

*Wollemia nobilis*, the Wollemi pine growing at Otway Ridge Arboretum, from the original auction sale in October 2005. It has found the Lavers Hill climate to its liking having now reached 7 m and showing the distinctive terminal strobili and cones. See pages 174 to 186.



ALISTAIR & JULIE WATT<sup>1</sup> write about the arboretum they have created, in Victoria, Australia, over the last 40 years, planting mainly known wild provenance trees.

Otway Ridge Arboretum is located approximately 150 km to the south-west of Melbourne, Victoria, in the coastal hills of the Otway Ranges. We are at almost 500 m above sea level; however, the temperature range is ameliorated by the closeness of the arboretum to the ocean, and frosts are infrequent and light. Prevailing winds from the south-west bring rain-fronts from the Southern Ocean nearly all the year, hence the most unusual (for mainland Australia) average annual precipitation of around two metres. Light snow falls occasionally. The area of the arboretum that we first planned was itself of only four hectares and emphasis was placed on quality, with nearly all the plantings of known wild-source provenance.

In 2009 we made the decision to sell part of the property keeping some 1.5 hectares of garden around our house. However, when planning the subdivision we arranged matters so that we still kept our most exciting section i.e. our self–collected plantings from Fiji, New Caledonia and Chile.

Although we bought our land, essentially a bare block, in 1974, we only moved here from Geelong in 1976. Our property sits atop the main east– west ridge line of the Otway Ranges; it was originally cleared of heavy forest

# Climate and geography

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Longitude 143° 23' East Latitude 38° 40' South Height a.s.l. 460-490 m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ост	NOV	DEC
Mean max. temp. (°C)	19.9	21.0	18.5	15.0	11.9	9.4	8.6	9.7	11.2	13.6	15.8	17.9
Mean min. temp. (°C)	10.6	11.6	10.7	8.8	7.3	5.2	4.2	4.6	5.3	6.6	7.9	9.3
Av. monthly rainfall (mm)	85	79	105	177	216	204	236	247	208	183	149	120

Extreme max. temp. 39.4 °C • Extreme min. temp. -0.6 °C • Average annual rainfall: 2009 mm

: <sup>1</sup> Lavers Hill, Victoria, 3238

**Opposite**, our land and house at Lavers Hill, Victoria—a bare block in early 1977. **Below**, an aerial view of the house in 2018. Now surrounded by trees and shrubs, showing the range of texture and leaf colouring.

dominated by mountain ash (*Eucalyptus regnans*) and blackwood (*Acacia melanoxylon*) in the 1930s, remaining as dairy farmland for many decades. Our first plantings were individual seedlings of *Quercus robur* and *Araucaria bidwillii*, both of which still remain. The latter specimen produced its first gigantic cones after 40 years in the ground, which shows that it can be worth hanging around waiting for results in the garden!

After that came a series of windbreak trees and shrubs, including photinias, Leyland cypress and *Cupressus macrocarpa*. The former were a failure, they quickly grew to three metres, but then as the soil became wet in winter, the wind would blow them out of the ground and the large shrubs would roll around like huge tumbleweeds! It was a great mistake to plant windbreaks which grow too quickly. As for the cypresses, they are now being removed and converted into firewood and wood-chip mulch as well as giving us more space for more plants.

The majority of plantings began in 1982 and are continuing to this day. Specimens are put straight into the ground as we find that the matted grass holds the plants steady when the soil becomes saturated in winter, and the equinoxial winds from the southwest can be extremely strong. Soil is medium to heavy clay and acidic (around 5.0), but the substrate is broken sandstone, which allows very good drainage. There are no major pests, but problems include mist shrouding for many months a year, strong gales, bush rats and bird damage, especially (something I really, really hate!) cockatoos breaking off







the top-leader shoots of conifers. There are few insect pests. Plants are watered for their first year and then generally have to manage for themselves. For those into such detail, I plant into square-sided holes. Dam water is available but an irrigation system is not usually required although as our summers without a doubt have become drier due to climate change, some precious things have to be hand-watered.

The temperate climate, combined with the relatively high rainfall of two metres per annum, has allowed us to develop three main themes: *Rhododendron* species, conifer species, and Gondwanan plants.

We are particularly proud of the conifer collection, with approx. 300 species

**Top**, the *Araucaria* collection: this view includes, from right, *Araucaria laubenfelsii*, *A. rulei* and *A. montana*; all from seed collected in 1987.

**Opposite**, perhaps my favourite conifer, *Taiwania cryptomerioides*. This specimen from 1982 seed is now around 6 metres high.

**Right**, the beautiful display of *Carpolepis laurifolia* (syn. *Metrosideros laurifolia*) from New Caledonian seed collected in 1994. This introduction is now available in Australia.



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Left, Cathaya argyrophylla from seed obtained around 2003.

Opposite, the largeleaved Nothofagus codonandra from New Caledonia is a genuine slow grower at Lavers Hill. It has reached only 2.5 metres from 1995wild collected seed.

in the ground or the nursery, with a range from *Larix kaempheri* to *Papuacedrus papuana*, as well as *Cathaya argyrophylla* and *Agathis montana*, all flourishing well. It has been a huge delight to discover over the years that our essentially frost free climate has allowed us to grow a large range of tropical-montane trees such as *Dacrydium* species from Papua and New Guinea and many species of *Araucaria*. Nevertheless, we are not too hot in summer to prevent us growing a large number of *Abies* and *Picea* species. Although we have a mixed 'flower' garden immediately around the house , the majority of the plantings are laid out on a geographical basis, i.e., there is a New Caledonia section, Chilean section, New Zealand section, Chinese section etc. I might add that this makes identification a little easier—knowing where a plant comes from can help a great deal.

These geographical themed collections are supplemented by selected

ornamental and endangered species. Our range of rhododendron species now produce flowers nearly all year round, with big leaf *Rhododendron magnificum* in July, the Maddenii series shrubs performing superbly into mid-summer and Vireya rhodos can delight at any time. The Gondwana collection is designed to show the principal Southern Hemisphere relationships such as *Nothofagus* from Australia, New Zealand, Chile and New Caledonia: *Lomatia* from Chile and Australia: *Weinmannia* from New Zealand and Chile etc. An interesting genus which is well represented in the collection are the sophoras which include one of my favourites, *Sophora toromiro*. This species from Easter Island was declared extinct before being resurrected from seeds found in pods attached to a herbarium specimen collected by Thor Heyerdahl.

# Emphasis on wild-collected and provenance species

Particular thanks are due to Dr Ben Wallace, then Horticultural Botanist at the Royal Botanic Garden, Sydney. It was he who encouraged us from the beginning of our serious planting to utilise plant material from wild-collected sources as far as possible. His displayed enthusiasm for working with private gardeners was a wonderful inspiration and soon led to a very mutually beneficial exchange of plants with the Sydney Botanic Garden.

Mid-nineteenth century Australian–based plant collectors such as Charles Moore at RBG, Sydney and nurserymen such as William Guilfoyle worked as hard as their European counterparts at bringing novelty plants in from the exotic South Seas Island. They were much supported in their efforts by prominent enthusiasts such as William Macarthur, with his fabulous garden at Camden Park, and Alexander Macleay at Elizabeth House. Some 150 years later, the situation was rather different. In particular, very few new plants were being introduced into Australia even into our botanic gardens. As an enthusiastic collector of conifers, there remained only one possible avenue for

obtaining new species and that was to go and get them! I was lucky. By building a good case, I was able to obtain support from the IUCN specialist conifer group, help from the CSIRO Forestry research section, and assistance (with quarantine) and direct sponsorship from various universities and botanic gardens. The Maud Gibson Trust in Melbourne and private individuals such as the late John Silba from New York, provided a degree of funding for some expeditions. This has been much bolstered by the exchange of plant material with botanical institutions and individuals. As a result our collection here at Lavers Hill now holds one of the most important range of



conifers in the world, together with a large number of broadleaf species which are seldom grown in Australia.

I have recently been encouraged to document my introductions whilst I still had access to my field notes and accession records, but also, I suspect, while I was still somewhat *compos mentis*! The publication of the plant lists below allow those growing the material to have some idea of provenance, but it will also establish the date of introduction of a number of new species into Australia (and some introductions sent elsewhere, e.g. the Royal Botanic Garden, Edinburgh). The listing below refers essentially to personal plant collecting activities in Fiji, New Caledonia and New Zealand (etc.), but additionally includes some of the material collected in Chile in 1985 while on expedition with the RBG, Sydney.

The last two decades of the twentieth century were perhaps a golden age for the introduction of new plants into Australia. Not only were plant handling facilities well developed, but ethylene-absorbent plastic bags were available, many quarantine establishments were in existence, and air carriage was quick and efficient. In those days it was relatively straightforward for plant hunters to obtain an import permit for live plant propagation material, and it was also quite legal to import a wide range of species as seeds. The recent, and extremely clumsy, Nagoya Protocol to the Convention on Biological Diversity is aimed at 'controlling' the movement of plants between countries, and will probably now make new plant introductions all but impossible.

As for the future of the collection, we have been working particularly closely with the Geelong Botanic Gardens for many years. We recently had the honour of being allowed to plant a very special tree there, a specimen of Dacrydium nausoriensis wild-collected from Fiji in the highlands behind Nandi during 1988, at the opening of a large, brand new development there which will include the 'Alistair and Julie Watt Collection'. At present the Geelong Botanic Gardens holds an extensive range of our original introductions and a large number of newly re-propagated species will shortly be planted in a dedicated 'Southern Hemisphere' section including, for example, the beautiful Carpolepis laurifolia collected on the Dzumac Mountains behind Nouméa. In addition, in a dedicated New Caledonian section adjacent to their New Zealand bed, the RBG, Melbourne displays an interesting range of species, including species such as Grevillea exul and Callistemon pancheri, mainly collected by the author in the 1990s. The botanic gardens of Sydney, Adelaide and Hobart also hold some collections propagated from the original plant introductions. Although I am growing most of the new conifer species here in our arboretum at Lavers Hill, the cool climate of southern Victoria has proved to be too cold over winter for most of the tropical low-altitude plants from the South Pacific such as Storckiella plancheri and all the shrubby Xanthostemon species, for example.

One of the great benefits of investing a great deal of time and effort into acquiring wild-collected collections was that the surplus material was readily



This small tree, *Caldcluvia rosifolia*, introduced from New Zealand is now in cultivation in Australia.

'marketable' for plant exchanges. We have been able to obtain a large number of rarer species that otherwise would never have been available for purchase. Particularly profitable contacts were made with institutions such as the Pinetum Blijdenstein *via* the late Nico Schellevis, the Taiwan Forestry Institute and the Chollipo Arboretum as well as private collectors including Bill Funk and Bob Cherry, the latter both Australian members of the IDS.

I mention many of my favourite plants in the text and below, however I might just record some of the more significant species which seem to do particularly well here at Lavers Hill. These include: *Nothofagus glauca*, *N. codonandra* and *N. alessandrii*, *Cupressus dupreziana* and *C. gigantea*, *Pinus fenzeliana* and *Pinus bungeana*, *Itoa orientalis*, *Abies religiosa*, *Carpolepis laurifolia*, *Fitzroya cupressoides*, *Barringtonia macrocarpa* (syn. *Michelia insignis*), *Sophora toromiro*, *Dendroseris litoralis*, *Magnolia delavayi*, *Elingamita johnsonii*. On the other hand there have been some failures. Despite many attempts, I have been unable to grow *Austrocedrus chilensis*, for example, the foliage rots away in our wet winters! And we were too hot in summer for *Lepidothamnus fonkii* to succeed. We were allowed by authorities in Nouméa to collect seeds and cuttings of the fabulous *Parasitaxus usta* several times but were never successful in propagating this parasitic conifer.

# Addenda: expeditions and plant details

When collecting plant material in the wild, either for propagation or herbarium purposes, it is necessary to provide details of the provenance of the collection: the locality of any specimen taken; the latitude/longitude, the altitude and the environment. However, apart from some necessary voucher specimens, the greater majority of the collections were live material only.

All the species listed below were collected with the required permissions from

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the authorities of the countries or native landowners involved (for example, in Fiji) and legally processed by the Australian quarantine service. Virtually all the material imported was initially handled by one or another of our major botanic gardens (identifications, quarantine etc.). The species marked with an asterisk (\*) are those which I know came into limited cultivation here in Australia, but unfortunately I can find no evidence of whether they still survive in gardens. I would welcome any feedback from those who may have these growing as I myself do not have them! I note that certain species—*Caldcluvia rosifolia, Metrosideros collina, Xeronema moorei* and *Carpolepis laurifolia* among them—are now being offered by some 'rare plant' nurseries.

# CHILE

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1985

Significant species collected during our extended plant collecting expedition to Chile by Dr Ben Wallace and John Forlonge, both of the Royal Botanic Garden, Sydney.

#### (Collection numbers BJW 850001 to 850354)

Species which are listed on CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) were formally cleared through Sydney's Royal Botanic Garden and the relevant Chilean authorities.

Certain species—*Caldcluvia rosifolia*, *Metrosideros collina*, *Xeronema moorei* and *Carpolepis laurifolia* among them—are now being offered by some 'rare plant' nurseries.

Acacia caven	Aextoxicon punctatum	Araucaria araucana
Austrocedrus chilensis	Caldcluvia paniculata	Citronella mucronata
Cryptocarya alba	Drimys andina	Empetrum rubrum
Escallonia alpina	Escallonia pulverulenta	Escallonia revoluta
Fascicularia bicolor	Fitzroya cupressoides	Gaultheria insana (as G. furiens)
Gaultheria leucocarpa	Gaultheria littoralis	Gevuina avellana
Gomortega keule*	Greigia sphacelata	Griselinia jodinifolia
Griselinia scandens	Gunnera magellanica	Latua pubiflora
Laurelia serrata	Laureliopsis philippiana	Lepidothamnus fonkii*
Libertia sessiliflora	Lithraea caustica	Lobelia tupa
Lomatia dentata	Lomatia ferruginea	Lomatia hirsuta
Maytenus magellanica	Nothofagus alessandrii	Nothofagus betuloides
Nothofagus glauca	Nothofagus leonii	Nothofagus pumilo
Ovidia andina*	Persea lingue	Peumus boldus
Pilgerodendron uviferum	Proustia pyrifolia	Pseudopanax laetevirens
Puya berteroniana	Puya chilensis	Quillaja saponaria
Ribes magellanica	Tepualia stipularis	

\*Limited cultivation in Australia with no evidence of whether they still survive

#### PAPUA NEW GUINEA

Material obtained from Dr Nancy Bowers under import permit directly from Mt Hagen, Papua New Guinea.

Dacrydium beccarii	Papuacedrus papuana	Phyllocladus hypophyllus	
Podocarpus rubens			

### FIJI

#### Alistair and Julie Watt (Collection numbers AW 860001-860198)

Acacia richii*	Paphia vitiensis* Agathis macrophylla*		
Bulbophyllum vitiense*	Cordia subcordata*	Cycas seemannii	
Dacrycarpus imbricatus var. patulus		Gardenia hutchinsoniana	

Pittosporum rhytidocarpum Podocarpus neriifolius

#### NEW CALEDONIA 1987 Alistair Watt et al. (Collection numbers AW 870500 to 870581) Acmopyle pancheri Agathis lanceolata Agathis montana Agathis ovata Araucaria bernieri Araucaria biramulata Araucaria laubenfelsii Araucaria luxurians Araucaria muelleri Araucaria nemorosa Araucaria scopulorum Araucaria subulata Dacrydium guillauminii Codiaeum peltatum Dacrydium araucarioides Dubouzetia confusa Libocedrus yateensis Myodocarpus fraxinifolius Neocallitropsis pancheri Neoveitchia storckii\* Nothofagus aequilateralis\* Podocarpus longefoliolatus Podocarpus decumbens\* Podocarpus sylvestris Podocarpus gnidioides Retrophyllum minor Xeronema moorei

FIJI		1988
Alistair Watt and Bob Cherry (Colle	ection numbers AW 880100 to 880160	)
Acmopyle sahniana	Balaka longirostris*	Balaka macrocarpa*
Collospermum montanum	Cyathea alata*	Cyathea lunulata*
Dacrydium nausoriensis	Dacrydium nidulum	Davallia fejeensis*
Homalium nitens*	Huperzia squarrosa*	Metrosideros collina var. vitiensis
Podocarpus affinis	Podocarpus degeneri	Podocarpus hybrid
Retrophyllum vitiense	Saurauia rubicunda	Scaevola taccada*
Spathoglottis pacifica*	Turrillia ferruginea*	

\*Limited cultivation in Australia with no evidence of whether they still survive

NEW ZEALAND		1991
Alistair and Julie Watt (Collection nu	mbers AW 910001 to 910047)	
Astelia chathamica	Caldcluvia rosifolia	Cordyline indivisa
Cordyline kaspar*	Cordyline pumilio	Elaeocarpus dentatus
Elingamita johnsonii	Fuchsia excorticata	Gaultheria antipoda
Griselinia lucida	Halocarpus biformis	Halocarpus kirkii
Knightia excelsa	Laurelia novae-zelandiae	Lepidothamnus intermedius
Leptospermum scoparium	Libocedrus bidwillii	Libocedrus plumosa
Macropiper excelsum	Manoao colensoi	Nothofagus solandri
Olearia ilicifolia*	Ourisia macrophylla*	Planchonella costata
Pomaderris kumeraho	Rhopalostylis cheesemanii*	Schefflera digitata
Taxus brevifolia	Weinmannia silvicola	Xeronema callistemon

Alphitonia neocaledonica*	Araucaria humboldtensis	Astelia neocaledonica
Cordyline neocaledonica	Cunonia bullata*	Cunonia macrophylla*
Dacrycarpus veillardii*	Dacrydium balansae	Dacrydium lycopodioides*
Dicksonia thyrsopteroides*	Dodonaea viscosa*	Dracophyllum sp.*
Falcatifolium taxoides	Gymnostoma deplancheanum	Joinvillea gaudichaudiana*
Libocedrus chevalieri	Melaleuca quinquenervia	Metrosideros operculata
Podocarpus lucienii	Podocarpus sylvestris	Schefflera candelabrum
Xanthostemon aurantiacus		

NEW CALEDONIA

Alistair and Julie Watt (Collection numbers AW 930100 to 930150)

NEW ZEALAND			1993
Alistair and Julie Watt (Collection	numbers AW 930001 to 930092)		
Aristotelia serrata	Ascarina lucida*	Astelia solandri	
Beilschmiedia tarairi	Beilschmiedia tawa	Collospermum hastatum	
Coriaria pteridoides	Corynocarpus laevigatus	Dracophyllum latifolium	
Dysoxylum spectabile*	Fuchsia procumbens	Gunnera prorepens	
Hibiscus trionum	Laurelia novae-zelandiae	Melicope ternata	
Pennantia baylisiana*	Phyllocladus alpinus	Podocarpus hallii	
Pomaderris elliptica			

\*Limited cultivation in Australia with no evidence of whether they still survive





Left, the author with a genuine tree rhododendron over five metres high, *Rhododendron giganteum*. Grown from cuttings, ex. 1986, it has not yet flowered!

**Opposite**, **left**, this superb flowering and foliage tree is *Alloxylon pinnatum*, the Dorrigo Waratah, a threatened Australian native tree species from the mid-north coast of New South Wales. **Opposite**, **right**, the silvery foliage of the rare *Acmopyle sahniana* is stunning. Introduced from Fiji in 1988. 185

#### NEW CALEDONIA

Alistair and Julie Watt (Collection numbers AW 941501 to 941705)			
Arillastrum gummiferum*	Astelia neocaledonica	Austrotaxus spicata*	
Callistemon pancheri	Callistemon suberosa*	Carpolepis laurifolia	
Casuarina collina	Cunonia hirsuta*	Cycas circinalis	
Dacrydium x suprinii*	Dicksonia baudouinii	Diospyros pentamera*	
Dysoxylum rufescens*	Geissois hirsuta	Joinvillea plicata*	
Libocedrus austrocaledonica	Metrosideros porphyrea	Metrosideros tetrasticha	
Parasitaxus usta*	Podocarpus novae-caledoniae	Prumnopitys ferruginoides	
Retrophyllum comptonii	Santalum neocaledonicum	Tristaniopsis glauca	

NEW CALEDONIA				1995
Alistair and Julie Watt (Collection numb	oers AW 950003 to 950204)			
Carpolepis laurifolia dwarf form, summit Mt Humboldt		Dracophy	/llum humboldtensis*	
Gardenia aubryi*		Grevillea exul		
Grevillea gillivrayi		Metrosid	eros tetrasticha	
Nothofagus codonandra		Podocarp	us afin. sylvestris (now P. colli	culatus)
Stenocarpus milnei		Stenocar	bus umbelliferus	
Syzygium tripetalum		Xanthost	emon longipes*	
NEW CALEDONIA				1996
Alistair and Julie Watt (Collection numb	pers AW 960001 to 960064)			
Storckiella pancheri	Xanthostemon macrop	hyllus*	Xanthostemon laurinus*	
RAROTONGA				2000
Seed only sent to the Brisbane Alistair and Julie Watt (Collection numb				

Alphitonia zizyphoides\* Fitchia speciosa\* Fagraea berteroana\*

Sophora tomentosa\*

\*Limited cultivation in Australia with no evidence of whether they still survive

1994

#### Acknowledgements

We have received much moral support over the many years since the mid-1970s, much needed as one of our local neighbours bluntly told us back in 1976 that nothing would grow here at Lavers Hill but potatoes, blackberries and ragwort! Specific mention must be made of the mentoring and encouragement given by the late Noel Lothian, our first Australian VP and Dr Brian Morley, both former Directors of Adelaide Botanic Gardens. Personal thanks are owing to Dr Ben Wallace ex RBG, Sydney, John Turnbull from The Australian CSIRO, as well as IDS friends and 'fellow travellers' in plant collecting, Bill Funk and Bob Cherry.

Finally, as for many writers, the greatest thank you of all must go to my partner in all this - my wife Julie. For 30 years she has put up with being dragged away on plant collecting expeditions to some really out of the comfort zone locations involving not only climbing mountains in the rain but also bearing up to the inevitable cleaning of seeds washing plant roots! To Julie, then, my gratitude for all the help you gave, and the patience you maintained.