

Leyland cypress and the shifting spectrum of names

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The late Alan Mitchell, dendrologist for the British Forestry Commission, called it a silvicultural event on a par with the invention of the spade. A British judge called it the biggest single cause of litigation between neighbours in Britain. Many New Zealand farmers who need shelter in difficult situations regard it as the best thing since sliced bread.

"It" is the Leyland cypress, the archetypal Cinderella tree, which arose as a hybrid in England in the 1880s, was not recognised as special until the 1920s, and did not become widely known even in Britain until the 1960s. The hybrid was a centenarian by the time the mass-production techniques developed in the 1980s made it available at an affordable price for shelter belts in New Zealand.

Within the last 20 years, thanks to its vigorous growth and its tolerance of exposure and a wide range of soil and climatic conditions, the Leyland cypress has become probably the second most often planted tree (behind radiata pine) in New Zealand. Some of the clones available have even been talked about as possible sources of high-quality plantation timber.

Unfortunately, it has another, less desirable, claim to fame. In the last two decades its shifting spectrum of scientific names has caused more confusion for nurseries, farmers, and foresters than any other tree.

Leyland cypresses have been in New Zealand only about 60 years, which makes their popularity and rapid spread all the more remarkable, given that they can only be propagated vegetatively.

The Leyland cypress originated in 1883 according to some accounts and 1888 according to others, at Leighton Hall, Welshpool, Wales, as a chance seedling in a batch raised from cones

picked off a Nootka cypress. The seedlings were sent to Haggerston Castle, in Northumberland, for planting in 1892. The clone later named 'Haggerston Grey' is one of those seedlings.

In 1911 two similar seedlings were raised at Leighton Hall from seed collected off a Monterey cypress. These were later named 'Leighton Green' (Fig. 1A–B) and 'Naylor's Blue'.

The name "Leyland" commemorates the family who owned the Haggerston and Leighton estates when the original seedlings were raised and propagated. C. J. Naylor was managing the Leighton part of the estates when the first batch of seedlings was raised in the 1880s. In 1892, after inheriting both the estates, which had been entailed under the will of his great-great-uncle Thomas Leyland, he moved to Haggerston (taking the hybrid cypresses with him) and changed his surname to Leyland. Subsequently, he sold his lifetime interest in Leighton Hall to his brother John Naylor, who died in 1906. John Naylor's son, Captain J. M. Naylor, took over Leighton Hall in 1909 and remained there until 1931. He was probably the Naylor of 'Naylor's Blue'.



Fig. 1 *x*Cuprocyparis 'Leighton Green'. A, shoot. B, foliage. Photos: Derrick Rooney.

Despite the unusual appearance and vigorous growth of the seedlings they attracted scant interest until 1926, when they were brought to the attention of William Dallimore, curator of the British National Pinetum at Bedgebury, who described them and arranged for the 'Haggerston Grey' and 'Leighton Green' clones to be propagated. 'Naylor's Blue', which grew near 'Leighton Green' on a hillside behind Leighton Hall, was propagated only after it was felled by a freak windstorm in 1954. A fourth clone, 'Green Spire', remains less well known.

Dallimore recognised the seedlings as that uncommon occurrence, an intergeneric cross. The parents were determined to be the Monterey and Nootka cypresses. This meant that under the international rules then in force, a new name, incorporating bits of both generic names, had to be erected. This was to lead to considerable disruption and confusion later.



Fig. 2 Storm-battered macrocarpa growing on the shoreline, South Bay, Kaikoura. Photo: Derrick Rooney.

At that time, the Monterey cypress was known to taxonomists as *Cupressus macrocarpa*. This species is a native to California and is commonly called "macrocarpa" in New Zealand (Fig. 2). The Nootka cypress, also popularly known in the American Pacific North-west as yellow spruce or yellow cedar, was classified in the same false-cypress genus as the better-known Lawson cypress,

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and was known as *Chamaecyparis nootkatensis*. Nootka cypress is native to the west coast of North America, from Alaska to northernmost California.

Dallimore coined the compound generic name *×Cupressocyparis* and the specific name *leylandii* for the Leyland hybrids (Jackson and Dallimore, 1926). The name *×Cupressocyparis* was subsequently used for all crosses between the Nootka and other American cypress species.

Another two *leylandii* clones were selected in 1940 from a different source: seedlings from a macrocarpa growing at the small East Dorset town of Ferndown. The seed was raised at the Barthelemy nursery at a nearby village, Stapehill, and although no Nootka cypress was known to be growing in the vicinity two unusual seedlings were determined to be of the same parentage as Leyland cypress. For many years these seedlings were known only under the Stapehill code numbers, 20 and 21.

In 1956 the research division of the British Forestry Commission sent a genetics team to Leighton Park to collect seed in the hope that new Leyland hybrids could be raised from the original source. They were unsuccessful in this, but seed collected from an Arizona cypress, then known as *Cupressus glabra*, growing about 20 metres from the Nootka cypress that had produced the original Leyland clones, yielded two seedlings that displayed unusual adult foliage. These were subsequently propagated and named *×Cupressocyparis* 'Notabilis'.

In 1961 a Mr Howard Ovens, from Tany-Cae, Dyfed, in Wales, collected seed from a Mexican cypress, then known as *Cupressus lusitanica*, near a grove of Nootka cypresses at the Westonbirt Arboretum in Gloucestershire. Two of the resultant seedlings were clearly crossed with Nootka cypress. One of these, commonly known as 'Ovensii', is grown in New Zealand and has become popular, particularly in the North Island, where it seems to grow better than it does in the South Island and produces timber of good quality.



Fig. 3 *×Cuprocyparis* 'Silver Dust', a variegated sport of 'Leighton Green'. Photo: Derrick Rooney.

A more recently named Leyland clone, 'Silver Dust' (Fig. 3), was raised in the United States from a branch sport on 'Leighton Green'. Its green foliage is speckled with creamy white variegation at the tips. 'Silver Dust' is available in New Zealand but it's not to everyone's taste. It can be eye-catching as a specimen tree in the right context of other dark evergreen trees but does not make an attractive hedge.

A slower-growing, bright yellow clone, 'Robinson's Gold', was released in the mid-1970s. This was a chance seedling, found in a rhododendron garden near Belfast, Northern Ireland. The older 'Castlewellan Gold' originated after severe snowstorms in the 1962–63 winter snapped a branch from a golden macrocarpa growing in the forest park at Castlewellan, in County Down. A local nurseryman who sowed seed collected from the fallen branch selected a golden-coloured seedling that proved to be a Leyland-type hybrid. 'Castlewellan Gold' was first marketed in Ireland in 1970 and has been available in New Zealand since the early 1980s. Since 1980 numerous other clones and sports of Leyland cypress have been named in Great Britain, including some with coloured foliage. Today, more than 40 Leyland cypress cultivars have been named. Many of these are almost certainly branch sports.

The "original" Leyland clones thrive almost anywhere in New Zealand below the treeline. In the United States they are rated for USDA Hardiness Zone 5 (hardy to -23°C, perhaps lower).

'Leighton Green' was the first clone established in New Zealand. Although it was grown commercially in Britain from the 1930s little is known about early attempts to import it to New Zealand. The first known attempt at acclimatisation was made in 1949 by the North Otago Tree Planting Association, but the plants failed to survive. The association's minutes, held in the North Otago Museum, contain no record of a second attempt by them. An importation in 1952 by the then Department of Agriculture was successful, and the cultivar was established at a research station at Rukuhia, near Hamilton, from where propagating material was presumably distributed.

Harry Hart obtained six plants, via the then Forest Research Institute (FRI) at Rotorua, for planting in the H. E. Hart Arboretum at Lake Coleridge in 1961, but recorded in his notebook² that the material supplied had "weak root systems". Three plants died in his garden nursery. The remaining three were planted as group No. 80 in the arboretum in September, 1961, but two of them died soon afterwards and the third was removed in September, 1962.

² Hart kept a bound notebook in which he recorded, from 1934 until shortly before he died in 1979, detailed observations of acquisition dates, sources, and planting dates of all the trees in the arboretum at Lake Coleridge. His notebook is currently held by the Central Canterbury Farm Forestry Association.

Three replacement plants obtained from Lincoln University (then Lincoln College) were planted as group No. 81 in September, 1962, at which time he noted that they were 2ft 3in (69 cm) high. His notes say the plants were topped in 1965, but give no reason why this was done. Two more plants from Lincoln were planted as group 58, also in 1962 (Hart's practice was to plant in groups of three, with five metres between plants and 15 metres between groups). All are still there, and now have considerable historic significance, as they are the oldest documented Leyland cypresses in Canterbury, and probably in the South Island. Presumably the Lincoln material was 'Leighton Green' obtained from the Department of Agriculture, but there are no accession records to confirm this. Leyland hedges growing at the university today were planted in the 1970s and 1980s and were probably obtained from commercial sources. There are no specimen trees of Leyland on the university campus today. A large solitary tree that was probably the source of the Lake Coleridge material was removed because of canker in the 1970s (Roy Edwards, pers. comm.). Leyland cypress was not planted in the Christchurch Botanic Gardens until 1977, when a plant of 'Leighton Green' was obtained from the Christchurch City Council nursery in Linwood. This plant is still growing in the Pinetum at the Gardens, but is affected by canker (Dean Pendrigh, curator of collections, Christchurch Botanic Gardens, pers. comm.).

At that time Leyland cypresses were still uncommon in New Zealand and the few nurseries that listed them were selling them at specimen-tree prices, although their growth form, with its heavy, low branching, was not suitable for a specimen tree. An Ashburton farmer, the late Bill Buchan, was one of the first to grow Leyland cypress in Mid Canterbury, probably in the late 1960s. He established a small woodlot of Leyland cypress on a very fertile site behind his house alongside the Ashburton River. At a field day in the late 1980s he was able to display bowls and other items that had been turned from timber harvested from this woodlot. The trees were probably

only about 15 years old and the fact that logs had been harvested from some of them indicated rapid growth because of the fertility of the site.

The clone 'Naylor's Blue' was imported by FRI to Rotorua in 1962, and 'Green Spire' and 'Haggerston Grey' were brought in by the New Zealand Forest Service a year later. The two Stapehill clones were imported to Lincoln for evaluation in 1978 by Dr J. W. "Hamish" Sturrock, a scientist at the former DSIR. These were subsequently named 'Stapehill' (No. 20) and 'Ferndown' (No. 21). Four more clones, three identified only by number and one named 'Rostrevor', were imported by the DSIR in 1985 (Sturrock, 1989), but these have not persisted in cultivation in New Zealand. One of the numbered clones failed to survive quarantine and the others were presumably either discarded as inferior or failed to thrive under trial.

All Leyland clones are usually considered to be sterile, and there is no overseas record of any of them producing viable seed. However, Dr Sturrock found fertilised cones in a trial planting of Leylands near Mosgiel, in Otago. Seedlings were raised from these at Lincoln, and when Dr Sturrock retired he was given permission to take the seedlings with him for evaluation on his lifestyle property at Rangiora. These F₂ hybrids proved to be a mixed bag, with variable shape, size, and growth form. The pollen parent (or parents) remained unknown, but the appearance of several of the seedlings suggested that the most likely candidate was an Arizona cypress, a common component of shelter belts in the area. The collection was apparently destroyed after Dr Sturrock died but before this was done the best of them was selected and propagated by the Southern Cypresses nursery at Ohoka. One of these F₂ hybrids is included in the Central Canterbury Farm Forestry Association's cypress trial at its experimental area at Silverwood. When the five clones in the trial were measured in October 2012, the Sturrock clone ranked fourth in growth rate and third when assessed for form and canker resistance.

These seedlings, with their obvious affinity to the Arizona cypress, were an interesting development, because about the beginning of the present century intensive research, including chemical and DNA analysis, in the United States and Australia indicated that the Nootka cypress was closer to the New World cypresses than to the other *Chamaecyparis* species. This view was reinforced by the fact that while the Nootka cypress had been shown to hybridise with several American *Cupressus* species, it had never been known to cross with another *Chamaecyparis*, although its natural range overlapped that of the Lawson cypress (*Chamaecyparis lawsoniana*) in Oregon and it would have had plenty of opportunity to do so both in the wild and in cultivation. It was also not known to have hybridised with any Old World *Cupressus* species in cultivation, although again there would have been plenty of opportunities for it to do so, particularly in British collections such as the Bedgebury or Westonbirt arboretums, where conifer species from many parts of the world were planted in close proximity.

When the Nootka cypress was first described in 1824 it was placed in *Cupressus* but in 1840 it was reclassified as *Chamaecyparis nootkatensis* on the basis of its foliage being in flattened sprays, like those of the Lawson cypress, and its cones having only four scales, whereas other North American and Mediterranean cypresses had cones with six or more scales. Both characters were of doubtful value, because some Chinese *Cupressus* species also have flattened foliage sprays or four cone scales. In 2000, Nootka cypress was transferred back to *Cupressus nootkatensis* (Gadek et al., 2000). As a result, Dallimore's \times *Cupressocyparis leylandii* became plain *Cupressus \times leylandii*, which, if nothing else, made the name a lot easier to spell and pronounce.

Soon afterwards, the name changed again, as a result of the discovery in 1998, far away in the mountains of northern Vietnam, of a rare conifer completely new to science. The "new" conifer, dubbed "Vietnamese golden cypress", was found by a joint expedition of botanists from Vietnam, Russia, the United States,

and England. After detailed taxonomic studies it was determined to be the closest known relative of the Nootka cypress.

The Vietnamese tree has hard, yellow-brown, fragrant, fine-grained timber that is valued highly by local residents, which might account for why the scientists found large specimens only on steep ridges where access is difficult. "This tree was already rare and endangered when we discovered it," an American member of the botanical team was reported as saying. The species is unusual in that mature specimens carry both juvenile and adult foliage.

To accommodate it and its Nootka relative, Aljos Farjon, then head of the temperate section of the herbarium at the Royal Botanic Gardens, Kew, erected in 2002 a new genus, named *Xanthocyparis* (Farjon et al., 2002). The Vietnamese golden cypress then became *Xanthocyparis vietnamensis*, while Nootka cypress became *Xanthocyparis nootkatensis*.

Some 54 morphological characters, as well as DNA evidence, were used to place *Xanthocyparis vietnamensis* as a sister species to the Nootka cypress. The name *Xanthocyparis*, which translates as "golden cypress", seemed perfectly matched to both trees, given the yellowish colour of their sawn timber. Farjon proposed a new name, *xCuprocyparis*, for the Leyland and other hybrids of the Nootka cypress, but that name became redundant within two years because further research in North America revealed that *Xanthocyparis*, however appropriate a name it might have been for the golden cypresses, was invalid under the "oldest wins" rule in the International Code of Botanical Nomenclature. When more than one name has been validly published for a species, as has often happened when taxonomists from different countries have been working independently on the same species, only the first validly published name may be used.

In this case, American research uncovered a monospecific generic name, *Callitropsis*, dating from 1865. A paper published in the *American Journal of Botany* (Little et al., 2004) transferred the golden cypresses to this obscure genus, which as a result contained two species widely



Fig. 4 *Callitropsis nootkatensis*. A, farm planting. B, foliage. Photos: Derrick Rooney.

separated by geography: *Callitropsis nootkatensis* (native to western North America; Fig. 4A–B), and *C. vietnamensis* (native to moist karst forest in northern Vietnam). The effect of this was to leave the Leyland cypress without a formal name until 2006, when Little (2006) transferred all the North American species of *Cupressus* to *Callitropsis*, a move that once again made a compound name for Leyland cypress unnecessary. However, Adams and others rejected this classification in 2009, and on the basis of molecular and DNA analysis transferred all Western Hemisphere cypresses except the Nootka cypress to a new genus, *Hesperocyparis* (Adams et al., 2009). This move has been widely accepted in North America (where the new name is included in the USDA plant database) and many other countries, including Australia, and appears to be here to stay, although its status is still listed as "unresolved" at Kew. The name *Hesperocyparis* appropriately translates as "western cypress".

The changes proposed by Adams et al. (2009) affect nearly all the familiar cypresses grown for timber or shelter, including the macrocarpa (Monterey), Mexican, Arizona, and Guadalupe cypresses, and most of the species grown for amenity purposes, leaving only the nine Old World species from the Mediterranean, the Himalaya, and China in the genus



Fig. 5 *Cupressus tortulosa* has elegantly fine foliage. Photo: Derrick Rooney.

Cupressus, which now includes only *C. atlantica*, *C. chengiana*, *C. duclouxiana*, *C. dupreziana*, *C. funebris*, *C. gigantea*, *C. sempervirens*, *C. tortulosa*, and *C. torulosa*. *Cupressus tortulosa* (Fig. 5) is the elegant weeping tree better (but wrongly) known in cultivation as *C. cashmiriana* (Silba, 2009). *Hesperocyparis* includes *H. arizonica*, *H. bakeri*, *H. benthamii*, *H. forbesii*, *H. glabra*, *H. goveniana*, *H. guadalupensis*, *H. lusitanica*, *H. macnabiana*, *H. macrocarpa*, *H. montana*, *H. nevadensis*, *H. sargentii*, and *H. stephensonii*. Nootka and Vietnamese golden cypresses remain in *Callitropsis* and *Xanthocyparis* respectively. These are both monotypic genera.

Here is a chronological sequence of botanical name changes:

1926: Intergeneric name, *×Cupressocyparis*, erected for the Leyland cypress by W. Dallimore, curator of the British National Pinetum at Bedgebury (Jackson and Dallimore, 1926).

2000: Nootka cypress, one of the parents, transferred to *Cupressus*, making the compound name unnecessary (Gadek et al., 2000). Leyland cypress becomes *Cupressus ×leylandii*.

2002: New generic name, *Xanthocyparis*, erected for the Nootka cypress. New compound name, *×Cuprocypris*, erected for the Leyland cypress and other hybrids between the Nootka cypress and American cypress species by A. Farjon, RBG, Kew (Farjon et al., 2002).

2004: Older name, *Callitropsis*, published in 1865, discovered for the Nootka cypress (Little et al., 2004). The name *Xanthocyparis* is dropped.

2006: All North American cypresses, including the macrocarpa, transferred from *Cupressus* to *Callitropsis* (Little, 2006). Leyland cypress thus becomes *Callitropsis ×leylandii*.

2009: All North American cypresses except the Nootka cypress transferred from *Callitropsis* to a new genus, *Hesperocyparis* (Adams et al., 2009). Only the nine Old World species remain in the genus *Cupressus*. Nootka cypress reverts to *Callitropsis*, Vietnamese golden cypress to *Xanthocyparis*.

2011: A group of six taxonomists from Finland, United States, and Britain recommended that the name *Cupressus* be conserved for *Callitropsis*, *Xanthocyparis*, and the New World cypresses until the evolutionary history of the Cupressaceae has been resolved (Christenhusz et al., 2011).

2013: Scientific name for Leyland and New World cypresses remain unresolved. The most recent validly published name for Leyland and other hybrids of Nootka cypress is still *×Cuprocypris* (Farjon et al., 2002).

Given the widespread use of cypresses, particularly those from North America, for shelter, ornamental, and forestry planting, this is a major upheaval affecting thousands of tree-growers, foresters, horticulturists, and nurseries. Eventually all of these will probably have to get used to the new names, but for the foreseeable future many will probably dispense with Latin names and use accepted common names for the cypresses. If nothing else, this might for once be less confusing. It is important to remember that throughout these nominative disruptions the plants themselves have not changed. The changes have occurred in our knowledge and understanding of their relationships and evolutionary background.

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