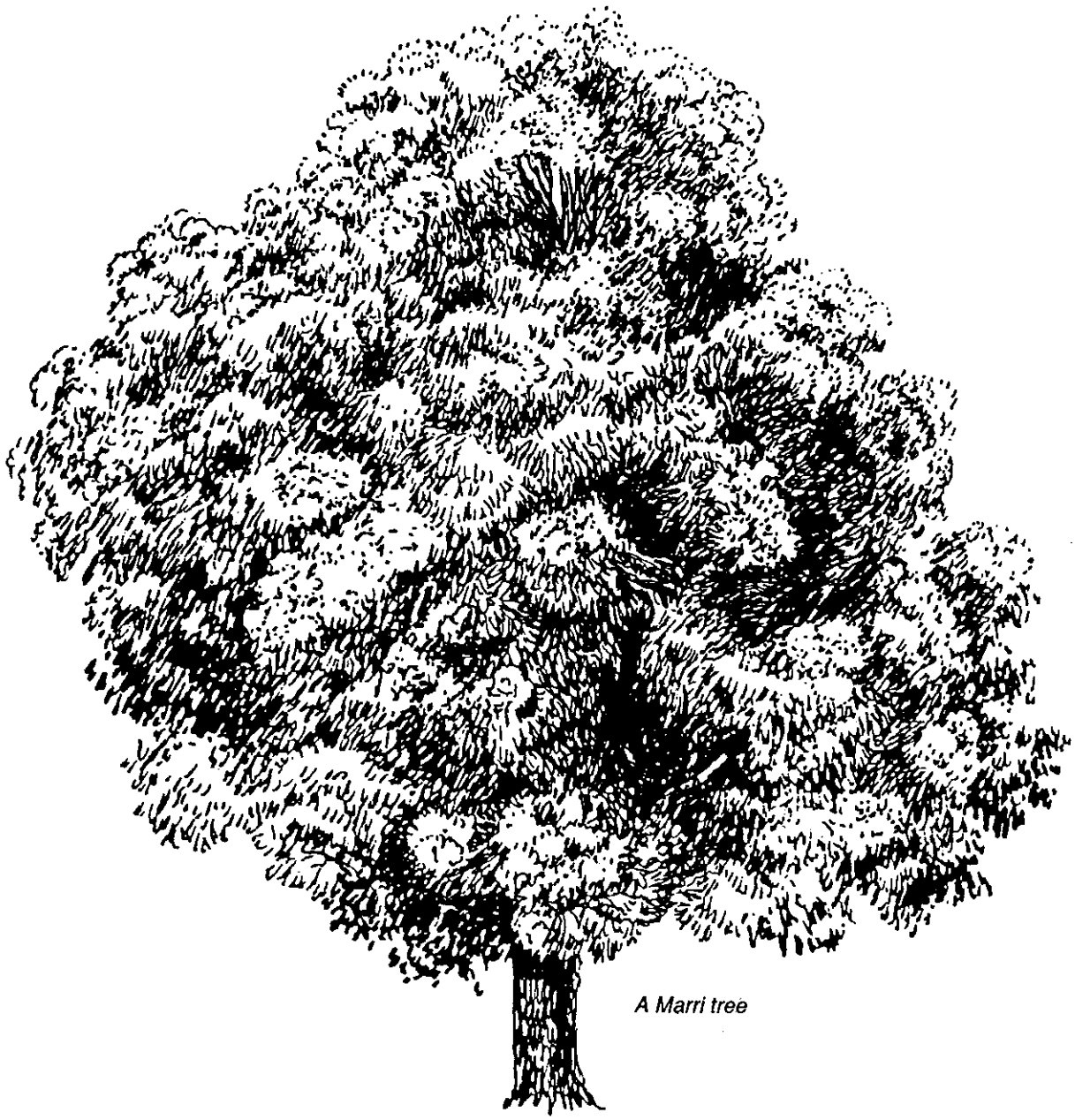
Gum Tree Pack



A Marri tree

INFORMATION AND ACTIVITIES ABOUT GUM TREES FOR GROUPS OF CHILDREN LED BY AN ADULT

Published by the Western Australian Wildflower Society.
Drawn by Margaret Pieroni. Written by Bronwen Keighery.

INTRODUCTION

Western Australia has a unique and exciting flora. The Western Australian Wildflower Society (Inc) is vitally concerned with the conservation of this flora through cultivation and provision of an adequate reserve network. To achieve this it is essential that our flora be appreciated by Western Australians. Towards this end the Society has produced this Pack to be used with young people in Western Australia to introduce them to one group of our special plants - the gum trees or eucalypts.

The Pack has two purposes:

1. To introduce children to some of the Western Australian gum trees that make our environment unique. (The aim is not to teach the children the names of the species but to acquaint them with the concept that a consistent group of characteristics, which they can observe, is common to the genus *Eucalyptus* and to the individual species of the genus.)
2. To develop an understanding of the relationship between the seeds, the adult tree, flowers and fruit, i.e. the life cycle of the gum tree.

Materials in the Pack relate to four core areas to accomplish these objectives:

1. ***Gum Trees*** - characteristics of the genus *Eucalyptus*.
2. ***Western Australian Gums*** - distinguishing selected Western Australian *Eucalyptus* species.
3. ***Seeds and Gumnuts*** - the seeds and fruit (gumnuts) of eucalypts.
4. ***Young Gum Trees*** - raising eucalypts from seed.

There are two types of material in the Pack:

PART I: Information Sheets

The Information Sheets provide background information on each of the four core areas. These Sheets are designed to be used in conjunction with the Activity Sheets in PART II. To facilitate their use in this way, each Sheet is divided into coded sections; these codes appear on any related Activity work.

The information in these Sheets is also suitable for any group (child or adult) as an introduction to eucalypts in Western Australia. Children under 11 years will need help reading these Sheets.

PART II: Activity Sheets and Leader's Guide

The Activities have been prepared for use with each of the four core areas. These are supported by a Leader's Guide which contains notes on Activity preparation and suggestions for extensions and variations of the Activity.

The level of the work is not indicated. The children's background, the size of the group and the nature of the group (family, scout, school, brownies, etc) will influence how the material is used. Generally younger children (5 to 10 years) will need a great deal of adult help. Older children will need less help. The Activity work should be developed to suit each group's needs using the leader's ideas as well as the variations and other references (e.g. those listed in this Pack).

Adults will need to read all relevant Information Sheets thoroughly before attempting to begin any Activity with a group of children. The Information Sheets will help adults choose appropriate gums to study and develop a time plan for a programme based on this material by supplying information about each gum's flowering time, the period taken for fruit to ripen and time taken for seeds to germinate.

Each Activity can be self-contained and used alone with the appropriate introduction. Alternatively each Activity can be used in sequence with other Activity Sheets.

PART I INFORMATION SHEETS
GLOSSARY
REFERENCES & ACKNOWLEDGEMENTS

Typeset by
Salli's
TYPEWORKS
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GUM TREES or EUCALYPTS

Eucalypts are, to many people, the central feature of the Australian landscape.

Generally trees or mallees, they are the most characteristic trees of the well settled areas of Australia. They are of immense cultural and economic importance, being:

- the dominant plant in much of our bush, farmland and cities
- a major source of timber for general building and construction purposes, furniture, wood turning, firewood, paper pulp and wood chipping
- of fundamental importance in soil conservation and salinity control
- the major farm, street, park and garden trees for shade, shelter and beauty
- a principal source of nectar and pollen for honey bees
- a source of raw materials for the burgeoning market in Australiana (in the form of jewellery, ornaments and inspiration for artworks)
- the source of eucalyptus oil
- a source of natural dyes

These features have led to eucalypts being grown around the world. In fact Australia imports eucalypt products, e.g. eucalyptus oil, from other countries.

Eucalypts occur naturally in Australia and some islands to the north of Australia, e.g. Timor and New Guinea.

The first eucalypts were collected by Sir Joseph Banks and Daniel Solander in 1770 when they landed at Botany Bay with Captain James Cook. It was not until 1788 that the group was named from a plant collected on another of Cook's voyages. A French botanist, Charles Louis Heriteur de Brutelle, working at Kew, coined the name *Eucalyptus* in reference to the cap - *eu*, well, and *calyptos*, covered.

There are now over 700 species of *Eucalyptus* known. The genus *Eucalyptus* belongs to a bigger group, the family *Myrtaceae* or Myrtle family which also contains the species Geraldton Wax (*Chamelaucium uncinatum*), bottlebrushes (*Callistemon*) and the myrtles (*Melaleuca*). Relationships within the genus *Eucalyptus* are very complex. Some botanists believe that there is sufficient evidence to justify breaking this large genus up into smaller genera; however, these distinctions are only of use to the botanical specialist. In Western Australia there are about 240 eucalypt species.

What's a Gum Tree?

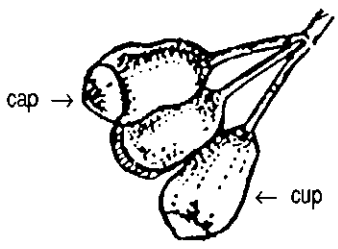
Gum trees grow naturally in Australia. They may be found in school grounds, streets, parks, gardens, the bush, farms and road verges.

Gum trees are planted in many other countries.

Gum trees have characteristic ....

A. leaves which
- are leathery to feel
- have a eucalyptus smell when crushed

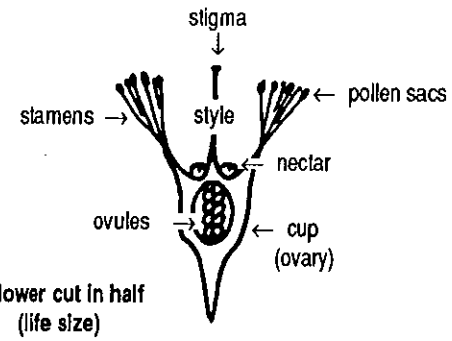
B. buds
which are made up of a ***cap*** and a ***cup***



a branch of Marri buds, flowers and a leaf (life size)

C. flowers which

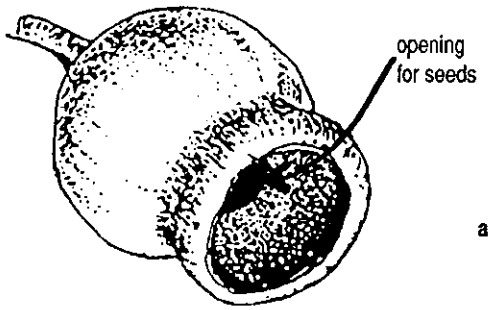
- open when the cap is pushed off by the stamens to show bright masses of stamens
- produce lots of nectar at the base of the cup



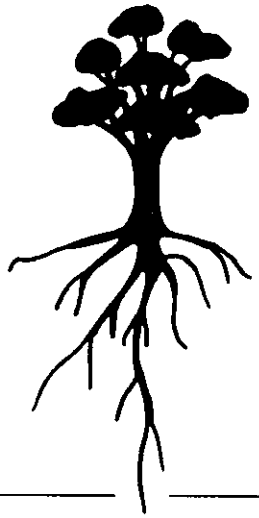
a flower cut in half (life size)

D. fruit which

- are hard and woody
- have formed from the cups when the seeds grow

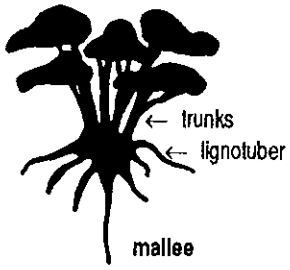


a Marri gumnut (life size)



E. trunks

Most gums are trees with a single trunk but some are ***mallees*** with several trunks. The trunks grow from the ***lignotuber***.



mallee

... and on the trunks and branches ...

F. bark which is either rough and sheds as strips or flakes, or smooth and sheds in sheets.

Introduction to INFORMATION SHEET 2

Eucalypt Species Sheets

Eleven species are described and illustrated in the Pack. These species were selected as they give examples from throughout the State and illustrate a great variety of eucalypt characteristics and uses.

DESCRIPTION

This information is divided into nine sections. Each section deals with a separate aspect, e.g. Pollination (Information Sheet 2E) or Appearance (Information Sheet 2B). The information has been deliberately divided in this way to make it easy for the children to find what they are looking for. Children only need to read the section indicated on the Information Sheet. For example, to answer the section on 1. **Your Tree's Name**, the children only have to read the first section on the Information Sheet which deals with names (Information Sheet 2A).

The sections are:

A. Plant name and its origins

Common names as well as scientific or botanical names are given.

Common names are local names and may be given to more than one species. For example *Eucalyptus calophylla* is called Marri which is unique to this species; but it is also called Red Gum which refers to *Eucalyptus camaldulensis* as well.

Scientific names - these are confined to one species and have two parts, the genus and the specific name. For example Marri is called *Eucalyptus* (genus) *calophylla* (species). When botanists find a new plant, they determine which group it belongs to for its genus and then give it a specific name that refers to some feature of the plant that distinguishes it from other plants in that genus. These names are derived from Greek and Latin. The botanist who names the plant also describes it with words and drawings. This description is published in a journal (scientific magazine). When a plant's scientific name is used in a journal, the name is followed by this botanist's name and an abbreviation of it. Marri's name is written as *Eucalyptus calophylla* R.Br., the R.Br. referring to Robert Brown, a 19th century botanist.

B. Appearance

This describes the general appearance (habit) of the gum tree as well as the bark and the mature leaves.

C. Where does it grow in the bush?

The natural distribution of the species is described and illustrated on a map of Western Australia. The soil type and rainfall of the area is also given.

D. Buds and Flowers

Information is given about when the buds form and when the flowers open. The colour and shape of both are described.

E. Pollination

This gives information on how pollination occurs in each species. Pollination is the transfer of pollen from one flower to the stigma of another flower. To form good seed the pollen must grow a long tube down the style to the ovules in the ovary. A nucleus from the pollen grain and the nucleus from the ovule fuse to form one nucleus (fertilisation) and from this develops the seed.

Pollen is moved from one gum tree flower to another by various animals (principally insects and birds) and these are described if known. The "reward" offered to these animals, the nectar, is described and the amount produced indicated.

F. Fruit (gumnuts)

The fruit are described according to their colour, shape, time taken to ripen and their persistence on the tree. The fruit (gumnuts) are the swollen ovaries containing the seed and the ovules that were not fertilised (chaff).

G. Growing..... *[species name]*

The seeds are described, giving shape and colour. The time taken for the seed to begin growing (germination) is given, the first leaves (seed leaves or cotyledons) and the seedling leaves are described (i.e. three types of leaves can be distinguished: cotyledons, seedling leaves and mature leaves - see B).

Common pests are described and specific cultivation information is given.

H. Uses

This section describes present as well as historical uses and covers such areas as horticultural and forestry uses, honey production, arts and crafts, tanning, etc.

I. Specific References

Papers and pamphlets dealing with the species are given. (At times the information required for these sheets was not available. Whenever possible observations by B. and G. Keighery were used to fill these gaps.)

ILLUSTRATIONS

These contain:

(i) **Life size** illustrations on a small branch of the gum tree of:

- leaves
- buds
- flowers
- fruit

(ii) a **life size** illustration of a seedling with cotyledons and the first three pairs of seedling leaves.

(iii) a drawing of the mature gum tree (not to scale).

It is intended that the illustrations be broken down into parts, e.g. buds, fruit, etc, and used either enlarged or reduced (e.g. Marri on the Pack cover) as illustrations for other handouts, e.g. number work - use 10 gumnuts on a sheet and 10 gumnuts as counters).

Bushy Yate

Eucalyptus conferruminata

A.

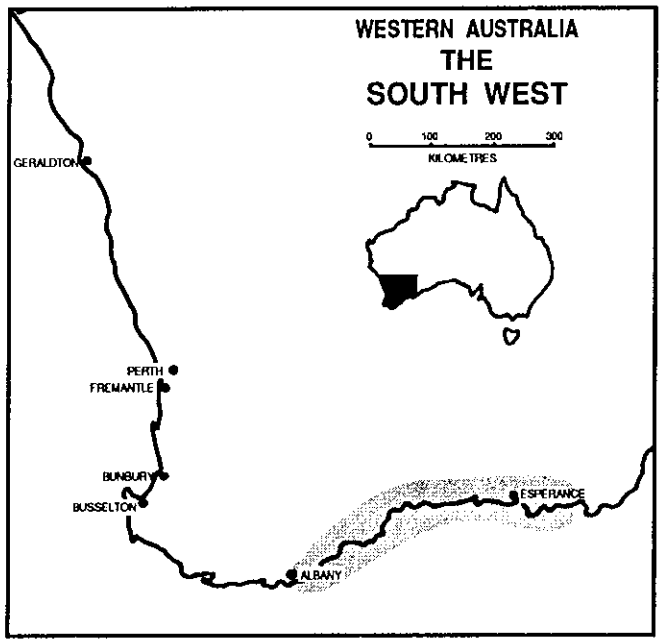
The names Yate and Marlock are both of aboriginal origin. Yates have groups of buds with long peaked caps and marlocks are small trees with short trunks. The Bushy Yate or Bald Island Marlock has been in cultivation for many years and the cultivated tree develops a dense crown that reaches to the ground (bushy). Dense stands of the tree are found on Bald Island (east of Albany); it is often stated that this was the source of the original seed used in its cultivation. Surprisingly, Bushy Yate has a very recent botanical name, *Eucalyptus conferruminata* D.J. and S.G.M. Carr (1980). Two botanists, D.J. and S.G.M. Carr from Canberra, studied the species *E. lehmanni* and decided that it contained two distinct plants, *E. lehmanni* and *E. conferruminata* from *conferruminatus* meaning fused, joined together (a reference to the arrangement of the buds).

B. Appearance

Bushy Yate is a small tree, without a lignotuber, of 4m to 8m (up to 12m) with a broad dense crown. Low branching results in a short trunk which is rough barked at the base but smooth grey to grey-brown elsewhere. Young leaves are bright green becoming green with age and red prior to falling. After a light fire, pruning or drought, trees sprout profusely along the branches and/or trunk.

C. Where does it grow in the bush?

Bushy Yate prefers to grow on the sandy loams of granitic hills along the south coast. It is found in areas with between 380mm to 940mm of rain each year.



D. Buds and Flowers

Pendulous groups of buds on flattened stalks form amongst the leaves several years before flowering. Each group of buds is formed from 19 to 35 individual buds fused together at the cup. The long caps (up to 3cm long) are pale yellow to purple and are pushed off the paintbrush-like mass of yellow green stamens. Each group of flowers forms a soft green ball. The main flowering period is from October to January but may occur outside this time.

E. Pollination

Copious nectar is produced in the flowers, especially in the early morning, and the trees are visited by numerous honey-eaters.

F. Fruit (gumnuts)

The fused mass of flowers forms a large woody mace-like head up to 8cm in diameter. Fruit are retained on the tree for many years and form fascinating shapes along the older branches, especially when these have lost their leaves.

G. Growing Bushy Yate

Dried fruit readily drops its seed. Good seed is dark brown to black amongst the red-brown chaff. Within 7 to 28 days of planting, two Y-shaped leaves should appear. Seedling leaves are hairy with rough edges. Bushy Yate has been cultivated for many years but is generally incorrectly called *E. lehmanni*. True *E. lehmanni*, often called a dwarf form of *E. lehmanni*, is a small tree or mallee with a lignotuber, and has fewer flowers in each group with long slender caps on the buds.

H. Uses

Bushy Yate is a widely grown tree, especially throughout the south-west. The bushy habit of the tree makes it an excellent windbreak and shade tree. Although tall enough to become a menace under power lines it can be pruned and makes a good street tree. The fascinating caps and fruit have many uses in craft activities.

I. Specific References

Carr, D.J. and S.G.M. (1981), "*Eucalyptus lehmannii* and its allies", *Australian Plant* Vol.II, 157-158.

Carr, D.J. and S.G.M. (1980), "The *Lehmannianae* a natural group of Western Australian eucalypts", *Aust.J.Bot.* 28, 523-550.

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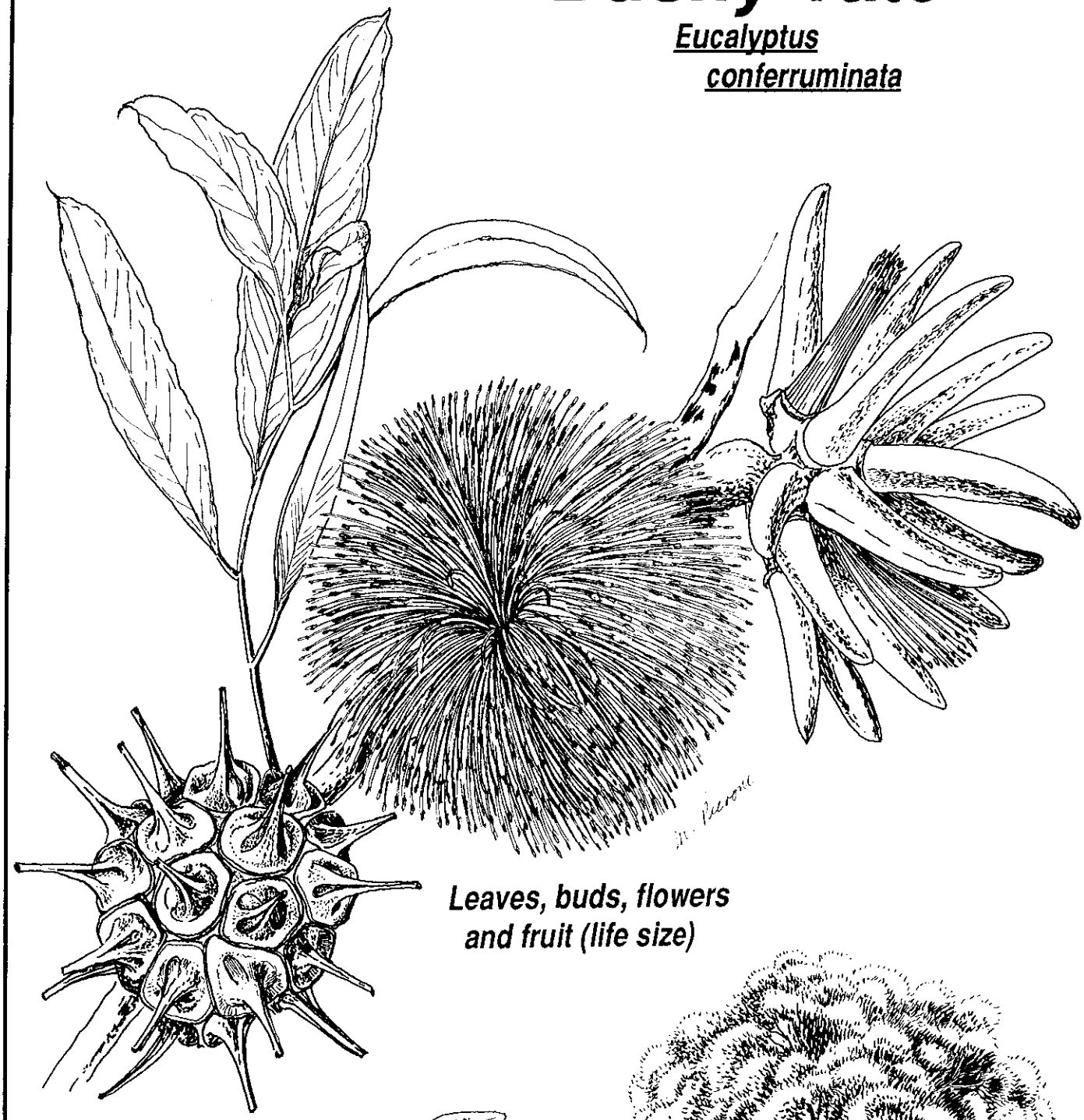
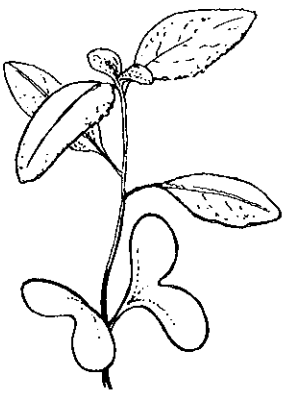
Bushy Yate

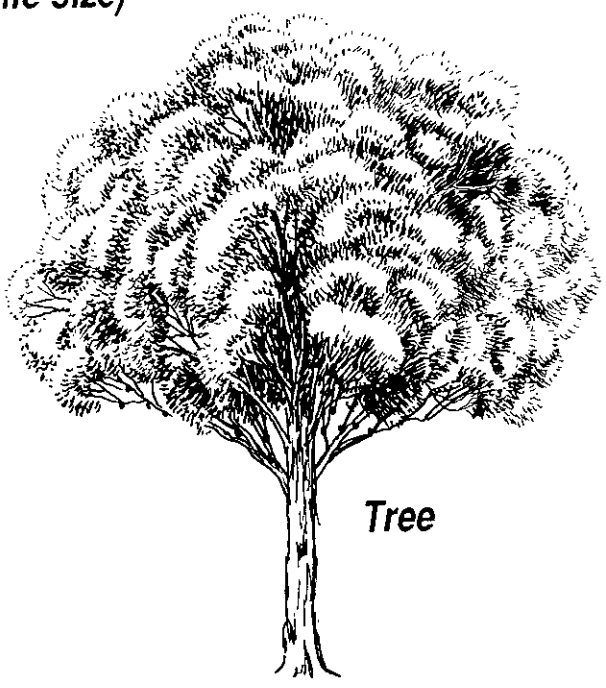
Eucalyptus conferruminata



Leaves, buds, flowers and fruit (life size)



Seedling (life size)



Tree

Caesia

Eucalyptus caesia

A.

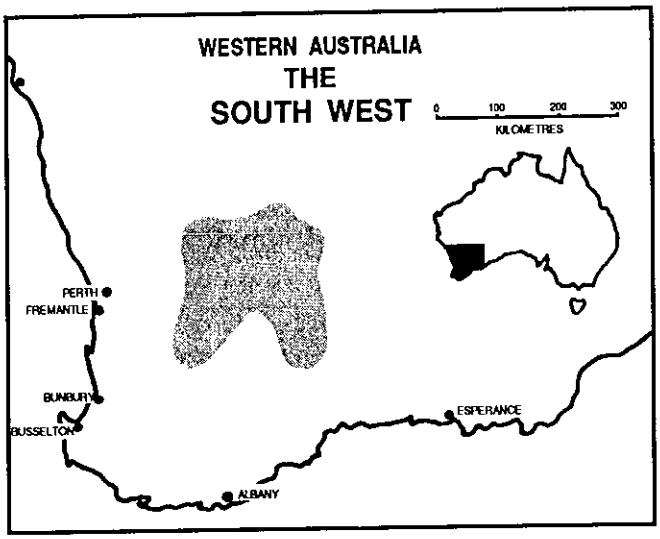
Caesia is the tree's specific name, its full scientific name being *Eucalyptus caesia* Benth. An English botanist, George Bentham, named the plant from a dried specimen. The specimen was collected by James Drummond, a professional plant collector in the nineteenth century who sold his collections to botanists around the world. Caesia comes from *caesius* meaning light grey, a reference to the frosting of grey on much of the plant. (This species is often incorrectly called Gungurru, an aboriginal name for *Eucalyptus woodwardii*.) There are two forms of this plant, subsp. *caesia* and subsp. *magna*.

B. Appearance

Caesia is a small tree or mallee of 6-9m that weeps at the tips (subsp. *caesia*) or weeps to the ground (subsp. *magna*). Mature trees have reddish brown bark which peels in longitudinal curls to show greenish bark underneath. Dark green leaves hang from young branchlets that are red with a frosting of grey. The leaves of subsp. *magna* are generally larger than those of subsp. *caesia*.

C. Where does it grow in the bush?

Small groves of Caesia are found in crevices on and at the base of large isolated granite outcrops in the central wheatbelt. In the late 1970s only 2117 plants were counted on 15 rocks.



D. Buds and Flowers

Buds are produced many months before flowering occurs in April to September. The pendulous buds are red with a frosting of grey. Light pink to crimson stamens push the peaked caps off on flowering. The buds and flowers of subsp. *magna* are larger than those of subsp. *caesia*.

E. Pollination

Nectar is produced in the cup for birds which are attracted by the bright red stamens. Eight different species of honeyeater have been observed feeding on the trees in the bush and caesia appears to be only pollinated by birds. However it is often visited by insects, e.g. honeybees.

F. Fruit (gumnuts)

Pendulous red urn-shaped fruit form from pollinated flowers. As would be expected the fruit of subsp. *magna* are larger than those of subsp. *caesia*. The fruit remain unopened on the tree for many years and may not be shed until the trees are affected by drought, fire or death.

G. Growing Caesia

Ripe fruit can be dried and the seed and chaff collected. Good seed is black and "fat", the chaff is reddish brown. The seed easily rots so is best sown in autumn, spring or early summer in a free draining seed mix. Germination should occur in 8-10 days when two thick reddish-green, Y-shaped leaves appear. The first seedling leaves are long and thin, then heart shaped leaves are produced which gradually change to those of a mature tree. If a mallee shape is wanted it is best to pinch out the growing tip at 40-50cm high. Older plants can be pruned back to 50cm to encourage mallee growth. In the wild, trees killed by fire will sprout again from the trunk or lignotuber.

H. Uses

Caesia is a widely grown ornamental tree. Both forms are grown but subsp. *magna* seems to be preferred and is sold under the name "Silver Princess". The fruit is used in jewellery making and various parts of the tree can be used for making natural dyes for dyeing wool.

I. Specific References

Dixon, I.R. "*Eucalyptus caesia*", Native Plant Note 20, Kings Park and Botanic Garden.

Hopper, S.D., Campbell, N.A. and Moran, G.F. (1982) "*Eucalyptus caesia*, a rare mallee of granite rocks from S.W. Aust." in Goves, R.H. and Ride, W.D.L. (1982), *Species at Risk*, Aust. Academy of Science, Canberra.

Rye, B.L. and Hopper, S.D. (1982) "Misapplication of the Aboriginal name 'Gungurru' to *Eucalyptus caesia* Benth. and notes on the species distribution", *Journal of the Roy. Soc. of W.A.*, Vol.65, Part 3, 93-95.

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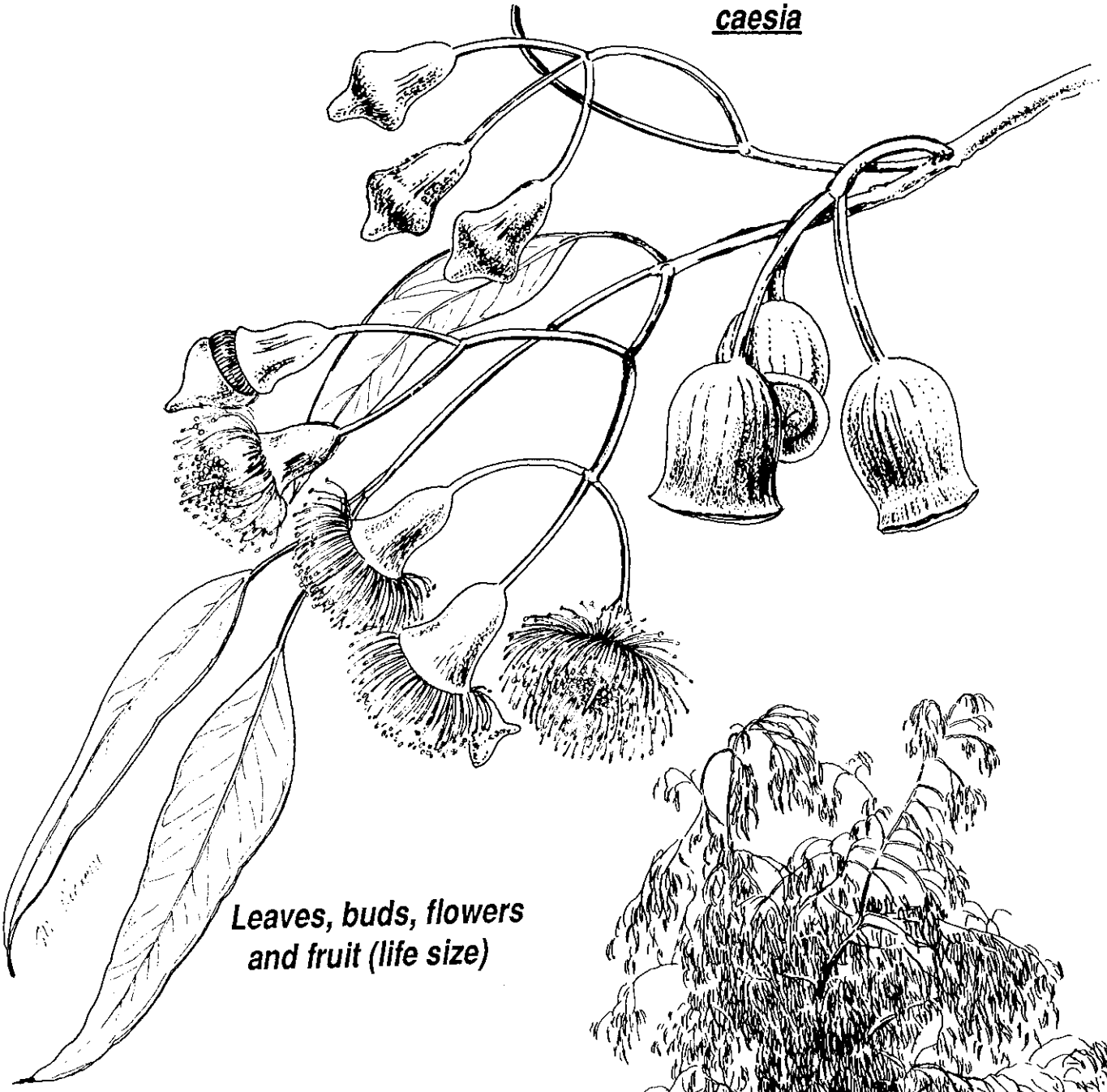
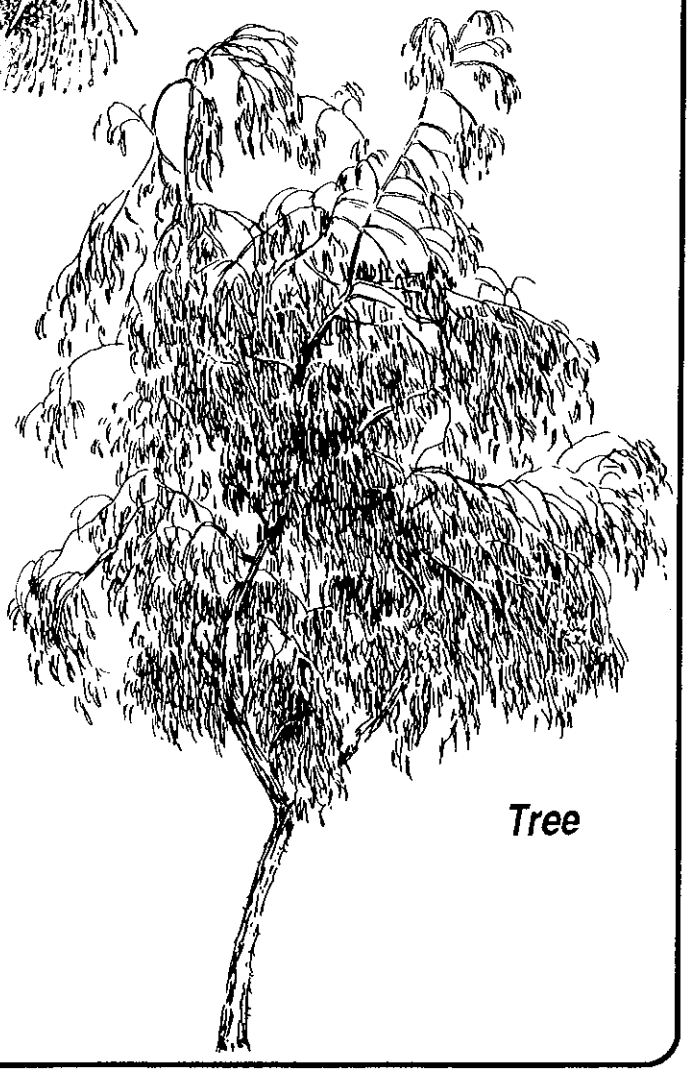
Caesia

Eucalyptus caesia



Leaves, buds, flowers and fruit (life size)

Seedling (life size)



Tree

Fuchsia Gum

Eucalyptus forrestiana

A.

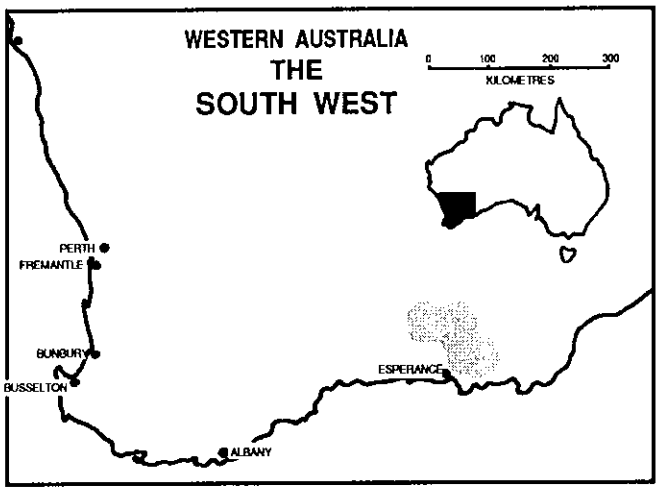
Fuchsia Gums have bright pendulous flowers reminiscent of a garden fuchsia. Generally plants are scientifically named according to their individual features but some are named to honour a person. In 1900 when the German botanist Ludwig Diels and his companion Pritzel collected plants in the South West, the Premier and Treasurer, John Forrest, gave them a lot of assistance. Diels acknowledged Forrest's help by calling the Fuchsia Gum *Eucalyptus forrestiana* Diels.

B. Appearance

Fuchsia Gum is a small tree or mallee from 3 to 8 metres with erect branches forming a narrow, often open, crown. The thin trunk sheds its grey bark in long strips to show smooth brown unweathered bark. Upright thick glossy green leaves form the crown. Young branchlets are reddish.

C. Where does it grow in the bush?

This tree grows in small groves that are conspicuous in the generally shorter surrounding low open forest or woodland. It prefers to grow in gravelly sands or sandy loam over clay with 330-400mm rain each year.



D. Buds and Flowers

Bright red pendulous buds form singly amongst the leaves. The cap of the bud is ridged. The nature of the ridges and the length of the cap varies and has resulted in three forms (subspecies) being recognised:

Eucalyptus forrestiana subsp. *forrestiana*: the cup is four-sided with a short domed cap.

Eucalyptus forrestiana subsp. *dolichorynca*: the cup is four-sided with a tall peaked cap. (This form is rare.)

Eucalyptus forrestiana subsp. *stoatei*: the cup is four-sided but has many lesser ridges as well as a short domed cap. (Until very recently this was a species in its own right, but studies in the bush of the three forms found they gradually graded into each other.) The common name of this form is the Scarlet Pear Gum.

The short yellow stamens push off the cap from October to March (flowering peaks at this time but may occur at other times). The dense ring of in-curved stamens and the long deep cup form a tube-like flower.

E. Pollination

The nectar is found at the base of the tube-like flower, making it only accessible to animals able to reach into this tube. Many honeyeaters have a bill perfectly suited for this. Detailed work on subsp. *stoatei* found ten species of honeyeater visiting the flowers and it appears that Fuchsia Gum is pollinated only by birds.

F. Fruit (gumnuts)

As the fruit ripen they change to brown-green, then brown. Fruit are retained on the tree only opening to drop seed if affected by drought, fire or death.

G. Growing Fuchsia Gums

Seed falls readily from dried fruit. The fertile seeds are black. The infertile chaff is red-brown. Five to 21 days after planting, two green-purple kidney-shaped leaves should appear. This purple colouring is retained in the seedling.

H. Uses

Fuchsia Gums are very attractive garden plants and are well suited for planting as street trees. They have the additional advantage of being attractive to birds. Their buds and fruit are attractively shaped and useful in jewellery making.

I. Specific References

Hopper, S.D. and Moran, G.F. (1981). "Bird Pollination and the Mating System of *Eucalyptus stoatei*", *Aust.J.Bot.* 29:625-638.

Robinson, C.J. (1984). "*Eucalyptus stoatei* as a subspecies of *Eucalyptus forrestiana*", *Nuytsia* 5(2):195-200.

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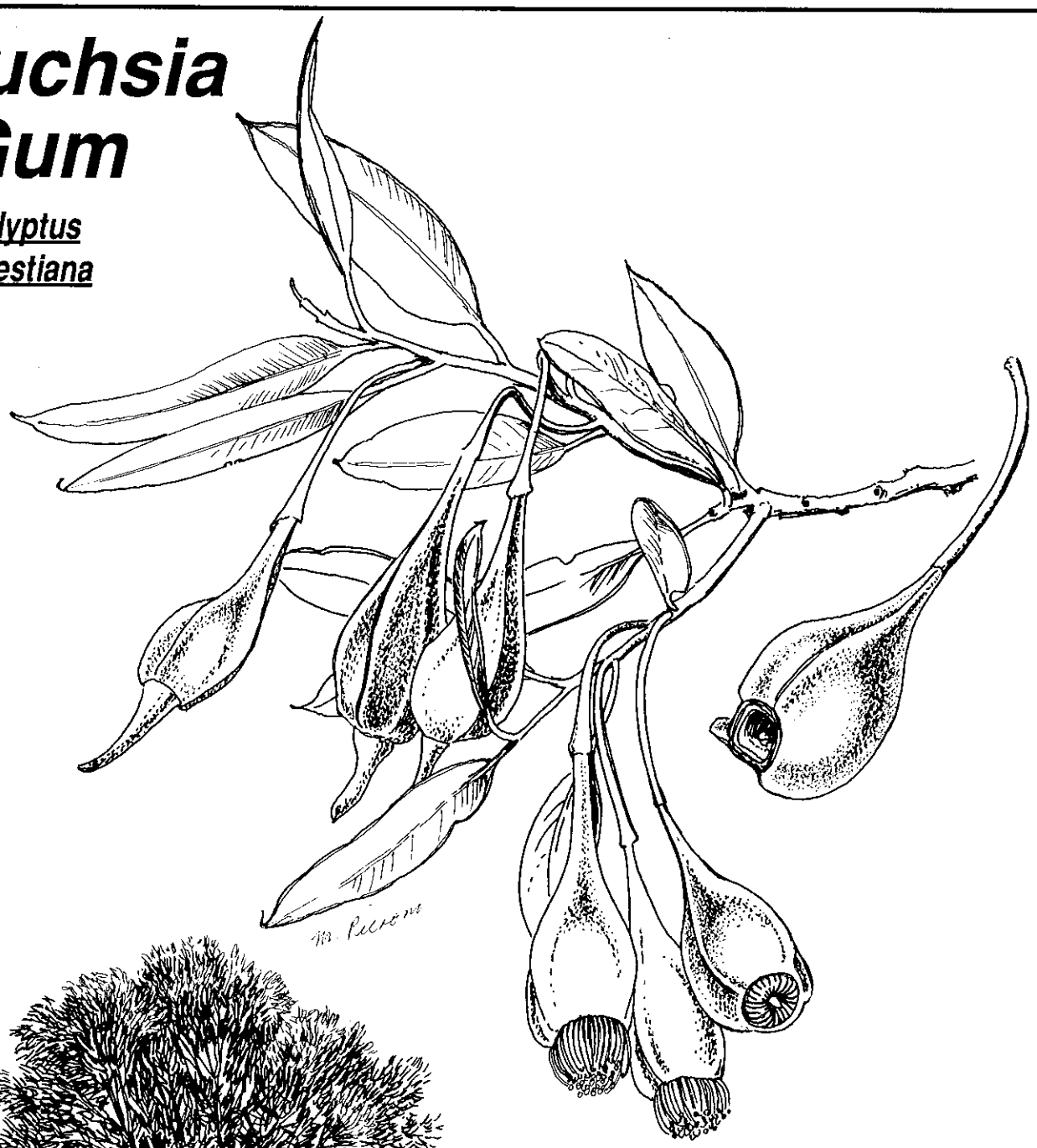
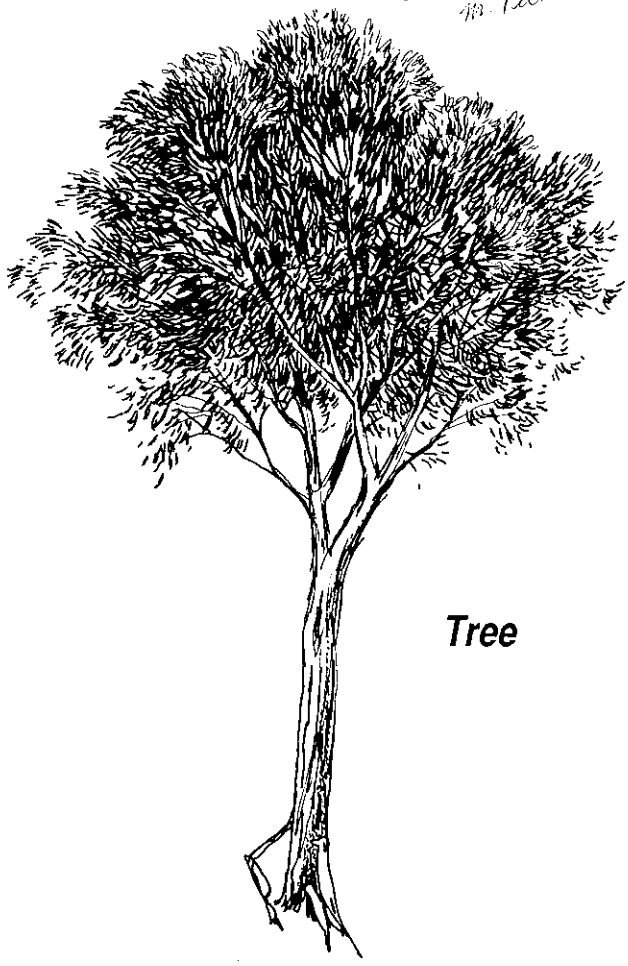
Fuchsia Gum

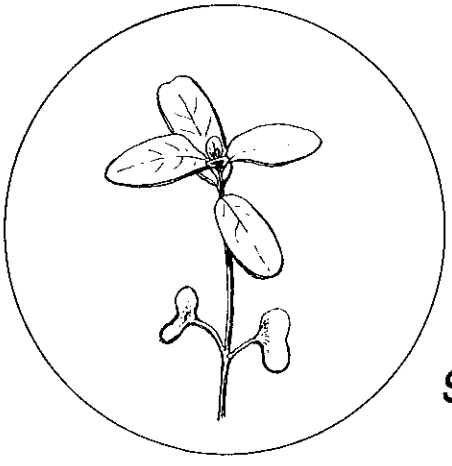
Eucalyptus forrestiana



Leaves, buds, flowers and fruit (life size)



Tree



Seedling (life size)

Illyarrie

Eucalyptus erythrocorys

A.

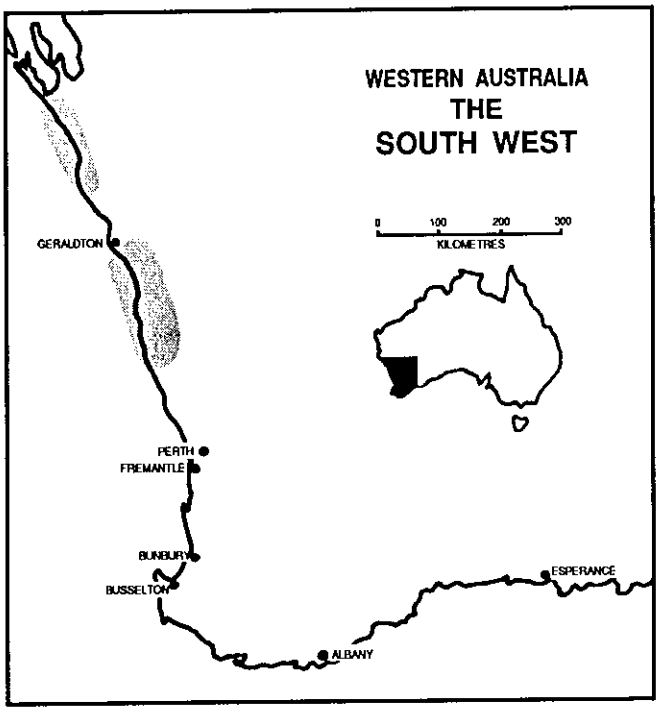
Illyarrie is the tree's aboriginal name, believed to refer to its ornamental nature. The botanist Ferdinand von Mueller named it scientifically for its red caps, *erythro-* (red) and *korys* (helmets), that is *Eucalyptus erythrocorys* F. Muell.

B. Appearance

Illyarrie is a small tree of mallee to 10m. Mature trees have a smooth whitish bark which sheds as short, brown flakes. Leaves are dark green with a prominent light green midvein. Young branchlets and leaf stalks are reddish.

C. Where does it grow in the bush?

Small groups of Illyarrie trees are found on coastal limestone soils of the area. They stand prominently above the other plants and are very conspicuous.



D. Buds and Flowers

Large clusters of buds form amongst the leaves just before flowering in February to May. The buds are green at first and the caps turn bright red just before flowering. As the four bunches of bright yellow stamens open out the caps are pushed off.

E. Pollination

Copious nectar is produced in the cup of the flower overnight and is available for birds in the early morning. The colourful buds and flowers attract the birds to a reward of nectar.

F. Fruit (gumnuts)

Large ribbed bell-shaped fruits form from pollinated flowers. The fruit change from green to brown with ripening. In cultivation the ripe fruit remain on the trees for years and need to be pruned to stop the tree from drooping under the weight. In the bush the ripe fruit open and drop their seed then fall before the next flowering. Much fruit is lost before it is ripe when Black Cockatoos search for grubs in the fruit.

G. Growing Illyarrie

Seed falls readily from ripe fruit that is allowed to dry. "Seed" collected is a mixture of chaff and good seed. Sow the lot in early autumn to early spring in a good, free-draining seed mix. Germination occurs in 5 to 14 days when two kidney shaped red-green leaves appear. Leaves covered with reddish hairs will then be produced until the adult leaves form.

Leaves of young trees are often attacked by the grub (larvae) of a sawfly causing brown blisters on the leaves. Holes are left in the leaves when the adult sawfly flies away.

A mallee can be formed by cutting back the trunk to soil to encourage sprouting from the lignotuber.

H. Uses

Naturally fallen caps and flowers are used in craft activities such as collage and jewellery. Illyarrie trees are commonly grown in gardens and parks and as street trees, and caps and flowers can be collected from the ground in February, March and April.

I. Specific References

Dixon, I.R. "*Eucalyptus erythrocorys*", Native Plant Note 12, Kings Park and Botanic Garden.

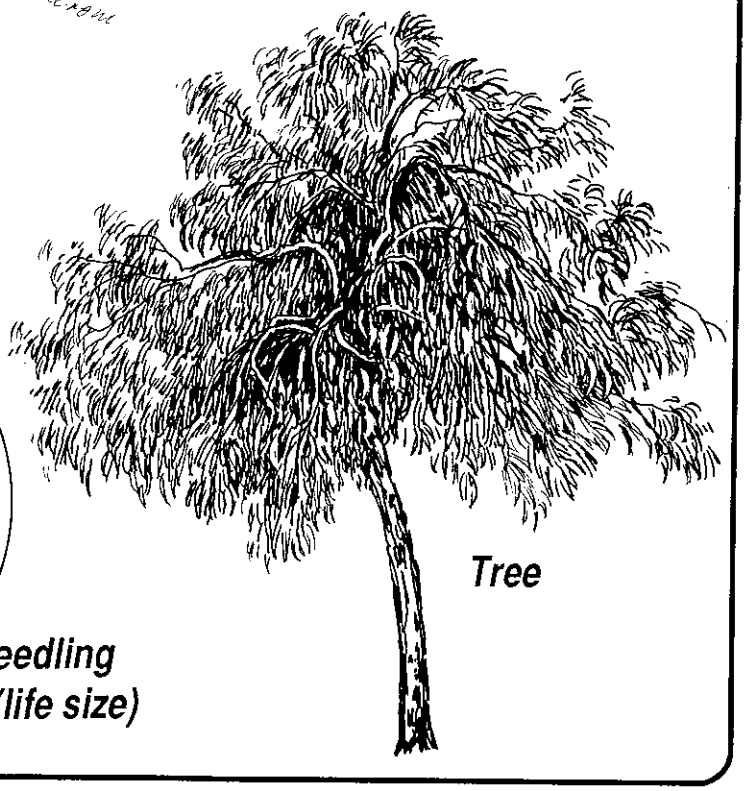
Published by the Western Australian Wildflower Society
Drawn by Margaret Pieroni
Written by Bronwen Keighery

Illyarrie

Eucalyptus erythrocorys

Leaves, buds, flowers and fruit (life size)

Seedling (life size)



Tree

Jarrah

Eucalyptus marginata

A.

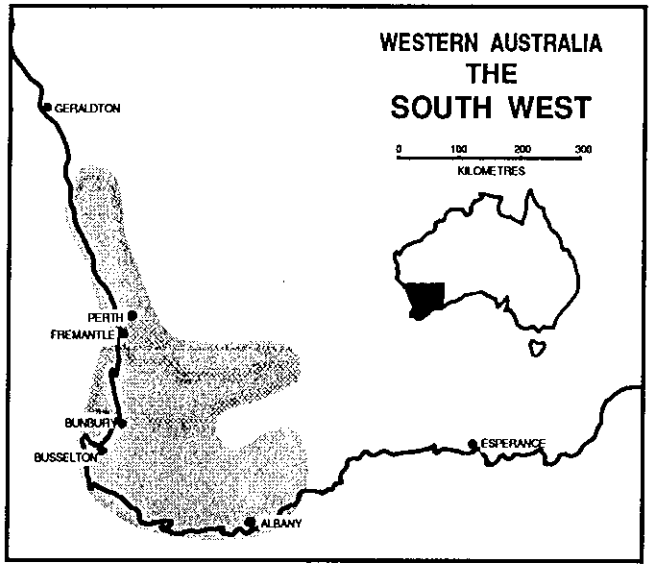
Jarrah is the tree's aboriginal name. Jarrah seed was collected in Western Australia in 1794 and was taken to England. These seeds were grown at Kew Gardens and botanists studied a cultivated plant to give Jarrah its scientific name. The scientific name refers to the vein that goes right around the edge of the leaf, *Eucalyptus marginata* Donn. ex Smith from *marginatus*, edged or bordered.

B. Appearance

Jarrah is a tall tree of 30-46m and, less commonly, a mallee up to 9m. Forest trees have tall straight trunks up to 2m diameter and an open crown. Mallees and trees in more open positions have shorter stout trunks or main stems and a dense crown. The stringy bark is red-brown, weathering to grey. Leaves are dark green, glossy on the upper surface and dull on the lower surface. Young branches are orange-red.

C. Where does it grow in the bush?

Jarrah grows on a variety of soils. On red loams over clay it forms tall forests with other trees (e.g. Marri); in some areas it may even form pure stands. On less ideal soils forests are more open and mixed. Towards the edge of its range and on poor soils, it occurs as a mallee in heathlands. Jarrah is generally found in areas with 600mm or more rain in a year.



D. Buds and Flowers

Many clusters of orange-red buds are formed amongst the leaves up to a year before flowering. The buds are towards the ends of the branches, so that when the cream stamens expand and push the cap off, the tree is crowned by masses of flowers. Flowering occurs from September to December. Heavy flowering occurs every 4 to 7 years and is accompanied by the loss of many leaves.

E. Pollination

The masses of flowers attract insects (native bees, wasps, honeybees, flies and beetles) and birds (honeyeaters) and provide a good supply of nectar and pollen.

F. Fruit (gumnuts)

The green fruit ripen to brown in about six months or longer. Seed drops from the ripe fruit but the fruit remain on the tree for a few years, small branches of seedless fruit falling gradually over the years.

G. Growing Jarrah

Seed readily falls from dried fruit. Good seed is black. Within 10 to 21 days of planting, two kidney-shaped leaves should appear. Seedling leaves are greyish and stalkless. Jarrah is a slow growing tree.

Jarrah can be severely affected by a leaf miner (*Perthida glyphoda*) which is the caterpillar of a small grey moth. The leaves are mined in June-August, then the caterpillars form a cocoon between the two surfaces of the leaf. Holes are left in the leaves when the cocoon falls to the ground. Jarrah leaf miner also thrives on *Eucalyptus rudis* (Flooded Gum). Silvereyes feed on these caterpillars.

H. Uses

Ornamental: Jarrah is rarely planted as a park, garden or street tree; most trees in such places are remnants of the native vegetation. Jarrah is an attractive tree and could be grown more widely.

Forestry: Jarrah has a dark red to reddish brown, hard, strong, white ant resistant timber. Jarrah is used for many purposes from heavy construction to fine furniture. The finish on dressed timber is so beautiful that it deserves its early name of Swan River Mahogany; it was one of the first exports from Western Australia. Substantial forest reserves are threatened by dieback caused by a soil fungus (*Phytophthora cinnamomi*) which attacks and destroys the fine feeding roots. The fungus spreads through soil with the movement of water, so low-lying areas are the most susceptible. It is also spread by shifting infected soil. Consequently large areas of forest have been quarantined in an attempt to stop this spread.

Honey: Jarrah produces large quantities of nutty-flavoured, medium amber coloured honey.

Catchment: Jarrah is an important tree in the water catchments. It has a tap root able to penetrate small cracks in the laterite layer to obtain water from below the water table. Because of this Jarrah is an important factor in maintaining the level of the water table and preventing the movement of salt up through the soil.

Arts and Crafts: The fruit are used in many activities and wood is widely used in turning.

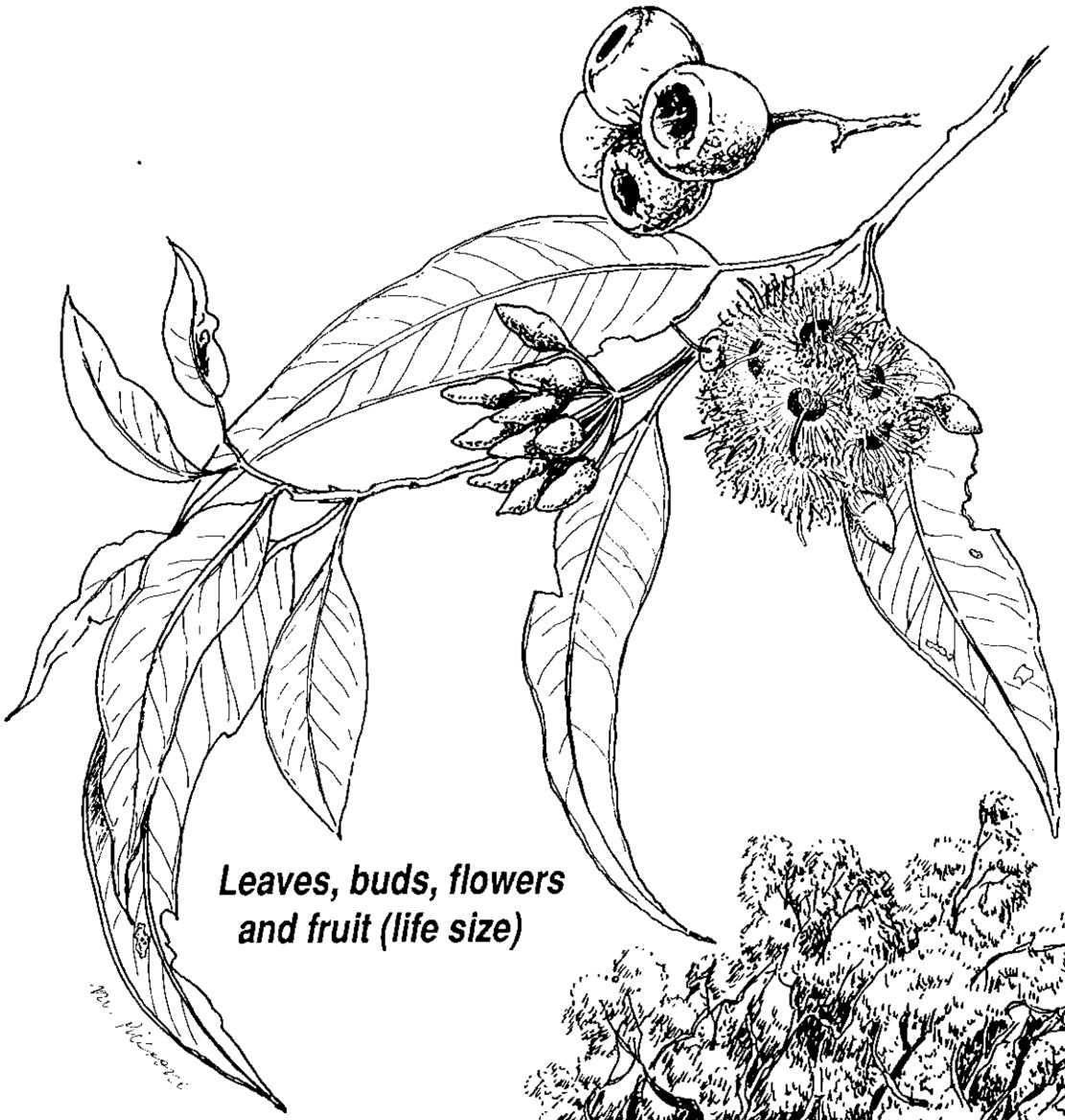
I. Specific References

Kimber, P.C. (1974). "The Root Systems of Jarrah (*Eucalyptus marginata*)", Forests Department Research Paper No.10.

Published by the Western Australian Wildflower Society
Drawn by Margaret Pieroni
Written by Bronwen Keighery

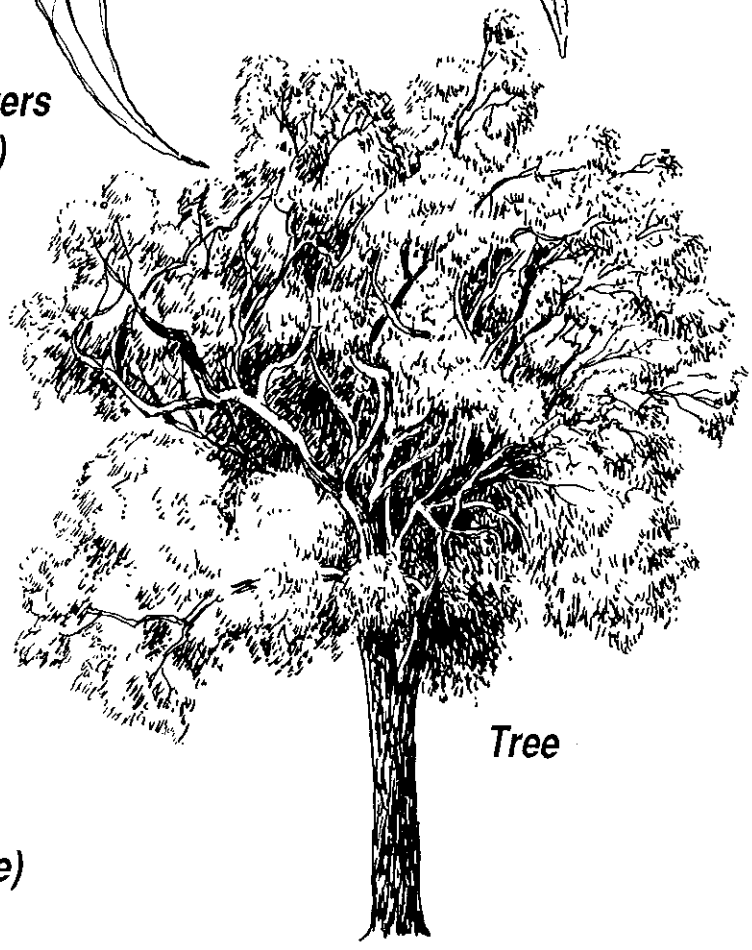
Jarrah

Eucalyptus marginata



Leaves, buds, flowers and fruit (life size)

Seedling (life size)



Tree

Marri

Eucalyptus calophylla

A.

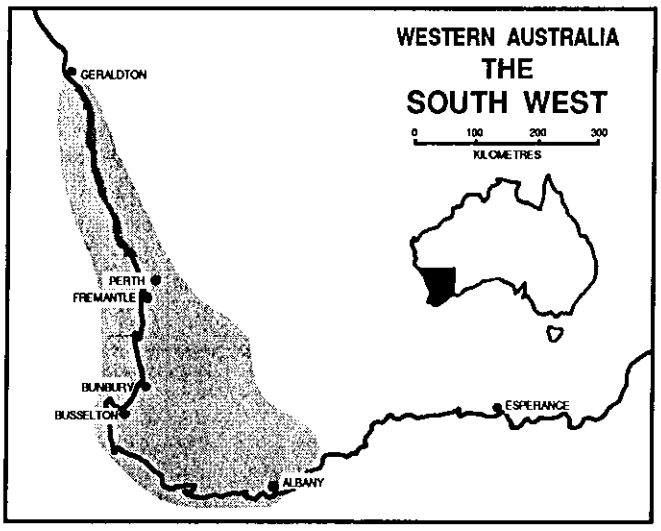
Marri is one of the tree's aboriginal names. An English botanist, Robert Brown, collected the plant near Albany in 1801 and later gave it its scientific name. Marri is named scientifically for its leaves *calos* (beautiful), and *phyllon* (leaf), that is *Eucalyptus calophylla* R. Br.

B. Appearance

Marri is a medium sized to tall tree, up to 40m, or a mallee with a dense, branched crown. The trunk is covered in a thick layer of short flaked, grey-brown bark. Fires leave black charred patches on the trunks which persist for many years. When the bark is damaged, the tree weeps a dark red "gum" (kino) which solidifies into a solid shiny mass (hence another common name, the Red Gum). The large leaves are glossy green on the upper surface and dull green on the lower. New growth has red branchlets and bronze-green leaves.

C. Where does it grow in the bush?

Marri is generally found in mixed open forests with Jarrah, Wandoo, Powder Bark Wandoo or Tuart. It will grow on deep sands and lateritic sandy gravel, but it grows best on sandy loams. Rainfall is from 650-1500mm per year with a winter maximum. Trees are still common in the metropolitan area in remnant bushland and parkland.



D. Buds and Flowers

A few months before flowering, masses of green buds form in large heads at the ends of the branches. In February to March the expanding cream, or more rarely pink, stamens push off the caps.

E. Pollination

The heavy crops of flowers containing nectar and pollen attract a wide variety of animals. Honeyeaters, silvereyes, parrots and numerous insects (wasps, native bees, honeybees, etc.) feed on and pollinate the flowers. Silvereyes can become major pests in vineyards when Marri trees are cleared or don't flower.

F. Fruit (gumnuts)

Marri fruit are very variable in size, ranging from 1cm to 5cm in diameter. The green fruit ripen to grey-brown and most drop their seed and fall before the next year's flowering. Much of the fruit is lost to parrots (twenty eights, red caps and black cockatoos) when it is still green. Many trees have carpets of half eaten green nuts under them after visits from parrots. Marri fruit are commonly known as honkey nuts.

G. Growing Marri

Seed falls readily from ripe fruit that is allowed to dry. The large fertile black seeds are the largest of any eucalypt (up to 2cm long). Seeds germinate in 7 to 14 days when two reddish-green leaves appear. Seedling leaves are skirted around the leaf stalk and covered in reddish hairs as are the stems. Marri leaves, especially young leaves, are eaten by a variety of insects. The most impressive of these are the spitfires (the caterpillars of sawflies) that congregate on branches during the day and move on to feed at night. Often as these clumps make their way to the ground to pupate, they spit at any disturbance. *Lyctus* borers (beetles) attack the wood just below the bark, leaving characteristic tracks.

H. Uses

Ornamental: Especially in parks and along streets where the pink form is often preferred. Hybrids between Marri and the Red Flowering Gum are also very common.

Forestry: The timber is not widely used but is suitable for weatherboards, fence posts and piles . It has moderate resistance to termites. However most Marri presently cut is used for woodchips.

Honey: Marri is an important honey source.

Arts and Crafts: The Marri fruit is commonly illustrated (e.g. in May Gibbs' works) and used in craft activities. The Cubs' toggle is a marri fruit.

Tanning: The "gum" contains tannin which can be used to tan leather.

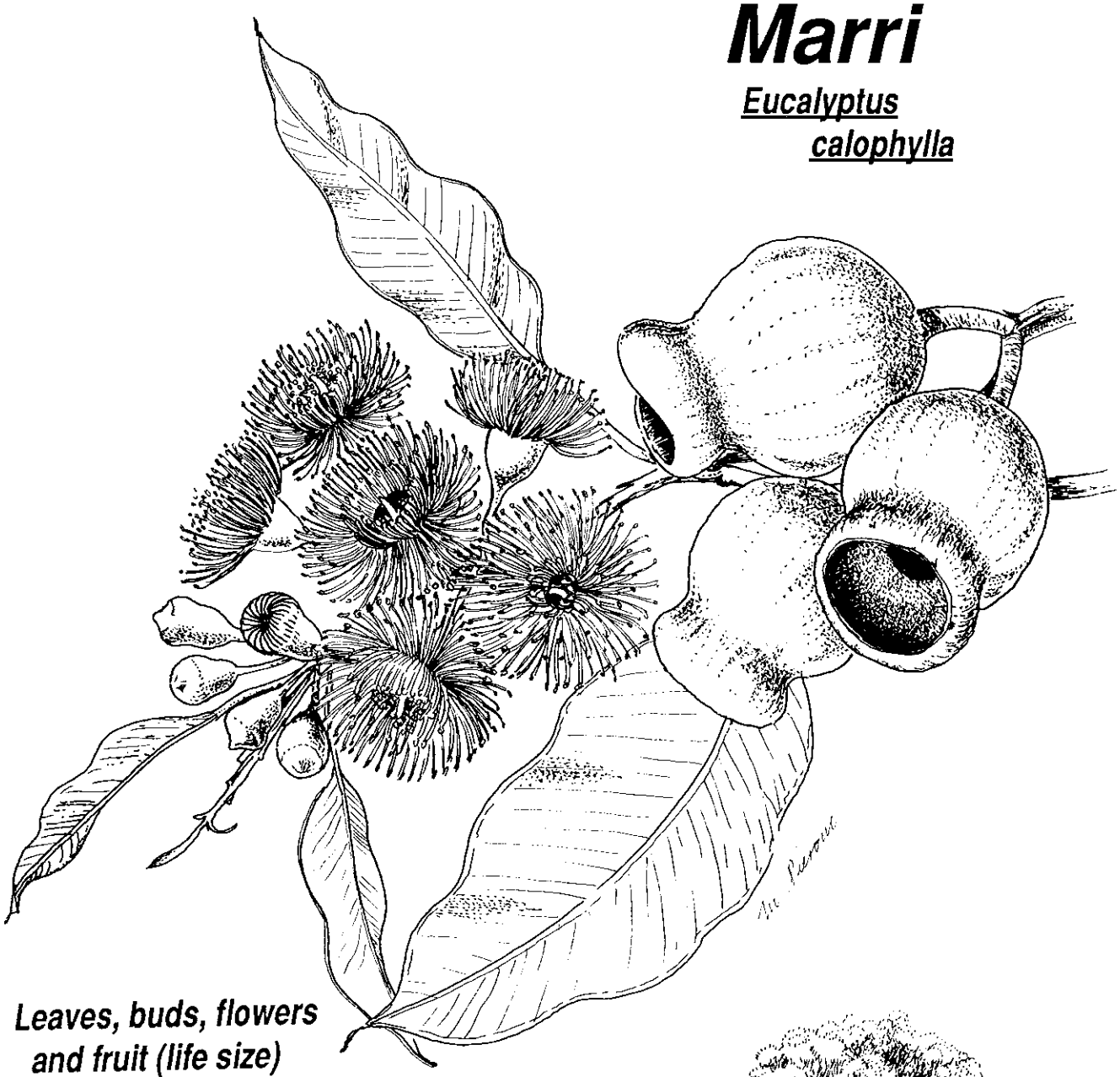
I. Specific References

Rooke, I.J. (1984). "The Silvereye (*Zosterops lateralis*): A Review", *Journal Royal Soc. of W.A.*, Vol.66, 163-169.

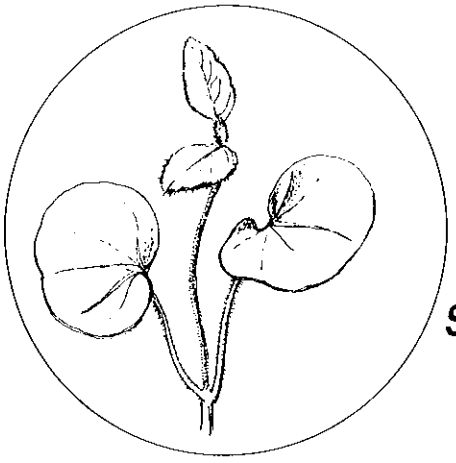
Published by the Western Australian Wildflower Society
Drawn by Margaret Pieroni
Written by Bronwen Keighery

Marri

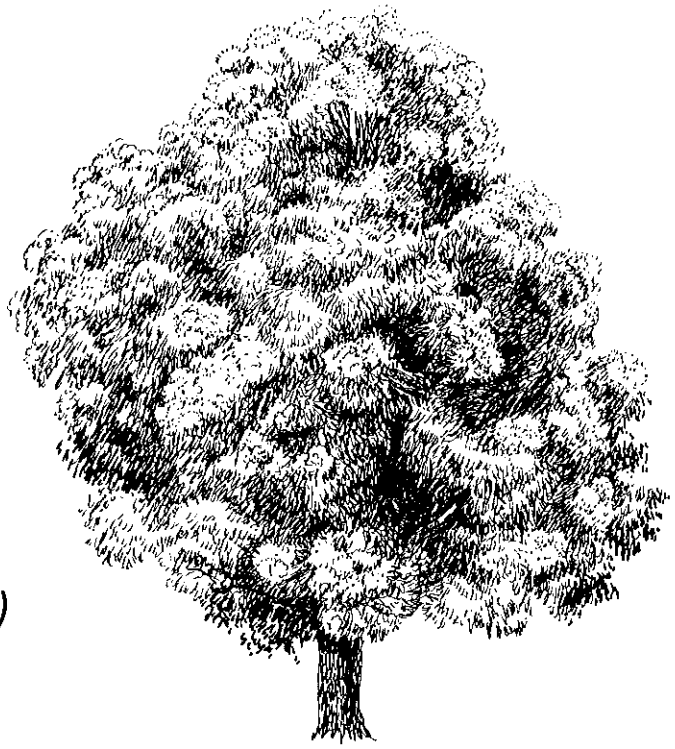
Eucalyptus calophylla



Leaves, buds, flowers and fruit (life size)



Seedling (life size)



Mottlecah

Eucalyptus macrocarpa

A.

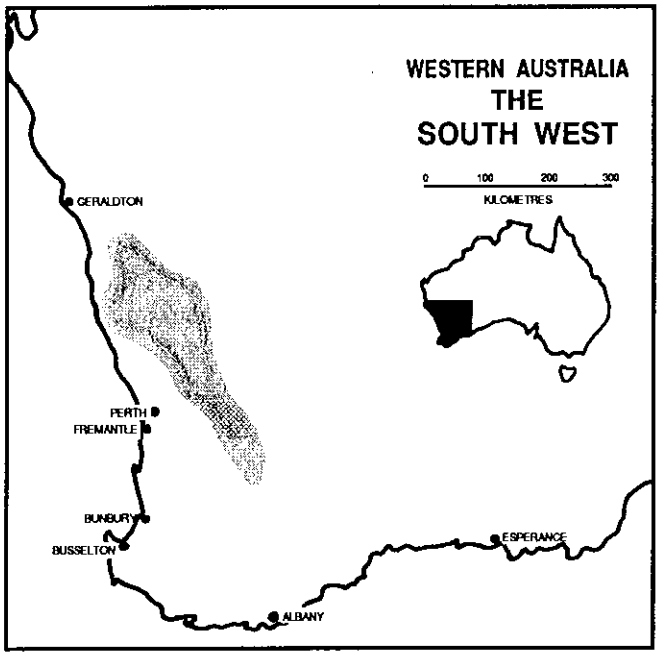
Mottlecah is the tree's aboriginal name. An English botanist, Joseph Hooker, named it scientifically for its large fruits from *macros* (large or long), and *karpos* (fruit), so that it is *Eucalyptus macrocarpa* Hook.

B. Appearance

Mottlecah is a mallee of 1m to 5m often spread over a large area as new growth is produced for many years from an expanding lignotuber. Some can cover an area of 12m diameter. Old sections of the branches have a smooth white bark while younger branches and leaves are green with a thick frosting of grey powder. The large ornate leaves are stalkless and are found in pairs along the stems. Young branches are angular.

C. Where does it grow in the bush?

Mottlecah is found in open sand heath on sandy lateritic or loamy sand soils in areas with 380mm to 500mm rain in a year. Its striking grey foliage generally stands about a metre above surrounding plants.



D. Buds and Flowers

Large grey buds form singly amongst the leaves but are often close enough to give a bunched appearance. Each bud has a very short stem and appears to be coming straight out of the stem. The stamens are generally red but sometimes (though rarely) yellow or cream. On expanding the stamens push off the solid thick cap. Flowering occurs from August to November. The flower is one of the largest found in the eucalypts.

E. Pollination

The large red flowers produce ample nectar and are held conspicuously above the surrounding vegetation. Many honeyeaters collect nectar from the flowers. These birds appear to be the major pollinators of mottlecah.

F. Fruit (gumnuts)

Large woody top-shaped fruit develop on the mallee. The frosting of grey tends to wear off as the fruit age and become brown. Ripe fruit remain unopened on the plant until affected by drought, fire or the death of the plant when they open to drop their seed.

G. Growing Mottlecah

Dried fruit readily drop seed. Good seed is large and greyish-black witha net-like pattern. The chaff is brown. Within 7 to 21 days of planting the seed, two Y-shaped leaves with a purplish hue should appear. Seedling leaves have very short stalks or are stalkless and purplish.

Mottlecah has a lot of natural predators; many mallees in the bush have heavily eaten leaves and seeds. However, in the garden, away from the natural habitat and native pests, they are not so affected.

H. Uses

Mottlecah is a spectacular garden plant with its grey foliage and bright red flowers. Care should be taken to allow sufficient room for the spreading plant. Caps and fruit are useful in craft activities.

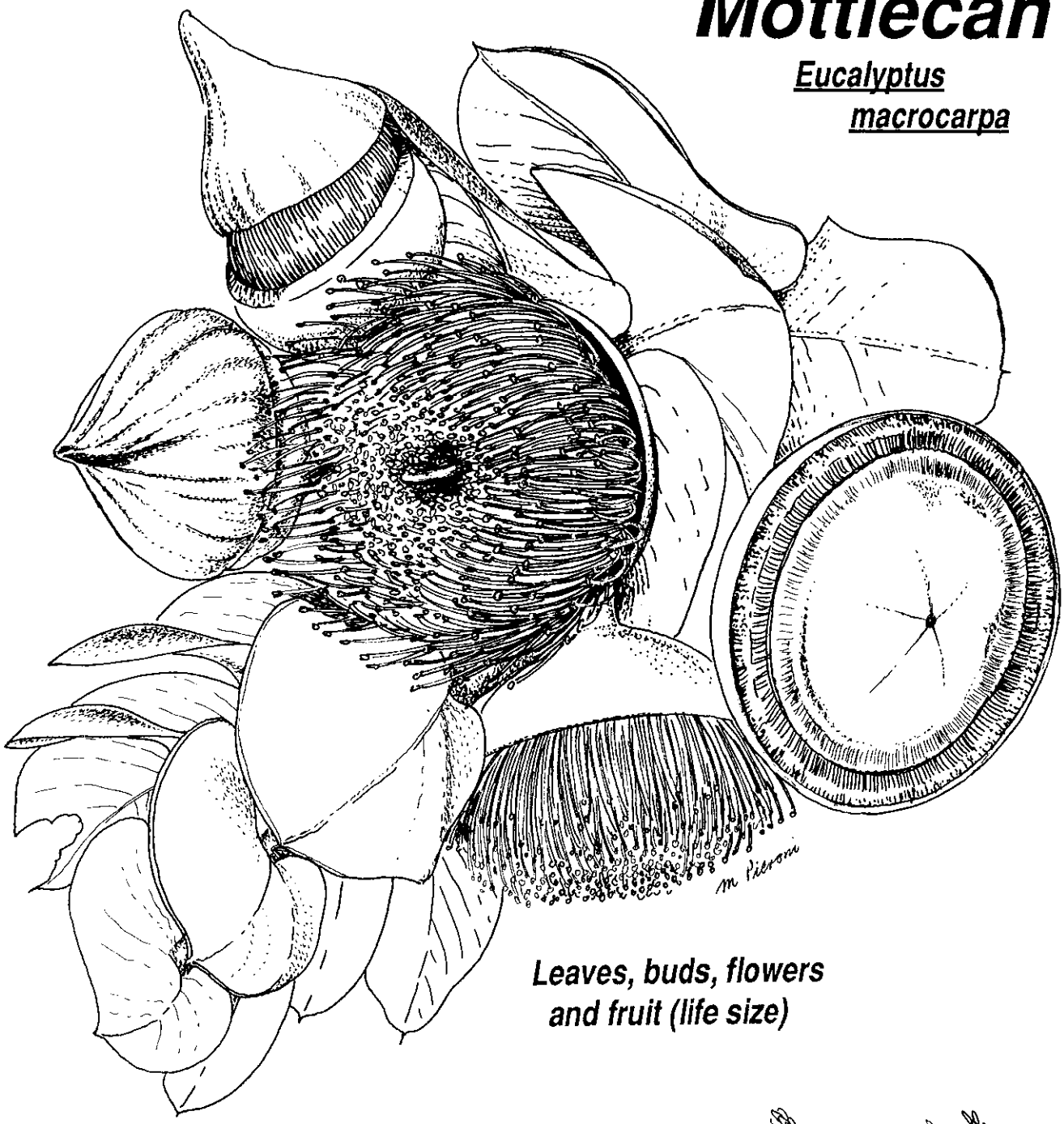
I. Specific References

Dixon, I.R., "Mottlecah", Native Plant Note 8, Kings Park and Botanic Garden.

Published by the Western Australian Wildflower Society
Drawn by Margaret Pieroni
Written by Bronwen Keighery

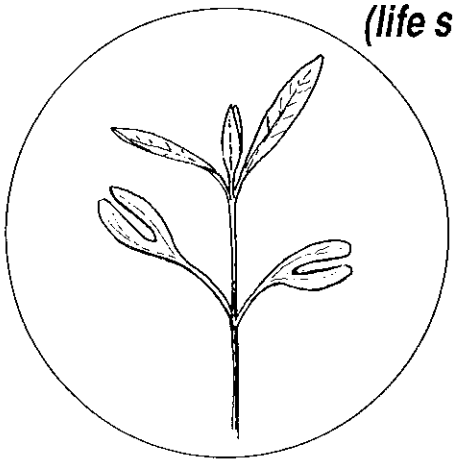
Mottlecah

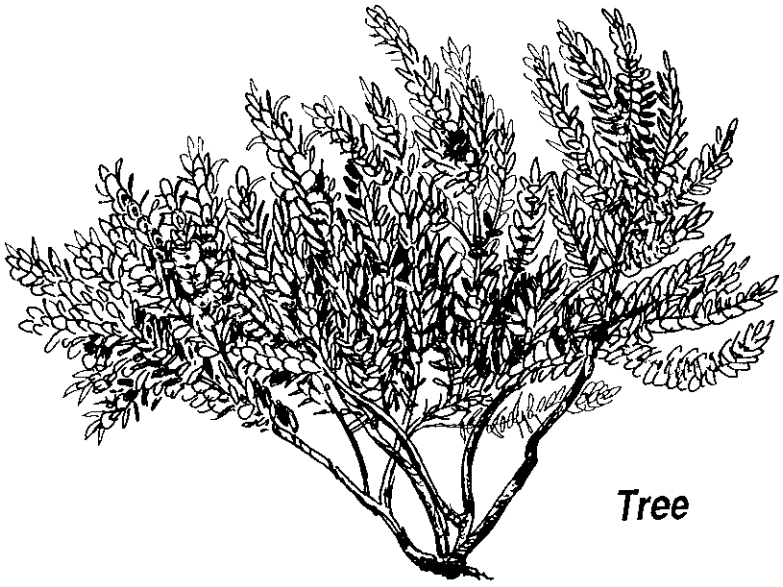
Eucalyptus macrocarpa



Leaves, buds, flowers and fruit (life size)

Seedling (life size)





Tree

Red Flowering Gum

Eucalyptus ficifolia

A.

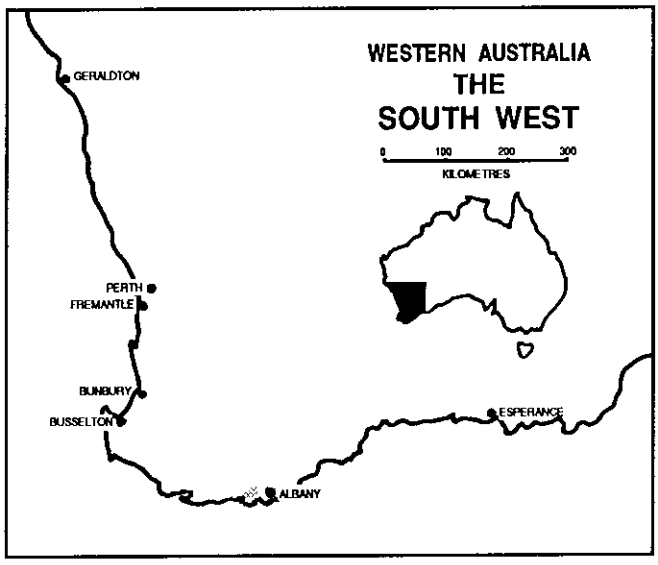
The Red Flowering Gum is named for its spectacular heads of orange-red flowers. Its rather mundane scientific name *Eucalyptus ficifolia* F. Muell. refers to its tough leathery leaves resembling those of *ficus* (fig tree) and *folium* (leaf). Baron Sir Ferdinand Jakob Heinrich von Mueller (1825-1896), the first Government Botanist of Victoria, named this tree. Appropriately Mueller Park (adjacent to Subiaco Football Oval in Roberts Road) is lined on the southern side by "Red Flowering Gums". See notes about hybrids in the growing section.

B. Appearance

Red Flowering Gum is a small tree or mallee to 9m with a very dense much branched crown. The short thick trunk is covered in short flaked grey-brown bark. Leaves are thick and leathery, olive green on the upper surface and dull olive green on the lower surface. Young foliage is red-green.

C. Where does it grow in the bush?

Red Flowering Gum grows in small groves only near Nornalup in sandy soils over clay. Some rain falls all year but there is a definite winter maximum. Its local occurrence is recognised in the naming of Ficifolia Road which runs through this area.



D. Buds and Flowers

Masses of buds and flowers are formed at the ends of the branches from October through to December. New growth of buds and leaves are red and gradually change to green. In January to March the bright orange-red, rarely off white, stamens push off the cap.

E. Pollination

The Red Flowering Gum is a good nectar producer and many honeyeaters and, to a lesser degree insects, are attracted to its bright blossoms.

F. Fruit (gumnuts)

The green fruit ripen to red-brown. Ripe fruit can remain on the tree for many years becoming grey and pitted as they are weathered. Fruit fall gradually over the years.

G. Growing Red Flowering Gum

Large brown seed falls readily from dried fruit. Seed is best sown in autumn, spring or early summer, and two red roundish leaves should appear in 5 to 14 days. Seedling leaves are red-green and rough.

Red Flowering Gums in WA can be killed by a fungus (stem canker disease (*Sporotrichum destructor*) which attacks the stem and branches. As this is such a desirable tree in the garden, attempts have been made to develop more resistant trees. This is done by hybridization and grafting. The Red Flowering Gum is closely related to Marri and if pollen from one is carried in some way to flowers of the other, some seed will form that will grow. Plants grown from these seeds are hybrids, i.e. with parents of different species. Only similar species of eucayptus will hybridize. Many of the Red Flowering Gums now available in the metropolitan area are hybrids and will show a great deal of variation in height and flower colour. Marri is more resistant to the fungus and this characteristic is kept by the hybrid. The hybrids which are most like Red Flowering Gum have the tough leathery leaves of the Red Flowering Gum. Marri leaves are somewhat larger and softer.

Grafting: A tree is selected with the desired characteristics and this is used as a source of scion wood (top grafted plant). This scion wood is grafted onto the stem of a Marri seedling. Grafting has the advantage of giving a resistant tree with known flower colour.

H. Uses

A beautiful ornamental tree grown world-wide especially in California and South Africa. Fruit can be used in craft activities.

I. Specific References

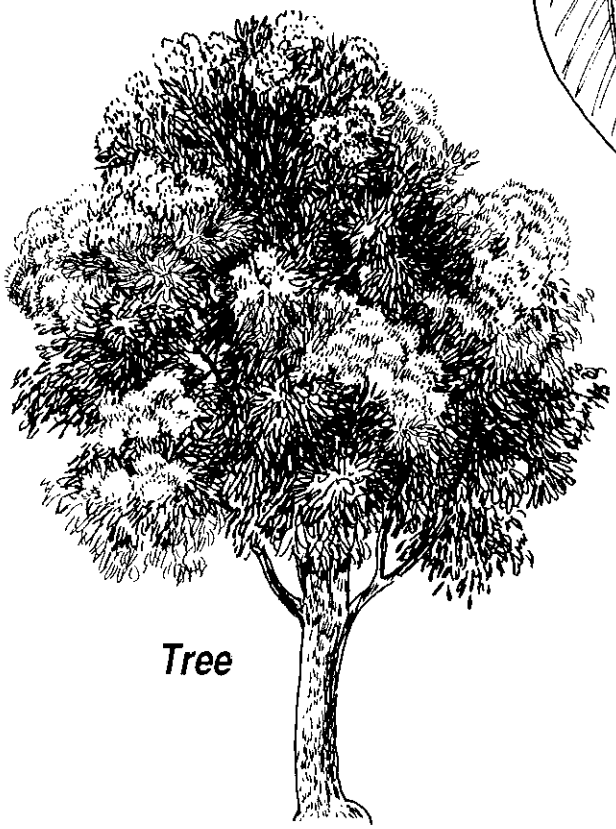
Dixon, I.R., "*Eucalyptus ficifolia*", Native Plant Note 14, Kings Park and Botanic Garden.

Published by the Western Australian Wildflower Society
Drawn by Margaret Pieroni
Written by Bronwen Keighery

Red Flowering Gum

Eucalyptus ficifolia

Leaves, buds, flowers and fruit (life size)



Tree

Seedling (life size)

River Gum

Eucalyptus camaldulensis

A.

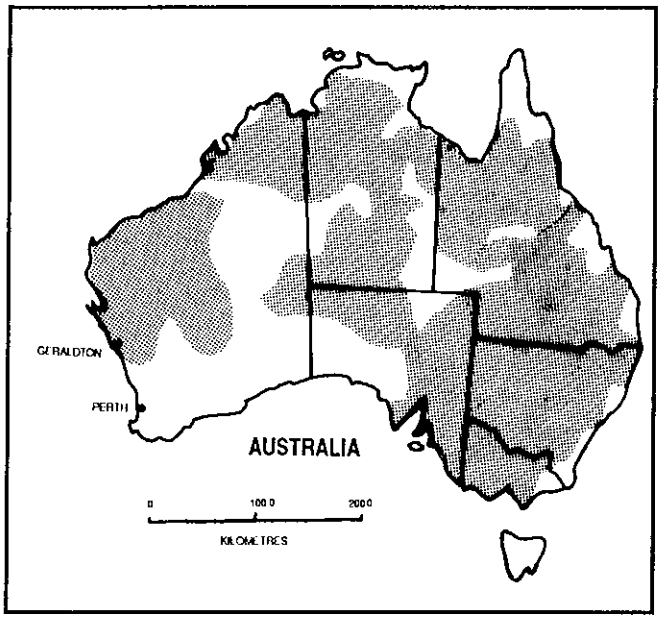
River Gum is the characteristic gum of the rivers throughout much of Australia. It is also known as River Red Gum, Red Gum and Murray Red Gum, a reference to its red timber. The scientific name for the tree, *Eucalyptus camaldulensis* Dehnh. has unusual origins. A botanist, F. Dehnhardt, named it in 1832 from a specimen taken from a garden plant in the Camalduli Gardens near Naples in Italy.

B. Appearance

River Gum is a medium sized (around 20m) to tall (45m) tree with a semi-weeping crown. The short thick trunk and spreading branches have a covering of smooth whitish bark with patches of grey, brown and red formed when the bark shreds in strips. Occasionally some grey scaley bark is found at the base of the trunk. Leaves are yellow green.

C. Where does it grow in the bush?

River Gum is the most widespread species in the eucalypt group growing throughout much of mainland Australia. It grows along permanent and seasonal watercourses and any adjacent river flats in sandy alluvial soils. In Western Australia it is not found south of Eneabba (100km south of Geraldton) as it prefers the drier areas of the State. South of Eneabba Flooded Gum (*Eucalyptus rudis*) is found in the watercourses. River Gum is able to grow in these often very dry areas (sometimes with as little as 150mm of rain in a year) as it is able to tap the underground watercourse. The seasonal watercourses need to flood every 5-10 years to maintain the River Gums in a healthy condition and to allow the growth of seedlings.



D. Buds and Flowers

Large numbers of pale green buds form amongst the leaves just prior to flowering. Cream stamens expand to push off the cap in December to March.

E. Pollination

The masses of tiny flowers attract honeyeaters, parrots and insects (beetles, wasps and bees). River Gums are an important source of nectar and pollen in the arid areas in which they grow.

F. Fruit (gumnuts)

The small green fruit ripen to grey-brown soon after flowering. While still on the tree, the ripe fruit open and drop their seed. These open fruit then fall to the ground. Each fruit has a crown of three to five prongs.

G. Growing River Gum

Small smooth yellow fertile seeds and chaff can be collected from ripe fruit allowed to dry. After sowing, two kidney shaped leaves should appear in 5-10 days. Seedling leaves are broader than those of adult trees. Young trees show very rapid growth. leaves are eaten by small sap sucking bugs (Psyllid insects). The adults lay eggs on the leaves. The nymph (a small wingless replica of the adult) hatches and forms a covering, the lerp-scale, to protect it while eating the leaves. Hundreds of these lerps (nymph and scale) can live on a tree: heavily infected leaves fall from the tree. The wood, below the bark, is subject to *Lyctus* borers (beetles).

H. Uses

River Gum is the most commonly grown gum in the word. This is possible as River Gum shows a great deal of variation in some important characteristics over its huge geographical range in Australia. Such characteristics are salt tolerance and the ability to form a lignotuber. Selected forms of River Gum are grown to suit local needs.

Ornamental: River Gum is used extensively in landscaping as it is a fast growing attractive tree. However, River Gum is generally a tall tree in cultivation and has a tendency to drop its branches, so care should be taken not to plant it in unsuitable positions.

Farm Tree: Salt tolerant forms have been selected and are widely used to help reclaim salt affected land.

Forestry: The red timber has been extensively milled in south-eastern Australia and it can be used for railway sleepers, heavy construction, flooring, fencing, turning, veneer, firewood and charcoal. In WA it is not an important timber but is used locally for fencing and fire wood. Plantations of River Gum are grown extensively overseas principally to revegetate and provide firewood. For firewood lignotuberous forms are used as each time the wood is cut the gum regrows from the lignotuber.

Honey: River Gum is a good producer of nectar and pollen for honey.

Nesting Sites: Hollow limbs on River Gums are important nesting sites for many species of birds including rosellas, parrots, lorikeets, goshawks, ducks, kookaburras and kingfishers.

Soil Stabilisation: The preservation of stands of River Gums along Australia's watercourses, especially those in dry areas, is vital. The River Gums prevent degradation of the river channel during flooding, provide food and shelter for many animals and contribute to the great beauty of much of our arid landscapes.

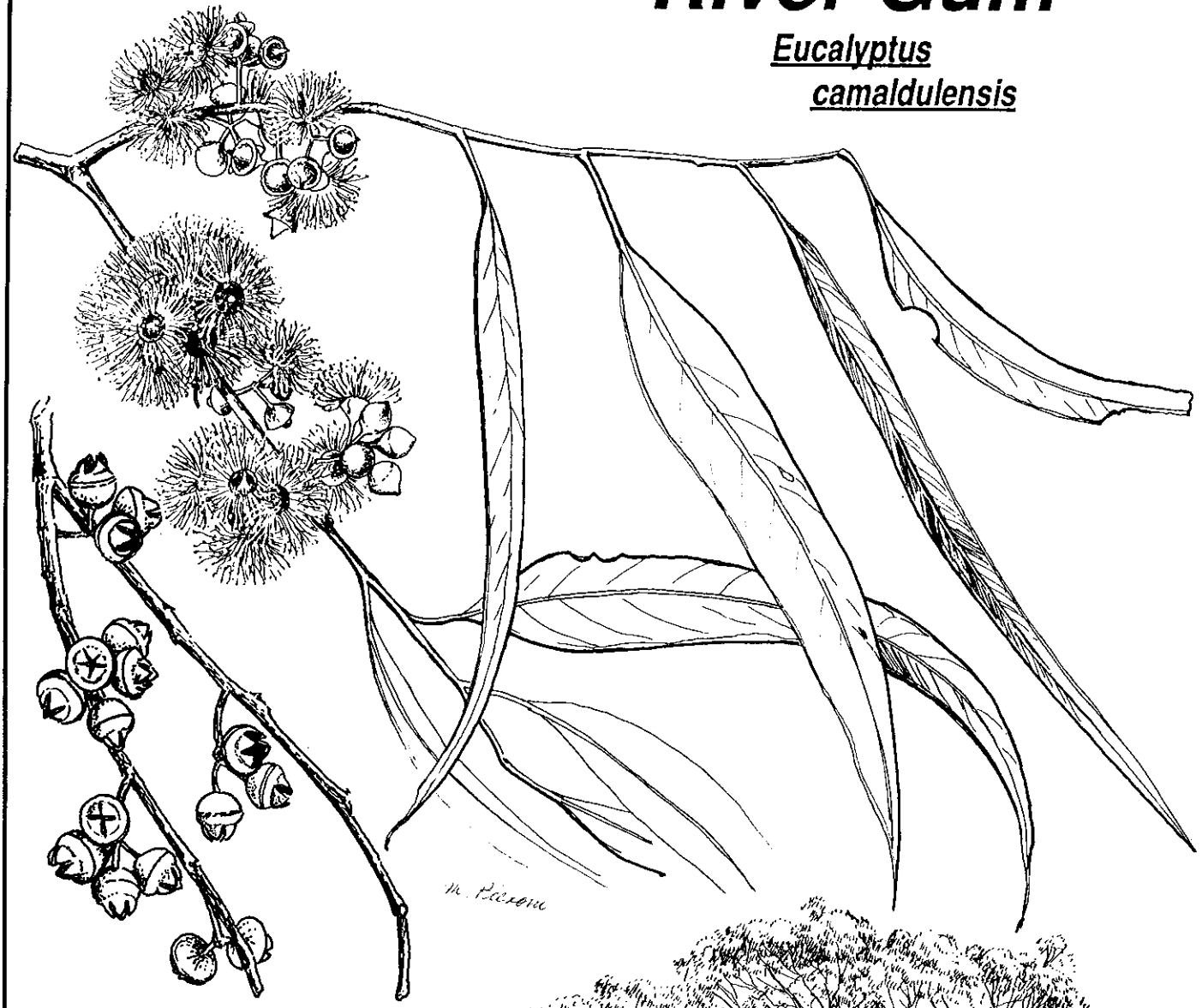
I. Specific References

Chippendale, G.M. (1988). "Eucalyptus, Angophora (Myrtaceae)", *Flora of Australia 19* Canberra: Australian Government Publishing Service.

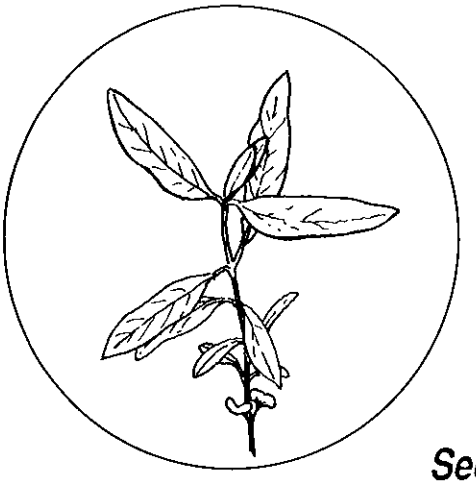
Published by the Western Australian Wildflower Society
Drawn by Margaret Pieroni
Written by Bronwen Keighery

River Gum

Eucalyptus camaldulensis



Leaves, buds, flowers and fruit (life size)



Seedling (life size)

Tree

Salmon Gum

Eucalyptus salmonophloia

A.

Salmon Gum's common and scientific names refer to the tree's salmon coloured bark. *Eucalyptus salmonophloia* F. Muell. is derived from *salmos* (the salmon) and *phlois* (bark of a tree).

B. Appearance

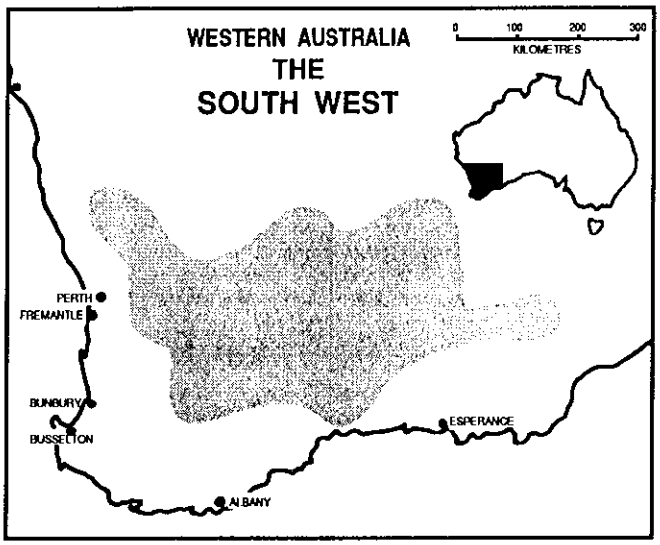
Salmon Gum is a tree of 15-20m (rarely to 30m) with a much branched and widely spreading canopy. The tall straight trunk is covered in smooth pink bark that ages to grey or grey-brown. Old bark sheds in grey flakes. Glossy green leaves are massed at the ends of the young branches to form a beautiful tree.

C. Where does it grow in the bush?

Salmon Gum grows in woodlands in the wheatbelt and in the goldfields. It grows on sandy loams and on fairly heavy clays. On heavier soils Salmon Gum is replaced by Gimlet. The loamy soils on which Gimlet and Salmon Gum woodland occur are the best wheatlands in Western Australia. Salmon Gum country is extensively cleared, and throughout the wheatbelt Salmon Gums now occur only on roadsides and as shelter and shade trees in paddocks. In the goldfields they have escaped this widespread clearing, but they have been extensively logged in the past. They require a rainfall of 250mm to 500mm each year.

D. Buds and Flowers

Groups of yellow-green buds form amongst the leaves just prior to flowers. Creamy white stamens expand and push off the caps in November to March. Flowering can be erratic, especially towards the east, and is recorded at other times.



E. Pollination

Flowers produce copious amounts of nectar and attract many insects (native bees, wasps, honeybees, beetles and flies) and birds (especially purple crowned lorrikeets and, to a lesser extent, honeyeaters).

F. Fruit (gumnuts)

The small green fruit ripen to brown with a peaked crown of three slender prongs. Fruit are ripe by November to February and should be collected for seed around this time.

G. Growing Salmon Gum

Ripe fruit that is allowed to dry will readily drop seed. Good seed is grey-brown with a network-like pattern; the chaff is red-brown. Within 10 to 21 days of planting seed two Y-shaped purplish leaves should appear. Initially seedlings are slow-growing, but grow more rapidly later.

H. Uses

Ornamental: Trees grown individually have a broad dense crown suitable for shade. Such a beautiful tree serves more use as an ornamental plant especially as it is resistant to drought and frost and is fairly salt tolerant.

Forestry: The deep red timber is very strong and used locally for fencing, pit props, sleepers, farm buildings and firewood. Salmon Gum has been grown in temperate and arid areas throughout the world.

Honey: A clear bright amber honey is produced from Salmon Gum trees in December through to March.

Oils: Salmon Gum leaves have obvious oil glands and up to 3.6 percent cineole can be obtained from the leaves. This yield is highly variable.

Art and Craft: The wood is used in wood-turning.

NESTING SITES: Hollows in the trunk and limbs of Salmon Gums are important nesting and breeding sites for galahs, corellas, cockatoos and parrots. Salmon Gums need to be over 100 years old to be of a size to accommodate suitable hollows. The poor regeneration of Salmon Gum woodlands is of concern not only for soil stabilisation but for the supply of nesting holes in the future.

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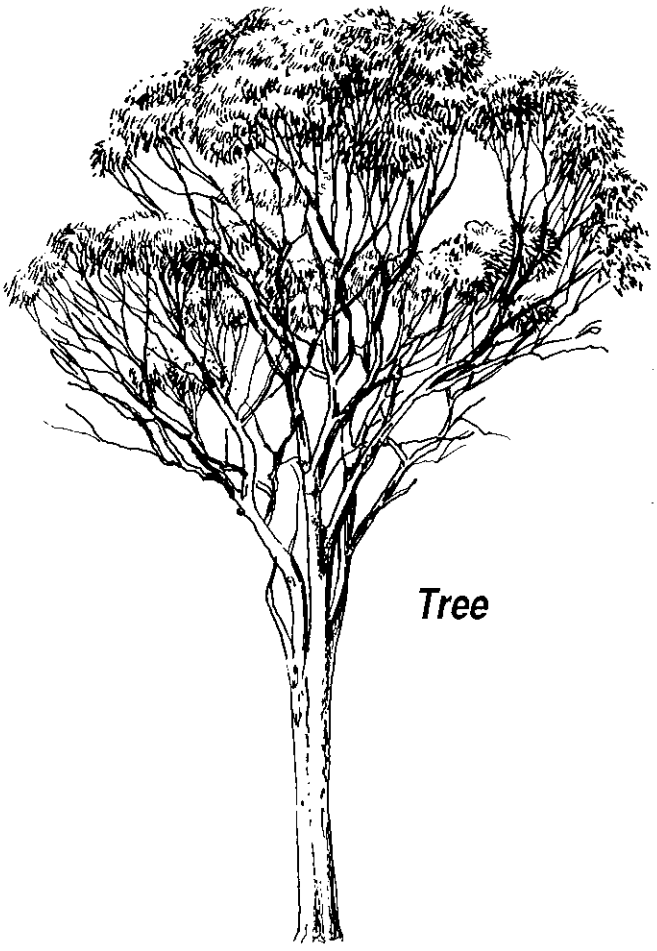
Drawn by Margaret Pieroni
Written by Bronwen Keighery

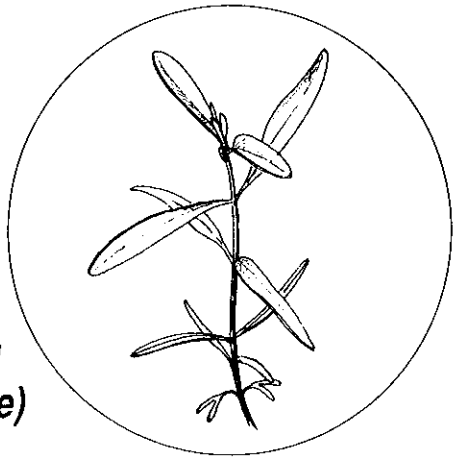
Salmon Gum

Eucalyptus salmonophloia

Leaves, buds, flowers and fruit (life size)



Tree



Seedling (life size)

York Gum

Eucalyptus loxophleba

A.

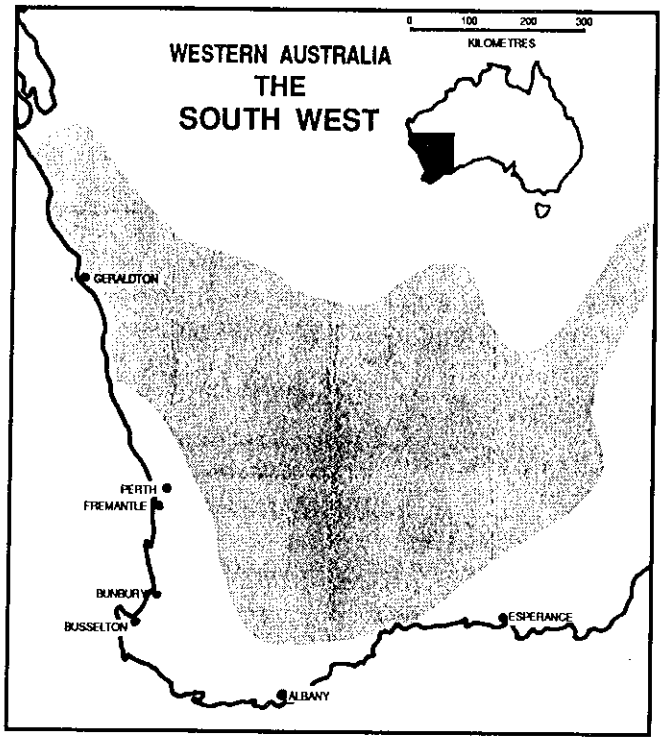
York Gum is the common tree in the area of York town. The aboriginal name recorded for this tree is Yandee. The botanist George Bentham named the tree scientifically for the pattern of veins in its leaves, *loxos* (crooked, slanting) and *phlebos* (vein) - hence *Eucalyptus loxophleba* Benth.

B. Appearance

York Gum is a tree of 5m to 15m or less, commonly a mallee with a broad crown. The trunk has a stocking of rough grey-brown bark that reaches to the lower branches, above which is smooth grey-brown bark. The bark is lost in long thin strips. Leaves are pale glossy green. Two forms are recognised: *Eucalyptus loxophleba* subsp. *loxophleba* which is the "typical" York gum, and *Eucalyptus loxophleba* subsp. *gratiae* that has larger leaves, flowers and fruit and is normally a mallee.

C. Where does it grow in the bush?

York Gum is a common tree in woodlands of the wheatbelt and the southern goldfields. Sandy to medium density loams are preferred in areas with 250-750mm of rain in a year. Subsp. *gratiae* occurs only in the vicinity of Lake Grace.



D. Buds and Flowers

Groups of seven to eleven green buds form amongst the leaves as well as at the ends of branches up to nine to ten months before flowering. Cream sweet-smelling stamens push off the caps as they expand in December to September in subsp. *loxophleba* and October to March for subsp. *gratiae*. Flowering can occur at other times in the eastern edges of its range.

E. Pollination

The flowers produce a good nectar flow that attracts many insects (native bees, honeybees, wasps, flies and beetles) and birds (honeyeaters and lorrikeets).

F. Fruit (gumnuts)

Small green fruit ripen to brown soon after flowering. Seed falls from the ripe fruit that are held on the tree for several months after the fruit ripen. The empty fruit falls later.

G. Growing York Gum

Seed falls readily from dried ripe fruit. Good seed is brown to light brown, crescent shaped with a net-like pattern on its surface. The chaff is light brown to red. Five to 21 days after planting, two Y-shaped leaves should appear. Seedling leaves are "roundish", adult leaves are grey-green.

H. Uses

Farm Trees: York Gum has been used as an indicator of good agriculture and grazing lands and has been intensively cleared. Thus, even though it is a widespread tree, throughout much of its range it is confined to road verges or found as isolated paddock trees. Because these trees are remnants of the original woodlands they are becoming old and beginning to die and need replacing. Hopefully they will be replaced as they play an important role in soil conservation, in providing shelter, and above all, in maintaining the individual character of the "York Gum country". There is some evidence of the trees' need for a specific fungal presence in the soil which makes it important that the tree be replaced immediately. York Gums are quick growing and salt tolerant - features in their favour as farm trees.

Forestry: The dense, hard and tough pale brown timber has been used in the wheelwright trade and in spear-making by the aborigines.

Honey: A good medium amber honey is produced from York Gums which are an important honey source. The pollen is not suitable for use by honey bees and they must obtain pollen from elsewhere if the hive is to survive.

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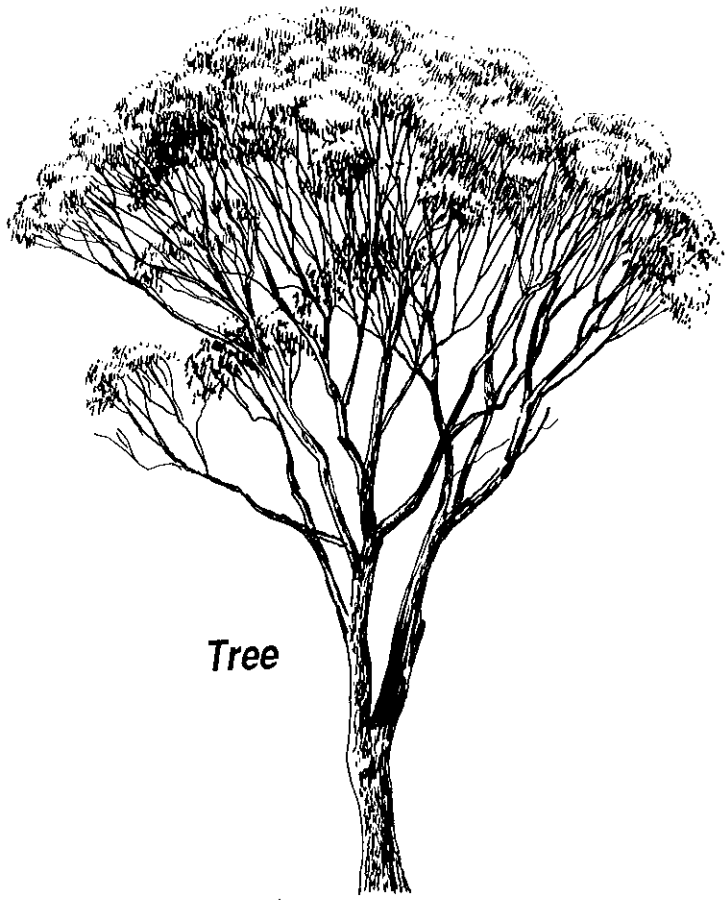
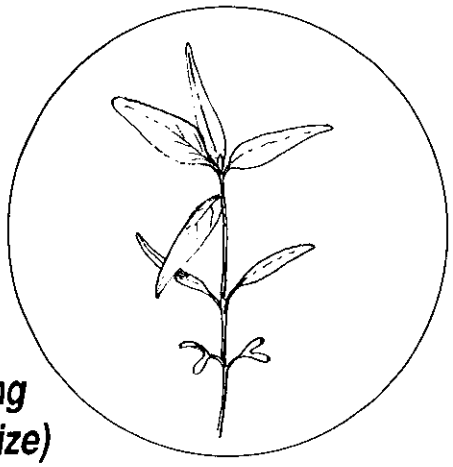
York Gum

Eucalyptus loxophleba

Leaves, buds, flowers and fruit (life size)



Tree



Seedling (life size)

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REFERENCES

There is a great deal of information on eucalypts in the literature: it ranges from popular to extremely technical. The following books and papers were used in preparing these materials. References for individual species are given on the INFORMATION SHEET 2 dealing with that species.

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GLOSSARY

Each of these terms is used in the INFORMATION SHEETS and/or ACTIVITY work.

botanical (or scientific) name: the Latin or Greek name used for each species of a plant

cap (operculum): a cover over the bud formed by the fusion of the sepals and petals (see flower)

chaff: unfertilised ovules that do not grow to form seed (see flower)

common name: the colloquial name given to a plant species (the same name may be used for several species)

cotyledon (seed leaves, sprout leaves): the first pair of leaves formed after germination

cup (hypanthium): the part of the flower surrounding the ovary that swells to form the fruit (see flower)

flower: the portion of the flower containing the male and female parts necessary for reproduction. These are

(i) male parts: the stamens each having a stalk (filament) and a pollen sack (anther) holding the pollen;

(ii) female parts: the ovules, which on fertilisation become the seeds, enclosed in the ovary; the stigma which receives the pollen and the style that connects the stigma to the ovary.

When acceptable pollen lands on the stigma the pollen grows a long tube (pollen tube) down the style into the ovary to an ovule.

Fertilisation occurs when a nucleus from the pollen grain fuses with a nucleus from the ovule to form ONE nucleus which grows to become an embryo plant (the "germ" in a seed). The remainder of the seed is formed by the growth of the rest of the ovule. The ovary and the structures surrounding it (cup) also grow to become the fruit to protect the seeds.

The other parts of flowers, the sepals and petals, are to protect the flower before it opens. If the sepals and petals are brightly coloured they will attract animals to the open flowers. Flowers are designed to attract animals so that they will carry pollen from one flower to another (pollination) to get the best possible seed.

In eucalypt flowers the petals and sepals are fused to form the cap (operculum) which protects the unopened flowers (buds). On opening, the expanding stamens push off the cap. The stamens and sometimes the caps are the colourful parts of the flower. The pollen of these stamens is immediately fertile but the female parts of the same flower will not be fertile for several days. Therefore fertilisation is more likely to occur between these flowers and other flowers on the same tree or on different trees whose flowers have been open for a few days. Pollen is moved from flower to flower (pollination) by insects, birds or more rarely small marsupials. Nectar (and to a lesser extent an excess of pollen) produced by the flowers is eaten by these animals and encourages them to move from flower to flower and to return at other times.

fruit: the portion of the plant containing the seeds (see flower)

germination: when the seed begins to grow

lignotuber: a swollen woody stem formed at ground level from which many stems may arise

mallee: a woody plant with more than one stem at ground level each arising separately from a lignotuber

nectar: a sugary fluid produced by flowers (see flower)

ovary: the portion of the flower containing the ovules (see flower)

pollination: the transfer of pollen from one flower to another (see flower)

seed: formed by the growth of a fertilised ovule consisting of an embryo plant enclosed in a seed coat

seed coat: a protective layer around the embryo plant formed from parts of the ovary

species: those plants which are able to interbreed to produce fertile seed

sprout: the plant that first emerges from the seed consisting of two cotyledons and a root

stamen: a male plant of the flower having a stalk (filament) and pollen sac (anther) holding the pollen (see flower)

subspecies (subsp.): a distinct form of the species

tree: a woody plant with one stem at the ground which may divide a short distance above ground level

PART II LEADER'S GUIDE and ACTIVITIES

PO BOX 64, NEDLANDS WA 6009
TELEPHONE (09) 383 1254

Area 1 Gum Trees - characteristics of the genus *Eucalyptus*

Materials	Leader's Guide 1		
	Information Sheet 1a	-	*Gum trees or Eucalypts*
	Information Sheet 1b	-	*What's a gum tree?*
	Activity 1	-	*What's a gum tree?*

Leader's Guide 1

PREPARATION

- Familiarise yourself with the gum trees in your local area, using Information Sheets 1a and 1b. Any gum trees can be used, but if you intend going on to the next Activity try to use a tree for which you have an Information Sheet 2.
- Encourage the children to look as well as feel, taste (nectar) and smell all applicable parts of the tree. Eucalypts are not poisonous.
- Enlarge the Activity Sheet as necessary.

EXTENSIONS and VARIATIONS

- Do leaf and bark rubbings (using crayons and greaseproof paper wrap).
- Make a 2D or 3D model of a gum tree. Use a drawing that all children colour, a collage of their rubbings or of pieces from the tree. Make several models and build a forest.
- Discover what lives in your tree - watch for birds, insects, people, etc.
- Draw a map of the school grounds, local park, etc, showing the location of all the gum trees. At this stage do not attempt to distinguish different species.

Area 2 WA Gums - distinguishing selected Western Australian *Eucalyptus* species.

Materials	Leader's Guide 2		
	Information Sheet 2	-	*Bushy Yate, Caesia, Fuchsia Gum, Illyarrie, Jarrah, Marri, Mottlecah, Red Flowering Gum, Salmon Gum and York Gum*
	Activity 2	-	*Getting to know my gum tree*

Leader's Guide 2

PREPARATION

- Use Information Sheets 2 to choose a species of gum tree that occurs in your area that is either cultivated or in the bush. (Choose a species in flower if possible.)
- Remember it is not necessary for the whole group to deal with the same species. If several species are accessible, use more than one species.

VARIATIONS and EXTENSIONS

- Use the Activity Sheet 2 as a guide to what the children need to know, but get them to colour their drawings directly from a branch of the tree that you have collected or take them out into the garden or bush and get them to colour the drawing while sitting near the tree.Please note however that all questions cannot be answered without the Information Sheet.
- Complete the Activity Sheet 2 for several species. Compare the different species.
- Draw a "Gum Tree Map" of your locality, showing the location of each of the gum trees you have been studying.
- Compare the species of gum tree found in the bush with the cultivated species.
- Investigate the suitability of trees selected for planting in the following places: home gardens, streets, parks and regenerating bushland. Consider such factors as shape and height of the adult tree (relate these to shade cast); ornamental value of the flowers and fruit; whether or not it is native to the area; and ability to provide nectar for animals.
- Try a "Gum Game". Make a set of cards for each species using Information Sheet 2 illustrations. Each species set should contain cards for buds, fruit, flowers, seedling and adult tree (leaves are too much alike to use), i.e. 5 cards per species set. Two games can be played:

Gum Pairs: You will need two sets of cards for each species.

1. Let the players look at all the cards, picture side up.
2. Turn all the cards over and mix them up.
3. Each player turns two cards picture side up. If these are a pair of fruit or flowers, etc, from the same species, the player keeps the pair. If the two cards are not a pair the player turns them over and the next player has a turn.
4. The game is completed when all the pairs are collected.

Find Your Tree: You will need:

Information Sheet 2 illustrations to match each card set

One card set (i.e. 5 cards) for each species

1. Each player chooses or is allocated a species and is given the appropriate Information Sheet 2.
2. Let the players look at all the cards, picture side up.
3. Turn all the cards over and mix them up.
4. Each player turns two cards picture side up. If either of these cards is a part of their gum tree they keep it and turn up another card. Play passes to the next player as soon as two cards of another species are turned up. Turn the uncollected cards over.
5. The game is completed when all players have a complete set (i.e. 5 cards) for their species.

These games are fun; as well, they help the children to recognise the important parts of gum trees.

Area 3 Seeds and Gumnuts - the seeds and fruit (gumnuts) of Eucalypts

Materials	Leader's Guide 3
	Information Sheet 3
	Information Sheet 2
	Activity 3a - *Seed Collectors at large*
	Activity 3b - *Gumnut crafts*

Leader's Guide 3

PREPARATION

- It is important that children understand that trees do belong to someone - either individuals or the community (however indirect). Every tree has a "caretaker" who must be approached before collecting parts of the tree.
- Seed collected will be a mixture of "chaff" and fertile seed. These are easily distinguished for a species like Marri, but not for most others, so keep the lot.
- Take care when you drill or skewer holes in gumnuts. With most groups it would probably be best to make the holes before working with the children.

EXTENSIONS and VARIATIONS

- ***What is a Seed Bank?*** Eucalypt seed is in great demand around the world as well as in Australia. Contact CSIRO or the Department of Conservation and Land Management (CALM) for information on the collection, storage and distribution of seed.
- ***What is a seed orchard?*** The Eastern Hills Branch of the Wildflower Society has established a seed orchard - contact them for more information.
- ***Who owns the gum trees?*** Investigate ownership or vesting of public land in your area. The land will be in the hands of the local government or the Water Authority or the Ministry of Education or the Department of CALM or other bodies. Decide if they are caring for the community's trees as the community wishes.
- ***Compare seed of different species:*** Look at size, shape, colour and patterning of the seed.

Area 4 **Young Gum Trees - raising eucalypts from seed**

Materials

Leader's Guide 4
Information Sheet 4 - *The growth of young gums*
Information Sheet 2
Activity 4a - *Growing Gums from seed*
Activity 4b - *My Baby Tree Album*

Leader's Guide 4

PREPARATION

- Check the ***drainage*** of water in the cartons. Use a free draining soil mix, for example one used by the CALM Nurseries:
  3 parts sand (white or yellow coarse sand)
  1 part peat moss
  Mix by bulk and add 1.5kg fertilizer per cubic metre (fertilizer mix is 1 part potato E and 2 parts superphosphate). Often the local sand will be suitable but it must be from a dieback free area. Add some slow release fertilizer, e.g. Osmocote, in the amount directed on the packet. Drainage is important as the roots of germinating seeds need more oxygen. They get this from the air trapped between the soil particles. If the soil is waterlogged these spaces are full of water. Waterlogged conditions are also most favourable for the growth of fungi that will contribute to the death of the seedling.
- Try "sterilizing" your soil mix in one of these easy ways:
  (i) ***Boiling Water Method***
  Pour boiling water through the soil in your cartons before planting your seed.
  (ii) ***Moyle's Method using the Sun***
  - spread black plastic across the ground
  - cover with 5cm of soil mix
  - wet thoroughly and cover with clear plastic
  - hold down with weights - leave 4 to 5 days in sun (it reaches near 100°C and 70°C will sterilize).

  [November 1988 WA Wildflower Society Newsletter]
- Obtain ***seeds*** from a nursery, seed supplier or the Wildflower Society or collect them yourself. Use about a half teaspoon of larger seeds, a quarter teaspoon of smaller seeds per carton (see Activity 3a).
- Other seedlings may germinate in your pots so make sure that you and the children can recognise your gum tree sprouts (Information Sheet 2G and Illustration). (The terms "sprouts" and "sprout leaves" are used as most children are familiar with edible sprouts and can extend their knowledge of these sprouts to the comparable stage of their gum and the sprouts of other plants.) ***Weed*** all other seedlings by using scissors to cut them off at ground level. Do not pull them out as this will disturb the soil and roots of your gum tree sprouts. If necessary thin out the sprouts in the same manner.

- Have a few ***extra cartons*** planted to replace unsuccessful cartons and observe root growth.
- Keep cartons ***outside***, at least during the day, in light shade in summer or full sun in winter. The gum tree seedlings grow too slowly and the fungi too fast if you keep them inside.

EXTENSIONS and VARIATIONS

- ***Root Growth.*** It is important that children appreciate root growth in the ground. Use some Marri seeds for the "traditional" seed growing exercises.
  (i) Sprout a Marri seed on some wet cotton wool.
  (ii) Observe Marri seeds growing in the side of a jar instead of broad beans. Keep the jar covered except when observing the seeds.

  Grow some spare trees in cartons and open some of these cartons over the time and let the children see the roots. Compare root and vegetative growth. NOTE the time taken for Marri seed to germinate. You need about four weeks to get from the cotyledon stage to the leaf stage.
- ***Germination.*** Compare the time taken for different species of gum tree seed to produce their cotyledons.
- ***Growth Rate.*** Record the height of the seedlings. Graph height against time. The growth rate of gum trees is not as rapid as annuals such as broad beans.
- ***Sprouting.*** While the gum tree seeds are germinating sprout some Alfalfa seeds and compare these with your gum tree sprouts.
- ***Visit or write a letter to a commercial nursery that grows gum trees.*** Find out how they grow them. Give special attention to how they cope with fungal attack and weeds.
- ***Temperature and Germination.*** Most gum seeds germinate at around 25°C. However, gums from more tropical areas germinate best at higher temperatures, e.g. *Eucalyptus camaldulensis* at 30°C and *Eucalyptus microtheca* at 35°C. By varying these temperatures you could compare germination rates.
- ***Rate of growth of seedlings.*** Compare rates of different species or different seedlings of the same species.
- ***Planting the young gums.*** It is important that children understand how large their tree will grow so they can plant it in a suitable location. Activity 2 treated this to some degree but choosing a location could be investigated in more detail.

Getting to know my gum tree ...

Before you start this ACTIVITY you need: an INFORMATION SHEET 2, a pen, coloured pencils, ruler and a rubber.

To do this ACTIVITY you need to: use the INFORMATION SHEET to complete much of the ACTIVITY to give a description of your tree then find one of your trees growing in the bush or a garden to complete the ACTIVITY.

My gum tree's name INFO 2 A

My gum tree's common name (like your nickname) **is** .....

Its special botanical name is .....

because it has .....

What does my gum tree look like? INFO 2 B, D, F and G, Pictures

To COLOUR your picture, first find the parts below, ticking each box as you find the part.

I found these parts of my gum tree ...

leaves	☐	**buds**	☐	**flowers**	☐	**fruit**	☐
a cap	☐	**a cup**	☐	**a baby tree or seedling**	☐		

The colours of these parts are ...

leaves .....

bud caps .....

bud cups .....

flowers (stamens) .....

bark .....

sprout leaves .....

seedling leaves .....

The ripe fruit are generally brown.

Now COLOUR your PICTURE correctly.

How does my gum tree grow? INFO 2 B

My gum tree grows to be ..... **metres tall. I am** ..... **metres tall.**

To be as tall as my tree I would need to stack ..... **people of my height.**

My tree has ..... **trunks so it is best described as a** .....

Where does my gum tree grow? INFO 2 C

Put a triangle (▲) on the map on the INFORMATION SHEET to show where your house is.

To see if your tree is found in bush close to your house use a ruler and the scale on the map to complete the following.

I would have to travel .....kms to find some of my gum trees growing in the bush. It would be best to travel by .....

(choose from foot, bicycle, car, train or aeroplane)

TAKE your coloured drawings and these sheets and see if you can FIND ONE OF YOUR TREES in the bush or a garden.

I found my tree growing .....

.....

My tree had grown from a seed that had .....

.....

(choose from either "been planted by someone" or "fallen from a tree")

All trees are different — DRAW your tree here.

Many trees are planted in unsuitable places such as too near houses and under wires.

DESCRIBE any problems the tree may have as it grows.

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What's a Gum Tree?

Before you start this ACTIVITY you need:
INFORMATION SHEET 1b, a pen, coloured pencils - and your eyes, ears and nose.

To do this ACTIVITY you need to:
1. FIND a gum tree.
2. LOOK at the tree's leaves, trunk and bark and its buds, flowers and fruit if it has these parts.

LEAVES INFO 1b A

Crush a leaf with your fingers.

The crushed leaves smell like...

.....

(choose from eucalyptus oil or pine needles)

DRAW or STICK
a leaf here

BUDS INFO 1b B

FIND the cup and the cap.

DRAW a fruit and colour it correctly.

FLOWERS INFO 1b C

The flowers on my gum tree are coloured...

.....

RUB your cheek on some of the flowers.

My tree's flowers feel .....

..... **on my cheek.**

Try to COLLECT some nectar from the cups in your hand.

The nectar tastes .....

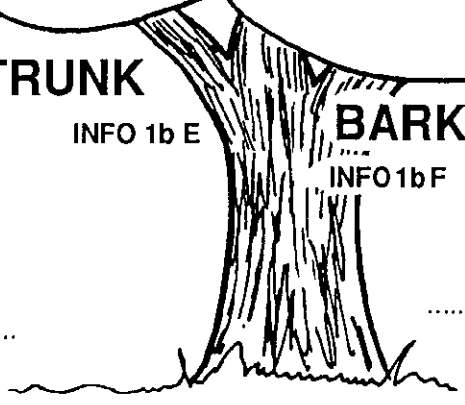
..... **I think the nectar would be food for** .....

.....

FRUIT (gumnuts) INFO 1b D

My gum tree's fruit are too ..... **for me to bite** *(choose from hard or soft)*. **Parrots have strong** ..... **to open them to get out the seeds to eat** *(choose from beaks or feet)*.

DRAW them and colour them correctly.



TRUNK INFO 1b E

HUG your tree.

I need to hug my tree ..... **times to go right around its trunk.**

My tree is best described as a .....

(choose from tree or mallee INFO 1b A)

BARK INFO 1b F

RUB your hands over the bark.

The bark on my gum tree feels .....

.....

(choose from rough, smooth, prickly or your own words)

Seed collectors at large

Before you start this ACTIVITY you need:
INFORMATION SHEET 2, your completed ACTIVITY 2 and a pen.

Have a good look at the gum tree you found in ACTIVITY 2.
FIND some fruit (gumnuts) on your tree.
CHECK to see if these are ripe. **INFO 3 and INFO 2F**

My gum tree's fruit (gumnuts) are

ripe ☐ *(tick the box)*

and unopened ☐ (they don't have a hole in them)

or **My fruit are not ripe yet. They should be ripe in** ..... **days. (INFO 2F)**

ONCE you have RIPE FRUIT on your tree you will need paper bags, secateurs and a labelling pen.

1. LABEL your bag with a label like this -

Collector's name .....
Plant's name .....
Date collection was made .....

2. CUT the *ripe unopened* fruit from the tree and put them in the labelled bag.

3. FIND a warm dry place, e.g. window sill, back ledge of the car, and leave your bag there. **INFO 3D**

4. CHECK your bag -
   - in two days if you have "collect me quicks" **INFO 3A**
   - in a week or two if you have "wait a years" **INFO 3B**
   - in 3 or 4 weeks if you have "wait for a ..." **INFO 3C**

My tree's fruit are .....
(choose from one of the above)

My fruit took ..... **days to ripen and drop their seed and chaff.**

5. SHAKE the bag to remove the seed and chaff. **INFO 3E**

6. STORE the seed in the bags in a dry place until needed.

KEEP the empty fruit.

ALSO COLLECT caps, cups and extra fruit from under your tree for ACTIVITY 3b, ***Gumnut Crafts***.

Remember:
You must get permission to collect gumnuts from the tree's caretaker.

Gumnut Crafts

To do this ACTIVITY you will need:

A good collection of gumnuts, caps and cups from as many different gum trees as possible.
KEEP these dry and
STORE them in a warm place.

GUMNUT CREATURES

You will NEED your collection of gumnuts, caps and cups, a ***quick*** drying glue (the best is hot glue from a gun), wobbly eyes from a craft shop, fine string and dry gum twigs.

1. ARRANGE your pieces into the creature you would like - an echidna, a gnome, an angel, etc.
2. STICK them in the order you planned.
3. ADD some wobbly eyes.
4. MAKE a COLLECTION of creatures and SUSPEND them with string from a twig for a mobile.

GUMNUT NECKLACES

You will NEED: cups, caps and gumnuts, a small vice, a drill, leather thonging or good quality string, leather scraps and scissors.

1. DRILL holes in the cups, caps and gumnuts. HOLD the gumnuts in a vice to do this. ***(This can be dangerous - make sure you have an adult to help you.)***
2. CUT leaf shapes from the leather scraps and make a hole at the top for threading.
3. THREAD these onto your thread.
4. MAKE a closing toggle with a loop one end and a small gumnut at the other.

HINT: If your gumnuts, etc. are green when you collect them you can make holes with a hot skewer. ***(This can be dangerous - make sure you have an adult to help you.)***

Remember:

You must get permission to collect caps, cups and gumnuts from the tree's caretaker.

If you like, VARNISH the pieces of gum for a long-lasting finish.

Getting to know my gum tree ...

Before you start this ACTIVITY you need: an INFORMATION SHEET 2, a pen, coloured pencils, ruler and a rubber.

To do this ACTIVITY you need to: use the INFORMATION SHEET to complete much of the ACTIVITY to give a description of your tree then find one of your trees growing in the bush or a garden to complete the ACTIVITY.

My gum tree's name INFO 2 A

My gum tree's common name (like your nickname) **is** .....

Its special botanical name is .....

because it has .....

What does my gum tree look like? INFO 2 B, D, F and G, Pictures

To COLOUR your picture, first find the parts below, ticking each box as you find the part.

I found these parts of my gum tree ...

leaves	☐	**buds**	☐	**flowers**	☐	**fruit**	☐
a cap	☐	**a cup**	☐	**a baby tree or seedling**	☐		

The colours of these parts are ...

leaves .....

bud caps .....

bud cups .....

flowers (stamens) .....

bark .....

sprout leaves .....

seedling leaves .....

The ripe fruit are generally brown.

Now COLOUR your PICTURE correctly.

How does my gum tree grow? INFO 2 B

My gum tree grows to be ..... **metres tall. I am** ..... **metres tall.**

To be as tall as my tree I would need to stack ..... **people of my height.**

My tree has ..... **trunks so it is best described as a** .....

Where does my gum tree grow? INFO 2 C

Put a triangle (▲) on the map on the INFORMATION SHEET to show where your house is.

To see if your tree is found in bush close to your house use a ruler and the scale on the map to complete the following.

I would have to travel .....kms to find some of my gum trees growing in the bush. It would be best to travel by .....

(choose from foot, bicycle, car, train or aeroplane)

TAKE your coloured drawings and these sheets and see if you can FIND ONE OF YOUR TREES in the bush or a garden.

I found my tree growing .....

.....

My tree had grown from a seed that had .....

.....

(choose from either "been planted by someone" or "fallen from a tree")

All trees are different — DRAW your tree here.

Many trees are planted in unsuitable places such as too near houses and under wires.

DESCRIBE any problems the tree may have as it grows.

.....

.....

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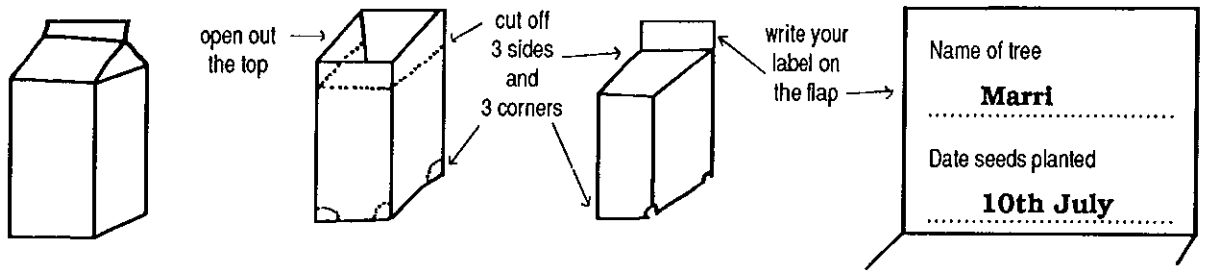
Growing gum trees from seed

GROWING A BABY GUM TREE FROM SEED

You will need a packet of GUM TREE SEEDS, a LITRE MILK CARTON, a WATERPROOF PEN, some WELL DRAINING SOIL, SCISSORS and WATER. Use ACTIVITY 4b "My Baby Tree Album" to RECORD the growth of your gum tree.

1. First make a "pot" out of your carton.

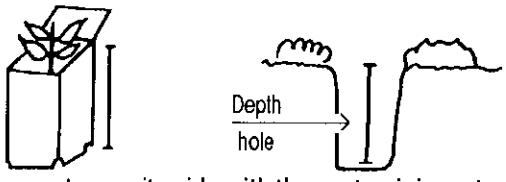


2. Fill your carton with soil. Shake and water your soil until it settles about 2cm from the top.
3. Scatter half of your packet of seeds over the soil surface. Cover with just enough soil to cover the seed.
4. Place your carton in a sunny place (winter) or lightly shaded place (summer), away from snails. Water it GENTLY every day.
5. When your gum tree is 10cm tall it needs to be planted in the ground or in a bigger pot.

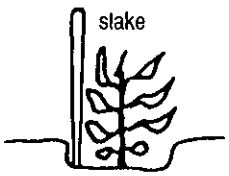
PLANTING YOUR BABY GUM TREE IN THE GROUND OR A POT

You will need a SPADE, a STAKE and your BABY GUM TREE.

1. Look back to ACTIVITY 2 to see how big your gum tree grows. Carefully choose a place to plant your tree, remembering how big it will grow.
2. Dig a hole as shown in the pictures. Put a sturdy stake in the hole away from where you are to place the tree.



3. To remove your tree from the carton, carefully lie the carton on its side with the carton join on top. Cut or peel the carton apart at the join.
4. Lift the baby tree with ALL ITS SOIL out of the carton and place it in the hole. Fill the hole with soil so that there is a dip around the tree that can be carefully filled with water. DO NOT tie the tree to a stake.



5. Water your tree daily for the first two weeks and weekly for the next six months.

If you are planting your baby gum tree in a bigger pot, follow Step 3 to remove the tree from the carton. Then lift the baby tree with all its soil out of the carton and place it in the pot. Fill the pot with soil and water gently.

My Baby Tree Album

To do this Activity refer to the sections of your gum tree Information Sheet 2 indicated throughout the Activity and what you observe as you grow your gum seeds.

First the Seeds INFO 2G

My gum tree began life as a seed. My gum tree's seeds are shaped like  ,  ,

 ,  **or**  . *(CIRCLE the shape most similar to the shape of your seeds.)*

DRAW and COLOUR
your gum tree seeds here
or STICK some of your seeds here.

Growing my gum tree INFO 2G

Follow Activity 3 to grow your gum tree. Use the chart below to make a RECORD of the GROWTH of your BABY TREE. CUT out the pictures on page 3 to help you make this record.

KEY

seed planted 

water 

sprout appeared 

sunny day 

cloudy day 

rainy day 

seedling leaves appeared 

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

My Baby Tree Album

... in about 2 weeks the SPROUTS INFO 2G

When gum tree seeds start to grow (germinate) the first growth seen is the two leaves of the sprout.

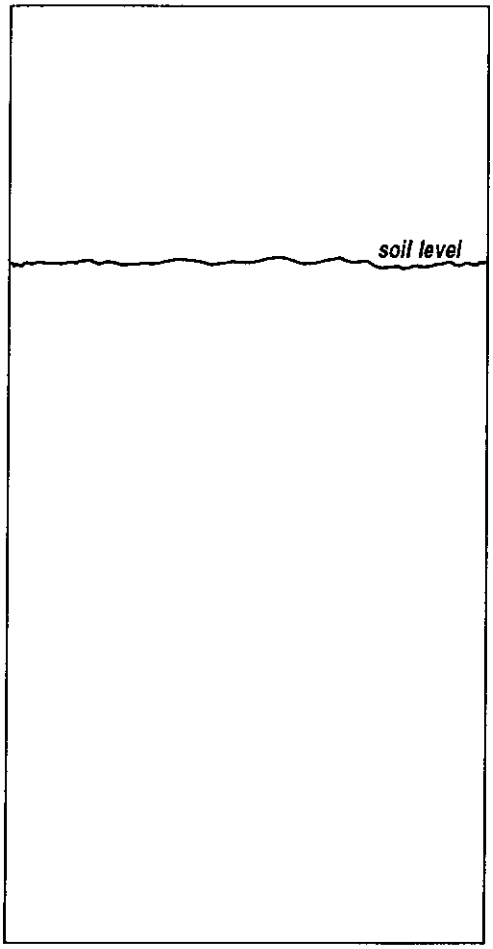
My gum tree's sprout leaves should look like

CIRCLE the sprout leaves like yours.

These leaves should come up in my pot ..... days after I plant my seeds. I planted my seeds on ..... so I should see my sprout leaves on .....

(FIND this date by adding the number of days your seeds take to germinate to the date you planted your seeds.)

TURN to page 3. CUT out your sprout leaves and PLANT them in the soil. SPROUTS have ROOTS too. CUT out the roots on page 3 and join them to your sprout leaves.



... in about 4 weeks the SEEDLING INFO 2G

The sprout soon grows more leaves - the SEEDLING leaves. These leaves are unlike SPROUT leaves and generally unlike ADULT TREE leaves. COMPARE the shape, colour and hairiness of the SEEDLING and ADULT TREE leaves.

My gum tree's seedling leaves are .....

.....

.....

(WRITE about their shape, colour and hairiness)

COLOUR your gum tree seedling picture to match.

My Baby Tree Album

... in about 8 weeks a BABY GUM TREE

Your gum tree should now be about 10cm tall and ready to plant in the ground or a large pot. Look back to Activity 2 to help you decide on a good place to plant your tree.

... and in about 5 years a young ADULT TREE will have grown.

Look at the picture on your Information Sheet 2 to see what your tree will look like.

CUT OUT THESE PICTURES AS DIRECTED