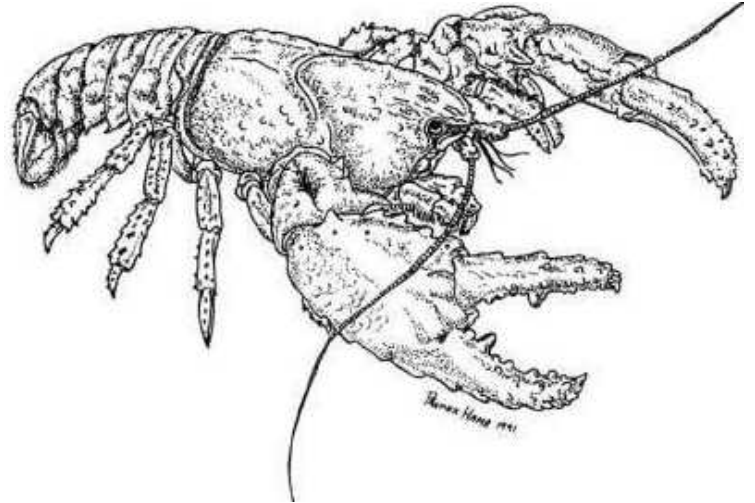


Disjunct Naturalists

WEBSITE OF THE CENTRAL NORTH FIELD NATURALISTS



The Search for the Golden Fagus (Part 1)

by **Paul Edwards**



1. Early Fagus colours, Robert Tarn (western shore), Tarn Shelf, Mt. Field NP, 27 April 2014.

*When the autumn
weather
turns the leaves to
flame ...*
(September Song: Kurt
Weill & Max Anderson)

Introduction

Increasing numbers of tourists and residents venture into Tasmania's national parks after Anzac Day (25 April) each year in search of the golden Fagus, the spectacular annual show of autumn colours by the endemic deciduous southern beech, *Nothofagus gunnii*. I joined the search last year in Cradle Mt. National Park, and again this year in Mt Field National Park. Those expeditions aroused my interest in the Fagus and led me to write this two part article. In [Part 2](#) I sketch some of the basic physics and chemistry underlying the Turning of the Fagus – no longer

the sole province of dedicated bushwalkers and fellow members of the Australian Plant Society and field naturalist clubs.

Digital images of the autumnal *Fagus* are now legion, greatly extending the photographic lexicon pioneered by Olegas Truchanas and Peter Dombrovskis. Tourist operators and native plant nurseries actively market the *Fagus* and this year marked an inaugural *Fagus* Festival with a (somewhat premature) dinner on April 26 at Mt Field NP to celebrate The Turning. What is it about this scraggy little bonsai-candidate shrub, otherwise known as 'tanglefoot', that appears to be raising it to the status of a Tasmanian icon?



2. Late *Fagus* colours

Part of the answer lies of course in its uniqueness. It is Tasmania's, although not Australia's, sole native deciduous tree, despite an enthusiastic assertion to that effect on the web by Tourism Tasmania. *Fagus* communities provide unexpected exotic splashes of yellow, orange and (occasionally) red amidst the browns and greens of the eastern-facing slopes around the alpine lakes, tarns and in the sheltered gullies of the Tasmanian highlands in late April and early May.

N. gunnii belongs to an ancient genus. The fossil evidence shows that *Nothofagus* species populated the temperate Antarctic forests of the Cretaceous period, 80 mya (million years ago) when the planet was wetter and warmer, the concentration of atmospheric CO₂ was over 1000 ppm (2.5 times the 2014 level) and Antarctic temperatures must have been at least 10 degrees hotter.

The geographic distribution of the 34 extant members of *Nothofagus*, widely dispersed as they are over Australasia, Oceania and South America, is believed to define the ancient super continent Gondwana in the Cretaceous, and led historically to the original Gondwana hypothesis. The *Fagus* is one of four members of the ancient *Fuscospora* subgenus and its closest relative is actually *N. alessandrii*, a native of Chile. South America separated from Antarctica and Australia at the beginning of the Oligocene era, about 45 mya, and Australia and Tasmania rafted away with their consignment of *Nothofagus* species and other Gondwana plants (K. Corbett, 2001).

The comparative rarity of the species is undoubtedly a major factor in the rise of 'Fagusmania'. Stands of the slow-growing, fire-sensitive shrub are estimated to have a total area now of no more than 100 square km, much less than its more prolific relative, the myrtle beech, *N. cunninghamii*.

The Turning

According to the Tasmanian Parks & Wildlife (TPWS) websites:

'as days shorten, chlorophyll starts to break down and another pigment called anthocyanin takes over. It is this pigment which gives autumn leaves their colour.'

However, current thinking has moved on and it is doubtful whether the ubiquitous anti-oxidant anthocyanin plant pigments play any significant part in the normal turning of the *Fagus*. Rather, it is the carotenoid pigments, the yellow xanthophylls and orange carotenes that gild the autumn *Fagus* leaves by absorbing light at the blue end of the spectrum, masked earlier in the season by the green chlorophylls.



Although the TPWS websites maintain that '*the deciduous beach turns a spectacular range of autumn colours, from rust red through to brilliant gold*', this seems to be the



3. Early *Fagus* foliage

exception rather than the rule. The yellow colours of late autumn, presumably due to the carotenoids unmasked by the departing chlorophylls, usually give way to the brown tannins of dead foliage, not the striking anthocyanin-based reds of the northern hemisphere maples and oaks. The claim that anthocyanin gives autumn leaves their colour therefore seems unlikely if northern hemisphere deciduous leaf chemistry (US National Arboretum) is any guide. Actually it is well known that in the northern hemisphere the most brilliant reds generally follow cool, sunny, and dry autumn weather. Interestingly, the Patagonian and Chilean deciduous relatives, *N. antarctica*, and *N. alpina*, normally display intense red autumn foliage, unlike *N. gunnii*. (D. Ziegeler, 2014)

Plant pigments lend their colours to fungi and to the flowers, fruit, roots, bark, stems and foliage of a wide variety of plants, sending signals to pollinators, seed dispersers and predators. Although not synthesised by animals, they also serve important communication functions when consumed and displayed by birds and animals, and are evidently vital components of the natural world.

Of course tanglefoot foliage is not the only splash of autumn colour in the Tasmanian highlands. The trunks of the Tasmanian snow gum *E. coccifera*, and the alpine yellow gum *E. subcrenulata* (right), like the mainland snow gum *E. pauciflora* on the NSW cross country ski fields, also display striking carotenoid yellow and (probably) anthocyanin red colours like those found in *Fagus* leaves.



4. Alpine yellow gum

To return to the present: in summary, as the daily input of solar energy to their foliage declines at the end of summer, deciduous trees like the *Fagus* prepare for winter by closing down normal photosynthetic production and shedding their leaves. As they do so, they display a range of brilliant yellow, orange, and (occasionally) red colours. Although the benefit to the trees, of these swan-song colour changes is somewhat unclear, the basic physics and chemistry is now well understood and makes an interesting story which I shall outline in the second part of this article.

Acknowledgements

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Captions

- 1 Early *Fagus* colours, Robert Tarn (western shore), Tarn Shelf, Mt. Field NP, 27 April 2014.
- 2 Late *Fagus* colours, Robert Tarn (western shore), Tarn Shelf, Mt Field NP, 10

May 2014 (Photo: M.Ziegeler).

3 Early *Nothofagus gunnii* foliage, Robert Tarn, Tarn Shelf, Mt Field National Park, 27 April 2014.

4 Alpine yellow gum (*E. subcrenulata*) trunk colours. Lake Lilla, Cradle Mt. NP, 26 April 2013.

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