





# Botanic guardian



A recent exhibition at the New Norcia Museum and Art Gallery showcased the botanic works of Charles Gardner, one of the State's most influential and enigmatic botanic figures and Western Australia's Government Botanist between 1929 and 1960.

Neville Marchant describes Gardner's lasting legacy to science and conservation in Western Australia.



by Neville Marchant



**C**harles Austin Gardner was just 33 when he was appointed Western Australia's Government Botanist in 1929. Like the Government Geologist, Government Entomologist and others with similar titles, he was expected to provide a service to the Government in his expert field. He was to serve for the next 30 years, providing expert advice on botanically related economic issues confronting a developing State.

He described important timber trees, identified the range of native poison plants and provided a book on native and alien grasses important in the grazing industry. He was to dominate WA's botanical scene until his 'retirement' in 1960 and his untimely death from Parkinson's Disease in 1970. An enigmatic and forceful figure, Gardner accomplished much, although he died regretting that he had never completed his prime aim—to publish a Flora of Western Australia.

Charles Gardner grew up in a farming family of several children at Yorkrakine, near Tammin in the Wheatbelt. Despite having no formal scientific training, Gardner became an all-round expert on many subjects: he was also a competent climatologist, surveyor, plant geographer, soil scientist, botanical historian, scientific and popular writer and illustrator with a vast knowledge of the flora of WA.



**Previous page**  
**Main:** The shrublands around Middle Mount Barren, now in Fitzgerald River National Park, were recognised by Charles Gardner as a valuable conservation area. Photo – Jiri Lochman  
**Insets from top:** Charles Gardner photographing a prostrate banksia. Photo – Loaned by Walter Gardner  
 Four-winged mallee (*Eucalyptus tetraptera*). Photo – Bill Bachman

**Above:** The Gardner exhibition was opened by Lt General John Sanderson (centre right), Governor of WA. The display featured herbarium sheets of the original specimens of material and notebooks used by Gardner in his artwork. Photo – Michael James

**Below:** Kalbarri National Park, viewed from Hawks Head lookout. Photo – Jiri Lochman

Gardner had a photographic memory for plants, and was even able to picture a plant in his mind after he had read a botanical description of it. His knowledge of soils and flowering times was staggering. One of his favourite pastimes was to guess where new WA Herbarium specimens came from—and he was usually right!

## A UNIQUE FLORA

South-western Australia is internationally recognised for its rich flora, especially of shrubby plants and their strange flower shapes. Charles Gardner recognised that "...it is only in South-Western Australia...that the true Australian flora is today most richly developed". He estimated that 80 per cent





of south-western species were found nowhere else; an approximation that was amazingly accurate given that the currently accepted figure is 79 per cent.

A characteristic of WA wildflowers noted by Gardner was that flowers were generally small, but aggregated together in heads, such as those of the southern cross (*Xanthosia rotundifolia*)—which are surrounded by large petal-like modified leaves arranged in a cross—and those of the banksias and bottlebrushes.

Charles Gardner was fascinated by the strange Christmas tree (*Nuytsia floribunda*), which grew near his boyhood home, and by sandalwood, the once-widespread shrub closely related to the Indian species of the same genus. Many of the eucalypts he studied and illustrated were rare. He also had a special interest in insectivorous plants—such as the rainbow plant (*Byblis gigantea*), the Albany pitcher plant (*Cephalotus follicularis*) and *Utricularia* species—which were uncommon and bizarre. He was fascinated by the wildflowers that had heads of flowers, such as the mountain bells (*Darwinia*), the rare Mogumber bell (*Darwinia carnea*) and the Qualup bell (*Pimelea physodes*), one of the banjines.

## FOREST TREES

Gardner was appointed to the WA Forests Department in 1920, where he developed an intense interest in eucalypts. This group of plants is now placed in two genera, *Eucalyptus* and *Corymbia*, and range from small shrubs to tall trees, such as jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*). They produce many useful products, such as timber, tannin bark, essential oils and nectar, which in turn supports a lucrative honey industry.

Unlike their eastern Australian



**Top left:** Hutt River poison (*Gastrolobium propinquum*) was discovered and described by Gardner. It is now uncommon. Illustration – Charles Gardner

**Above:** The WA Christmas tree (*Nuytsia floribunda*), the world's biggest mistletoe, is widespread in coastal south-western Australia, extending inland to near Yorkkrakine. Photo – Jiri Lochman

**Top:** At the exhibition of Charles Gardner's artworks were (from left to right): nephews Tony and Richard Gardner, art patron Ann Cullity (who studied under Gardner), nephew Walter Gardner, botanist Neville Marchant, botanical author Rica Ericsson, Dom Chris Power from the Benedictine community and exhibition curator Joy Legge. Photo – Michael James

relatives, many of the WA eucalypts have a shrubby or mallee form. A number of them have enormous sculptured fruits, with the largest being that of the mottlecah (*Eucalyptus macrocarpa*), which may be up to 15 centimetres across.

Beginning in 1923, Gardner published a series of articles on the forest trees of WA that featured his detailed illustrations. A key to eucalypts, enabling identification, was published in 1924, the year that he transferred to the Department of Agriculture. A series of more than 100 eucalypts was

described and illustrated in the *Journal of Agriculture* between 1952 and 1966, under the title 'Trees of Western Australia'. They were later reprinted as departmental bulletins, and, after Gardner's death in 1970, a new edition was compiled and published by T E H Aplin.

During his lifetime, Gardner described 15 new species of *Eucalyptus*, including *Eucalyptus megacornuta* and *Eucalyptus coronata*.

## POISON PEAS

The first settlers of the Swan River Colony were confronted by an array of





native plants that were highly toxic to their valuable, imported sheep, horses and cattle. After many stock losses, botanists such as James Drummond (the first Government Botanist) found that the major culprits were a number of shrubby species in the legume family. European farmers were used to legumes being nutritious and suitable for grazing; yet in the new colony they caused severe economic losses, which continued well into the 1900s.

As Government Botanist, Gardner was charged with confirming which of the species were toxic, and with making his findings known to the agricultural community. In 1929, the year of his appointment, he joined forces with Dr H W Bennetts, a scientist at the Department of Agriculture. In 1934, a large-scale trial of suspected poisonous plants confirmed the toxicity of a number of members of the genus *Gastrolobium* and all of the *Oxylobium* species (all of which are now recognised as belonging to the genus *Gastrolobium*). A number of poison plant leaflets, covering legumes and other native and introduced poison plants, were published to assist in identification. In 1937, Gardner joined with brilliant botanical artist Edgar Dell to publish an illustrated guide, *The Poison Plants of Western Australia*.

In 1956, Gardner and Bennetts published a definitive account of WA's poison plants—*The Toxic Plants of Western Australia*—with many excellent colour plates by Dell and some by Gardner himself. Gardner also prepared detailed botanical drawings in black and white, to illustrate the distinguishing characters needed for positive identification of poison plants.

**Top left:** Like many WA blooms, the individual flowers of the southern cross (*Xanthosia rotundifolia*) are small and surrounded by white modified leaves. The inflorescence is arranged in the shape of a cross.

Photo – Marie Lochman

**Centre left:** Gardner named the rare Mogumber bell (*Darwinia carnea*). This is the very rare Narrogin variant.

**Left:** The fruits of mottlecah (*Eucalyptus macrocarpa*) are the largest in the eucalypt family and can be up to 15 centimetres across.

Photos – Bert & Babs Wells





## GRASSES

A major task of the Government Botanist was to study economically important plants. The huge pastoral industry depended on native and introduced grasses and other fodder plants, so Gardner selected the grass family for treatment as the first part of a massive undertaking—a published book on the flora of WA with descriptions of all known plants, keys to identify them and many illustrations to assist.

In 1952, Gardner published the *Flora of Western Australia, Volume 1, Part 1, Gramineae*. Unfortunately, this was the only part of a statewide flora he published. Nevertheless, it gave detailed descriptions of more than 120 native and alien grass genera, and keys to enable their identification. The book was accompanied by many of Gardner's detailed drawings. Even though grasses are difficult to draw, because of their intricate, small flower parts and complex structures surrounding the individual grass flowers, the drawings were excellent and greatly assisted in the identification of grasses.

Although the grass book was primarily concerned with identification of economically important species, Gardner stressed his underlying concern for their conservation. He pointed out in the introduction to his grass book that uncontrolled exploitation of native grasses might lead to desertification. He wrote:

It is thus of the utmost importance, in our pastoral areas, to maintain, by careful stocking, that delicate balance between the plant and its environment which, once lost may lead to the irreparable loss of a valued natural asset.

## SCIENTIFIC ACHIEVEMENTS

During his lifetime, Gardner collected more than 20,000 pressed and dried plant specimens from all over the State. He described eight new plant genera and 286 species. Gardner was not originally a Latin scholar so he traded his botanical knowledge for Latin tutoring with Father William Gimenez, from the Benedictine community at New Norcia. An early scientific landmark in his career was the publication, in 1930 and 1931, of a checklist of the Latin names of the plant families, genera and species of WA.



The *Enumeratio Plantarum Australie Occidentalis* was the only authoritative WA plant list available for 50 years.

Charles Gardner's next landmark scientific achievement was in 1942, when he delivered the Presidential Address to the Royal Society of WA, on *The Vegetation of Western Australia with Special Reference to the Climate and Soils*. Because of World War II, it was not published until 1944, but was a major compilation and analysis of the origin, evolution and diversity of the WA flora.

Many awards recognised Gardner's scientific contribution. In 1949, he was awarded the Gold Medal of the Royal Society of Western Australia. During the 1950s, probably his most productive decade, Gardner published his definitive

**Above:** Gardner stressed the importance of fire in the development of the WA flora. This Stirling Range silvery-leaved variant of drumsticks (*Kingia australis*) flowers profusely soon after a fire. Photo – Bill Bachman

study of the grasses of WA, as well as the book about the poison plants of the State.

Apart from other major scientific contributions on the ecology and taxonomy of flora, he presented ideas on the importance of fire in *The fire factor in relation to the vegetation of Western Australia*. This was published in 1957, three years before he retired, and his conclusions on the role of fire became his most controversial publication. He provided evidence that bushfires were an important factor in the evolution of

## CHARLES AUSTIN GARDNER

During his lifetime Gardner:

- collected 19,151 specimens of WA flora;
- described eight new genera;
- described 286 species new to science;
- studied and published on the botany of poisonous species of *Gastrolobium*;
- elucidated Kimberley Walkabout Disease after a study trip in 1951;
- published illustrations and details of toxic plants with Dr H W Bennetts;
- published a book on grasses of the State in 1952;
- collected 1454 specimens of *Eucalyptus*;
- described 15 species of *Eucalyptus* new to science; and
- published numerous leaflets describing the eucalypts of WA.



Gardner was also a friend to the Benedictine community at New Norcia. He left his collection of botanical specimens, gathered over 50 years, to the community, which then placed them on permanent loan to the WA Herbarium. He also bequeathed 77 unique botanical pen and ink drawings and delicate watercolours to the community, which were restored and put on public exhibition at New Norcia in winter 2002.

*Left:* A Gardner watercolour of strychnine bush (*Strychnos lucida*), a toxic shrub or small tree common in the Kimberley.

## GARDNER'S COLLECTIONS



WA species and that certain plants were even dependent on fire for survival.

In recognition of his scientific endeavour, the Royal Society of New South Wales awarded Gardner the W B Clarke Medal. In 1965, he gained a well-earned MBE and, shortly before his death in 1970, he received the 1969 Australian Natural History Medallion.

Today, Gardner's extensive specimen collections form part of the holdings of the Department of Conservation and Land Management's Western Australian Herbarium. His specimens have now been databased and his label information on where and when he collected them are available to any researcher.

### CONSERVATION LEGACY

As a knowledgeable and colourful lecturer, Charles Gardner eagerly displayed his incredible knowledge of WA flora. His many public lectures, as well as his close involvement with scientific and naturalist study groups, gave him an opportunity to emphasise the need for more effective conservation of the State's flora.

From 1921, when he joined an expedition to the Kimberley district, he travelled widely in WA. Before conservation was fashionable, he argued the need for sound conservation measures. An advocate for large reserves, especially in the most biologically diverse habitats of the State, Gardner predicted that small reserves and road

verges were not viable. He believed that to concentrate effort on these detracted from recognition of the importance of large reserves. Largely through his influence, and through the presentation of his own undisputed observations on plant geography, his persistence on large reserves was successful.

During the 1950s, Gardner made a series of landmark recommendations for protecting species-rich botanical areas. These resulted in the reservation of several of WA's most valuable national parks and nature reserves, including Kalbarri National Park, Fitzgerald River National Park, Cape Arid National Park, and the Lake Cronin area east of Hyden.

These are now among the State's most important biological conservation areas. One of them, the Fitzgerald River National Park, has become a World Biosphere Reserve. Gardner also recommended that the incredibly botanically diverse Mount Lesueur area should be reserved, but this did not occur for some time.

It is a fitting tribute to Gardner that a diverse sample of the Wheatbelt flora, close to Yorkkrakine where he developed his initial interest and expertise in the WA flora, was set aside and named the Charles Gardner Reserve. This is an excellent sample of remnant Wheatbelt sandplain vegetation and the home of the rare woolly sheoak (*Allocasuarina fibrosa*), a species described as new to science by Gardner himself.

*Above:* Gardner collected widely in WA from the 1920s until his death in 1970. All of his collections, now at the Department of Conservation and Land Management, are databased. Each dot on the map shows an individual collection attributable to Gardner.

*Below:* An acacia and the trunked zamia (*Macrozamia fraseri*) are common inhabitants of areas north of Perth, such as Mt Lesueur and Badgingarra, recommended by Gardner as large reserves. Photo - David Bettini



Neville Marchant is a Senior Principal Research Scientist with the Department of Conservation and Land Management, and the Director of the Western Australian Herbarium. As a new recruit in the 1960s, he worked with Charles Gardner, finding him enigmatic, energetic and eclectic.

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Winner of the 1998 Alex Harris Medal for excellence in science and environment reporting.

# LANDSCOPE



VOLUME EIGHTEEN, NUMBER 3, AUTUMN 2003



*Cane toads are poisonous, prolific breeders and are getting closer to the WA border. Hop to page 10.*

*Once thought to be extinct, Gilbert's potoroo has overcome many obstacles. What is being done to improve its chances of survival? See page 28.*



*The tuart once typified the coastal strip north and south of Perth. Why should we cherish this majestic tree? See page 16.*



*Discover some of the prehistoric megafauna that once roamed the State in 'Walking with WA giants' on page 23.*



*Lichens decorate Lake Muir, near Manjimup, with varying colours and shapes. Turn to page 43 to learn more about these fascinating life forms.*

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**Design and production:** Tiffany Aberin, Maria Duthie, Gooitzen van der Meer.

**Illustration:** Gooitzen van der Meer.

**Cartography:** Promaco Geodraft.

**Marketing:** Estelle de San Miguel ☎ (08) 9334 0296 Fax: (08) 9334 0498.

**Subscription enquiries:** ☎ (08) 9334 0481 or (08) 9334 0437.

Colour Separation by Colourbox Digital.

Printed in Western Australia by Lamb Print.

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Published by the Department of Conservation and Land Management, Dick Perry Avenue, Kensington, Western Australia.

## COVER

*Royal hakea rises above the surrounding heath, straight and column-like. When sunlit from above or below, its unusual large variegated leaves appear to glow like lanterns, so the shrub is also known as the Chinese lantern bush. Among the birds that obtain nectar from its flowers (hidden at the base of the leaves) is the western spinebill.*

*Royal hakea grows almost exclusively in Fitzgerald River National Park, an area that was reserved on the recommendation of then Government Botanist Charles Gardner (see 'Botanic Guardian' on page 36).*

*Cover illustration by Philippa Nikulinsky*



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*Conserving the nature of WA*