Four redwoods and Funerals[1]

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Foreword
While the contribution of conifers to the native flora is limited to possibly three species, *Taxus baccata* L., *Juniperus communis* L. and *Pinus sylvestris* L (and there is some debate as to whether or not Scots pine is native to Ireland), their contribution to the exotic flora in this Country is in excess of 230 species. This contribution represents the conifers of the temperate regions of the world, China, Japan, Australia, New Zealand, South Africa and western North America, Chile and Europe. They include the common genera of *Picea, Abies* and *Pinus* (Pinaceae) which are grown for timber production and for ornament in gardens, parks and open spaces. Less common and generally confined to specialist collections, such as those at Mount Usher and Kilmacurragh in Co. Wicklow, are members of the Taxodiaceae. The Taxodiaceae comprise a family of 10 genera of evergreen and deciduous trees. The most common is *Sequoiadendron* (giant redwood or Wellingtonia) with their tall spire-like habit visible from a distance above other trees. Of the genera described by John Joe Costin, *Metasequoia glyptostroboides* (Hu & W.C. Cheng) has become an important fast-growing amenity tree. In Dublin there are examples on the Dundrum bypass. In London, a 1 ha garden, Jubilee Park, constructed over a car park, was planted with mature specimens of the tree. A long cry from their native habitat, as described in this article by John Joe Costin.

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Seeing a plant growing in the wild in its native habitat deepens my understanding of its growing needs and offers evidence of how it should be used in landscapes. Some plants make an indelible first impression. It may be the location, its companion plants, fortuitous timing, a peak moment in its ornamental phase or simply the circumstances of how the plant revealed or presented itself.

Japanese umbrella pine (*Sciadopitys verticillata* (Thunb.) Sieb.)
What was memorable about the umbrella pine was the sheer sense of its difference. I was looking at a relict that has been around for 250 million years. It has distinctions. It is not a pine at all. It has no immediate relatives, being the sole species in the Sciadopityaceae family. It occupies a botanical family alone. It is like no other plant. It is a remote member of the redwoods (family Cupressaceae) with redwood-like cones.

I did not find it in the wild. Roy Lancaster (former curator of the Sir Harold Hillier Gardens, Hampshire and a renowned freelance writer, plant explorer and broadcaster)

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and I were taken by Professor Mikinori Ogisu (Chengdu University, China) to see it growing in small groups on steep, mossy slopes and rocky ridges in a remote wooded area in central Honshu, Japan in the shade of some broadleaved trees. Mikinori said that it grows best where it enjoys high summer temperatures, plenty of moisture, shade, perfect drainage and rich forest soil. We stood in a silence induced by awe of the venerable. Mikinori said that it is not a good competitor in Japan and that the excessive competition drove it out of more favourable sites, but similar to the redwoods it survives in difficult habitats because it can tolerate poor soils. Nevertheless, it has 'travelled' well, is hardy and is a great success in the landscape and gardens of Europe and N.E. America, tolerating even the winter cold of Massachusetts (Mitchell 1987).

Mikinori, a great modern-day ethnobotanist and explorer, was the first foreign botanist permitted to stay in China (following détente in 1973). He has spent a long time in China and completed a floral survey of Mt. Omei, a sacred mountain in Sichuan where he identified 200 endemics among the 2,000 species-rich flora. He showed us that it has two types of leaves, small scale leaves pressed against the shoot and at its end an umbrella-like whorl of 20-30 stiff flat leaves (10-15 cm long). This arrangement inspired its botanical name, Shiados, Greek for umbrella and pitys for pine. He showed that each compound leaf is composed of a pair of fused leaflets, as evidenced by the grooved surfaces that lacked a keel. Distinctive but similar, this ancient type of leaf arrangement has been found in fossil samples.

Its growth habit is distinctive, dark green, lustrous foliage and texture that make it an elite tree. It should be more widely used as an accent plant as it is one that will not outgrow its space. It has a neat, upright, densely clothed, pyramidal habit that does not flatten out to form an umbrella-like canopy, as its common name might imply. Easily raised from seed, it takes about six years to reach 30 cm. Price usually reflects age, but even so it is considered expensive for its size. Prized by discerning gardeners, it does not meet the needs of the large sector of the market that demand "fast growing dwarf conifers", 9 m in 50 years and 30 m in 250.

The umbrella tree is cultivated in 12 of the 30 Great Gardens of Ireland (Forrest 1985). The Tree Council of Ireland (1985) list Champion Trees in:

Location	Girth (cm)	Height (m)
Glenville Park, Co. Cork	210	14.0
Recess, Co. Galway	124	13.0
Curraghmore Co Waterford	224	16.0

The Curraghmore tree was 14 m tall in 1976 and 30 years later it was 16 m tall, a rate of growth of less than 7 cm a year.

Anthropologists have concluded that man is the only creature that is known to bury its dead. Burial was not for hygiene reasons, but it represented a belief that the death of an individual did not signify the end of his or her life. It also symbolised the preparation for an onward journey. The poor wrapped bodies in cloth or hay; the rich commissioned limestone sarcophagi, in places where trees were not common, such as

Egypt, but the majority used coffins made of wood. Primitive people split a tree trunk and hollowed it out. Particular woods were favoured by different people, the choice of depending on local availability and cultural tradition. Some selected the wood for its aroma, resistance to decay or durability in water.

"What was the coffin?" was, I recall from childhood in Ring, Co. Waterford, a question asked about every funeral. An oak (*Quercus*) coffin was the affirmation of wealth or status. Elm (*Ulmus*) according to Eldin was the traditional timber for coffins in England (Edlin 1964). In tropical Japan and China camphor wood, prized for its scent and durability, was the timber of choice for coffins (Scott 1980). Currently, wickerwork woven from willow (*Salix*) are the coffins of fashion among environmentalists. On botanising expeditions down the length of temperate Japan and across Sichuan in China, we were exposed to the remarkable coffin culture of the indigenous people. Timbers of four different redwoods meet their needs.

The umbrella pine enjoys exclusivity. It is the wood of choice for making coffins for members of the Japanese Royal Family. This designation has symmetry. The oldest trees of one of the most ancient coniferous species are held for making coffins for the oldest imperial lineage (2,500 years). It is a strong, straight-grained, soft, elastic and almost white wood when cut, which matures to a light brown. It is comparable to the best spruces.

***Japanese cedar* (*Cryptomeria japonica* (Thunb. ex L.f.) D. Don)**

The ordinary person's coffin in the subtropical south of Japan is made from the scented wood of the camphor tree (*Cinnamonum camphora* Nees). Elsewhere coffins are made from the timber of Japanese cedar, known locally as the Sugi tree. It is the dominant timber tree in Japan where nearly 70% of the land area is covered in forest, one of the highest proportions of forest cover in the world. They pioneered the concept of forestry as a slow growing crop. Despite Japan's high population density, Japanese people identify strongly with trees.

Many past plant hunting expeditions to the Orient were motivated by profit. Wealth and fame was promised to those who could determine a new use for a plant in the west. Thomas Jefferson claimed that the "greatest service that could be rendered to any country was to add a useful plant to its culture". Each plant collected and catalogued was assessed for its novelty value and especially for its possible utility. The timber potential of exotic conifers was promoted by selecting a common name to show an association with one of the three important, well-known timber conifers in Europe; fir (*Abies*), pine (*Pinus*) or the prized cedar of Lebanon (*Cedrus libani* A. Rich.). The emphasis was on marketing economic potential, not botanical accuracy. Japanese cedar was first described by Kaempfer in Japan in 1697. Two geographical forms are distinguished. *Cryptomeria japonica* var. japonica is the Japanese form (Bean 1970). Robert Fortune, while in China for the Royal Horticultural Society, was the first to collect seed of the Chinese form of *C. japonica var sinensis*. He sent large quantities of seed to England in 1844. Introduced as Japanese cedar, it is in fact not a cedar, but is a redwood that is most closely related to the giant redwood (*Sequoiadendron giganteum* (Lindl.) J. Buchholz).

Cryptomeria is a 50 m tall, neat pyramidal tree in its native forests. In the landscape,

its profile is as elegant as the giant redwood and is valued as an ornamental. It is one of the notable trees planted in the precincts of its many Buddhist temples and Shinto shrines. It forms no less than a 32 km-long avenue to the 8th century Nikko Shrine, which is on the east coast, north of Tokyo. It was planted in the mid 17th century when the shrine was redeveloped as the site for a Mausoleum to Tokuyama Ieyasu, the warlord founding-father of modern Japan. Fine specimens of this species growing in our damper coastal counties, according to The Champion Tree records (Tree Council of Ireland 2005) include:

Location	Girth (cm)	Height (m)
Fota Arboretum Co. Cork	270	34.0
Lough Rynn, Mohill, Co. Leitrim	325	24.0
Curraghmore, Co. Waterford	549	28.5
Cappoquin	519	30.5

Like the umbrella pine, it is the sole species in its family. The wood is scented by volatile oils, is easily worked, durable and highly ornamental in colour and grain. It has never been important as a forest tree in Ireland. It is known to perform poorly on heavy clay soils, and the lack of sufficient summer heat in Ireland may have restricted its use. In the comparative forest tree trial planted from 1904-1913 in Avondale, it suffered extensive frost damage, was of poor form, forked and did not produce sawlog material (Carey 2010).

This species is recorded in 16 of the Great Gardens of Ireland (Forrest 1985). *Cryptomeria japonica* 'Elegans', listed in 21 garden records, is more popular and is the form we normally encounter, selected strictly for its ornamental novelty of its foliage turning purple in winter. Its feathery juvenility is retained permanently. There are many cultivars in Japan but few have attained popularity here. The Irish Champions are:

Location	Girth (cm)	Height (m)
C. *japonica*, 'Cristata' Castleforbes, Co. Longford	257	24.5
C. *japonica*, 'Viminalis' Lissadel House, Co. Sligo	133	11.0

Cryptomeria japonica 'Sekkan Sugi' (Snowtopped cedar) refers to its new lemon white growth. Is a graceful, slow growing, form with hanging branchlets, with soft, lemon-yellow foliage. Costin's Nursery introduced it in 1982. It is regarded as the best cultivar for Irish Gardens. Our 25 year-old 4 m specimens command attention. The first plant released was a 2 m specimen donated to the RTE Telethon Charity Auction in 1992 and sold for £10,000. That price gave it unwarranted attention exclusivity that effectively discouraged further inquiries or sales.

Chinese fir (*Cunninghamii lanceolata* (Lambert) Hooker)

This species is the most important forest timber tree in China, ranking second only to the bamboo in volumes harvested and in its versatility of use. The highly prized wood is light, soft, fragrant, pale yellow or almost white, easily worked, durable and rot resistant where in contact with soil. Most Chinese are buried in coffins made of its scented wood. We were familiar with its wood in grocery stores of old, as virtually all the tea in China was exported in chests made of its wood. It is the first wood I got to know; a recycled tea chest was the standard means to confine crawling babies in farmhouses long before colourful Mothercare playpens were affordable.

The species name honours James Cunningham, a minor and largely forgotten plant hunter. He is credited with introducing the first plants from China in 1698. He collected specimens of it on the Island of Chusan, near Shanghai in 1701/2. I am of the opinion that he was an accidental botanist. He was a surgeon at the East Indian Co. based in Canton. Officially Britons could not travel outside the warehouse bases to which they imported opium (illegally) into China and from where they exported tea to London. They were incentivised to procure whatever plants they could by the expectant market for exotic plants back in Europe. We can only speculate about the incongruity of the genus name given. It is wrong that so many species were named after European explorers, whereas the names used should have honoured the many great Chinese botanists. The botanical name given to Chinese fir was no exception to this.

China was a conundrum. Undoubtedly it was an Empire, but it was built on religion values and was a system alien to the British explorers. It had an Emperor, a hierarchy and was administered by a meritocracy recruited through a 2000 year old mandarin examination system that selected the best and the brightest irrespective of class, wealth, or place of birth. It would be another 140 years before it was realised that the British tradition of naming new plants after the explorers was insensitive to the feelings of the natives. For example, the Americans took umbrage and resisted Kew Gardens' proposal that one of their great trees should be called Wellingtonia, after an Irish born Duke from Trim, Co. Meath.

The foliage of Chinese fir appears to be prickly, but in fact it is pliant. Superficially, it resembles the monkey puzzle (*Araucaria araucana* (Mol.) K. Koch). It is neither, but is another redwood with similar type cones and the characteristic soft, spongy, red bark. It makes a pyramidal tree to 50 m with horizontal branches pendulous at the extremities. The leaves, with two white stripes underneath, turns bronze in winter, are spirally arranged as is characteristic of all redwoods. Its ornamental disadvantage is that the tree does not shed its five year-old leaves when they die, giving it a detracting ragged but exotic appearance. Like *Sequoia*, Chinese fir trees tend to regenerate at high densities. As with *Cryptomeria* it has the inestimable asset of regenerating by coppicing and the sprouting of new growth after cutting or burning. Thus, the extensive Chinese fir forests in Japan and China regenerate readily.

However, on a number of seed collecting expeditions in the 1980's, Lancaster (1989) observed that it was widely planted in western Sichuan. It grows in central, western and southern China in the mountain valleys of Sichuan, Hubei and Yunnan. Travelling

in Sichuan in 1993, I saw extensive forests and clearfell harvesting, an entire 35 km stretch was denuded on the steep slopes on each side of the Yalong River, a tributary of the Yangste. Wind exposure adversely affects the growth of *Cunninghamii*. I observed that some roof tiles on houses were slightly askew and I was told they lay roof tiles on battens but that there was no need secure them with nails because wind speeds were generally low. *Cunninghamii* is also vulnerable to late spring frost damage and grows ideally in warmer and wetter conditions than that provided by the mild and damp Irish climate.

The species is recorded in 10 Great Irish Gardens; Birr, Castlewellan, Dunloe, Guincho, Headfort, Ilnacullin, J.F Kennedy Arboretum, Mount Congreve, Mount Usher and Powerscourt (Forrest 1985). It is grown by Leahy's, a wholesale nursery, who supply stock to Garden Centres. Champion Trees are recorded at:

Location	Girth (cm)	Height (m)
Castle Forbes, Co Longford	74	9.5
Mount Usher, Co Wicklow	308	25.5

Dawn redwood (*Metaseqouia glytostroboides*)

The redwood family that was once widespread throughout the world is now represented by relict species. From the fossil records in North America, the Black Sea area and China, it is known that at least 12 other redwood species existed. One species grew within the Arctic Circle and another was found in Australia. It was in 1941 that Professor Shigera Miki, a Japanese palaeobotanist, identified and named the new genus Metasequoia to describe some fossil found in Japan from the Pliocene period (1.6 - 5 million years ago) that were until then confused with *Sequoia* and *Taxodium*. Its leaves are opposite, whereas they spiral around the stem on other redwoods. Metasequoia fossils have since been found in North America, China, and Greenland.

In 1944 a forester discovered a tree new to him in Sichuan Province (Hawes 1989). He took it to Professor Z. Wang of the Central Bureau of Forestry who was unable to identify it. He took them to Professor W.C. Cheng at the National Central University of Chungking, China. Confused and intrigued, he sent his student Hsuch Chi-Ju to collect more complete specimens, including branches bearing male cones. They realised it was a new species, identical to the tree fossil recently described in Japan. They published their findings and sent specimens to two American tree experts. Ralph W. Chaney, Professor of Palaeobotany at the University of California found the samples remarkably similar to fossils he had found in Oregon. Professor Merrill (Director of the Arnold Arboretum in Harvard University) was the other recipient. Hsuch Chi-Ju returned to measure the tree. It was 37 m tall with a girth of 7 m. On his second visit he was directed to another village (Shu-Se-Pu in the Hubei Province), 48 km away when he found thousands of trees. The villagers fed its foliage to their cattle as fodder!

In 1947 a group of Americans visited the area and fortuitously collected a large number of specimens and a great quality of seed. In early 1948 they distributed seeds to all leading botanical institutions around the world. This may account for the rapid

spread of the species worldwide. Within months, Mao's Red Army was in power and travel to the area was forbidden. When exchanges commenced in the late 1970's there were already sizeable specimens in many places. It is now widely planted along roadsides and as a street tree in China.

There is no ambiguity on the botanical identity of the fossil tree, but there is an intriguing question to be answered as to how and why a tree which had a worldwide distribution became extinct except in one small remote mountainous location in SW China. In an attempt to answer this question, since 1973 hundreds of scientists from a range of disciplines descended on the area to study its habitat and people. In 1993 I got an opportunity to travel in this area with Roy Lancaster and Mikinori Ogisu. To do so Mikinori had to procure 13 licences. We were accompanied by two government minders. We had to report each night to the local police station in the area we were in, presumably for safety reasons. There were no hotels in the Yi area. We over-nighted in a network of government hostels built to accommodate visiting mandarins. They were simple, distinctive and their design was as recognisable as the National School in rural Ireland. Each had an open outside stair and hallway, concrete floor and bedrooms with tubular-steel bed frames and wire sprung base with a water jug, basin and chamber pot. We were prohibited from taking photographs of military installations, which included footbridges and graveyards.

Mikinori pointed out that *Metaseqouia*'s distribution in the mountainous SW China is confined within the land area occupied by the Yi people. Numbering 14 million, they are recognised as one of 58 minorities in China and are classified as of Austro-Asiatic origin and speak a distinct language with Tibeto- Burman roots. Tall, thin and narrow headed, their physiognomy is distinct from the dominant Han. Yi society is structured on a caste system, identifiable by a dress code. Their economy was based on barter, using salt as a currency and they practised slavery. Despite Chairman Mao's claim that he abolished slavery, they lived in an autonomous area from which foreigners were excluded. We entered their area via a manned barrier border crossing. We dined with their leader, visited their Ethnographic Museum in Leshan and a Shaman read a religious text for us from a 300 year-old book of parchments. They wash ceremoniously on three occasions in their life; at birth, marriage and death. They are hoe-using farmers, cultivating on steep slopes crops of potatoes, hill rice and buckwheat. We observed them going to the slopes with their 'transistor radio', a songbird in a cage!

Mikinori then made four observations. China had been botanised extensively over the previous 400 years. It seemed plant hunters could not have missed such a distinctive tree, particularly in the two provinces of Sichuan and Hubei. These were and are of primary interest to Europeans, as most of the Chinese plants in our gardens are native to these two provinces. Secondly, Mikinori claimed that plant hunters avoided this area, warned off by their Chinese guides by the fear of enslavement. *Cunninghamii* does not grow in these areas. Thirdly, the Yi people make their coffins from *Metasequoia* wood. Fourthly, to celebrate the birth of a child they take a hardwood cutting of this tree and stick it into the ground. In effect, they plant the tree that will provide the timber for their child's coffin.

Seeds are the most efficient means of propagating most conifers. Few conifers strike from hard-wood cuttings, *Metasequoia* is an exception. Kelly, in trials conducted in

Kinsealy, confirmed that up to 80% of cuttings taken from one or two year-old shoots, rooted within 12 weeks. Although it can readily be raised from seed, hard-wood cuttings are the favoured means of propagating new stock in most parts of the world.

Although the observations described above are intriguing, it is important not to over speculate when there is insufficient evidence to support the claims made. The youngest *Metasequoia* fossils are about 2 million years old. It is thought that *Metasequoia* became extinct in Japan 700,000 years ago. Peking Man, discovered in 1927, places the evidence of the oldest human habitation in China at 350,000 years. So the role of man in perpetuating the dawn redwood in this area still remains to be revealed from anthropological and other records. Human activity can be traced back two million years through Museum-held man-made objects. It is not unreasonable to assume that the study of such objects may yet reveal the answer to this question.

Dawn redwood was coined as a common name for what the Yi called the swamp larch. Like its next of kin (but much younger), the swamp or bald cypress (*Taxodium distichum* (L.) Rich.), it too thrives in water, damp ground and in ordinary soil. It grows much faster than *Taxodium*, it colours well in the autumn, develops a fluted bole like it and forms a distinctive pyramid growth habit. As it ages, it may take on the mature characteristics of a splendid irregular head of the original tree. Its only drawback is that the young leaves are vulnerable to damage in areas prone to late frosts. That was my experience when I planted 200 m long avenue with 3 m tall trees in a frost pocket in Co. Kildare in 1973. My splendid landmark imaginings regressed into the ground within three years.

Sichuan is the most populous state in China. Its land area approximates to that of Japan. Given that the *Metasequoia* native habitat is located on the same latitude (30° N) as New Orleans and Cairo, it would have been adventurous to predict that it might succeed well in the wide range of locations where is has been established. It grows well above 1200m. Its companion trees include *Liquidambar formosana* (L.), *Cercidiphyllum japonicum sinense* (Siebold), *Quercus engleriana* (Seemen) and *Q. glauca* (Thunb.), *Sassafras albidum* (Nutt.) Nees and *Acer palmatum* (Thunb.) *tsuma*. None of these perform nearly as well as *Metasequoia* in our climate.

Mary Forrest confirms the popularity of the dawn redwood, recording it in 26 of the 30 Great Gardens in Ireland. The Champion Tree records confirm that that it grows rapidly and is well suited to Ireland.

Location	**Girth (cm)**	**Height (m)**
Mount Usher, Co. Wicklow	211	21.5
Lismore Castle, Co. Waterford	292	15.0
Belfast Botanic Gardens, Co. Antrim	207	16.5
Red Hall, Co. Antrim	270	16.5
Ballylickey, Co. Cork	249	15.5
Headfort Golf Club, Co. Meath	286	19.5
Belvedere, Co. Westmeath	205	18.0
Newbay House Hotel, Co. Wexford	245	17.0

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