CALEYI

Australian Plants SOCIETY NSW


pic Andre Porteners

NORTHERN BEACHES GROUP
January February 2018

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Next Meeting: **7.15 pm Thursday February 1, 2018** at Stony Range Botanic Garden, Dee Why.
Presentation: Dr Peter Weston. 'The Gondwanic Plants of the Sydney Region.'.
Supper: **Georgine & Jane**

Coming Up:
APS Northern Beaches walk Saturday February 17, 2018 Koolewong Track, West Head. Starting at 11 a.m. Probably the best word to describe this walk is 'cute'. The circuit walk starts with a few steep steps, but soon flattens out, following a well-defined track through an open forest, via some natural sandstone sculptures. The lookout is notable for wonderful views to Patonga, Lion Island and out through the entrance of Broken Bay at Barrenjoey. A seat at the lookout is well placed to encourage people to stop and enjoy. Penny will email all for attendance and lunch intentions.

From the Editor
Please continue to send me interesting reports or photographs that the members would enjoy. Jane. email: march@ozemail.com.au

2017 NORTHERN BEACHES CHRISTMAS LUNCH.



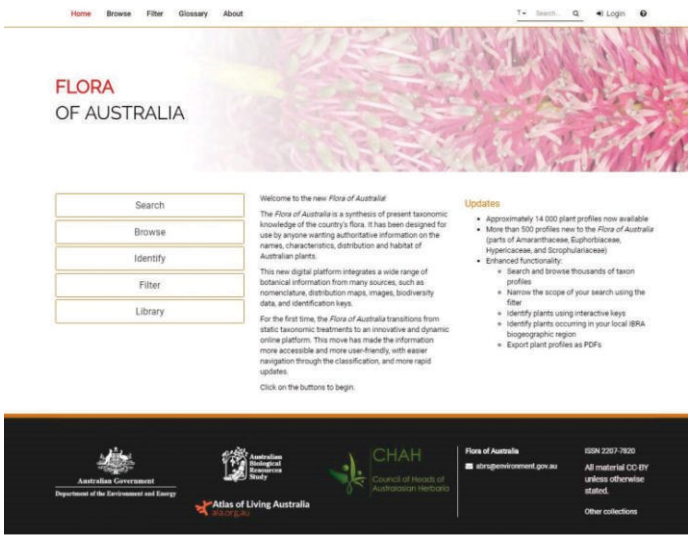




FLORA OF AUSTRALIA LAUNCH

https://www.ala.org.au/blogs-news/flora-of-australia-launch/ November 27, 2017

The much anticipated new digital platform Flora of Australia was launched today by project partners the Department of the Environment and Energy (specifically the Australian Biological Resources Study,ABRS), the Council of Heads of Australasian Herbaria (CHAH) and the ALA as part of the Systematics 2017 conference at The University of Adelaide.



Flora of Australia is a synthesis of taxonomic knowledge of the country's flora and represents a momentous collaborative effort among taxonomists in Australia and New Zealand. It is designed for anyone wanting authoritative information on the names, characteristics, distribution and habitat of Australian plants.

The new digital platform integrates a wide range of botanical information such as nomenclature, distribution maps, images, biodiversity data, and identification keys, sourced from the National Species List, 'Australias Virtual Herbarium, Keybase, Australian Plant Image Index, and the Atlas of Living Australia (ALA).

Flora of Australia is the leading authoritative source for Australia's plant biodiversity information. It is an essential resource for plant identification, and provides vital information that underpins decision making for national and international biodiversity conservation, threatened species and biosecurity management activities.

For many decades, Flora of Australia was produced as a hard copy book series. It required considerable time and resources to produce and was often out of date by the time it went to print.

ABRS, CHAH and the ALA understood the benefits of moving Flora of Australia to a digital platform and the ALA provided the digital infrastructure, hosting requirements and technical expertise necessary to make it happen. The ALA was launched in 2007 as part of the Australian Government's National Collaborative Infrastructure Strategy (NCRIS) and within 10 years has become a world-leader in digital biodiversity infrastructure.

The Flora of Australia digital platform enables direct contributions online, faster publication of biodiversity information, greater collaboration, and open access to data. The information is now more accessible, more user-friendly, easier to navigate through the classification, and can be updated more rapidly. It also includes innovative features such as an ability to filter the national Flora of Australia coverage to targeted geographic areas.

Flora of Australia dynamically links a range of Australian biodiversity informatics resources to help deliver robust scientific information about Australia's native and naturalised plants. Approximately 14 000 taxon profiles are now available in Flora of Australia, including treatments previously published in the hard copy series. Nearly 500 new taxon profiles have been added in draft form (not publicly accessible) and will be progressively published.

This project assists Australia to meet Target 1 of the Global Strategy for Plant Conservation (GSPC), 'An online flora of all known plants'. Data from Flora of Australia will be gradually contributed to the World Flora Online.

The launch was hosted by Dr Judy West, Assistant Secretary, Parks Island and Biodiversity Science, Department of the Environment and Energy. For more information visit Flora of Australia online www.ausflora.org.au or contact Anthony Whalen, General Manager, ABRS, anthony.whalen@environment.gov.au or ALA info@ala.org.au

ABSEILING BOTANISTS DISCOVER RARE PLANTS GROWING ON CLIFF FACE IN LIMPINWOOD NATURE RESERVE

ABC North Coast December 7, 2017 Bruce MacKenzie

Botanists from the NSW National Parks and Wildlife Service are going to great heights to identify and record some of the rarest plants in the country.

Rare beauty - Green Waxberry (Image Lui Weber - Office of Environment and Heritage.)

Some of the species are only known to exist along one escarpment within the Gondwana Rainforests of Australia World Heritage area on the New South Wales–Queensland border.

A special conservation permit was required to allow a botanist to abseil down a cliff face and conduct a threatened species assessment.

Saving Our Species project officer Justin Mallee said the effort was justified when nearly 1,000 rare green waxberry (Gaultheria viridicarpa) plants were discovered in the Limpinwood Nature Reserve.

"We knew a handful of these very rare plants existed along the top of the cliff line, but what we didn't know was how many plants were growing on the cliff faces, or their condition," Mr Mallee said.

"The mossy cliffs of Limpinwood Nature Reserve are the only place in the world where these plants are found. "So the discovery of a bigger population is fantastic news for this threatened species and really boosts this plant's chance of long-term survival."

The survey also revealed a thriving colony of lamington eyebright (Euphrasia bella).

Mr Mallee said the species was last known as a small population of only five plants, recorded in 1982. "Ninety-four lamington eyebright plants were counted [recently] … a huge boost to our knowledge of this population," he said.

The rare lamington eyebright plant was also counted during the survey. (Supplied: Lui Weber/Office of Environment and Heritage)

"Some of these sites take a good six hours or so to walk into, so there's not often people there looking for them. "They're in some very hard to get to places."

The aim of the survey was to document the extent of the populations of the threatened plants, assess their habitat condition, and record potential threats.

Mr Mallee said the biggest threat was climate change, due to the plants' location in a fragile, high-altitude environment.

"These plants have existed for thousands and thousands of years and to be able to know a bit more about them … it gives us some hope that we'll be able to manage their environment in such a way that they'll persist for thousands of years into the future."

CICADAS LOUDEST IN FOUR YEARS AS SYDNEY EXPERIENCES A BUMPER SEASON

hawkesburygazette.com.au December 20, 2017 Sarah Falson

Discarded nymph shells like this can often be found all over trees during cicada season. These were picked-off a tree in Bowen Mountain. Picture: Geoff Jones

YOU'D be right if you thought the cicadas were a little louder this year. Sydney is experiencing a bumper season - the largest since 2013 - and leafy areas of the Hawkesbury are teeming with the vociferous invertebrates.

Their chorus is so loud in some suburbs (including Bowen Mountain where this journalist lives) that simply being outside amongst the trees, once peaceful, has become a little stressful.

Then, once the sun goes down and the cacophonous chorus calms, the boisterous bugs find other ways to make nuisances of themselves - like flying into the nearest person's head en route to gather around the glow of the garden light.

Cicadas live for years underground as nymphs, eeking-out existences undetected under the dirt. But once they emerge and shed their shells, boy, do they make their presence known!

Sound of summer

The cicada song is actually a mating call sung by the males to attract females, and every species has a particular sound. Cicadas only live between one and four weeks above ground, so procreation is top of their 'to do' list.

They're usually loudest around dusk, and their song tapers off into the evening when they rest. Though if the weather is warm, some species will sing all day, and some individuals will keep going through the night.

According to cicada enthusiast and scientific officer at the Australian Botanic Gardens at Mount Annan, Dr Nathan Emery, cicadas sing in synchrony for mating and survival.

"We call it a 'cicada chorus' where one will start and the others will join in. There are two reasons for this: the louder you are, the more attractive you potentially are to mates; and it's also a better defence against birds because it's harder for them to find where an individual cicada is calling from," he told the Gazette.

He said this season is particularly loud not only due to numbers, but also because three of the country's loudest species have come out to play - the Cherrynose, Double Drummer and Green Grocer.

Cumberland Ambertail. Picture: Dr Nathan Emery

Hawkesburians can also expect to see Redeyes, Black Princes, Yellowbellies and Razor Grinders, along with some smaller species including the Double-spotted cicada, Alarm Clock Squawker, Sydney Ticking Ambertail and Southern Red-eyed Squeaker.

"When they're in chorus together they can reach 120 decibels, which is about on par with a chainsaw operating. Anything above about 90 to 100 decibels can be painful to the human ear, and prolonged noise at this level can cause damage," Dr Emery said.

Dr Nathan Emery. Picture: Christie Foster

So how much longer can we expect to hear them? It could be until March or April, according to Dr Emery, though November through to January are typically the loudest months.

Weather has a role to play, too, as long heatwaves and dry spells can kill them off - especially if they don't have adequate protection against the elements.

Hawkesbury's cicadas
The sound of cicadas is synonymous with the childhoods of most Sydneysiders, yet (surprisingly) not much is known about Australia's species.

Working in plant science as Dr Emery does, knowing a thing or two about cicadas makes sense, however the work he does on the insects is actually a research hobby. “My dad had an interest in cicadas for the majority of his life, too, and he would take myself and my siblings out to national parks when we were really young and we would catch cicadas,” he said.

He is one of only a handful of cicada researchers in Australia, and unfortunately - like a lot of invertebrate research - there's not a lot of funding available. “So the majority of us do it because we're passionate about it and we fund it out of our own pockets,” Dr Emery said.

He has been tracking cicadas for around seven years now, and recently authored a book called A photo guide to the common cicadas of the Greater Sydney Region, designed as a companion to identifying backyard varieties.

Dr Emery and his pal, Central Coast ecologist Alan Kwok, have been surveying cicadas in Windsor Downs Nature Reserve and the Cumberland Plain Woodlands for three years.

Their research is two-pronged: the first component is taxonomic - classifying different species - and the second is ecological - working out where they like to live and why. “There are between 700 and 1000 species of cicada in Australia, we think - that's the most in any country in the world. 'The cicada capital of the world', I like to call it. But there's only 300-350 species that are scientifically described with names,” Dr Emery said. “We're trying to understand why we have such a unique diversity here, and also what types of trees they prefer and if they are able to adapt to exotic tree species.

“We've been looking at vegetation communities like ironbark forests and scribbly gum woodlands which can be adjacent to each other and - in the short term - we've found they have different types of cicadas as well. Even on a local scale there's a uniqueness from one patch of woodland to the next, and that could be due to things like canopy cover - protection from birds - or they might have a preference to specific trees for their food source.

“But because they're periodical insects, it makes it very difficult to examine their emerging patterns and distribution shifts, and very hard to tell if one species might be endangered more than another.”

In terms of their cycles, the likes of this summer's emergence hasn't been seen since 2013, and before that there was a major emergence in 2010, and before that in 2003. “There is a potential for a seven-year cycle based on those numbers, but it could also be ten years,” said Dr Emery.“No one's been able to put in concrete how long they spend underground, but we think it's somewhere between five and ten years.”

Citizen science
Dr Emery is appealing to Hawkesbury residents to get involved with a citizen science project he started online - go to inaturalist.org and search for 'The Great Cicada Blitz' (or download the free iNaturalist app).

Users can upload photos and audio recordings of cicadas they've come across, and submit 'observations' for experts to comment on. “I'd absolutely recommend getting involved. It will help us to look at distribution patterns and emergence over the years, which will allow us to see what effect climate is having on different species,” he said.

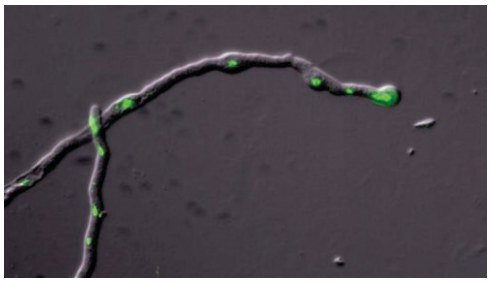
“There are a lot of nature reserves and natural bushland in the Hawkesbury, which we think will be very important to cicada diversity in the future.”

HOW PLANTS FORM THEIR SEEDS

www.sciencedaily.com December 20, 2017 University of Zurich

Summary:

Vegetable, fruit, or grain -- the majority of our food results from plant reproduction. Researchers have now discovered the key to how plants regulate pollen growth and seed formation. In addition to seed formation, knowledge about these signaling pathways can be used to influence plant growth or their defense against pests.



Pollen tubes with internalized, fluorescence-labelled signal substances (RALF peptides). Credit: University of Zurich

Around 80 to 85 percent of our calorie needs is covered through seeds, either directly as food or indirectly through use as feed. Seeds are the result of plant reproduction. During the flowering period, the male and female tissues interact with each other in a number of ways. When pollen lands on the flower's stigma, it germinates and forms a pollen tube, which then quickly grows towards the plant's ovary. Once it finds an ovule, the pollen tube bursts to release sperm cells, which fertilize the ovule and initiate seed formation.

Pollen tube interacts with female plant tissue

Led by Ueli Grossniklaus, professor at the Department of Plant and Microbial Biology at the University of Zurich, an international research team has now demonstrated how the pollen tube interacts with, and responds to, female plant tissue. The pollen tube does so by secreting extracellular signals (RALF peptides) which it uses to explore its cellular environment and regulate its growth. Two receptors on the cell's surface enable it to perceive the secreted signals and transmit them to the inside of the cell.

Intracellular signals regulate growth

Working together with the teams of Christoph Ringli from UZH and Jorge Muschietti from the University of Buenos Aires, the team around Grossniklaus was able to determine that further proteins had to be active for the pollen tube to recognize the signals -- LRX proteins. These proteins were identified at UZH 15 years ago by Beat Keller and his research group, but their function had previously not been clear. LRX proteins are localized in the cell wall surrounding plant cells, where the signals can dock. "We suspect that the pollen tube explores changes in the cell wall by sending out signals and responding accordingly, for example by realigning its growth," says Ueli Grossniklaus. It is rare for plants to produce and perceive signals with the same cells. The researchers suspect that this allows the pollen tube, which grows extremely quickly, to faster respond to changes in its environment rather than being dependent on signals from other neighboring cells.

Molecular insights open up wide range of potential applications

The signaling pathways described by the researchers are involved in many other basic processes, and knowledge of how they work opens up numerous possible applications for plant breeding. "By better understanding how these proteins work, we can not only influence pollination and seed formation, but also the development and growth of plants or their defense against pests," concludes Ueli Grossniklaus.

THE ANCIENT XANTHORRHOEA: UNCOVERING GRASS TREES IN BAILIESTON

rememberthewild.org.au December 23, 2017 story & image Bruna Costa

The state forest around Bailieston in Central Victoria consists of acres of Box-ironbark and other Eucalyptus trees. Their leafy canopies offer shelter from wind and rain to resting birds. With strong competition for water and sun, young trees produce a narrow trunk reaching towards the sunlight. Older, established trees have broader trunks and far-reaching branches, and bear the clumps of cascading mistletoe in light, golden shades of green, evidence that Mistletoe Flowerpeckers, or Mistletoebirds, inhabit the area.

An array of spindly Sifton Bush and lustreless Parrot-pea shrubs dominate the dry and rocky undergrowth and are home to little spiny spiders that anchor their cobwebs between adjoining bushes. Intricately woven webs not only trap insects but also catch tiny moisture droplets that glisten in the early morning sunlight. A much larger spider, the Golden Orb Weaver, creates its web in the branches of the Eucalyptus trees. The delicate structure stretches at least one metre from one branch to another, a string of flying insects becoming entwined in its strands strong enough to trap small birds. Care is essential when strolling through the bush so as to not disturb these intricate webs.

Dead tree branches litter the forest floor. But it's the aged tree stumps that transform it into an outdoor gallery, exhibiting sculptured works of art created by resident termites and the eroding climate. A pale green moss clings to these masterpieces, adorning them with a semblance of softness, and heralding the purity of air in the environment. Many years pass before these old grey logs break down completely, their once stately trunks reduced to nothingness, unlike the younger tree trunks which seem to decay at a much faster rate.

A dry creek bed shows evidence of flooding from previous winters by the leaf litter and rubble banked up against fallen logs across its path. Mullock hills scattered in parts of the forest, abandoned by gold mining prospectors, warn hikers of the mining pits that lie alongside them, some being dangerously deep.

In cooler months, there's an emergence of green moss and clumps of lichen where grasses don't grow. The texture of the lichen feels soft and spongy in the hand. Regular rainfall brings colour back to the leaves – colours that may have been bleached away in the hot summer sun. And pink and white eucalypt blossom that speckle the tree tops.

But there is greater merit in wandering through this forest with its rocky ground and hardened soil.

It's the peaceful silence, broken only by the chirping and whistling birds flittering through the tree canopy. Birds like rosellas, parrots, cockatoos, whistlers and honeyeaters, to name a few. Some species dare to linger and observe the hikers wandering through their territory. One of my favourites is the Yellow-tufted Honeyeater. Its curiosity towards intruders and its fleeting behaviour when searching out insects make it an interesting bird to observe, as is the little Spotted Pardalote when stripping bark from young stringy bark trunks. The Red-capped Robin is also one that likes to know who or what is wandering through its habitat. When it comes to singing birds, the Golden Whistler always draws my attention.

And there's the chance of walking into a large patch of the awesome Xanthorrhoea, a tree that exists in stark contrast to the bushland in which it grows.

Otherwise known as grass trees, there are around 28 species of these native marvels in Australia, some of which can grow to six metres in height and can live for up to 600 years. Xanthorrhoea australis, Xanthorrhoea glauca and Xanthorrhoea minor are found in coastal bushland and extend inland in the south-eastern regions, including Tasmania, South Australia, Victoria and New South Wales. Xanthorrhoea preissii and Xanthorrhoea brunonis are found in Western Australia, whilst Queensland boasts around six species. But only one grows in the Northern Territory: Xanthorrhoea thorntonii, or the Desert Grass Tree, which only grows to two metres.

These wonderful trees produce green, needle-like leaves that sprout upwards and arch over the trunk's sides. The leaves themselves grow to one metre in length. Eventually they die back and in their natural environment, remain attached to their black trunks, giving a thatched appearance. I like to call them grass skirts. Skinks, small lizards, snakes, spiders and other living creatures seek shelter within and beneath these canopies.

Xanthorrhoea's black trunks become exposed in the wild only if fires ravage the forest and burn off the dead foliage. Their flowering spears are more prolific after such fires. The long brown flowering stalk or spear can grow two to three centimetres a day and can reach a height of up to three metres. A dense cover of attractive yellow flowers encompasses the entire spear and provides a rich nectar to a variety of honeyeaters, bees and butterflies that find them irresistible. When the flowers die back, the stalks eventually collapse, scattering seeds across the ground. It is encouraging to find a show of thriving young shoots while strolling through this delightful outcrop.

The plant has many uses. According to Plant Diary: Balga Grass Trees, the Noongar people in the south-west region of Western Australia named the Xanthorrhoea the Balga Grass Tree. They collected its nectar and made a sweet drink by soaking the flowered stem in water. The soft bases of young leaves were eaten as a vegetable, while people in the Port Lincoln area in South Australia added its roots to their diet.

The tough leaves and the edges of seed pods could be used as knife blades, while tall brown flower spikes made ideal spear shafts. They were also useful as a base for starting a fire by spinning a stick in a groove carved out on its surface. The little star-like stalks from where the flowers emerged make good kindling for fires once the flowers died off. Tiny clumps at the base of old leaves contain a resin and can be used as an adhesive or lacquer.

What is fascinating about these extraordinary trees is that they only grow one to two centimetres per year, so a one-metre tall tree could be around 75 to 100 years old. This makes some of the trees in the area where I walk at least 200 years old. These ancient wonders can also be traced back to when Gondwana was a continent.

Commercially available Xanthorrhoea are grown under licence, each one registered with its individual number. With their black trunks exposed, these marvellous specimens create an attractive feature in a structured landscaped garden. Removal of plants and logs from national state forests is illegal, and Xanthorrhoea is no exception. They are unlikely to survive without proper care if removed from their natural habitat.

In contrast to the plants I see in the bush, I have a very young Xanthorrhoea minor in a pot, grown from seed at La Trobe University. On the surface, it appears to be thriving in exactly the same manner as other species. However, its leaves never rise above ground level as its trunk grows underground. This means I will never enjoy the splendour of a black-stumped Xanthorrhoea in my garden, but I wait in quiet anticipation as it does produce flowering spears. As it is only two years old, I may be waiting for some time.

DEAD TREES ARE ALIVE WITH FUNGI

Sciencedaily January 9, 2018 Helmholtz Centre for Environmental Research - UFZ

Summary:
So far, little research has been conducted on fungi that live on dead trees, although they are vital to the forest ecology by breaking down dead wood and completing the element cycle between plants and soil. Soil biologists have now discovered that the number of fungus species inhabiting dead trees is 12 times higher than previously thought. Once trees die they are also colonized by different fungal communities depending on their species.

Deadwood logs of different tree species were laid out at three areas of temperate forests by UFZ scientists. They want to analyze which fungus species inhabit dead trees. Credit: Witoon Purahong

Fungi that live on trees perform an important function in the forest ecosystem by breaking down dead wood. This is no easy feat, because wood is very resilient. It is held together by a biopolymer known as lignin, which together with cellulose and hemicellulose form the cell wall of woody plants and give the wood its stability. Fungi are able to break down the robust lignin and the flexible cellulose fibres by releasing enzymes that cause the polymers to degrade and become mineralised. As part of the ecosystem's cycle, the leftover material becomes part of the humus layer, which gives the soil its stability and forms the substrate for a new generation of trees.

The study took the UFZ researchers to three areas of temperate forests in the Schorfheide-Chorin Biosphere Reserve, the Hainich National Park and the Schwa?bische Alb Biosphere Reserve, where they laid out around 300 dead tree trunks of eleven different species, each up to four metres long. The trees included seven deciduous species such as beech, oak, poplar and ash and four coniferous species: spruce, Scots pine, Douglas fir and larch. Three years later they returned to see what kind of fungal communities had established themselves in the trunks. The results were astonishing: "The diversity of fungi living in the trees was an order of magnitude greater than previously thought," says Dr Witoon Purahong, a soil ecologist based at UFZ in Halle and the first author of the study.

The researchers identified between 22 and 42 operational taxonomic units (OTUs) per trunk. OTU is a scientific term used by molecular biologists to describe organisms that can be equated with individual species due to their DNA but do not already have a species name of their own. All in all, the UFZ team identified 1,254 OTUs in the dead trunks. In a previous study, researchers found just 97 fungal species living on the same logs -- about 12 times fewer than the UFZ scientists have now discovered. Dead conifers generally had greater species diversity of fungi than most deciduous trees. The greatest diversity occurred on Douglas fir, larch and oak and the smallest amount of diversity on beech and hornbeam.

The reason why the UFZ soil ecologists found so many different species of fungi lies in the modern molecular technique they used. The researchers used a DNA sequencing technology known as next-generation sequencing to determine DNA markers of the fungi hidden in the wood. In previous, similar studies, only the fruiting bodies of the fungi growing on the surface of the dead trees were documented. This gave rise to the misleading impression that only a small number of fungus species inhabit dead trees. "It's like an iceberg: you can't see most of the fungi because they are inside the trunks in the form of a fine mycelium," says Prof François Buscot, who heads the department of soil ecology at the UFZ. In other words, the visible fruiting bodies are only a tiny part of the entire fungal communities inhabiting a dead tree.

But it's not just the much greater diversity of fungi than previously suspected. The UFZ soil biologists also discovered that wood-inhabiting fungi prefer certain species of trees and don't simply have a general preference for either conifers or deciduous trees, as scientists previously assumed. They discovered seven such distinct fungal communities on deciduous trees and two on coniferous species. For example, oak and ash each harbour very specific communities fungal species whose composition is very different from those found on other deciduous trees. In the case of the conifers, the fungi growing in dead Scots pine were clearly distinct from those found in the other coniferous species investigated. It is not yet clear why there are such marked differences between the fungal communities in different species of dead wood. "Oak and ash have many identical characteristics, such as the wood structure and the carbon-to-nitrogen mass ratio, but they are very different when it comes to the number of fungal OTUs," says Witoon Purahong. The fungal communities found on these two species are more different from each other than compared tp any of the other tree species the team investigated, he adds.

Now the soil ecologists from UFZ in Halle will focus on identifying the mechanisms that determine whether or not a fungus colonises a particular species ofv tree. "The millions of years of coevolution between trees and wood-inhabiting fungi could provide an explanation for their coexistence -- just as we see with symbiotic fungi, for example," says Purahong. What is fascinating, however, as Buscot adds, is that in some cases the specialisation of fungi on dead wood is greater than the oneof symbiotic fungi on living plants. The coexistence of communities of fungi, bacteria and invertebrates living in dead wood could also account for specific colonisation strategies.

The results of this study have increased our understanding of the biodiversity of communities living in dead wood. This is important not only because it will enable us to improve the protection of wood-inhabiting fungi, which may be threatened by the expansion of forest monocultures. It is also important because the fungi that grow in dead trees include species already known as soil-dwellers, plant pathogens or symbiosis partners, which appear to use dead wood as a temporary habitat. "Dead wood is an integral part of forest ecosystems, which plays a ital role in the function and maintenance of biodiversity," says Buscot.

"TOP 10" OF AUSTRALIAN REGIONAL BOTANIC GARDENS.

Australian Geographic Magazine January/February 2018 edition

1.The Australian Arid Lands Botanic Garden Port Augusta (S.A)

2. North Coast Regional Botanic Garden (Coffs Harbour, NSW)

3. Flecker Botanic Gardens (Cairns, QLD)

4. Olive Pink Botanic Garden (Alice Springs NT)

5. Tasmanian Arboretum (Devonport, TAS)

6. Eurobodalla Regional Botanic Gardens (Batemans Bay, NSW)

7. Geelong Botanic Gardens (Vic)

8. Tondoon Botanic Gardens (Gladstone, QLD)

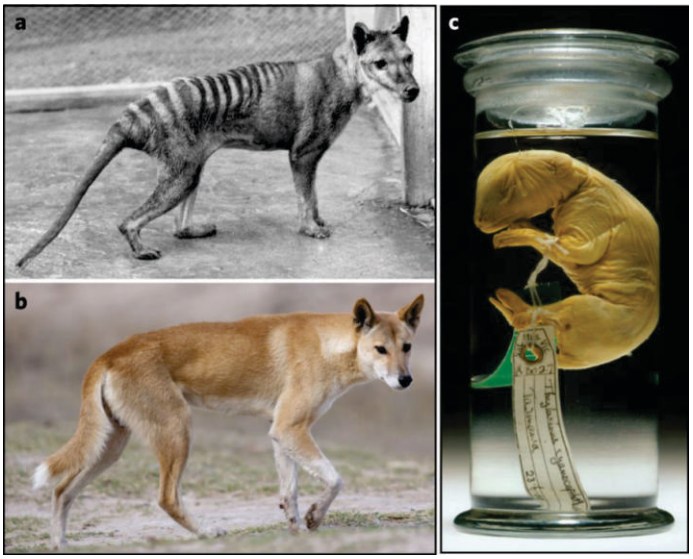
9. Wollongong Botanic Garden (NSW)

10. Hunter Region Botanic Gardens (Heatherbrae, NSW)

WHY DOES A THYLACINE LOOK LIKE A DOG NOT A TIGER?

https://australiascience.tv/ December 12, 2017

Tasmanian tigers, despite their stripes, look a lot more dog-like than a tiger. But dogs and Tasmanian tigers, also known as thylacines, split away from each other over 160 million years ago, and are some of the most distantly related mammals. Their striking resemblance is one of the best examples of convergent evolution, the idea that animals might take different evolutionary pathways to reach the same destination. Species end up evolving similar structures or features to solve a similar purpose or make use of a certain resource, without being evolutionarily closely related at all.



A thylacine (a) looks very similar to a dingo (canid, b). The ethanol-preserved thylacine pouch young sampled to sequence the genome. (Source: Nature)

Take the spiny mammals. There's the marsupial echidna, the hedgehog and the porcupine, who have all independently evolved spines, really just modified hairs, as a form of defense. So while the echidna may look related to a porcupine, it's much more closely related evolutionarily speaking to a platypus.

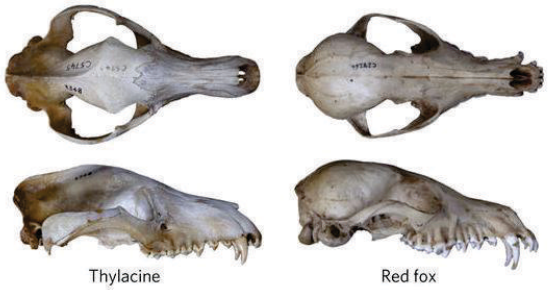
Similarly, the Tasmanian tiger is much more closely related to wallaby than a dingo. Apart from its pouch, common to all marsupials, it was virtually indistinguishable from from modern canids (dogs). So how did this Aussie marsupial end up looking so much like a dog?

Researchers turned to the Museum Victoria collection, which houses a 108-year-old thylacine pup, preserved in a jar of alcohol. They were able to extract DNA from this specimen and sequence the Tasmanian Tiger genome. Getting intact DNA out of such an old specimen is not easy.

“The DNA tends to leach out of the specimen into the alcohol over time” says Prof Alan Cooper, from the Australian Centre for Ancient DNA at the University of Adelaide and one of the study's authors, “Museum curators often change the alcohol whenever it gets cloudy, meaning more DNA diffusion into the newly added alcohol.” The team was lucky in this case though, says Alan, “the specimen was not so old and somehow the DNA preservation was great.”

Analysis of the genome shows that Tasmanian tigers experienced a steep decline in genetic diversity around 70,000 – 120,000 years ago, before human colonisation of Australia during a time that coincided with glacial climate changes.

Researchers then compared the head shape of the thylacine to other mammals, including modern canids like wolves, coyotes, red fox, arctic fox and jackals. They showed that there was exceptional convergent evolution between thylacines and canids, with the thylacine showing more closely related skull shape to the red fox or grey wolf than to its nearest genetic relatives.



Striking similarity between a thylacine skull and red fox skull. Source: Nature

The researchers conclude that this convergent evolution is not due to natural selection acting on similar protein-coding genes, but instead on regions that regulate how and when genes are expressed. These regions have much more “evolutionary flexibility”, and may be particularly important in how body patterns evolve.

Next up the Australian Centre for Ancient DNA will be sequencing the mainland thylacine genome, a population distinct from the isolated Tasmanian population sequenced in this study. But don't get your hopes up for any Jurassic Park style resurrections. “We're never going to bring these species back,” says Prof Alan Cooper, “genome sequencing or otherwise.”

WHEN DANGER IS AFOOT, THESE PIGEONS SOUND A WARNING CALL—WITH THEIR FEATHERS

www.sciencemag.org Nov. 9, 2017 Andrew Wagner

Birds are great communicators, and they “talk” using song, body language, and even musical instruments. But now, one species of pigeon is whistling a new tune—with its feathers. Crested pigeons, large birds indigenous to Australia, make a warbling noise when they flap their wings to take off. The upstroke of each wing beat produces a 1.3-kilohertz low note, and the downstroke produces a 2.9-kilohertz high note. To find out whether this distinctive sound is used to communicate, a group first examined the feathers themselves. They found that the noise was

coming from the eighth feather on the pigeon's wing; when this feather was removed, the high note disappeared. However, when the feather was placed in a wind tunnel, the high-frequency sound returned. To see how other birds reacted to the noise, the researchers played audio recordings of slow and fast wing beats to pigeons in their natural habitat. During the slow beats, the birds stayed where they were. But the faster wing beats set the birds fleeing. That means these wing whistles are likely serving as a type of warning signal, the researchers report today in Current Biology. Because the notes cycle back and forth between high and low, the speed of the cycle informs the pigeons whether there is danger, or whether it's just another bird taking off.