

Hughie Jones - February 2016

Antarctic Beech
Nothofagus antarctica

It is spring. You are walking by the Antarctic beeches in the Southern Hemisphere Garden at Vandusen. What is that different and delightful fragrance? The camphor like smell is coming from the leaves of *Nothofagus antarctica*. These beautiful glossy leaves with their crinkled texture give off this fragrance when they are young and fresh. If you rub a leaf in summer, it has a nutmeg-like smell.

Nothofagus (*Southern Beeches*) evolved in the southern hemisphere when the ancient continent of Pangaea broke up. About 40 species exist worldwide and these include some of the dominant trees of South America and Australasia. Some have remained remarkably *Fagus*-like and even produce similar mast-type fruit, despite millions of years of geographic isolation.

In the past *Nothofagus* was included in the family *Fagaceae*, but genetic tests revealed them to be genetically distinct. They are now in their own family *Nothofagaceae*, meaning 'false beeches'. Although the genus today mostly occurs in cool, isolated, high-altitude environments at temperate and tropical latitudes, the fossil record shows that it survived in climates that appear to be much warmer than those that *Nothofagus* now occupies.

Antarctic Beech, native to Chile and Cape Horn, has scattered specimens in a surprising variety of locations. It occurs in the widest range of habitat types among all South American *Nothofagus* - from flooded basins or flats where it is sparsely branched to an arboreal variant growing in optimal environments; from a dwarf variant growing at high elevation to a shrub-like variant in matorral (shrubland) environments.

One of the reasons *Nothofagus antarctica* continues in such a wide range of habitat is that Antarctic Beech is a resprouter. Resprouters are plants able to survive fire and other disturbances that destroy above-ground parts and recover by sprouting from unaffected buds. The majority of species that resprout also produce seeds which can contribute to species recovery. But in contrast to nonsprouters, resprouters do not depend on seed production and seedling recruitment for persistence.

It is a distinctive tree at all ages with tiny deciduous leaves about 2-3 cm long and typically with just 4 pairs of veins and 4 corresponding blunt lobes on each side of the leaf. The young bark is smooth, shiny grey with horizontal stripes like some cherries. It can become a medium-sized, though rather gaunt tree in time.



And this tree even has its own fungus exclusive to the Antarctic Beech growing in South America. Its fruit looks like a pingpong sized orange. This fungus is named after Darwin - *Cyttaria darwini*. According to the Royal Botanic Garden at Kew, Darwin sent his specimen to the eminent mycologist the Rev. Miles J. Berkeley, who identified it and named it after him. Darwin noted that these 'beech oranges' made up a substantial portion of the diet of the natives and grew in vast numbers on the beech trees.

This fungus releases chemical signals that cause the tree to form a gnarled gall that sustains the fungus. It then sprouts perennially in spring or summer. After shooting its spores, the beech oranges drop from the tree, while the gall remains. Although heavy infestations can kill branches, the fungus doesn't seem to rot wood or generally cause its host any serious harm. It may even offer its host a benefit of some sort. It is considered a parasite but may be a commensal - one partner benefits with no (perceived) effect on the other partner; a mutualist - both partners benefit; or all of the above. Fungal life is complex and often more a gray area than black or white.



Darwin's fungus (*Cyttaria darwini*) on Antarctic Beech

<http://blogs.scientificamerican.com/artful-amoeba/darwins-neo-golf-balls/>

<http://www.metla.fi/silvafennica/full/sf42/sf422177.pdf>

<http://apps.warwickshire.gov.uk/api/documents/WCCC-863-283>

www.clarku.edu - the fungal tree of life