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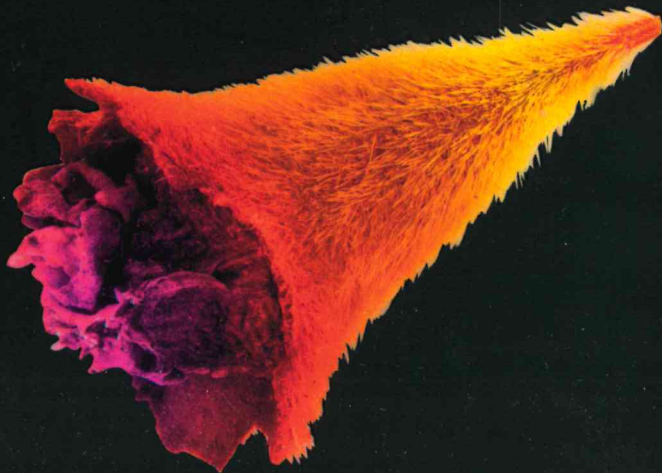
Department of Biodiversity,
Conservation and Attractions

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Lightscape Kings Park presents

The Future Keepers

Shedding light on the secrets of seeds





Xanthorrhoea

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Front cover: *Pileanthus peduncularis*

Lightscape Kings Park presents The Future Keepers



Kings Park and Botanic Garden has partnered with Sony Music and the City of Perth to deliver a spectacular illumination trail winding through the Western Australian Botanic Garden.

The creative lighting designer for Lightscape was fascinated by the diversity of seed photography produced by the Kings Park team. With some of these seeds less than one millimetre long, Lightscape presented a great opportunity to transfer these unique images into lighting displays that showcase the genetic diversity of Western Australian flora.

All seed images were taken in the Kings Park science laboratories using a powerful microscope with a digital camera, as part of a program that was generously supported by the Friends of Kings Park.





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Mangles Kangaroo Paw

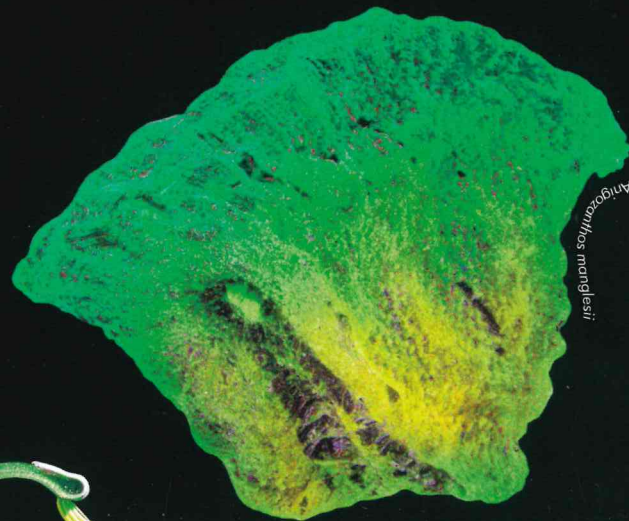
Kurulbrang

Anigozanthos manglesii

As the state's floral emblem, the Mangles Kangaroo Paw has special significance to Western Australians. It is one of 11 species of Kangaroo Paw that are only found in the South West of Western Australia. Its unique shape, height and colouring make it one of the most unusual and striking wildflowers found in Western Australia. The Mangles Kangaroo Paw is an endemic genus, meaning it grows naturally nowhere else on earth. One of its most common natural habitats is in the Kings Park Bushland.

The *Anigozanthos manglesii* seed loves smoke, heat and after a fire, it will germinate and grow rapidly. The *Anigozanthos manglesii* flower is cleverly designed to attract birds. Bird pollination in plants is uncommon on a world scale, but very common in Western Australia. The *Anigozanthos manglesii* stamens and styles are arranged so that a visiting bird is likely to brush its head against them, covering it in pollen as it feeds on the flower's nectar. The pollen then rubs off onto other flowers as the bird moves from one plant to another to feed.

Fun Fact: Kings Park scientists germinate *Anigozanthos manglesii* seeds by baking them in an oven for three hours at 100°C. This speeds up the long natural germination period, where the seed gradually matures over time and through exposure to hot summer temperatures.



Anigozanthos manglesii

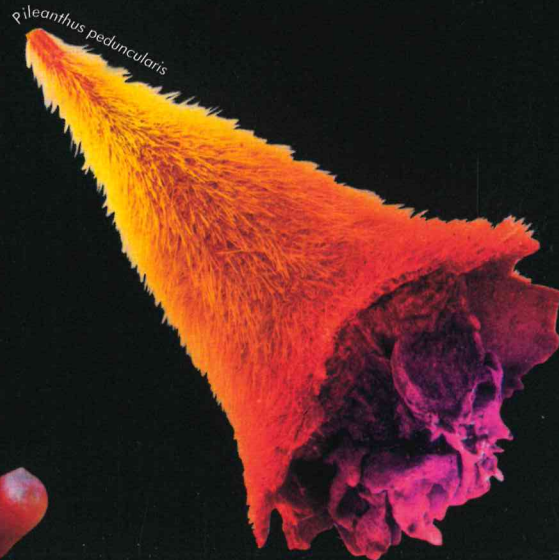
Coppercups

Pileanthus peduncularis

A spectacular sight when blooming in spring, *Pileanthus peduncularis* features vivid copper and orange coloured petals with a contrasting black coloured band and grow en masse along Western Australia's Mid Coast. This shrub grows up to one metre tall and thrives in sandy soil. It flowers in late spring and early summer. When in flower, the *Pileanthus peduncularis* bush looks leafless with its extravagant, dominant and vibrant floral shape. *Pileanthus* is an endemic genus to Western Australia and there are 10 known species.

This macro image of *Pileanthus peduncularis* is not actually a seed; it is really a fruit! The anthers on this fruit contain a syrupy nectar to lure pollinators in with its sweet smell. The fruit may contain up to three seeds.

Fun Fact: In order to germinate, the fruits and seeds of this species fall to the ground and slowly decompose over time.



Native Cornflower

Brunonia australis

Featuring clusters of blue petals atop tall, slender stems, this species is one of only a few plants that grows in every Australian state and territory. This plant gained its botanical name from the famous botanist Robert Brown who was part of Flinders' expedition to Australia from 1801 until 1803.

This striking blue-flowering species is spectacular when viewed in its natural habitat in the desert regions of Western Australia. The colour of the wildflowers vividly contrasts against the red desert sands. The *Brunonia australis* seed is dispersed by wind and its germination is activated by smoke.

Fun Fact: Plants that use wind to assist in dispersal have unique shapes to take advantage of even the slightest breeze to carry them beyond the parent plant. They also produce a high number of seeds per plant to increase the chances of a seed landing where conditions are perfect for germination.



Grey Cottonhead *Conostylis candicans*

Conostylis candicans is a distant relative to its better-known cousin, the Kangaroo Paw. *Conostylis* is an endemic genus to Western Australia, restricted to the South West region where over 70 species and sub-species grow wild. Like many Western Australians, *Conostylis candicans* is a beach lover, growing along the sandy coastal plains of Western Australia's famous coastline from Shark Bay to Augusta. Its vivid yellow flowers grow in bushy clusters.

Fun Fact: The seed of *Conostylis candicans* features a tiny embryo, which begins life in some ways similar to an embryo inside an egg. The embryo grows inside the seed and consumes energy from its surroundings to survive and to eventually germinate. Like many Western Australian species, this seed is highly responsive to smoke.



Oldfield's Darwinia

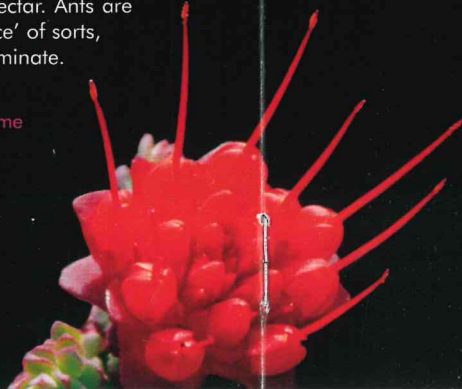
Darwinia oldfieldii

The genus name *Darwinia* commemorates the English physician Erasmus Darwin, grandfather of Charles Darwin. Most *Darwinias* grow wild in Western Australia's South West. Many species have bell-shaped flower heads with small flowers surrounded by a ring of enlarged and often red-coloured, petal-like leaves called bracts.

Darwinia oldfieldii is a compact small shrub with lovely pink flowers and grows naturally in one small area north of Geraldton.

This macro image of the *Darwinia oldfieldii* is actually a fruit with only one seed inside it. The fruit produces sticky, bird-attracting nectar. Ants are also attracted by this nectar and provide a 'delivery service' of sorts, by transporting the seeds into the soil where they can germinate.

Fun Fact: Like people, ants have their own personalities. Some colonies will 'take out their rubbish' and remove discarded seeds from their nests. Other ant colonies don't mind a bit of mess and leave the seeds underground within their nests where they will eventually germinate.



Grass Tree

Balga

Xanthorrhoea preissii

The most common tall Grass Tree of the South West is *Xanthorrhoea preissii*. It gained its botanical name from Ludwig Preiss, a Prussian plant and animal specimen collector who gathered the first Balga specimen near Toodyay in 1840.

Xanthorrhoea preissii may reach up to four metres tall with the main stem branching into separate large heads of foliage resembling grass skirts. The trunk, often blackened by fire and resin, is made up of rings of leaf bases, which are cemented together with resin. Inside the rings, vascular tissue allows water and nutrients to travel from the base of the tree to its green leaves at its top.

Xanthorrhoea preissii has particular significance for Aboriginal people in Western Australia and had many traditional uses including for tool making, shelter building and making fire. The resin was used as an adhesive and today, the woody stem base of old *Xanthorrhoea preissii* is loved by many wood turners.

Fun Fact: After a fire, *Xanthorrhoea preissii* flowers flourish quickly and seeds are released, which then germinate the following autumn. The whole process from fire to germination can take up to 18 months.



Xanthorrhoea preissii

Pink Everlasting

Rhodanthe chlorocephala subsp. *rosea*

A Western Australian spring icon, the Pink Everlasting is an annual paper daisy flower which blooms in a range of shades from pink to white. It is widespread from Geraldton through to the desert. After a good rainfall season, carpets of Pink Everlastings will spread as far as the eye can see. A field of Pink Everlastings is an unforgettable sight every spring in the Western Australian Botanic Garden.

The flower of a Pink Everlasting needs light to stay open and on a cloudy or rainy day, the petals will delicately close.

This species is the most commonly cultivated Western Australian annual here in Australia and worldwide. It is often featured in tourism promotions of Western Australian wildflowers.

Fun Fact: When growing Pink Everlastings at home you can easily harvest the fluffy white seeds after flowering and save them in a paper bag for sowing the following autumn. They are easy to grow but watch out for hungry slugs and snails that can devour young seedlings overnight.



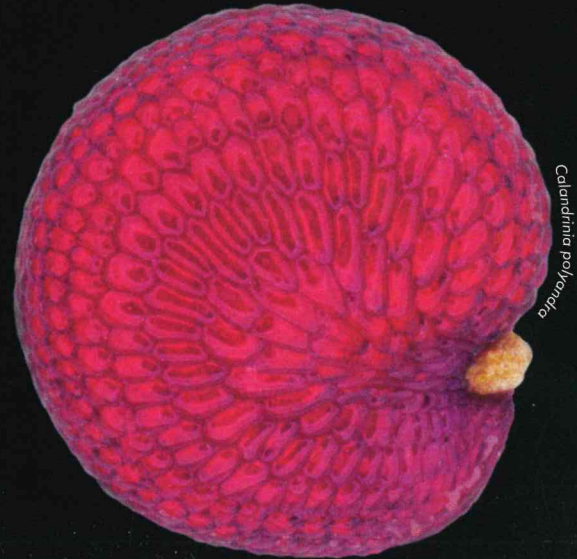
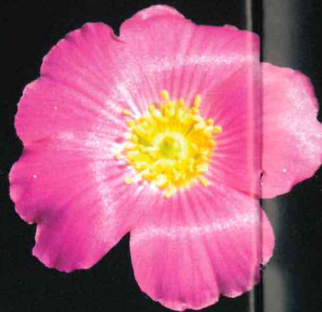
Parakeelya *Calandrinia polyandra*

Calandrinia polyandra is a succulent plant with flowers bright pink to purple with a bright yellow centre. It is attractive to insects that assist with pollination. *Calandrinia polyandra* grows mostly in arid regions of Western Australia in huge masses that form a spectacular carpet in the spring. Flowers open in the sun and close at the end of each day.

The flowers usually form a rosette shape, with each plant producing several slender flower stalks up to 30 centimetres long. Its leaves are thought to contain the toxic compound oxalic acid.

This species germinates after fire and the seed is only 0.3 millimetres in size, smaller than a grain of sand.

Fun Fact: *Calandrinia polyandra* can stay alive as a cutting for a number of weeks without any soil or water. By using the moisture held in its leaves it can continue to survive and even flower.



Calandrinia polyandra

Cooloomia Verticordia

Verticordia cooloomia

Verticordia cooloomia has a delicate scent and grows into a large shrub up to three metres tall and three metres wide. It produces masses of buttercup-yellow flower heads at the top of its stems, making it easy to spot in bushland. This species has been successfully grown as a garden plant in many parts of Australia.

This macro image shows the remnant of a *Verticordia cooloomia* fruit which may contain one or two seeds inside it. Only a few fruits contain any viable seeds, with four out of five containing no seeds at all. The seeds are activated by smoke and dispersed by wind. This plant can be grown successfully from cuttings.

Fun Fact: Despite being available as a garden plant, *Verticordia cooloomia* is a Priority Three species only known in the wild from 3 - 4 areas in the Cooloomia Nature Reserve near the Murchinson River.



The Future Keepers

Seed science

Kings Park stores the seed of 3,800 different plant species collected from all over Western Australia. This represents one quarter of all the state's native plant taxa. Kings Park has been collecting, studying and storing seed for more than 60 years.

Seed collecting

Seed is collected from all over Western Australia by the Kings Park seed collecting team who record details about each plant, its surroundings and exact location.

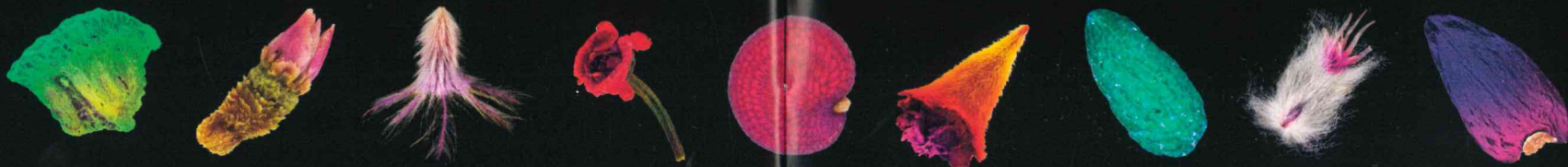
A plant specimen is pressed to assist a Kings Park botanist identify the species. Details are added to a database and dried specimens added to a 'reference library'. The seeds are then delivered to the science laboratories

to be cleaned and dried before being stored in freezers between -18°C and -20°C where they are expected to remain viable for hundreds of years.

Seed sowing

Seeds are used to grow plants in the Kings Park Nursery to enhance the 'living collection' in the Western Australian Botanic Garden. The Kings Park team also grows plants from seed for conservation projects, research and environmental restoration. Continual research and trialling on this important collection of WA flora ensures the Kings Park Nursery is a world leader in growing techniques.

Kings Park and Botanic Garden plays a critical role in conserving, managing, displaying and researching the astonishingly diverse and fragile flora of Western Australia.



Ex-situ conservation

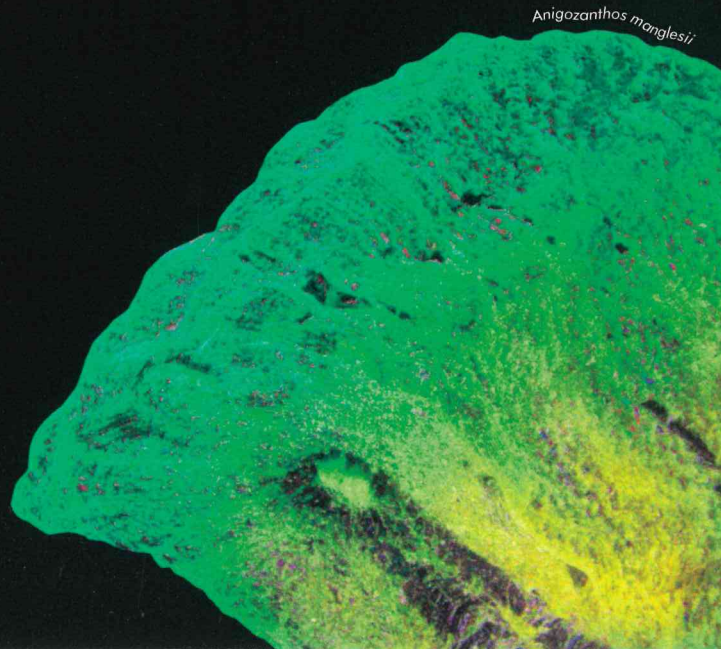
Ex-situ conservation – the conservation of plant species and their genetic diversity off-site and away from their natural habitat – is a core function of botanic gardens. The Botanic Gardens and Parks Authority (responsible for Kings Park and Bold Park) practises, contributes to and inspires environmental conservation.

Seeds have been collected and banked at Kings Park for over 60 years, with the first collections supporting the establishment of the Western Australian Botanic Garden.

Kings Park now houses a unique conservation collection of more than 3,800 different species made up of more than 13,000 accessions. This collection makes up about 25% of Western Australia's flora.

Ex-situ conservation is undertaken through state-of-the art seed banking, plant tissue culture, cryostorage, and nursery facilities.

Ex-situ collections support the continual development of the Western Australian Botanic Garden, the management and restoration of the bushlands of Kings Park and Bold Park, and BGPA's plant breeding, research, and education programs.





KINGS PARK & BOTANIC GARDEN LIGHTSCAPE

Powered by **City of Perth - City of Light**

Lightscape showcases the genetic diversity of Western Australian flora using these unique seed images as lighting displays projected onto walkways throughout the Western Australian Botanic Garden.

Kings Park and Botanic Garden continues to play an important role in conserving the biodiversity of Western Australian flora.

