



FRIENDS of the **National Arboretum Canberra** **Newsletter 32 / June 2016**

Warm greetings to you all in this miserably wet and much cooler weather.

However, we can almost hear the Arboretum trees sighing with the lovely rain falling on them. The Tuesday and Thursday Working Bees have begun applying fertiliser to every tree in the forests over the past few weeks and the rain will certainly have done its work in dissolving and sending the fertiliser down to the roots. When the remaining forests have been completed, another mighty task will have been accomplished by the Friends. Thank you to all those involved. This voluntary labour will save the Arboretum approximately \$25,000!

You are invited to attend a tree planting in the Friends Forest (Forest 100) on Saturday 9 July at 10:00 am. Holes will have been dug and water etc will be ready to apply. I will be waiting for you at the end of River Road, along with our new Friends Forest curator, Andrew Carter, and Adam Burgess, the Arboretum's Head Horticulturalist. A sign-on/sign-off sheet will be available.

Andrew is looking for a few Friends who would be willing to work in the Friends Forest every couple of months. Leave your contact details with us on the day or fill in the details on the website.

I hope you were able to attend the Friends' Seasonal Talk held at lunchtime on 20 June. Max Bourke AM, one of Canberra's icons, was the speaker and he believes that the Arboretum is as important as the National Gallery of Australia, the Australian War Memorial and the National Museum of Australia. Max presented an entertaining and amazingly interesting talk about his experiences

over 50 years, working in botanic gardens, woodlands, wetlands, and forests around the world. His talk is now on the Friends' website, available for downloading. Max has made a huge contribution to the Arboretum since its inception. He has served on the Friends' Council, been a Guides Trainer and an active Guide himself, and contributed enormously to the success of the Southern Tablelands Ecosystems Park in Forest 20. He describes himself as a chronic volunteer!

This year a main focus of the Warm Trees event will be the sugar maples in Forest 16 and the launch will take place on the North Deck of the Village Centre at 11:00 am on 1 July. This just happens to be Canada's National Day and His Excellency Mr Paul Maddison, High Commissioner of Canada in Australia and Mrs Fay Maddison will attend the launch.

Much lobbying has gone into successfully achieving a full-time position for a Co-ordinator of Volunteers. The position will be advertised in due course and I will keep you posted.

We thank Friends Jocelyn Plovits and her family for their very generous donation which has enabled the Covered Outdoor Learning Area (COLA) to be truly covered. It now has automatic doors, seating, heating and cooling, which all make it a much greater asset to the Arboretum as a meeting venue and for a variety of other activities.

The official opening of the upgraded facility will occur on Friday 16 July, when it will be renamed 'The Terrace'.

The launch of Voices in the Forest 2016 occurred mid-June and it was exciting to learn that the Korean operatic superstar Sumi Jo is returning to Canberra for this concert in the Amphitheatre on 19 November. I will let you know when the Village Building Company calls for Friends' volunteers to help with the event.

We were sad to learn of the death on 9 June of Gavan McArdle who was the husband of Sherry McArdle-English, the Friends' Inaugural Chair. On behalf of all members of the Friends, I offer Sherry our sincere condolences on her recent bereavement.

Our website is constantly being amended and updated. Take a look at www.arboretumcanberra.org.au

***Friends, I look forward to seeing you there—
at the Arboretum!***

Trish Keller OAM
Chair

IN THIS ISSUE . . .

Warm Trees 2016, with a hint of maple syrup *page 2*

What did the Friends' survey find? *page 3*

2016 photo competition *page 4*

Volunteers of the year *page 4*

Tree Week 2016: autumn at the Arboretum *page 5*

Trees in focus: sugar maple *page 9*

Forest Talk *page 11*



Warm Trees 2016, with a hint of maple syrup

BY LINDA MULDOON

The annual Knitters' Morning Tea was held in the Green Room at the Village Centre on 11 June, giving those that attended a sneak preview of the 2016 design theme—which has a decidedly Canadian flavour (see page 11).

The knitting that had been completed this year was piled high on the tables as Jocelyn Plovits, convenor of the event, explained the plan to create the largest knitted maple leaf anywhere in the world. This autumn-coloured leaf will be located over in the sugar maples (*Acer saccharum*) in Forest 16 and will be clearly visible from the Village Centre. Of course Warm Trees 2016 will also feature other colourful ideas, yet to be revealed.

To further add to the Canadian flavour, Warm Trees 2016 will be launched on 1 July by His Excellency Mr Paul Maddison, High Commissioner of Canada in Australia.

Some of the squares knitted for previous Warm Trees events have now been recycled into unique dog coats, designed by Jenny Cantlon. During the launch, these will be gifted to Domestic Animal Services to help keep Canberra's rescue dogs warm during winter.



Above: Doreen Wilson, knitting while surveying the pile

Right: How long is long enough?

PHOTOS:
LINDA MULDOON



The displays will remain in place for the month of July.

Jocelyn Plovits (left) with Jenny Cantlon (right), as they explained the design concept



What did the Friends' survey find?

BY ANNA HOWE

Many thanks to the many Friends who completed our online survey in January. This input has provided the Friends' Council with a basis for planning future activities. The following is a short report on the highlights of the findings.

Friends are stayers

Close to half of the respondents had joined before the public opening of the Arboretum in February 2013 and just over half had joined since. Three in four had already renewed their membership for 2016 and almost all of the remainder were intending to do so. Some 90 per cent were living in the ACT.

Frequent visitors

Half of the respondents had visited the Arboretum more than ten times during the past year. Apart from visiting for guiding, visits were most likely to be to attend a Friends' monthly long walk. The next most common reasons for visits included attending the Friends' Talks in the Margaret Whitlam Pavilion and quarterly meetings.

Not as many of the respondents joined in general working bees but most who did participated five or more times. Small numbers of respondents were involved in tree monitoring, Bonsai guiding and STEP's Forest 20, but most of those that were involved participated frequently.

Which events were we involved in?

One in three respondents joined in a Tree Week 2015 activity with the Wonderful Wollemi Exhibition in the Village Centre attracting the most interest. Some 95 per cent of respondents were satisfied with the activities they attended—the great majority were very satisfied.

One in three respondents were engaged in our Warm Trees event, through knitting, installing, taking down, and/or visiting. Almost as many had attended *Voices in the Forest* as a paying customer or as a volunteer. One in five entered the photographic competition or visited the exhibition of winning entries.

Neither lack of information nor costs were barriers to attending any events; rather, members were away from Canberra at the time or had other commitments.

Many comments expressed very positive views about being involved in the Arboretum overall or in specific activities and many expressed regrets about not being able to be more involved. Many said they loved their activities as a Friend, and the Arboretum was a favourite place in Canberra.

Purchasing

The *Arboretum Book* is the runaway leader among purchases of Friends' products—two out of three respondents had purchased one or more copies. Next in popularity came the 2016 calendar and the Friends' T-shirt. Not surprisingly, the discounted parking pass was rated as an important benefit of membership by nearly 70 percent, and half also appreciated discounts at the Sprout Cafe, major events and the Curatoreum gift shop.

How do we get information about what's on?

E-Updates effectively reached all respondents and 80 per cent received and read the Friends' quarterly *Newsletter*. One in three look at the Friends' and Arboretum websites monthly, but far fewer use social media. Very few commented that information was lacking or hard to find. Rather, our Social Media Secretary received high praise for the frequent and concise e-Updates.

Being a Guide

Friends who had been Guides for three months or more were highly-committed, with two out of three of them doing two or more shifts a month. Guiding was also very satisfying, a very positive experience for most. One in three found it less so, and a handful found it disappointing compared to their expectations.

The reason respondents gave for not wanting to become a Guide was most often associated with other commitments or health.

While the Guides are the largest single group involved in any one Friends' activity, many are also engaged in other volunteering activities within the Friends and outside in the general community. This overlap indicates a need to keep activities as inclusive as possible and for outreach into the general community, where there are many potential members of the Friends.

Which activities would we be likely to attend?

'Open Gate' days with guided walks in the forests in the southern section of the Arboretum was the most popular proposed activity according to 60 per cent of respondents. This event has now happened. Around half said they would attend Tree Week 2016 activities. This event has also now happened—see report pages 5–8.

Two other possible future events that attracted the interest of half of the respondents were: a seminar

The wide range of activities and events that the Friends could offer presents us with the challenge of developing a program that builds on our successes, appealing to range of members' interests, while also linking into other ACT events that involve the wider community.

during Science Week in August 2016, and a 'Tree Club' meeting each month to visit a forest and discuss a species, with the option of staying on for coffee or lunch at the Sprout Cafe (rather like a book club).

Friends' 10th Anniversary in 2018

Establishing a Friends Garden has been suggested as a way of marking the Friends' 10th Anniversary in a lasting way. Just over half supported this idea strongly and another third moderately; less than 5 per cent did not support the idea at all. The survey did not ask for donations or commitments to donate, but it did seek indications of support. One in three said they would

As a project planned 'by the Friends, for the Friends', a Friends Garden is likely to achieve the greatest success in attracting support from Friends. Council will consider this idea further.

make 'a substantial, one-off donation', one in four would donate \$100 to \$200, and most of the rest were prepared to donate \$50. To address support for a Friends Garden, our Council will discuss possible garden options with Arboretum management. These will be in keeping with long-term plans for gardens within the Arboretum.




PHOTO COMPETITION

Capturing Springtime at the Arboretum

School children and college students are invited to capture images of the National Arboretum Canberra which feature:

- new leaves emerging on trees after winter;
- springtime blossoms; or
- wildlife (birds, nests, reptiles, insects, spiders, fungi, plants, etc.).

We are encouraging young photographers to take an interest in all the flora and fauna on offer, whilst creating exciting and innovative images (from close-up or afar), recording something of this particular time and place.

The best photos will be displayed at the Village Centre and may appear on the websites of the Arboretum and the Friends of the Arboretum, and/or be used in promotional material.

For guidelines, prizes and entry forms go to:
www.arboretumcanberra.org.au

ENTRIES CLOSE 1 DECEMBER 2016



Planning for our photo competition is underway. Guidelines and entry forms will go on our website in July. All Canberra schools and colleges will be circulated with the relevant details.

Volunteers of the Year

This May, two exceptional people received 'Volunteer of the Year' awards at our Annual General Meeting.

They were:

Joanne Maples

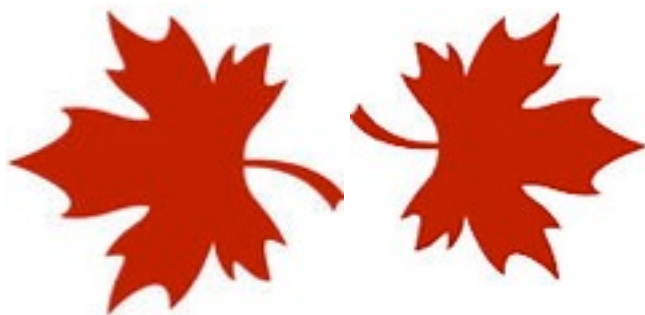
Joanne devotes an enormous amount of time to the Arboretum. She shared the Guides Roster Co-ordination role with Kathryn Cole on a three-month rotation basis (estimated to be a contribution of nearly half of a full-time position during those periods). She also undertakes two or three guiding shifts a month, leads hour-long forest walks, participates in guiding at special events and acts as a mentor to new guides. Her other activities have included selling excess tree stock, working bees, contributing to the development of information for guides, and helping with the Arboretum's school holiday activities. As Jocelyn Plovits said: '... she deserves a nomination for all her hard work'.

Jim Miller

It is estimated that during 12 months, Jim contributed over 412 volunteer hours to the National Bonsai and Penjing Collection of Australia, often as a stand-in for the Curators during their absences. He is also a member of the Collection Advisory Committee. Jim has been involved with the Collection since the beginning. He was part of the planning group initiated by Roger Hnatiuk in 2004. At that time Jim was President of the Canberra Bonsai Society, a position he held for eight years, and he was influential in gaining the local bonsai community's support for the Collection. He contributed to the design and construction of display benches for the temporary facility in Commonwealth Park.

Since the Collection opened in 2008, all-weekend opening has been run by volunteers. Along with Grant Bowie and Roger Hnatiuk, he took turns to open the Collection at weekends until the number of senior volunteers was increased to spread the load.

Jim is also a very capable bonsai artist and he has contributed not only his time, but his bonsai artistry and skills to the maintenance and improvement of trees in the Collection.



Autumn at the Arboretum

Opening of the Tree Week exhibitions

A REPORT BY ANNA HOWE

On 2 May, Caroline Lambert's energy and commitment were very evident in her address at the opening of the exhibitions in the Village Centre. As Climate and Environment Counsellor in the Delegation of the European Union, based in Canberra, Caroline had previously taken a major role in liaising with officials in Australia in the lead up to the United Nations Climate Change Conference which led to the signing of the Paris Agreement in late 2015.



Caroline began her address with an example of the power that can be generated by local community action led by school children. The **Plant for the Planet** initiative began in Germany in 2007, and by 2011 one million trees had been planted world-wide. Their target is to plant one trillion trees by 2020. She went on to explain that her



Caroline Lambert speaking in the Village Centre

role was not limited to working with governments and ministers, but encompassed engaging with many different organisations, such as the Arboretum and the Friends' group.

In order to illustrate the scale of action for change in European Union member countries, Caroline then outlined how a linear model of production and consumption is being replaced by a circular approach to environmental management. This new model, based on recycling, is particularly suited to using forest resources to achieve sustainability in Europe's dwindling areas of natural forest. Research is an integral part of this model, with the European Forest Genetic Resources Program focusing especially on conserving trees that are now only found in small populations.

Caroline's address was well-received by the audience of Friends, Arboretum staff and other visitors to the Village Centre. Her accounts of successes gave us all some very positive take-home messages.



PHOTOS:
LINDA MULDOON

TREE WEEK 2016—THE TALKS

Geological history of deciduous trees

TALK AND SYNOPSIS BY JENNIE WIDDOWSON

I set out to answer two questions for this topic: when did trees first become deciduous; and why did they become deciduous?

The more I investigated these questions, the more problems I found. The fossil record for plants is very incomplete, and little research is available about some species. This is partly due to the lack of fossil specimens available.

For fossil production of ancient plant species, there needed to be sudden submersion of the trees or other plant material caused by flood, tsunami, volcanic ash cloud or mud flow. Vegetation may have rotted once it had been inundated, so it needed to be quickly buried and compressed to start the process of fossilisation. Also the rock containing the fossils needed to be eroded in order for the fossils to become accessible.

These inundations are not very common and in order to study ancient deciduous trees, the inundation needed to occur when the tree was losing, or had recently lost its leaves. A further problem is proving that fossilised fallen leaves have been deposited by a deciduous tree, rather than a dead tree or leaves blown off in a storm.

There are a number of reasons why trees shed their leaves. It may help them to better cope with the weather they are experiencing, such as strong winds or snow, or as a response to insect attack. Losing leaves also helps a tree to adapt to a new harsher climate if temperatures are cooling in response to a global climate

Glossopteris leaf mat



change such as an oncoming ice age or other extreme event. A seasonal leaf loss is generally thought to be less costly to the trees's resources than constantly losing and replacing leaves. This allows the tree to shut down and use minimal resources over the harshest periods. This seasonal leaf loss is shown by many angiosperms, gymnosperms and ginkgoales.

EARLIEST EVIDENCE OF DECIDUOUS TREES

Fossil remains of Glossopteris (seed fern) forests have been found in Permian rocks (299–250mya) in Antarctica. Glossopteris was the dominant tree of the southern continent at that time. Fossilised leaf mats have suggested that the trees were deciduous. In the Antarctic, rocks there are both fossils of the fallen leaves and tree trunks. The tree rings in these trunks were found to have two different growth modes. There was the time when the tree was actively growing (early wood) and the time when the tree was preparing to be dormant (late wood), when growth stops and carbon is stored in cells. This late wood has denser and thicker cell walls.

In addition, carbon isotope studies measuring carbon 13 variability in the tree rings was used to confirm the deciduous status, but these studies showed mixed results. It was concluded that glossopteris forests may have contained both evergreen and deciduous trees.

Although the climate in the Permian was warmer than the present, the trees would have still experienced extreme variations of light. During the winter periods, light would have been very low, making photosynthesis difficult. Shedding leaves was probably an adaptive response to these low light conditions. Those trees that were still showing evergreen characteristics may have experienced short periods of dormancy.

Another probable very early deciduous tree is the ginkgo. It was the first identified in the Jurassic era (270mya) and increased in both number and species and its geographical distribution then declined from late Cretaceous.

There is no direct evidence or accepted theory about the origin of the ginkgoales, but the most common theory is that they probably originated from progymnosperms which were related to either the pteridosperms and cycads or to the cordaites and conifers.



Ginkgo fossil leaves

VEGETATION IN THE CRETACEOUS

Vegetation was evolving quickly in the Cretaceous era (145–65mya) and many new species appeared. Angiosperms became abundant and diverse with more than 200,000 species identified from pollen fossils. They evolved adaptive traits to withstand drought and extreme cold by developing advanced leaf stem anatomy and root systems able to survive severe winters. Many present-day angiosperms are also deciduous, but have they always been so? There is no specific evidence either way.

However, there are a number of points to ponder which may relate to the development of deciduous trees:

- ◆ The magnolia has both evergreen and deciduous species. It was first identified 140mya.
- ◆ Oaks have both evergreen and deciduous species.
- ◆ Most gymnosperms are evergreen, but dawn redwood (*Metasequoia glyptostroboides*), the swamp cypress and Montezuma cypress (*Taxodiums*) and the larch are all deciduous. In the past, some of these species tended to grow at latitudes where light was low, so survival was easier if the tree could lose its leaves and shut down completely for six months.

The climate in the early Cretaceous was warm, but gradually became cooler towards the end of the era. Those trees with broad non-deciduous leaves tended to die out except in tropical regions, but those that developed small, tough, evergreen leaves were able to survive in some areas.

Deciduous forests are now mainly found in the northern hemisphere where there are moist, warm summers and frosty winters, for example, eastern North America, eastern Asia and western Europe. Very few deciduous tree species are found in the southern hemisphere. *Nothofagus* (southern beech) is found in Australia, New Zealand and South America.

THE K-Pg EXTINCTION

During the Cretaceous period there was intense tectonic activity which caused large-scale mass extinctions. A 10 km diameter asteroid collided with Earth about 66mya. It landed in the Gulf of Mexico and the effects of the asteroid passing through the atmosphere and breaking up caused a burst of infra-red radiation and a massive dust cloud. Firestorms from the heat pulse reduced oxygen levels and increased the carbon dioxide levels around the world. The effect of this was the immediate death of many organisms. Mega tsunamis inundated the land, causing further destruction. The global dust cloud, which also contained sulphuric acid particles, caused a loss of sunlight and a reduction in photosynthesis, resulting in further extinctions, especially in plant life but also in animal life that relied on the plants for food. It is estimated that 85 per cent of all species that existed at that time were extinguished, including all the non-avian dinosaurs. Pollen studies have shown there was a high diversity of plant species before the asteroid impact and a much lower diversity after the impact.

It is estimated that the intense dust cloud lasted for about a year, but took up to ten years to dissipate completely. Recovery of species took between a few centuries and a millennium. Eventually vegetation was re-established, firstly with spores appearing, followed by ferns, then angiosperms and some conifers. These hardy species had to continue adapting and modifying their structures to survive the ice ages which occurred in the Cenozoic.

While there is little evidence to describe the mechanisms used by trees to become deciduous, there is plenty of evidence that trees which exist as deciduous today, also existed in the Cretaceous

period, but they were not necessarily deciduous then. It is likely that becoming deciduous was a mechanism used by trees to survive climate change. Both glossopteris and ginkgo appear to have been deciduous prior to the Cretaceous.

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Why do leaves fall in Autumn?

TALK DELIVERED BY ANDREW CARTER

This report is based on Sue Genner's notes

Andrew planted his first tree in a public space in rural South Australia more than 50 years ago. He went on to study botany and after graduation, worked in the fields of botany, forestry and ornamental horticulture.

Andrew Carter, at the beginning of his talk



This talk began with Andrew hovering over his colourful installation of red capsicums, mandarins, Granny Smith apples and more, while playing the 'Mamas and the Papas' song *California Dreaming* with the lines 'When all the leaves are brown and the skies are grey'.

He went on to talk about leaf senescence—the aging of leaves and the cause of autumn leaf colour in deciduous trees. The particular colour, rate of change, and timing, all vary with the species and with the local conditions. A tree species that drops its leaves in autumn in Canberra may drop its leaves in summer in another very dry location. This perennial strategy can be an effective survival strategy, because the tree saves energy during winter by not expending it on supporting leaves. It stores energy in the trunk, directing it towards the roots and the growing points, ready for a growth spurt when spring eventually arrives.

Other factors influencing leaf senescence are the energy available and the nutrient cycle. The senescence process includes maximising retention of proteins and starches before leaf fall (making an orderly retreat) and avoiding sun burn and damage via frozen leaves in cool winters. Prior to leaf loss, trees form a clean abscission zone where the leaf separates from the tree, thus avoiding/lessening the invasion of pathogens and/or insect attack. Factors shaping the process are both genetic and environmental.

The parts of trees where leaves are shed first varies between the species and there are a variety of 'patterns'. *Pyrus* varieties lose their leaves from the top down. *Ginkgos* lose their lower leaves first, while *Populus* species suffer even or uniform leaf loss, and *Fraxinus* species have random leaf loss.

The part of the leaf to colour first varies between species and the veins and some leaf margins are generally the last to change.

Green leaves are green due to the presence of chlorophyll. This acts like solar cells, converting radiated energy from the sun to drive photosynthesis.

Yellow leaf colour is due to carotenoids. This is present through all the leaf seasons, but is masked by chlorophyll in spring and summer. Some carotenoids act as antioxidants and, as chlorophyll breaks down, the carotenoid may protect the leaf from sunburn.

An exhibit on display in the pavilion (Washington thorn)



Brown leaves are due to tannins which are present in all leaf seasons. They act as antioxidants and can inhibit leaf attack by pathogens.

Red and purple leaves are due to anthocyanins which are only produced in autumn and only some trees, such as the *Robur* species, have this. It acts as an antioxidant and may have a role in limiting frost damage.

Which trees in the Arboretum have the best autumn colours and why?

PRESENTATION BY ADAM BURGESS

As the Arboretum's Head Horticulturalist, Adam needed no introduction and he gave a very well-illustrated entertaining talk, showing the many varied colours found in the Arboretum trees.

The small picture: bonsai in autumn

PRESENTATION BY LEIGH TAAFE

Leigh is Curator of the National Bonsai and Penjing Collection of Australia and he gave an illustrated talk on how autumn brings exciting colour to many exhibits in the bonsai pavilion and some trees only come out to the public display area during the autumn period.

The big picture: what remote sensing tells us about seasonal change at the Arboretum

PRESENTATION BY ASSOC. PROF. CRIS BRACK

Associate Professor Cris Brack of the Fenner School of Environment and Society wore very forest-oriented knitwear to deliver his entertaining and informative talk (see foreground of the pic at bottom of page 5). Prior to this, many of us were not aware that the ANU now spreads its surveillance well beyond Forests 98, 99, and 101 to cover the entire Arboretum. We became aware that the ANU's close relationship with the Arboretum is very likely to enhance knowledge on the world stage and they have gained the funding for the purchase of various types of drones and technology to make real progress. It may put our pedestrian tree-measurers out of work in the years ahead, but this brave new world sounded very exciting!

What makes for a brilliant autumn in Canberra's street trees?

PRESENTATION BY CARMA SWEET

Carma has worked in her present position, in charge of Asset Co-ordination, Urban Services in the Department of Territory and Municipal Services, for the past three years. She has a keen interest in urban design and landscape management, having a background in Landscape Architecture and Environmental Science. She illustrated many of our city's autumn colour hotspots, leaving us very aware that we live in a very beautiful city. Our Arboretum sits to one end of a well-treed city, rather like another huge arboretum!

CONCLUSION

Those attending thought this event was very successful and we enjoyed the exhibition of autumn leaf water colours, surrounding us on the walls of the Green Room.

Acer saccharum

SUGAR MAPLE

BY LINDA MULDOON

A. saccharum is a medium to large deciduous tree, typically with a height of 30 m and a spread of 15 m, but exceptional specimens can reach a height of 45 m. Trees are around 10 m tall after 10 years in their natural habitat. Forest 16 was planted in 2009, so it will be interesting to discover how tall our trees are in 2019. This species can live up to 500 years in favourable conditions. The smooth, brownish-grey bark becomes furrowed with age.

Mid-green leaves, about 20 cm long and 20 cm wide, are palmate in shape with five lobes. In autumn the leaves turn to brilliant reds, yellows and oranges, with some trees displaying a mixture of colours. Sometimes parts of a tree will change colour weeks ahead of the rest.

Trees begin flowering at 10–15 years of age. In early spring, greenish-yellow flowers hang in drooping clusters, with both male and female flowers occurring on the same tree. Winged fruits form (called samaras) with each containing two round seeds.

Sugar maples are native to north-eastern North America, extending from Nova Scotia westwards to southern Ontario in Canada, and south as far as Georgia in eastern United States. They tolerate more shade than most deciduous trees and grow in most types of soil, except sand. Trees grow at elevations of 500–750 m in the north of their range and 900–1500 m in the south. They favour cooler climates

This is not a rare or threatened species, but it is susceptible to pollution, acid rain, soil acidification and salt. These factors, along with land-clearing, have reduced the natural stands of sugar maples. It is the state tree of the US states of New York, Vermont, West Virginia and Wisconsin.

Sugar maple in autumn colour at the Arboretum on 19 April
PHOTO: AUTHOR

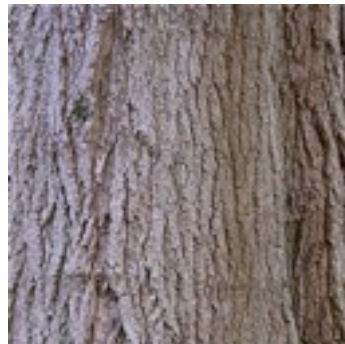


New leaves PHOTO: CAPTAIN-TUCKER



Flowers PHOTO: DONALD CAMERON

Sugar maple is an important tree in Canada, being the major source of sap for making maple syrup. After tapping the trees, an evaporation process concentrates around 34 litres of sap to make 1 litre of maple syrup.



Bark PHOTO: DEREK RAMSEY



Fruit (samaras) PHOTO: QUERCUS1981

Below; Sugar maple in winter in Ewing, New Jersey PHOTO: FAMARTIN





Maple syrup production

Maple syrup was first discovered by the indigenous peoples of North America and over time, European settlers refined production methods, particularly through the 1970s. The Algonquians recognised maple sap as a source of energy and nutrition and they used stone tools to make V-shaped incisions in trunks. The collected sap would be concentrated by dropping hot stones into it or leaving overnight for ice to form on the surface and then discarding water via the ice layer.

The Canadian province of Quebec produces 75 per cent of the world's maple syrup output. Vermont is the largest producer in the United States, generating about 6 per cent of global supply.

Trees were once tapped for their sap with collection buckets as in the photo top right and Vermont coin, but plastic tubing has superseded this method, directing the sap from multiple trees into a single storage tank. In springtime when the nights are still cold, water from the soil is absorbed into the tree. During daytime, warmer temperatures create pressure that pushes the pressure down to the bottom of the tree, making it easy to collect the sap. In Canada the sap is gathered over 12 to 20 days, usually between March and April, depending upon the region.

The number of times a single tree can be tapped, depends upon the tree's trunk diameter and growth rate. Any tree with a trunk over 20 cm diameter can be tapped. Each 20 cm increase in trunk diameter permits trees to be tapped a second or third time during the harvest season. The tapping is said not affect tree growth if these regulations are adhered to.



Right: State quarter of Vermont
PHOTO: UNITED STATES MINT

Left: Sugar maple in autumn colour
PHOTO: SELECTREE



Trees with taps and buckets for collecting sap to be made into maple syrup at Beaver Meadow Audubon Center, North Java, New York
PHOTO: DAVE PAPE

After harvesting, the maple sap is transported to a sugar house, where it is boiled down to create maple syrup.

Maple syrup is graded according to the Canada, United States or Vermont scales, based on its density and translucency. In recent times both Canada and the United States have been refining their grading systems.

It is not yet known exactly what compounds are responsible for maple syrup's distinctive flavour. Its primary flavour-contributing compounds are maple furanone, strawberry furanone and maltol. New compounds such as quebecol, a natural phenolic compound, are being discovered—these form during the boiling process.

Four different grades of Vermont maple syrup
PHOTO: DVORTYGIRL



FOREST TALK



PEDAL POWER'S ARBORETUM ZIG-ZAG RIDE

On 18 May, Pedal Power ACT 'recycled' their way up the zig-zag path through the Central Valley for another photo shoot. Participants certainly looked colourful!



BEHIND LOCKED GATES

On Saturday 23 April, the gates on River Road were open to the public for the first time and visitors in about 500 cars were able to drive south to discover some of the Arboretum's hidden treasures. The Friends played an important role at this event, supporting the Arboretum by greeting and directing visitors and leading free guided walks. The event was deemed a success and will be repeated at a later date.

MENTIONED IN DISPATCHES!

Kaye Birch, from a Sydney bushwalking group (on day five of walking the entire Canberra Centenary Trail), was having difficulty locating the route for the start of the south-bound track towards Stromlo Forest. She asked our guide Alice for directions and Alice took the group to where they needed to be and gave

them a little guided tour along the way. Kaye wrote of Alice: 'Her thoughtfulness and help was very much appreciated by us—please pass this onto her'. Well done Alice Posselt!

MAPLE LEAF SHAPES UP!

Continuing on from our story on page 2, this was the progress on 25 June.



CHANGED DATE FOR PHOTO COMPETITION PRIZE-GIVING

Prizes were to be awarded on 28 November at the Margaret Whitlam Pavilion event. Now the closing date for entries is 1 December and the event has been moved to Monday 12 December. This change came about because Linda Muldoon, the competition organiser, wanted to go on the trip to Chile and Argentina (14 November to 1 December) to see our South American species growing in their natural environment and hopefully get photos for a future version of *The Arboretum Book*. The competition judges will be: Graham Tidy (*Canberra Times* photographer, David Flannery (architect and photographer) and Linda Muldoon.

TWO SEATS NEED SPONSORS

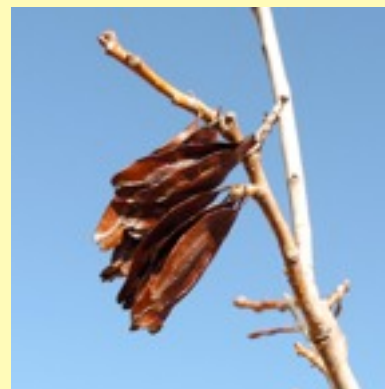
Usually Arboretum seats are only installed after sponsors have come forward. However, two seats have been installed early and we are still looking for sponsors. One is located in the Central Valley and the other is in Forest 14, the Persian ironwoods. They would cost donors \$5500 each (with plaque). Can you help? Email: colette@arboretumcanberra.org.au or phone 0418 412 640.





VISITORS FROM SWITZERLAND

On 19 April, Max Bourke guided eight Swiss visitors on a long walk around the Arboretum. They were two professors and six students from the Institute of Postindustrial Design in Basel and they were in Canberra to visit the ANU School of Art as part of their course. They were extremely interested in the background to the establishment of the Arboretum as a cultural attraction after the fires.



PHOTOS: LINDA MULDOON



Maggie Hawkes (left) and Lorraine Nicholls
PHOTO: ANGE MCNEILLY

FURTHER PROFITS FROM FIGS

We made a further \$572.30 profit, just from fig jams and chutneys, and aubergine pickles and basil pesto that were both made from fresh produce harvested from the Canberra Discovery Garden. Thanks to Bev Kaiser for harvesting small quantities of figs from Forest 3 on many occasions and to the all those involved in culinary production, label sticking etc. and to Lorraine Nicholls for managing the market stall on 21 May and going on radio to promote it.

MORE FRUITS RIPENING

Now that our trees are getting more established, we saw many species with mature fruits for the first time this year.

Top right is in Forest 42, *Eucommia ulmoides* (Chinese rubber tree); second right is Forest 45, *Luma apiculata* (Chilean myrtle); third right is Forest 67, *Styrax japonicus* (Japanese snowbell); and bottom right is Forest 86, *Diospyros lotus* (date plum).

2016 ACT VOLUNTEER OF THE YEAR AWARD

The Friends of the National Arboretum Canberra received a **Recognition Award** from Volunteering ACT 'in recognition of outstanding voluntary service to the Canberra region'. Thank you volunteers—you have been noticed!

AUTUMN-TONE WALKS THROUGH TREE WEEK

During Tree Week, 2–8 May, our guides led walks through our forests of autumn colour and read autumn-themed poetry along the way. Here is Guide Helen Hemphill in the black tupelos, reading poetry to two of the participants.



MEMBERSHIP APPLICATION FORM

Please complete this form, **OR** go to www.arboretumcanberra.org.au where you can join online and make a secure payment.

Yes. I/we wish to join the Friends of the National Arboretum Canberra Inc.

1. Title First name

L Last name

2. Title First name

..... Last name

Postal address

..... Postcode

Email address

I agree to receiving notices by email YES/NO

Telephone (h) (w)

Please remember to tell us about changes to your contact details

Date

Please circle your relevant membership category/parking voucher request:

Single	1 year \$35	3 years \$95	5 years \$155
Household	1 year \$40	3 years \$110	5 years \$180
Concession	1 year \$20	3 years \$55	5 years \$90
Association or club	1 year \$60	3 years \$160	5 years \$270
Corporate Friend	1 year \$2000	3 years \$5400	5 years \$9000

Friends' annual parking voucher \$25 Reg. No.

Total payment Please circle your method of payment

Cash Cheque Direct deposit

(cheques must be made payable to Friends of the National Arboretum Canberra Inc.)

Post membership applications to:

The Secretary, Friends of the National Arboretum Canberra Inc.
PO Box 48, Campbell, ACT 2612

Direct deposit details are:

WESTPAC, Petrie Plaza, Canberra, ACT

Account—Friends of the National Arboretum Canberra Inc.

BSB No. 032719 Account No. 375379

(when making a direct deposit, please record your name so that your membership can be verified)

Friends of the National Arboretum Canberra Inc.

Contact

You can contact us via email at friends@arboretumcanberra.org.au or visit our website at www.aboretumcanberra.org.au or by phone during business hours on 0406 376 711

Office bearers

Trish Keller OAM (Chair) Je
Del Da Costa (Secretary)
Richard Bear (Treasurer)
Colette Mackay (Donations and Sponsorship Manager)

Council members

Rob Ey
Cherie McLean (Social Media Manager)
Linda Muldoon (Publications Editor)
Lainie Shorthouse (STEP Representative)
Mike Woolley (NBPCA Representative)
The Council (all of the above) meet on the second Tuesday of each month

Life members

Max and Margie Bourke
Roger Hnatiuk
Sherry McArdle-English
Linda Muldoon
Jocelyn Plovits

Honorary member

Jon Stanhope AO

Patron

John Mackay AM

Newsletter

The newsletter is published quarterly. Please contact Linda Muldoon, the editor, by email on lindaon@grapevine.com.au if you would like to contribute an article, news or photos. Decisions regarding what content is published are determined by the Chair.

The Friends thank the ACT Government, ActewAGL, CanberraNet, Ginger Catering and Elect Printing for their support

NOTE: this page may be photocopied

