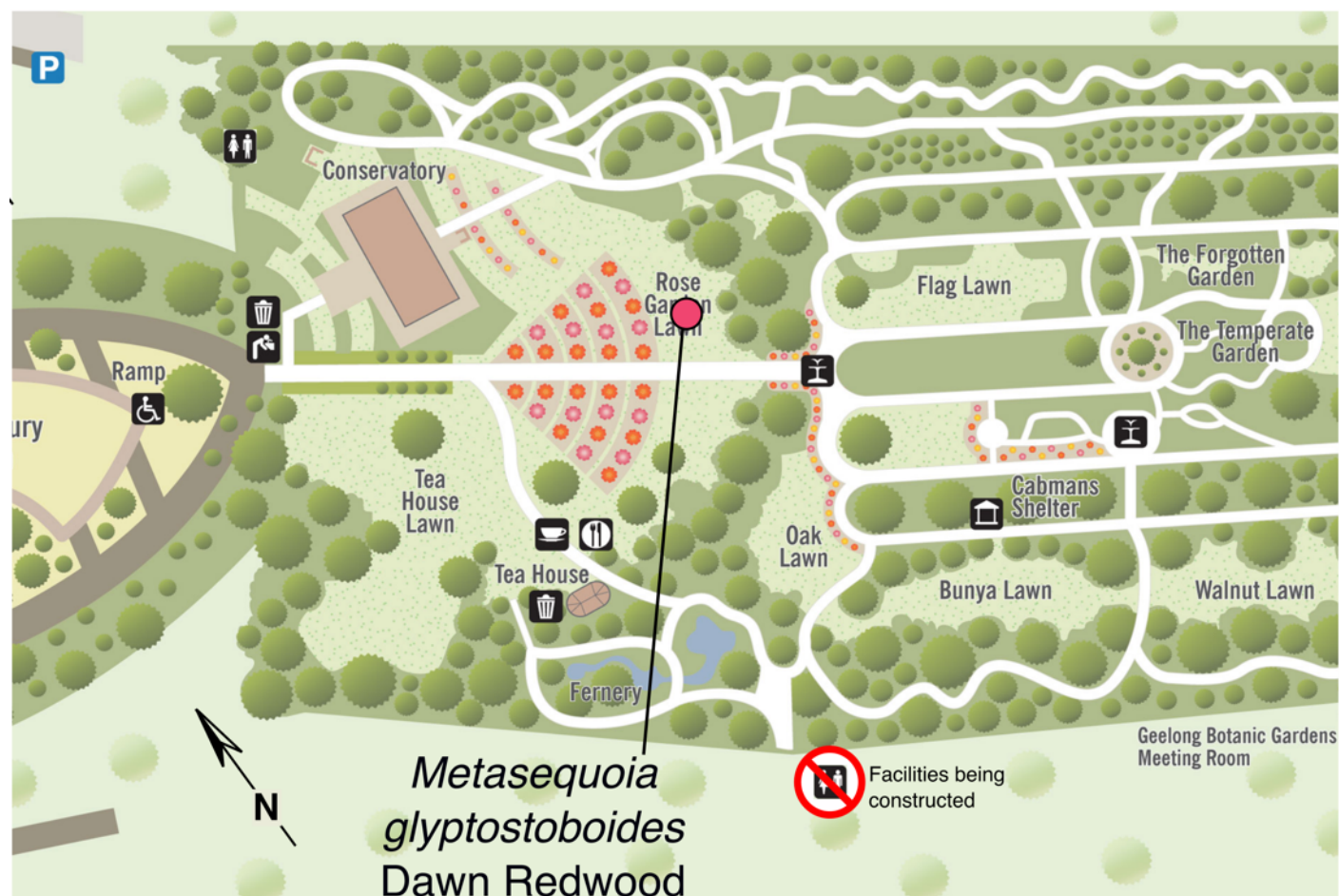
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Location in Geelong Botanic Gardens.