

CALEYI



NORTHERN BEACHES GROUP March 2018



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Next Meeting: 7.15 pm Thursday March 1, 2018

at Stony Range Botanic Garden, Dee Why.

Presentation: Dan Clarke. APS Conservation Officer, "Ideas and Actions for Conservation at APS". Followed by AGM.

Supper: Harry & Lindy

Coming Up:

APS NSW Quarterly hosted on Saturday March 3, 2018 by APS Sutherland at Loftus.

APS Northern Beaches walk Saturday March 17, 2018 Warriewood Wetlands. Penny will email details.

Congratulations to amazing Stony Range Botanical Gardens volunteer committee members, **Bob** and **Eleanor** who won Outstanding Community Service Awards at the Northern Beaches Council Australia Day Awards.

From the Editor

Thankyou Conny for the ANPSA coverage and David for two interesting articles. Please send me articles or photographs that you think the members would enjoy. Jane. email: march@ozemail.com.au

ANPSA 'GRASS ROOTS TO MOUNTAIN TOPS' 15 - 19/1/18 HOBART

Conny Harris

Jane and I attended the above conference, however neither of us attended any pre- or post conference tours.

The conference was held at 'Wrest Point' a waterfront function centre with accommodation, restaurant, pub and gambling facilities. Jane and I had arranged our own accommodation and others had done the same.

The days were all packed with presentations in the morning, site visits in the afternoon and social functions or get togethers each evening. I very much liked the structure, with only half days inside and fresh air and some leg swinging in the afternoons.

The standard of presentations was impressive and below are a few words about those I enjoyed particularly.

'Alpine Vegetation of Tasmania' by Jamie Kirkpatrick, Professor of Geography, who worked on this topic since 1972. He emphasised the uniqueness of Tasmania's alpine vegetation, characterised by shrubs and cushion plants, and the absence of long periods of snow cover and constant animal grazing.

'The subantarctic flora and vegetation of Macquarie Island' presented by botanist Nick Fitzgerald, also showed high adaptation to climatic conditions. Being 1500 km south of Tasmania, the island is now a World Heritage area and recovering from impacts / imports from the years when seals were slaughtered until locally extinct. Less than 50 vascular plant species grow on the 128 km² island.

The afternoon excursion to Mt Wellington with stops at different heights and inspection of the flora was the perfect follow up to see some alpine vegetation.



'A virtual tour of the Tasmanian coastal saltmarsh wetlands' by Vishnu Prahalad. He differentiated 4 types of wetlands, freshwater, brackish, coastal intertidal and submerged ones. The brackish wetland requires sheltered areas with full protection from the wave dominated high energy beach environment. Brackish wetlands are pretty limited because of their special location requirements and they will become even more limited with sea level rise and increased wave impact due to climate change. These wetlands are important habitat for flora and also for crabs and fish.



Vishnu.pic: Ed.



Sarcocornia quinqueflora.pic: Ed.



Lauderdale saltmarsh.pic: Ed.

Vishnu lead an excursion to two wetlands near Lauderdale, fitting in with low tide. One was in 'good' shape, the other degraded and much more limited in plant species. ('good', because the amount of litter was sad. But our little clean up felt good) I was amazed about the size of the oysters we saw and enjoyed eating - no not oysters! - but fresh and raw Sarcocornias (Samphires). *Sarcocornia blackiana* (thickhead glasswort) and *Sarcocornia quinqueflora* (beaded glasswort) family: Chenopodiaceae tasted both slightly salty but with *S. quinqueflora* also in our Sydney area present, I would not be surprised if you have tasted it already yourself.



Fern House at RTBG.pic: Ed.

'Tasmanian ferns and fern allies; diversity, habitats and conservation management' by Mark Wapstra. Tasmania has 105 or 1/5 of all Australian

fern species. The dolorite soils, which are not on the mainland, provide a special habitat enjoyed by pteridophytes and hence the variety of different species (biodiversity). The east-coast, the wetter area, has the greatest number of species, but the occasional rock outcrop in the centre where it is dry, and not usually thought of as fern habitat, has brought a few big surprises particularly in regards to endangered fern species. 22 species are threatened and 5 species are also found on Macquarie Island. Ferns were encountered on all excursions.



Inspecting *Lomatia tasmanica* world's oldest living plant at RTBG.pic: Ed.

A reminder of Harry, who was experiencing the other Gondwanan vegetation in Patagonia, came with two talks: 'Gondwanan flora: a global collection within a local natural ecosystem' by biologist Dr Tonia Cochran. Tonia established and talked about 'Inala' a 1500 acres conservation - covenanted property on Bruny Island, with over 500 species from the southern continents.

'Tasmania's rainforest and its Gondwanan heritage' by botanist Fred Duncan was a presentation with a good overview about the different types of rainforests, their distribution and their iconic plant species.

'Tasmanian native grasslands' by Louise Gilfedder reminded us that grasslands are the least protected biome in the world. As they occur on fertile plains, slopes and tablelands of south east Tassie, they have mostly been cleared to become farmland. I often think of grasslands as covering the poor soils, but isn't that where rainforests grow???

Anyway, as we were all encouraged to join a study group, grasses would be of interest to me.

There were many more very interesting presentations, but my two line summaries do not reflect the high quality or the excited atmosphere flowing from that, so I stop here. Topics included climate change, restoration of land, management of a natural orchid hotspot, the Tasmanian seed bank, ecological research in forests and a fabulous talk by botanist Patrick Dalton on bryophytes.

My expectations were more than satisfied in regards to the above, but I had hoped to hear much more from the study groups. There were some presentations, but not enough to make me sign up or set up a group (? grasses??)



Conny checks an early resident at the Tasmanian Bushland Garden. pic: Ed.

The next ANPSA conference will be in Albany, WA from 29 Sep-4 Oct 2019. I have already decided to attend and I do hope some of you will join me!
Conny Harris, President, APS Northern Beaches Group.

EUCALYPTS: 10 THINGS YOU MAY NOT KNOW ABOUT AN ICONIC AUSTRALIAN

ABC Science January 26, 2018 Genelle Weule



The Darwin woollybutt (*Eucalyptus miniata*) is native to northern Australia. (Supplied: Professor Pauline Ladiges)

You'd be hard pressed to go more than 10 minutes without spotting a eucalyptus tree in Australia.

They dominate our landscapes from the bush to our backyards, paddocks, parks and pavements. And they even have their own national day — on March 23.

They are extraordinary plants and many people love them. One of those people is botanist Pauline Ladiges.

The world expert has been studying this iconic group of plants for the past 55 years. "The most interesting thing for me is the diversity of the whole eucalypt group and its extraordinarily ancient history," said Professor Ladiges from the University of Melbourne.

So how much do you know about this iconic plant? Let's take a closer look.

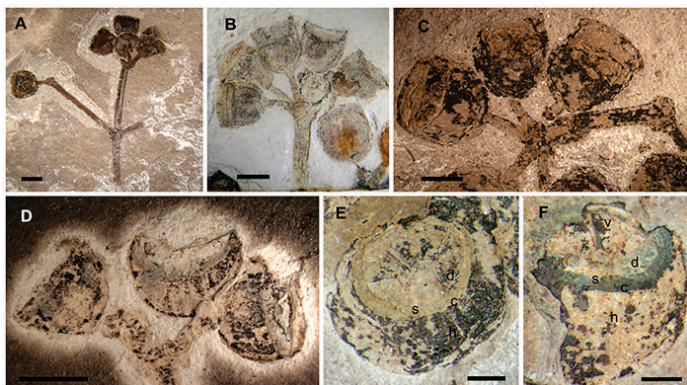
What's in a name?

The term eucalypt — meaning well (eu) covered (calyptos) — was first coined by French botanist Charles Louis L'Héritier de Brutelle in 1788.

He examined the flower buds of a rough-barked tree from Tasmania's Bruny Island collected on James Cook's third voyage. He named this species *Eucalyptus obliqua*. Commonly known as messmate, it is found right across south-east Australia.

The ancient fossil link to Gondwana

The roots of the eucalypt go back to when Australia was part of the supercontinent Gondwana. The oldest known examples of eucalypt fossils are 52 million-year-old flowers, fruits and leaves found in Patagonia.



52 million-year-old fossils of eucalypt fruits. (Supplied: Gandolfo et al/PLOS)

"There are some superb fossils that I don't think anyone doubts that have been described from South America," said Professor Ladiges.

"The eucalypt group has to go back beyond that [age] because the fossils are so recognisable. "They just look like fruits off a tree down the road."

Sequencing of the eucalypt genome from the rose gum (*Eucalypt grandis*) — a species found in coastal areas of New South Wales and Queensland — indicates the group goes back at least 109 million years. At that time, flowering trees were starting to take off and dinosaurs roamed the land.

A diverse Australasian

Today, botanists have identified around 900 species of eucalypts divided into three different groups: Eucalyptus, which make up the bulk of the species; Corymbia, the bloodwood eucalypts mainly found in the north; and Angophora.

There's the mighty mountain ash (*Eucalyptus regnans*), the world's tallest flowering tree; the gnarly snow gum (*Eucalyptus pauciflora*); the multi-stemmed bull mallee (*Eucalyptus behriana*); the apple or cabbage ghost gum (*Corymbia flavescens*) found in northern Australia; and the twisted Sydney red gum (*Angophora costata*).

"The only place they don't really dominate is the very, very arid parts of Australia," Professor Ladiges said.

But while we think of eucalypts as being uniquely Australian, there are also a handful of species in New Guinea, Timor, Sulawesi and even one species — the rainbow gum (*Eucalyptus deglupta*) — on the Philippine island of Mindanao.

Bark up the right tree

One of the most distinctive features of eucalypts is their bark.

Some trees have smooth bark — as the tree grows it sheds old layers from its trunk or branches. The new bark underneath is often brightly coloured that fades over time.

There are also half-barked trees that have thick bark around their trunk but smooth limbs. "In some areas where a fire might be more like a grass fire, a lower storey fire, you'll find trees there that only have rough bark at the base," Professor Ladiges said.

Eucalypts come in all shapes and sizes and dominate the landscape from alpine regions to the outback and edges of rainforests.



An Aboriginal scarred tree in the Royal National Park, NSW (Wikimedia commons: Sardaka)

Other trees are completely covered in rough bark. The old layer of bark stays attached to the tree and forms a thick protective layer against fire. Rough barks can be a bit trickier to identify because the texture can take different forms.

If the bark has long stringy bark, it might be a stringybark, if it has tough, blackened furrowed bark it might be an ironbark, and if it has really short fibres it might be a box or a peppermint.

But beware: not all trees with stringy bark are actually stringybarks, said Professor Ladiges. There are about 30 species in eastern Australia that can be classified as stringybarks, but she said the word gets used for similar species that are not closely related.

The Darwin stringybark (*Eucalyptus tetradonta*) used in Aboriginal bark paintings in the Northern Territory is one of these false stringybarks. Indigenous people across Australia also use bark to make canoes and shields. In New South Wales, Victoria and Queensland there are a number of protected scarred trees. As the name suggests these trees bear scars from where the bark was cut away and sometimes engraved.

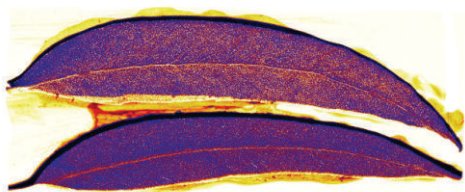
There's oil and gold in them thar leaves

A eucalypt's leaves are packed with oil glands that produce the aromatic compounds that give us their distinctive scent.

"Some smell very strongly eucalyptus-like, some smell really like peppermints, and the lemon-scented gum has a more lemony smell," Professor Ladiges said. These compounds help protect the tree from attack by pests. "Oil glands make them unpalatable to insects, but then you get insects that adapt to eating those sorts of leaves," she said.

In 2013, biologists discovered that a yellowbox tree (*Eucalyptus mellidora*) in sheep paddock in New South Wales could change the smell of its leaves from one side to the other to protect itself against attack.

Scientists also discovered the leaves of trees in Kimberley contain microscopic traces of gold, using sophisticated imaging techniques.



X-rays of eucalypt leaves showing traces of different minerals including gold (Supplied: Mel Lintern/CSIRO)

Eucalypt leaves also change over a tree's lifetime.

The leaves of a young sapling are held horizontally to maximise the surface area for gathering light. As the tree ages, the stalk of the leaf twists so that the leaf becomes vertical and is not exposed to as much radiation.

But it's not just the shape that changes, the structure changes, Professor Ladiges said. "The anatomy inside changes. Instead of having an upper and lower surface both sides will have photosynthetic tissue," she said. This enables the leaves to maximise photosynthesis and minimise exposure to heat. "They also have a lot of thick-walled cells, a lot of fibres. So they are really, really tough."

They're fruits not nuts

It doesn't have the same ring to it, but Snugglepot and Cuddlepie are technically gum-fruit babies. "People call them gumnuts but they're actually capsules which means that they open by valves at the top of the fruit. These valves dry up and open up and seeds drop out," Professor Ladiges said.

These hard, woody capsules have a thick wall, which is not destroyed by heat. The capsules open up after fire to release the undamaged seeds. Professor Ladiges said the shape and number of these capsules is distinctive from species to species.



May Gibbs brought whimsy to the eucalyptus with her gumnut babies. (Wikimedia Com)



Close up of fruits and flowers of the Mount Abrupt stringybark, found in the Grampians in Victoria (Supplied: Professor Pauline Ladiges)

Reading the fire risk of the country

Features such as oil-filled leaves and bark that can easily shed make eucalypts highly flammable. This ability to stoke a fire is part of their survival strategy, said Professor Ladiges. "If a fire is hot but goes through fast it will do less damage than a really slow burning fire." "The fact that that helps fire go through fast was clearly a selective advantage to the species because then their seeds wouldn't have been cooked."

Even if the tops of the trees are destroyed by fire, many species can re-sprout from buds under their bark or from a lignotuber at the base of the tree. But not all species can re-sprout.



Alpine ash forests in the Victorian Alps after fire. (Supplied: Professor Pauline Ladiges)

A handful of species only regenerate from seed, which makes them very vulnerable to frequent, high intensity fires. These species include the mountain ash (*Eucalyptus regnans*) and alpine ash (*Eucalyptus delegatensis*) in the Australian alps, and a group of species such as the salmon eucalypt (*E. salmonopholia*) in Western Australia's wheatbelt.

"To certain degree you can read the fire risk of the country by what the eucalypts are doing because they're the ones that have been around for a long time and they've taken the bet," said David Bowman, an ecologist at the University of Tasmania.

"Should the tempo of fires suddenly increase when they're immature, then they run the risk of becoming locally extinct," Dr Bowman said. This actually happened to alpine ash forests on the Australian mainland following the 2003, 2007, 2013, and 2014 fires. "Some places got hit by three fires and [we] had to do aerial sowing [for the forests] to recover."

By gum, it's kino

Many species of eucalypts ooze thick, red resin known as kino. Recent research based on two Queensland species, the lemon-scented gum (*Corymbia citriodora*) and cadaghi gum (*Eucalyptus torelliana*), has

shown eucalypt resin has antibacterial properties.

Resin has been traditionally used by Indigenous Australians to treat cuts and wounds.

While the most famous eucalypt-muncher is the koala, kino is an important food source for the yellow-bellied glider (*Petaurus australis*), a small tree-dweller that lives in the forests of eastern Australia.

The gliders only tap some trees to get their food so they have to move around large home ranges to find the right trees, said ecologist David Lindenmayer of the Australian National University.

Once they've found the right tree, usually a smooth bark species, they cut a distinctive v-shape into it to extract the sap. "It's a pretty miserable diet," Professor Lindenmayer told RN's Offtrack. "You have to do a lot of work to cut through the bark to get something that has low nutrient values."

Not only is the sap like arsenic, it wears down the animals' teeth very quickly. "Most yellow-bellied gliders won't last more than five or six years because basically their teeth are done," he said.

Summer and winter

Eucalypt flowers have evolved to attract specific pollinators.

Most eucalypts flower in summer, Professor Ladiges said.

"If you went down the coast now in Victoria you'd have messmate (*Eucalyptus obliqua*) and manna gums (*Eucalyptus viminalis*) flowering. And they're basically pollinated by insects," she said. While these species of eucalypts have pale coloured flowers, others such as the Darwin woollybutt (*Eucalyptus miniata*) and the large-fruited mallee (*Eucalyptus youngiana*) are more brightly coloured.

These species flower in winter and are pollinated by birds. "The colour is the stamens — the male part of the flower."



Close up of *Eucalyptus youngiana* (Wikimedia commons: Gngarra)

The flowering cycle also differs between species, with some flowering longer than others. Some alpine ash eucalypts in the Australian alps are also starting to flower early in response to recurrent fires, Dr Bowman said.

What's that eucalypt?

There are so many different species the best way to identify different species is to get a field guide for the local area, Professor Ladiges said.

While it may not help you put a name to the plant sitting on the verge outside your house, it will help if you go bush. "Once people start getting their eye in for the bark, the fruit and the juvenile leaves, they're well on their way to identifying a plant."

So go out bush and get closer to this iconic — and extraordinarily ancient — Australian.

CHARLES DARWIN'S EVOLUTIONARY REVELATION IN AUSTRALIA

theconversation.com January 12, 2016 Frank Nicholas



View of Port Jackson, Fort Macquarie and part of Sydney Cove, in 1836.

One hundred and eighty years ago, on January 12, 1836, HMS Beagle entered Sydney Harbour with the 26-year old Charles Darwin on board. Sydney was just one of many ports of call for the Beagle on its five-year round-the-world surveying voyage.

Before departing the antipodes two months later, he was to have a revelation that would eventually inform his grand theory of evolution by natural selection. In addition to that, he would marvel at the many natural wonders — flora, fauna and geological — of the great southern land.

Across the mountains

During the Beagle's 19 days in Sydney, Darwin "hired a man & two horses to take [him] to Bathurst...to get a general idea of the country".

This and the following quotations are from Darwin's Beagle diary or Beagle letters. In the Blue Mountains, he traversed what is now called the Charles Darwin Walk, a wonderful bush track that follows Jamison Creek from Wilson Park to Wentworth Falls:

Following down a little valley & its tiny rill of water, suddenly & without any preparation, through the trees, which border the pathway, an immense gulf is seen at the depth of perhaps 1500 ft beneath ones feet.

Always questioning what he saw, Darwin immediately began speculating



on how the magnificent Jamison Valley had been formed.

Charles Darwin in 1840, a few years after his voyage to Australia on the Beagle.

Near present-day Wallerawang, just west of the Blue Mountains, he examined a rat-kangaroo and a platypus. Noting that they occupied (what we now call) ecological niches similar to those of the rabbit and water rat in the northern hemisphere, he wondered in his diary why a single creator would make such different animals for the same apparent purpose: "Surely two distinct Creators must have been [at] work."

This was the first (and not the last) time the young naturalist penned such thoughts.

In and around Sydney, Darwin and his servant Syms Covington collected at least 110 species of animals, including a mouse not previously described (originally *Mus gouldii*; later *Pseudomys gouldii*; unfortunately now extinct), a crab, a snake, frogs, lizards, shells (including an oyster, a mudwhelk, air breathers, a sand snail, and a trochid or top shell) and 97 insects, 42 of which had not previously been described.

Four of these were named (by other authors) after Darwin: a Leaf beetle *Idiocephala darwini*; a Seed bug *Ontiscus darwini*; a Gasteruptionid wasp *Foenus darwini*; and a Bee *Halictus darwiniellus*.

The remaining novel insects comprise six Leaf beetles (*Chrysomelidae*), four Stink bugs (*Pentatomidae*), a Seed bug (*Lygaeidae*), an Assassin bug (*Reduviidae*), a Water boatman (*Corixidae*), a Leafhopper (*Cicadellidae*), a Cicada (*Cicadidae*), a Flatid planthopper (*Flatidae*), a Frog hopper or Spittlebug (*Cercopidae*), three Parasitic wasps (*Chalcididae*), an Encyrtid wasp (*Encyrtidae*), five Eucaratids (*Eucharitidae*), a Eulophid (*Eulophidae*), four Seed chalcids (*Eurytomidae*), five Lamprotatidae and one Torymid wasp (*Torymidae*).



Darwin's path around Australia on the Beagle. FitzRoy, R., Volume 2 of the official account of the voyage

Travelling south

On February 5, HMS Beagle arrived in Hobart. In the first few days, Darwin took "some long pleasant walks [on both sides of the Derwent River] examining the Geology of the country". On February 11 he climbed Mt Wellington.

Three days were spent with Surveyor General George Frankland, who took Darwin on "two very pleasant rides" and with whom Darwin spent "the most agreeable evenings since leaving England", presumably in Frankland's house Secheron, which still exists in Battery Point.



Alithograph of Hobart town in 1833, not long before Darwin's arrival. St. Aulaire, A./National Library

It is not known whether Darwin told Frankland that one of those days (February 12) was his 27th birthday. If he did, it is most likely that Frankland would have incorporated a small celebration into the dinner at "Secheron" that evening.

During his visit, Darwin also "dined...at the Attorneys General, where, amongst a small party of his most intimate friends he got up an excellent concert of first rate Italian Music". His host was Alfred Stephen and the house is Stephenville, which also still stands in Hobart.

In and around Hobart, Darwin and Covington discovered a species of skink not then described (*Cyclodus casuarinae*, later changed to *Tiliqua casuarinae*), and collected five other lizards, a snake (which he thought harmless, but which could easily have killed him), a "new" species of flatworm (*Planaria tasmaniana*) and at least 119 species of insects (63 of which were "new").

On March 7, 1836, HMS Beagle arrived in King George Sound, its third and final Australian port of call. In the following eight days, Darwin witnessed a corroboree, geologised around Vancouver Peninsula and Bald Head, and visited Strawberry Hill Farm (then belonging to the Government Resident, Sir Richard Spencer).

In and around the settlement, Darwin and Covington collected a native bush rat (*Rattus fuscipes*, a "new" species), a frog, at least 10 species of fish (two of which were "new"; Longhead Flathead and Common Jack Mackerel), several shellfish and 66 species of insects (48 being "new").



The Australian bush rat, a previously unknown species of rodent discovered by Darwin 'amongst the bushes at King George Sound', as illustrated in *Zoology, Part II (Mammalia)*. Frank Nicholas, Charles Darwin in Australia, 2008, Author provided.

Arguably, the most important scientific legacy of Darwin's visit to Australia was the key question of creation raised at Wallerawang. Darwin saw that similar ecological niches in different parts of the world tend to be occupied by very different species, and these are related to other species that occur in that part of the world.

This was the most important of Australia's contributions to the ideas that eventually emerged to great effect in Darwin's seminal work *On the Origin of Species*.

AUSTRALIAN PLANTS SOCIETY - NORTH SHORE GROUP WALKS AND TALKS PROGRAMME - 2018

KU-RING-GAI WILDFLOWER GARDEN 420 Mona Vale Road, St Ives

- Be guided by members of the North Shore Group of the Australian Plants Society to learn about our wonderful native plants. No booking needed – just turn up at the Caley Centre at 9.45 am for a 10.00 am start on any of the dates below. All meetings finish at about 12.30 pm. There is a fee of \$5 per person, discounted to \$2 for Australian Plant Society members. (The 'Walk Only' meetings are free.)

Enquiries ring Helen on 94891735)

- All walks are easy. Please wear a hat, have suitable footwear and bring water and a snack. Sunscreen and insect repellent advised.

Term 1 Autumn (In this term will be just three 'Walk Only' meetings.)

March 5 Monday Focused on the history of Ku-ring-gai Wildflower Garden

April 9 Monday Focused on edible plants – plants used by early white settlers and plants that indigenous people might have used

May 7 Monday Focused on wildlife. Maybe there'll be a possum visitor.

1,000,000 Not Out.

David Drage

If you think the recent scoring of the Australian cricket team is worthy of note, then consider the achievement of the Herbarium at the Royal Botanic Gardens in Sydney. A short time ago this institution passed the one million mark of plant specimens in its collection to be numbered.

Unfortunately, not all of these specimens have been fully databased yet but, the work continues. The total number of specimens in the herbarium's collection is now close to 1.4 million which is a remarkable botanic resource which can be accessed by researchers from around Australia and elsewhere in the world.

I haven't seen specimen 1 million, however, I understand it is an *Acacia victoriae* subsp *victoriae* which was collected in the South West Plains of NSW on the road to Balranald west of Oxley in 1990.



This plant is from the arid inland and is a tough, very spiky shrub. Probably not one for the urban garden.

The nearest I got to the 10⁶ was 1,001,225. This is an interesting specimen of *Austrostipa scabra* (Poaceae) collected in November 2016 in the Pilliga State Conservation Area. It is part of plant collections from a set of permanent monitoring plots being established prior to Australian Wildlife Conservancy setting up a feral species exclusion zone in order to reintroduce extinct native species back to the area.

Specimen image by permission of the Royal Botanic Gardens, Sydney.

SEED IMAGING AT THE NATIONAL SEED BANK

<http://www.anbg.gov.au/photo/complex-search.html>


The Centre for Australian National Biodiversity Research just completed a project digitising over 1000 species of Australian native seed from the collections of the National Seed Bank at the Australian National Botanic Gardens. The Australian Native Seeds: a digital image library project was supported through funding from the Australian Government's Australian Biological Resources Study (ABRS) Bush Blitz Program.



The digital images, and accompanying precise measurements of seed traits taken during the imaging process, help to explain the biological and ecological function of these important species. The images provide a vouchered resource for land managers and also highlight the beautiful biodiversity of seeds. Explore the seed images on the Australian Plant Image Index to learn more.

Seed imaging at the National Seed Bank

To find more seed images go to the Australian Plant Image Index: <https://www.anbg.gov.au/photo/complex-search.html> search class 'nsb' (lowercase, no spaces) for all seed images, or search for particular species. All nsb seed images are available under a creative commons licence, with the following attribution:

 CC BY The National Seed Bank, ANBG



Blennospora drummondii

The Australian native seeds: a digital image library project is supported through funding from the Australian Government's Australian Biological Resources Study (ABRS) Bush Blitz Program.

AUSTRALIA POST BANKSIA STAMP ISSUE FEBRUARY 2018.

David Drage

The activity of stamp collecting used to be very popular with young persons, male and female, but is perhaps less so today. Some people continue collecting into adulthood and beyond; it is estimated that there are more than 1 million collectors in Australia today. Some develop a theme or specialty- a visit to a stamp exhibition will show fine examples of thematic collections.

Australia Post stamp designs represent important moments in Australian history and culture. Also featured in designs are aspects of the built and natural environment we live in, including the native flora. A new issue of \$1 postage stamps, featuring four of Celia Rosser's Banksia paintings, is due out on the 20th February 2018.



Celia Rosser is well known as a botanical artist and was part of the Banksia project at Monash University between 1974 and 1999 when she painted or drew many Banksia species. The four species chosen for this issue are;

Banksia cuneata 'Matchstick banksia': a large shrub to small tree from a limited area in WA. Vulnerable to Phytophthora dieback.

Banksia speciosa 'Showy Banksia': a prominent shrub/small tree (6m) from the south coast of WA. Its range has been reduced in recent times due to dieback caused by Phytophthora. It is best grown in the east if grafted to *Banksia serrata*.

Banksia coccinea 'Scarlet Banksia': a large shrub to small tree from the south/southwest coast of WA. Familiar as a cut flower.

Banksia grossa 'Coarse Banksia': a small shrub that grows in sand in the Geraldton area of WA.

PLANTS COLONIZED EARTH 100 MILLION YEARS EARLIER THAN PREVIOUSLY THOUGHT

Sciencedaily.com February 19, 2018 University of Bristol

A new study on the timescale of plant evolution has concluded that the first plants to colonize the Earth originated around 500 million years ago -- 100 million years earlier than previously thought.



Early life on land resembled cryptogamic ground covers like this lava field in Iceland. Co-author Sylvia Pressel appears in the right of the picture. Image courtesy of Paul Kenrick

For the first four billion years of Earth's history, our planet's continents would have been devoid of all life except microbes.

All of this changed with the origin of land plants from their pond scum relatives, greening the continents and creating habitats that animals would later invade.

The timing of this episode has previously relied on the oldest fossil plants which are about 420 million years old.

New research, published today in the journal *Proceedings of the National Academy of Sciences*, indicates that these events actually occurred a hundred million years earlier, changing perceptions of the evolution of the Earth's biosphere.

Plants are major contributors to the chemical weathering of continental rocks, a key process in the carbon cycle that regulates Earth's atmosphere and climate over millions of years.

The team used 'molecular clock' methodology, which combined evidence on the genetic differences between living species and fossil constraints on the age of their shared ancestors, to establish an evolutionary timescale that sees through the gaps in the fossil record.

Dr Jennifer Morris, from the University of Bristol's School of Earth Sciences and co-lead author on the study, explained: "The global spread of plants and their adaptations to life on land, led to an increase in continental weathering rates that ultimately resulted in a dramatic decrease the levels of the 'greenhouse gas' carbon dioxide in the atmosphere and global cooling.

"Previous attempts to model these changes in the atmosphere have accepted the plant fossil record at face value -- our research shows that these fossil ages underestimate the origins of land plants, and so these models need to be revised."

Co-lead author Mark Puttick described the team's approach to produce the timescale. He said: "The fossil record is too sparse and incomplete to be a reliable guide to date the origin of land plants. Instead of relying on the fossil record alone, we used a 'molecular clock' approach to compare differences in the make-up of genes of living species -- these relative genetic differences were then converted into ages by using the fossil ages as a loose framework.

"Our results show the ancestor of land plants was alive in the middle Cambrian Period, which was similar to the age for the first known terrestrial animals."

One difficulty in the study is that the relationships between the earliest land plants are not known. Therefore the team, which also includes members from Cardiff University and the Natural History Museum, London, explored if different relationships changed the estimated origin time for land plants.

Leaders of the overall study, Professor Philip Donoghue and Harald Schneider added: "We used different assumptions on the relationships between land plants and found this did not impact the age of the earliest land plants.

"Any future attempts to model atmospheric changes in deep-time must incorporate the full range of uncertainties we have used here."

FOSSIL POOP REVEALS CRITICAL ROLE OF GIANT BIRDS IN NEW ZEALAND'S ECOSYSTEM

(Edited)

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When the first humans landed on what is now known as New Zealand 700 years ago, they didn't find mammals. Instead, they discovered giant birds called moas, as well as a host of other indigenous bird species. Soon, they had eaten many of them into extinction.

Now, by deciphering ancient DNA found in fossilized bird droppings, researchers have a better idea of the toll those extinctions took on New Zealand's forests and shrublands. The study shows that mushrooms and other fungi were important to the extinct birds' diets, and suggests moas had a strong hand in shaping New Zealand's native landscape by helping fungi spread, says co-author Alan Cooper, an ancient DNA specialist at The University of Adelaide in Australia. Now that the moas are gone, "The forest has potentially lost a potentially major way to spread."

"This paper is a clear example of the great potential of ancient DNA-based techniques," says Melania Cristescu, an ecological geneticist at McGill University in Montreal, Canada, who was not involved in the work. Cristescu says she was surprised by how much information the DNA contained. "The authors were able to identify a wide variety of species and to reconstruct the ecology of an extinct species."



Over the past decade, Jamie Wood, a paleoecologist at Landcare Research in Lincoln, New Zealand, has found hundreds of fossilized bird droppings, or coprolites, well preserved in caves and shallow sediments across the country. Earlier, Cooper and others had done some rudimentary DNA studies that showed that many coprolites came from five extinct species of moas and the kakapo (*Strigops habroptilus*), a critically endangered parrot. But the data provided few details about what these birds ate.

Since then, other studies have shown that more extensive, high-throughput sequencing of DNA found in poop has the potential to reveal much more information.