

# Proposal to plant a Dawn Redwood tree on Midsummer Common.

Midsummer Common has been a different place this year. Events have given way to a growing number of Cambridge residents taking exercise and having picnics on the grass during the covid-19 pandemic. It has been a very busy and enjoyable place. This should be remembered in some way.

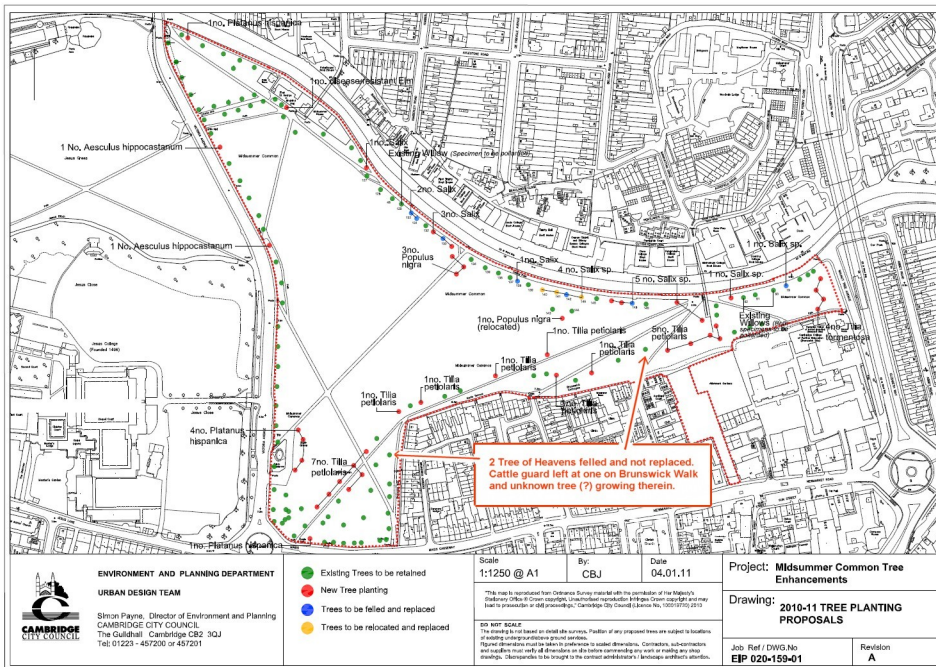
Cambridge City Council has a Citywide Tree Strategy for 2016-2026 which encourages the planting of more large trees, of diverse species and with community participation (policies E1, E2 and E3). The 2019-24 Management Plan for the Common says that "ways must now be found to increase the number and variety of trees on the Common". A Remembrance Tree would make a small contribution.

**What type of tree?** Trees help arrest the adverse effects of climate change. No tree is better able to convert carbon dioxide into oxygen than the family of redwoods. The following paper picks on the Dawn Redwood as a desirable Remembrance Tree.

**Where might a Dawn Redwood be planted?** In May 2019 the Council felled the only *Tree of Heaven* left on the Common - a tree native to China which was introduced to Britain in 1751. It would be fitting for another tree native to China, the Dawn Redwood, to replace it in the same location on the floodplain below the Community Orchard.



Another tree was felled and has left a vacant cow guard in front of Brunswick Walk. Both locations would fill a gap in the 2010 plan for new trees on Midsummer Common (as shown below) but the latter could not accommodate such a big tree to the nearby houses.



**Who will pay?** The Council might see it as their responsibility to replace a tree they removed from their common land. If not, FoMC could muster volunteers to plant a new tree and install the necessary cow guard. A budget of £1,000 should suffice and, if Council funds are not forthcoming, FoMC could ask its members and outside bodies to help with donations.

# Redwood Trees

The Redwood family<sup>1</sup> of trees has 3 members: the **Giant Redwood** (*Sequoiadendron giganteum*), the **Coast Redwood** (*Sequoia sempervirens*) and the **Dawn Redwood** (*Metasequoia glyptostroboides*). As shown below<sup>2</sup>, they are quite different trees but with some similarities in the first two at least. All three are fast growing and long lasting trees which make them good at removing carbon dioxide from the air and releasing oxygen back into the atmosphere. Doing this helps arrest the current trend towards adverse climate change.

 <b>Giant Redwood</b>	 <b>Coast Redwood</b>	 <b>Dawn Redwood</b>
<ul style="list-style-type: none"><li>• Most massive</li><li>• Can live for more than 3,000 years</li><li>• Discovered in 1850's in Sierra Nevada</li><li>• Soft spongy thick fire-proof bark</li><li>• Trunk usually has conical outward sweep to the ground</li><li>• Spikey leaves/needles</li></ul>	<ul style="list-style-type: none"><li>• Tallest</li><li>• Can live for around 3,000 years</li><li>• Discovered in Coastal California</li><li>• Fibrous thick fire-proof bark</li><li>• Trunk usually grows straight-sided</li><li>• Yew-like alternatively spaced flattish leaves/needles</li></ul>	<ul style="list-style-type: none"><li>• Uncertain maximum height/mass and longevity</li><li>• Discovered in 1940's in China</li><li>• Deciduous - leaves turn orange in Autumn</li><li>• Conical overall shape</li><li>• Delicate, flattened, opposing leaves/needles</li></ul>

## The Dawn Redwood

The Dawn Redwood tree (*Metasequoia glyptostroboides*) has an interesting history. In 1941, paleobotanist Shigeru Miki from Kyoto University in Japan discovered fossilised leaves in some Mesozoic rocks dating back 150 million years. When studying these leaves, he realized he had discovered a new tree genus which he named *Metasequoia* (meaning "like a sequoia"). This tree was thought to be extinct. About the same time two botanists working separately found unidentified trees looking like swamp cypresses in remote parts of China<sup>3</sup>. Seeds were collected and sent to Professor Hu Hsen Hsu, Director of the Fan Memorial Institute of Biology in Beijing<sup>4</sup>. Then, in 1946, two other Chinese botanists<sup>5</sup> linked Miki's fossilised leaves with these trees and provided the specific epithet *glyptostroboides* after their resemblance to the swamp cypress.

In 1947 the Arnold Arboretum of Harvard University funded an expedition<sup>6</sup> to China to collect seeds from these newly identified trees. It returned in 1948 with several kilos of *Metasequoia* seeds which the Director, Professor Elmer D Merrill, distributed amongst botanic gardens in the USA and Europe. However, the first Dawn Redwoods in the UK were planted at the Cambridge University Botanic Garden using seeds that came directly from China<sup>7</sup>. The limited source of all these seeds led to poor genetic variation in the early cultivations. More widespread seed-collecting expeditions in China in the 1990s sought to resolve this problem and restore greater genetic diversity.

In 1957, a far-sighted Pizhou Parks Manager, Qingxi Li, acquired 100 of the Dawn Redwood seedlings from the Nanjing Forestry College. He began to propagate many more seedlings over the following 18 years but very few trees were planted in China during the Cultural Revolution. Towards the end of Chairman Mao's period the anti-tree policy was relaxed and in 1975 Qingxi Li began planting the World's Longest Dawn Redwood Avenue along the main road through Pizhou County. It was 60-km long with over a million trees (although the original 60-km avenue has been interrupted by the removal of a 13-km length for the expansion of a new town). The journal containing this story shows an interesting chart below of the tree's history.

1. Family *Cupressaceae* sub-family *Sequoioideae*.

2. Taken from Redwood World at <http://www.redwoodworld.co.uk>.

3. In 1941 Kan Duo of Forest Management at the National Central University and in 1943 Wang Zhan of the National Bureau of Forest Research collected samples from very large unidentified trees while surveying in the Hubei and Szechuan provinces.

4. Mike Browell, *The creation of the longest tree avenue in the world*, The International Journal of Urban Forestry, pp.50-54, 2013. See <http://weddles.co.uk/wordpress/wp-content/uploads/2013/06/Arboricultural-Journal-The-creation-of-the-longest-avenue-in-the-world.pdf>.

5. Zheng Wanjun working at the National Central University in Nanjing and Hu Xiansu the founding president of the National Chung Cheng University.

6. By Zheng Wanjun's assistant Hua Jingchan.

7. The Botanic Garden's Annual Report for 1949 declares: 'Seeds of *Metasequoia glyptostroboides*, sent by Dr Silow from China to Professor F T Brooks, germinated freely. Three of the seedlings have been planted out: one in the Yard at the back of the Range and two beside the Pond (now called the Lake)'. Dr Silow worked at the time with the British Council in Beijing.

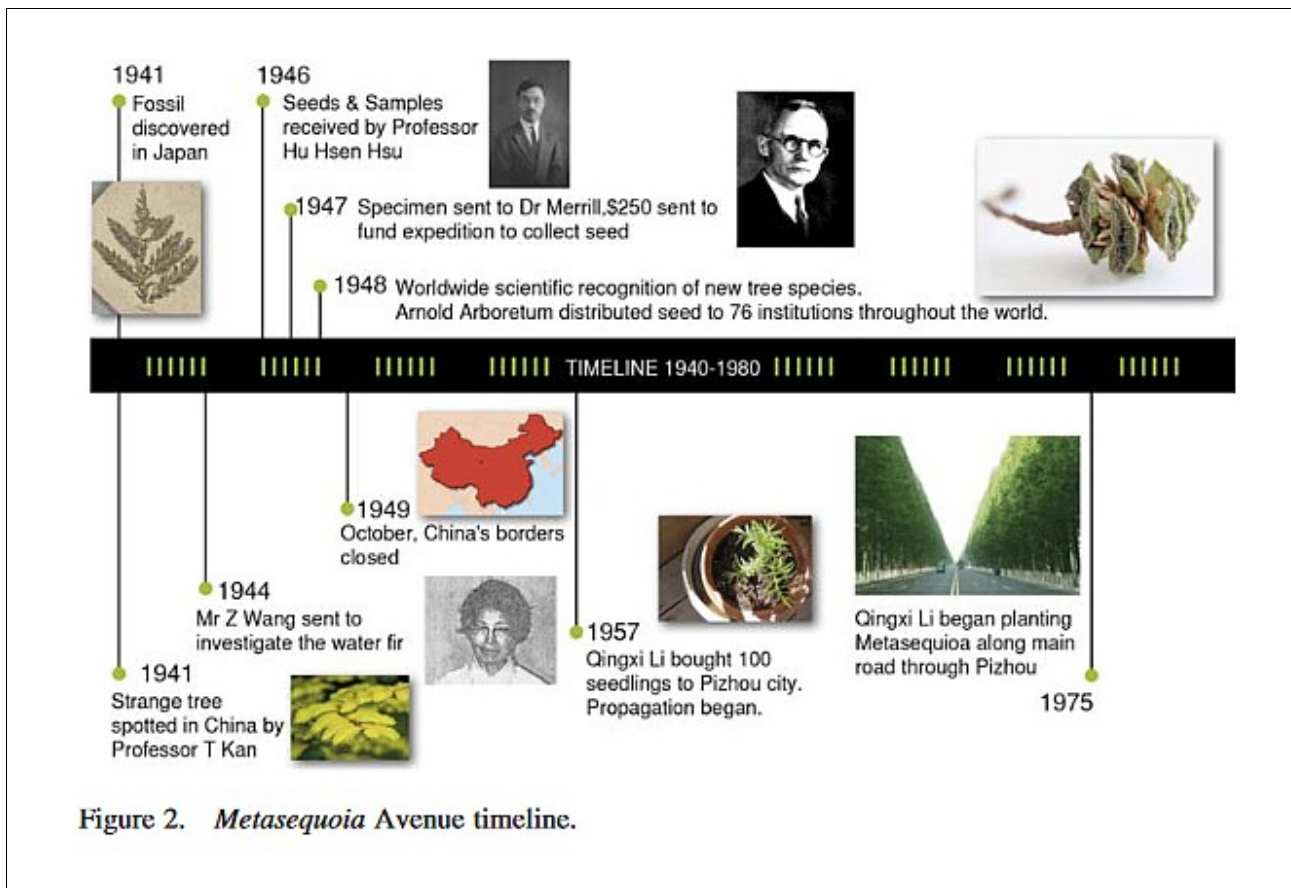


Figure 2. *Metasequoia* Avenue timeline.

### Tree profile

In nature, the original Dawn Redwoods are now restricted to just a few small and scattered stands in Hubei and Szechuan provinces in China<sup>8</sup>. But it has been planted extensively in the Pizhou Avenue in China, in arboreta around the world and increasingly in public and private gardens. It is one of the 50 trees included in The Tree Council's book of *Great British Trees*<sup>9</sup>. The strong pyramidal silhouette maturing into a more rounded crown gives the Dawn Redwood a very pleasing appearance. Unlike the other two Redwoods, it is a deciduous conifer with bright green, feathery leaves which turn orange-brown or reddish-brown in the autumn before dropping off for the winter. This combination makes the Dawn Redwood a strong contender for year-round interest.

The Giant and Coast Redwoods are tall trees, typically over 100m; and they live a long time, typically up to 3,000 years. It is too early to say how the Dawn Redwoods will perform outside of China but heights in excess of 40m have already been reported<sup>10</sup> and that is after only 70 years of growth! Dawn Redwoods are certainly fast growing trees. One planted in 1965 in Somerset had reached 36.5m in 2017 which (assuming a planting height of 5m) averages over 60cm a year<sup>11</sup>. One planted in the Cambridge Botanic Garden was 1.5m tall in 1952, 17m in 1977 and 23m in 2002<sup>12</sup> which averages over 60cm in the first 25 years but much less in the following period. The one planted in Clare College in 1949 was 24.5m tall in 2019 which averages 35cm a year<sup>13</sup>. Four more can be seen in Churchill, Jesus and Emmanuel College grounds and in a private garden along the Shelford Road but all were under 20m in 2019 and presumably planted later<sup>14</sup>. Generally speaking, growth in the UK has been fastest for those Redwoods planted in the south-east area of the country.

8. Studies carried out between 2007 and 2009 counted 5,371 trees primarily in Lichuan, Hubei, with much smaller groups in Shizhu, Chongqing and Longshan, Hunan.

9. See <https://treecouncil.org.uk/the-first-dawn-redwood-remarkable-british-trees>.

10. See <https://www.monumentaltrees.com/en/trees/dawnredwood/records>.

11. See [https://www.monumentaltrees.com/en/gbr/england/somerset/2741\\_dunsterestate/31656](https://www.monumentaltrees.com/en/gbr/england/somerset/2741_dunsterestate/31656).

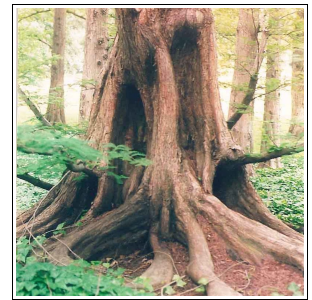
12. See <https://www.botanic.cam.ac.uk/the-garden/gardens-plantings/trees/dawn-redwood>.

13. See [https://www.monumentaltrees.com/en/gbr/england/cambridgeshire/8571\\_fellowsgardenclarecollege](https://www.monumentaltrees.com/en/gbr/england/cambridgeshire/8571_fellowsgardenclarecollege).

14. See [https://www.monumentaltrees.com/en/gbr/england/cambridgeshire/21849\\_shelfordroadtrumpington](https://www.monumentaltrees.com/en/gbr/england/cambridgeshire/21849_shelfordroadtrumpington).



Dawn Redwoods have a distinctive bright spongy red bark. If growing in standing water and left branched to the ground in full sun they will develop large contorted boles. The foliage comprises feathery leaves with the leaflets occurring in opposite pairs on the stem. They do not flower but produce small, round male and female cones. Male cones produce pollen, while the female cones produce small, winged seeds. Both occur on the same tree which allows them to be self-fertilizing.







Pollination starts in early to late spring. Under the right conditions, Dawn Redwood can produce cones every year. Most years, when they produce a bumper crop of cones, are dependent on light availability and summer temperatures. The female cones take around 8-9 months to mature and are shed in the autumn.



### Cultivation

Dawn Redwoods have proved to be easy trees to grow in temperate regions; Cambridge is home to many. They like full sun and prefer moist, deep, well-drained soils. The Royal Horticultural Society gives more soil details<sup>15</sup> in the panel to the right. They thrive in standing water; in the wild they have adapted to growing on flood plains. They do struggle from water shortages and suffer during droughts. Their fast growth rate and tolerance for air pollution make them well suited to urban environments.

<b>Soil</b>	
 Sand	 Clay
 Chalk	 Loam
<b>Moisture</b>	
Poorly-drained, Moist but well-drained	
<b>Soil</b>	
Sand, Clay, Chalk, Loam	
<b>pH</b>	
Acid, Alkaline, Neutral	



Growing Dawn Redwoods from seed presents a challenge and requires patience. Finding viable cones, prising out seeds and treating them is a daunting exercise. It is easier to buy seeds from a reputable dealer<sup>16</sup>. Once planted in a damp compost (ideally in a greenhouse), the seeds should germinate in a couple of weeks. The first signs of the newly emerging tree will be a tiny loop of reddish stem, a few millimetres in size, poking out of the compost. When the tiny seedling manages to straighten out, it will be about 3-5cm high and will often still have its seed case attached at the top. This should dry and fall off naturally within a day or so but if it looks like this is not going to happen it should be

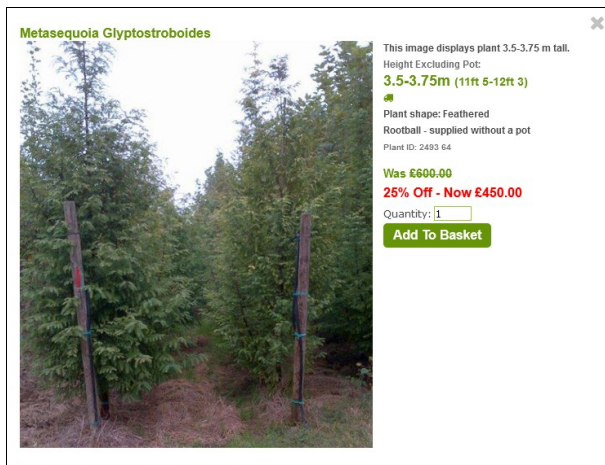
15. See <https://www.rhs.org.uk/Plants/42372/i-Metasequoia-glyptostrobooides-i-Emerald-Feathers/Details>  
 16. See [https://www.chilternseeds.co.uk/item\\_865a\\_metasequoia\\_glyptostrobooides\\_seeds](https://www.chilternseeds.co.uk/item_865a_metasequoia_glyptostrobooides_seeds).

very carefully removed. The top third or so will then split open, typically into four prongs, and within a week or so the little tree will have a dozen or more tiny green branches. By the second summer (around a year and a half old) the seedlings can be placed outside and there they will stay through all weathers. By this time they will be able to withstand, and probably enjoy, mid summer sun provided that the roots are not allowed to dry out completely.

Dawn redwood can be propagated from hardwood cuttings taken in early spring and planted as saplings in the autumn. Cut a 15cm long shoot from a side branch on the tree. An ideal cutting will have a stem about 50mm thick. Angle the cut end at 45-degrees, just below a leaf node. Scrape off a segment of bark about 1cm long and 50mm wide near the cut end of the branch, but take care not to damage the leaf node. Coat the cut end and the scraped area with acid rooting powder. Insert the branch, cut-side-down, into a pot of sand, burying it to about half its length. Place the pot in a sheltered outdoor area, and keep the sand constantly moist. Placing the pot on a heated mat may speed up the rooting process.



Test for roots after 1 month, by tugging on the branch to see if roots are holding it in place. It may take 2 or even 3 months for anchoring roots to develop. When roots have developed, transplant the cutting into a container filled with a mixture of equal parts loam, sand, and compost. Water the plant each week for the rest of the season. After the tree drops its foliage in the autumn it can be planted in the garden.



Seeds and cuttings take time to become established. For this reason it is more usual to buy saplings which come in various heights between 2 and 5 metres. These should be planted early enough in the autumn to allow the roots to become established. They should not be planted in a low-lying area (frost pocket) as they grow late in the season and may be damaged by early frosts. Limbing or pruning of lower branches at an early age will stop the formation of large, contorted boles.