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Forestry Commission
Booklet

50



A Key to Eucalypts in Britain and Ireland

M I H Brooker

with notes on growing eucalypts in Britain

J Evans



Front Cover: *Eucalyptus gunnii* foliage showing flower buds, flowers and fruits (capsules). (J. Evans)

FORESTRY COMMISSION

Booklet 50

A Key to Eucalypts in Britain and Ireland

by M I H Brooker
Division of Forest Research,
Commonwealth Scientific and Industrial Research Organization,
Private Bag, P.O. Wembley, Western Australia, 6014.
*(Australian Botanical Liaison Officer, 1981.
Royal Botanic Gardens, Kew, UK)*

with

notes on growing eucalypts in Britain

by J. Evans
*Silviculturist,
Forestry Commission*

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FOREWORD

The possibilities and potential of eucalypts in the British Isles have long fascinated garden enthusiasts and over the last 100 years many species have been tried. Today, eucalypts can be seen in many parks and gardens fulfilling a definite ornamental and amenity role. Although research into their forest potential is also underway, this key is designed primarily to meet the needs of arboriculturists, parks supervisors, horticulturists and those in the nursery trade.

The Forestry Commission are very grateful to Ian Brooker of the Division of Forest Research, Commonwealth Scientific and Industrial Research Organization, Australia, for preparing the identification key.

Julian Evans
Silviculturist
Forestry Commission

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Figure 1. A seedling of *E. pauciflora* – leaves becoming petiolate and alternate from the 5th node. (CSIRO)



Figure 2. A seedling of *E. archeri* – leaves remain sessile and opposite for many nodes. (CSIRO)

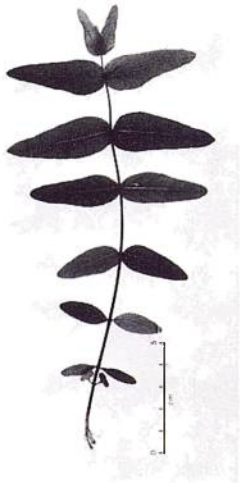


Figure 3. A seedling of *E. viminalis* – leaves remain sessile and opposite for many nodes. (CSIRO)

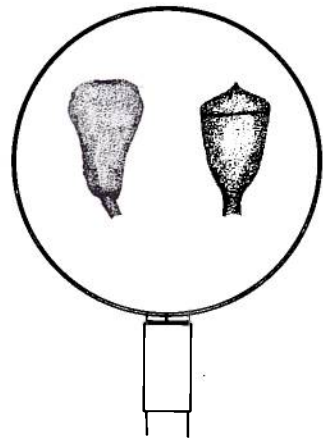


Figure 4. Bud on left with no operculum scar; on right with scar.

A KEY TO EUCALYPTS IN BRITAIN AND IRELAND

by M. I. H. Brooker

Preface

The species treated are those named in an arboriculture research note on eucalypts in Britain by Evans (1980) plus a few others at his suggestion, and the principal species grown in Ireland referred to by Mooney (1960). The most successful species are from areas of temperate climate in Australia and are relatively frost tolerant. The characters used are those that are usually available on specimens in the field. A synopsis of the life cycle and morphological features of a eucalypt plant is provided to assist those readers unfamiliar with the genus *Eucalyptus* to use the key.

Leaves

Following germination, eucalypts pass through a sequence of growth stages characterized by changes in leaf development and morphology. The stages are termed seedling, juvenile, intermediate and adult.

In the vast majority of species the first leaves are produced in opposite pairs. They may be sessile or petiolate, broad or narrow, green or glaucous. The number of opposite pairs is few (3–5) in the ash group of eucalypts (e.g. *E. regnans*, *E. pauciflora* (Figure 1), *E. delegatensis*). In many other species the opposite phase is maintained for many nodes (10 or more) as in *E. globulus*, *E. archeri* (Figure 2), *E. coccifera*, *E. viminalis* (Figure 3) and the seedlings are very conspicuous.

There is no definable end to the seedling phase but at about 30–60 cm tall the leaves are usually bigger than in the young seedling and in some species distinctly petiolate (Figure 1). The characteristics of the juvenile leaves are usually fully expressed by the 10th node although they may continue to about the 20th or 30th node.

The intermediate stage follows the juvenile and the leaves show a morphological transition from juvenile to adult. The leaves are often very large and always petiolate and pendulous. Glaucousness, if prominent in the seedling and juvenile leaves, usually becomes less prominent or disappears altogether.

Adult leaves are produced at the final growth stage. These are always petiolate, lanceolate or broad-lanceolate, and pendulous, although many eucalypts such as *E. cinerea* do not achieve this final stage during their life cycle. In these instances the trees develop buds and fruits in the axils of the juvenile leaves.

In this key 'juvenile' includes both the seedling and juvenile stages as the true seedling leaves are frequently unavailable for study. Trunk or butt coppice shoots may be regarded as 'juvenile'. For the fine distinctions, if any, between seedling and juvenile leaves, reference should be made to botanical descriptions in Hall *et al.* (1970). A more detailed discussion of the various stages of leaf development can be found in Jacobs (1955).

Illustrations of leaf shapes are given in Figure 5 following the Key.

Reproductive organs

Most eucalypts grown as exotics produce fruits with viable seeds within 5–10 years. Usually this occurs when the crown is composed of adult leaves but in some species the reproductive organs are produced

while the plant is still in the juvenile leaf stage.

The flower buds (referred to in the key as 'buds') form in the axil of a leaf. The buds are borne on a common stalk (peduncle) and may be single or in groups of 3, 7, 11 or more. The bud number is always odd and an apparently 2-budded inflorescence is most certainly derived from an original 3-budded state with 1 bud aborted, similarly 4, 5 or 6 bud states are derived from a 7, and so on. Close examination of the tip of the peduncle will show scars if buds have aborted. If the bud number is 3, the buds or scars will always be in one row at right-angles to the stem. Higher numbers of buds form in 3 or more rows.

A few species are notable for having different bud numbers. In the case of *E. coccifera* (3 and 7), the number varies with provenance. In *E. vernicosa* (1 and 3), the single-flowered condition is probably the result of the very early loss of the two side buds such that in subsequent development the scars are obscured.

In some species, as the bud develops, an outer operculum sheds leaving a ring scar on the side of the bud. The scar can often be seen with the naked eye or more easily by using a $\times 10$ hand lens (Figure 4). Other species have only one operculum and no scar forms (species in key, Group 3, A-M inclusive). At maturity, the inner or only operculum is forced off the top of the flower bud by the expanding stamens. The flower may be self- or cross-pollinated and the stamens are finally shed.

The fruit (capsule or gum-nut) develops from the basal part of the bud by becoming woody and larger. The mature seeds are released when the fruit dries out and the fruit subsequently falls from the tree. The woody fruit does not decompose quickly and can usually be found on the ground for examination.

Bark

As the tree grows, a layer of bark is constantly added to the girth and each year the outermost layer dies. In a high proportion of eucalypt species, the dead bark is shed (as in plane trees, *Platanus* spp.) leaving a smooth surface to the trunk (Figure 6a, c, d, e, l). The colour of the newly exposed living bark varies between species. It may be colourful at first, then fade with weathering. In other species the dead outer bark persists giving the trunk a rough appearance (as in elms, *Ulmus*, and oaks, *Quercus*). In the characteristically rough-barked species, the rough bark may persist only on the lower trunk (Figure 6b, f, g) or extend over the whole trunk and branches (Figure 6h, k). The thickness of the dead bark will vary with the age of the tree. The smooth or rough bark features in the key refer to the trunk of a mature tree.

Natural variation of characters

The variability of characters in a eucalypt tree has long been recognized by authors wishing to devise a usable key. It should be appreciated that the whole genus *Eucalyptus* consists of about 500 species. Some have diverged in an evolutionary sense from the mainstream of the genus, and in their genetic isolation have developed exclusive characters that make their identification easy. For example, *E. deglupta* (a tropical species of long geographic isolation from the Australian mainland) can be recognized from a single seed alone. Many other species are of more recent evolutionary divergence and consequently have many features in common with their nearest relative. There may be an overlap in morphology and dimensions, suggesting that in the natural populations gene exchange has prevented the selection of exclusive characters expressed by shape and size. For example, *E. subcrenulata* and *E. johnstonii* are closely related and clearly have a recent common ancestor. *E. subcrenulata* occurs naturally at higher altitudes than *E. johnstonii* where it has a poorer form, smaller buds and fruits and a more conical operculum but shares adult and juvenile leaf characteristics and bark colour, etc. Consequently it is not easy to distinguish them in a key, particularly when specimens of both are grown together and distinguishing field characters, such as form and habit, are not

faithfully reproduced. Similarly, *E. gunnii* and *E. archeri*, and the snow gums, Group 3, D-F, have diverged imperfectly into separate species and the distinguishing features seen in their natural distributions may not be strongly heritable.

Hybridism in exotic plantings

It must also be emphasized that in their natural environment *Eucalyptus* species have maintained their distinctions by many factors which include geographical isolation, ecological isolation, different flowering times and pollen-stigma incompatibility. The balance, thus preserved, which prevents species from crossing and hence merging, is often fragile.

However, many pairs of species are interfertile as shown by manipulated crosses. In natural conditions their species identity is usually maintained, but natural hybrids are not uncommon. Occasionally they are peculiarly suited to an area and lead to the establishment of a hybrid swarm.

In contrast, a drastic breakdown of barriers may be provided in exotic plantations when compatible species are brought together for the first time, flowering periods may be extended in the new conditions, and the possibility of crossing is greatly increased.

Therefore, the purity of plants grown from seed obtained from exotically grown eucalypts must always be suspect, unless it is certain that the mother tree is not growing within breeding distance of other compatible species. Few studies have been made on the pollen path in *Eucalyptus*, but Pryor (1976) found that the effect of *E. fastigata* pollen on *E. robertsonii* mother trees was almost nil beyond 60 m. The subsequent generations from trees growing near a compatible pollen source may reproduce the parental type by selfing or crossing with a tree of the same species, but equally may throw a multitude of recombinant forms of varying similarity between two distinct species.

The relative value of characters

If the user of this key is familiar with the morphology of the *Eucalyptus* plant and bears in mind the possibility of hybridism, some estimate of the value of characters is worth emphasizing. The characters used could be referred to the following categories of reliability:

- absolute* — presence or absence of an operculum scar
- high* — bud numbers
 - opposite juvenile leaves
 - connate juvenile leaves
 - parallel leaf venation
- medium* — dimensions, shape and sculpture of any organ
 - prominently square stems of seedlings
- low* — habit
 - bark colour and type

All illustrations in the key (pp. 4–14) are reproduced at actual size.

KEY

Apart from the segregation of the species into three groups based on bud numbers, the key is strictly dichotomous, i.e. two alternatives are always given under the same letter.

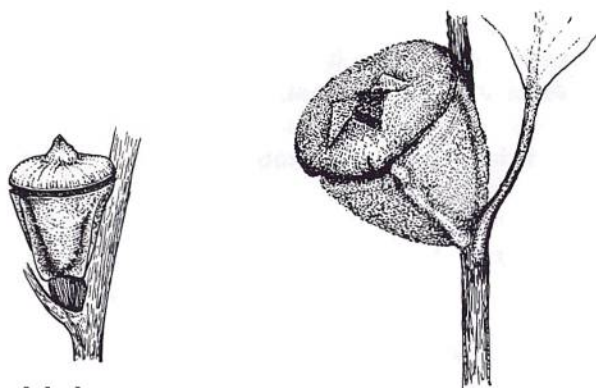
Buds single	Group 1
Buds in 3's	Group 2
Buds in 7's or more	Group 3

GROUP 1

- A. Tree with adult leaves alternate, often prominently falcate, to 25×4 cm; fruit more than 1 cm wide, warty, glaucous; juvenile leaves conspicuous, large, ovate, glaucous, on square stems; bark mostly smooth (Figure 6a) *E. globulus*
- A. shrub or small tree with opposite leaves less than 5 cm long; fruit less than 1 cm wide; juvenile leaves, small, elliptical, green; bark smooth *E. vernicosa*

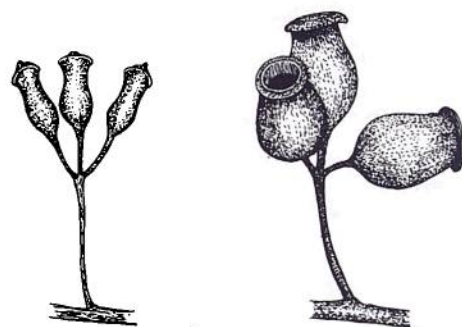
GROUP 2

- A. shrub or small tree with opposite, green leaves less than 5 cm long; buds and fruit sessile; bark smooth *E. vernicosa*
(For illustrations see Group 1)
- A. shrub to tall tree with alternate green leaves more than 5 cm long, or if opposite leaves present, then glaucous
- B. fruit urceolate, to 1.8×1.1 cm; peduncles to 2.5 cm long; bud and fruit on distinct pedicels; bark mostly smooth, pink *E. urnigera*
- B. fruit not urceolate; peduncles less than 1 cm long; fruit sessile or shortly pedicellate
- C. juvenile leaves connate; buds, fruit, leaves glaucous; bark smooth *E. perriniana*
- C. juvenile leaves free
- D. juvenile leaves narrow-lanceolate to lanceolate, green; adult leaves undulate; crown usually with ribbons of hanging bark; stem subject to frost-split; bark mostly smooth or trunk rough (Figure 6b, c) *E. viminalis*



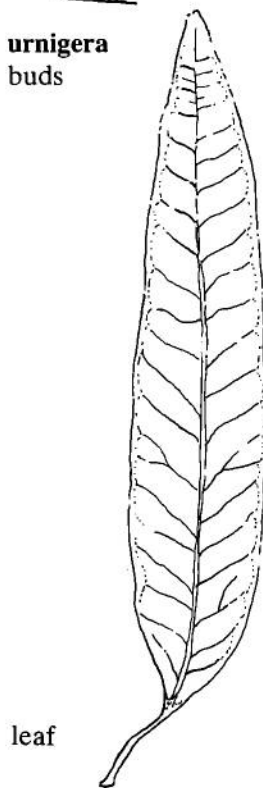
globulus
bud

fruit



urnigera
buds

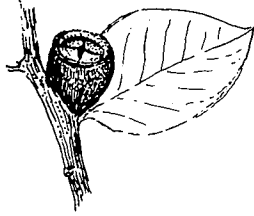
fruit



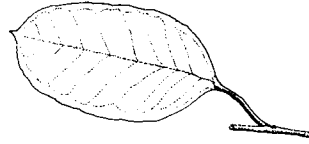
leaf



vernicosa
buds



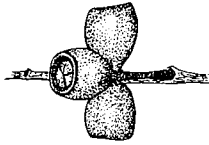
fruit



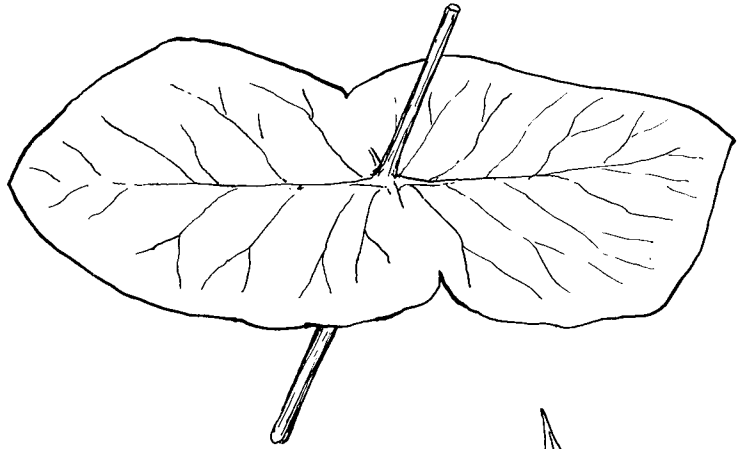
leaf



perriniana
buds



fruit



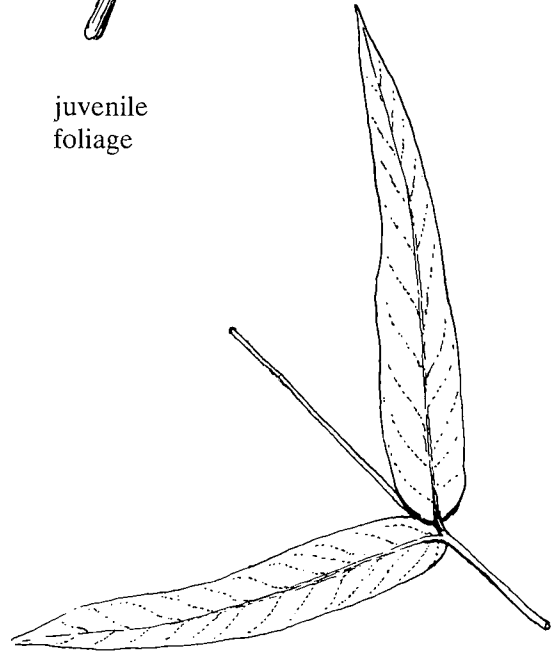
juvenile
foliage



viminalis
buds



fruit



juvenile
foliage

D. juvenile leaves ovate to orbicular, green or glaucous

E. juvenile leaves green; medium-sized to tall trees

F. juvenile leaves pale green, entire; adult leaves undulate; fruit hemispherical or cupular, to 0.8×0.9 cm, smooth; bark mostly smooth, white, grey or greenish *E. dalrympleana*

G. juvenile leaves bright, shiny, green, crenulate, glandular, thick; fruit obconical, hemispherical or campanulate; bark mostly smooth, pink or pinkish grey (Figure 6d)

G. fruit hemispherical to campanulate, to 0.6×0.9 cm; operculum conical
E. subcrenulata

G. fruit hemispherical to obconical, to 0.8×1.3 cm, often angled; operculum flattened and beaked
E. johnstonii
(syn. *E. muelleri*)

E. juvenile leaves glaucous or grey-green; shrubs to tall trees

H. operculum flattened, very uneven and warty; adult leaves uncinete, grey-green; fruit usually glaucous, obconical, to 1.1×1.3 cm; bark smooth
E. coccifera

H. operculum conical or beaked, not warty; adult leaves green or glaucous; fruit cupular, cylindrical, barrel-shaped or rarely obconical

I. shrub or small tree with much juvenile, orbicular, cordate or ovate glaucous foliage

J. bark rough, fibrous, thick
E. cinerea

J. bark smooth, sometimes flaky

K. juvenile leaves crenulate; stems strongly square in section; fruit to 1.3×1.3 cm
E. cordata

K. juvenile leaves entire; stems not square in section; fruit to 0.9×0.9 cm, rim sometimes flared
E. pulverulenta



dalrympleana
buds



fruit



johnstonii
buds



fruit



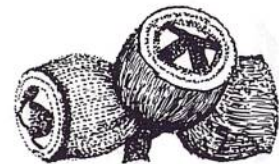
coccifera
buds



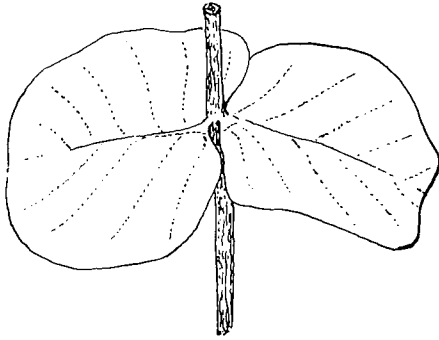
fruit



cordata
buds



fruit



juvenile
foliage



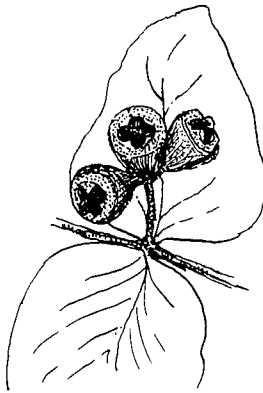
subcrenulata
buds



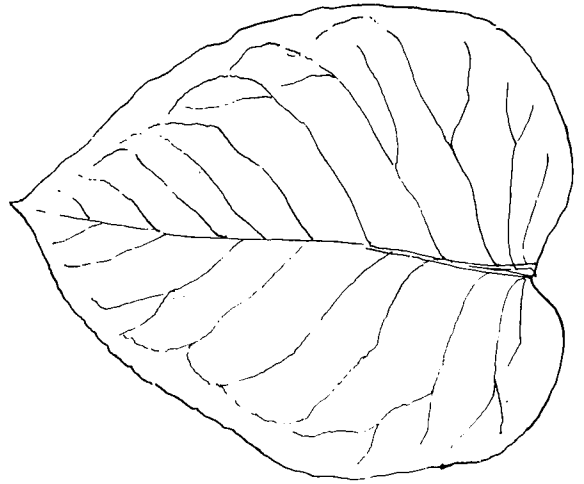
fruit



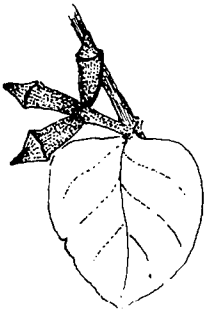
cinerea
buds



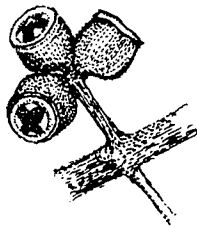
fruit



leaf



pulverulenta
buds



fruit

I. small to tall trees with canopy of green adult leaves (orbicular, glaucous coppice shoots may be present)

L. juvenile leaves crenulate; fruit cylindrical to obconical, to 0.9×0.7 cm; bark pink mostly smooth, or pinkish grey (Figure 6e)

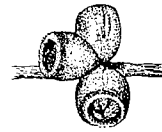
M. buds glaucous; fruit usually cylindrical *E. gunnii*

M. buds not glaucous; fruit cylindrical to obconical
E. archeri

L. juvenile leaves entire; operculum very short, fruit cylindrical to barrel-shaped, to 1.2×1 cm, usually glaucous; bark rough at base, smooth above (Figure 6f) *E. glaucescens*



gunnii
buds



fruit

GROUP 3

A. many peduncles in pairs in the axils; juvenile leaves green; adult leaves oblique, green; fruit obconical; bark rough at base, smooth above (Figure 6g), crown often with ribbons of imperfectly decorticated bark
E. regnans

A. peduncles single in the axils; juvenile leaves green or glaucous

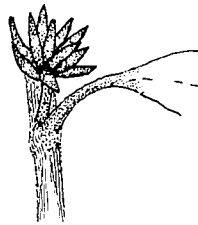
B. adult leaves with parallel venation

C. buds smooth, to 0.6×0.2 cm, in dense, stellate clusters, many more than 7, operculum sharply conical; adult leaves elliptical to broad-lanceolate, less than 10 cm long; with a midrib and two fainter side veins parallel to midrib and two more veins parallel to edge; bark rough over lower half of trunk, smooth above

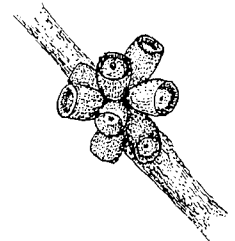
E. stellulata

C. buds often warty, to 1.5×0.7 cm in loose clusters of 7 or more; operculum hemispherical or shortly conical; adult leaves lanceolate to broad-lanceolate with several parallel veins; bark smooth

D. buds with sharp angles, sessile, glaucous
E. debeuzevillei



stellulata
buds



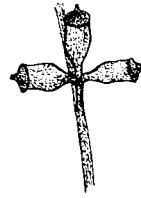
fruit



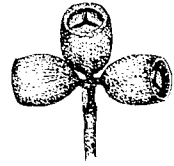
archeri
buds



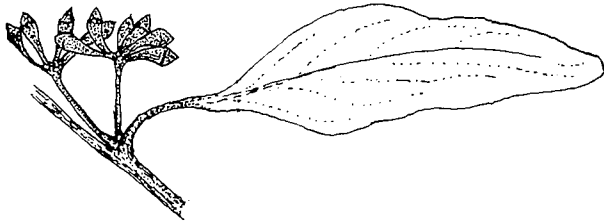
fruit



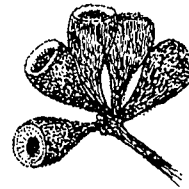
glaucescens
buds



fruit



regnans
buds



fruit



debezevillei
buds



fruit

- D. buds without angles, sessile or pedicellate, clavate, green or glaucous
 E. shrub with narrow juvenile leaves (to 2.5 cm wide); peduncles to 1 cm long

E. gregsoniana

- E. small or medium-sized tree with ovate juvenile leaves (to 8 cm wide); peduncles to 1.6 cm long

- F. adult leaves lanceolate or falcate, to 16 cm long; buds glaucous or green

E. pauciflora

- F. adult leaves lanceolate or oblong, not or scarcely falcate, to 10 cm long, uncinete; buds always glaucous

E. niphophila

- B. adult leaves with distinct midrib and side veins at an angle to midrib, not parallel to midrib

- G. operculum flattened, very uneven and warty; adult leaves elliptical to lanceolate, uncinete, grey-green, to 10 × 2 cm; fruit usually glaucous, obconical, to 1.1 × 1.3 cm; bark smooth *E. coccifera* (For illustrations see Group 2, H)

- G. operculum hemispherical or conical, smooth or wrinkled, not conspicuously warty; adult leaves green, or if bluish-green, narrow-lanceolate, to 13 × 1 cm

- H. mature buds without a ring scar formed by the loss of the outer operculum; buds in 7's or more

- I. juvenile leaves alternate, petiolate, pendulous, oblique, ovate, to 20 × 10 cm

- J. bark rough, fibrous over whole trunk (Figure 6h); juvenile leaves green, shiny; fruit barrel-shaped *E. obliqua*

- J. bark rough on lower part of trunk only. (Figure 6i, j); juvenile leaves glaucous

- K. fruit obconical or hemispherical

E. delegatensis
 (syn. *E. gigantea*)

- K. fruit urceolate *E. fraxinoides*



gregsoniana
buds



fruit



obliqua
buds



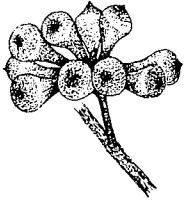
fruit



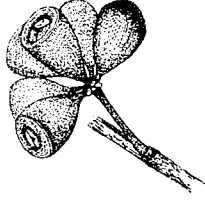
delegatensis
buds



fruit



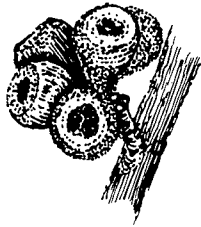
pauciflora
buds



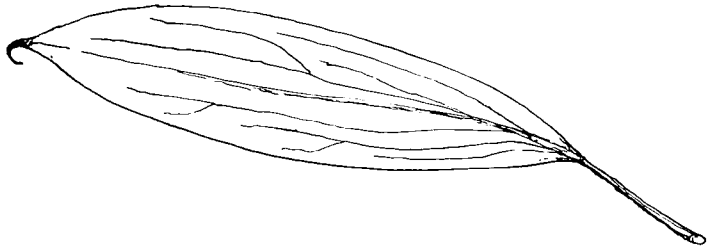
fruit



niphophila
buds



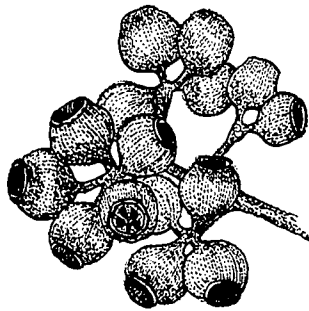
fruit



leaf



fraxinoides
buds



fruit

- I. juvenile leaves opposite, sessile, green
 L. bark smooth or thinly fibrous; juvenile leaves ovate, to 11×7 cm; fruit to 0.8×0.9 cm
E. nitida

- L. bark fibrous over most of trunk (Figure 6k), juvenile leaves elliptical or lanceolate; fruit to 0.7×0.7 cm

- M. adult leaves to 12×1 cm
E. amygdalina

- M. adult leaves to 15×1.5 cm
E. radiata

- H. mature buds with a ring scar formed by the loss of the outer operculum

- N. leaves on mature tree opposite and sessile or sub-opposite and shortly petiolate, to 7×1.5 cm, held somewhat stiffly and not pendulous; buds sessile, to 0.4×0.3 cm; fruit to 0.5×0.4 cm; bark smooth
E. parvifolia

- N. leaves on mature tree alternate, pendulous; buds in 7's

- O. juvenile leaves opposite, ovate, to 17×8 cm, bluish-green to glaucous, buds sessile; fruit sessile, shiny, to 0.7×0.6 cm; adult leaves to 25×2.5 cm; bark mostly smooth (Figure 6l)
E. nitens

- O. juvenile leaves linear to ovate, less than 10 cm long; buds and fruit pedicellate

- P. adult leaves 2.5–5 cm wide; buds to 1×0.5 cm; fruit obconical or cupular, to 0.8×0.7 cm; juvenile leaves elliptical to ovate

- Q. juvenile leaves usually emarginate; adult leaves elliptical, to 5 cm wide; bark mostly smooth
E. camphora



nitida
buds



fruit



parvifolia
buds



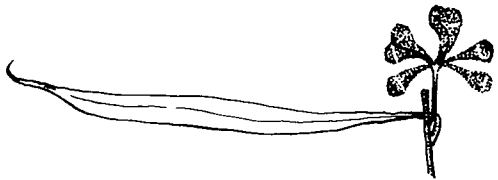
fruit



nitens
buds



fruit



amygdalina
buds



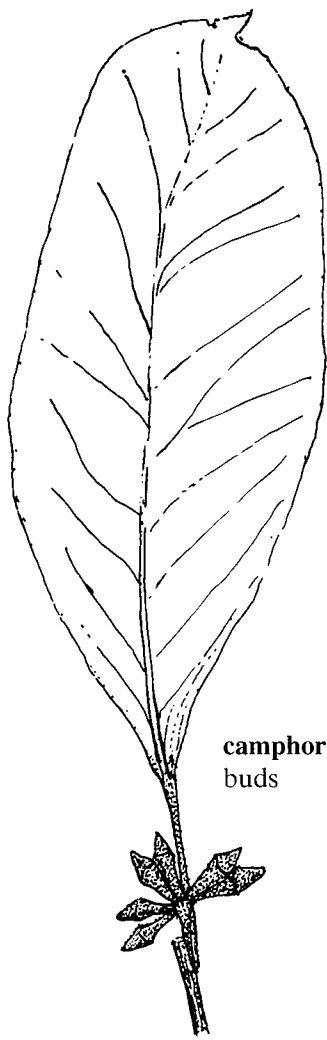
fruit



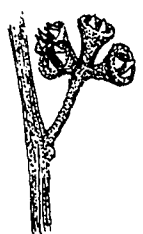
radiata
buds



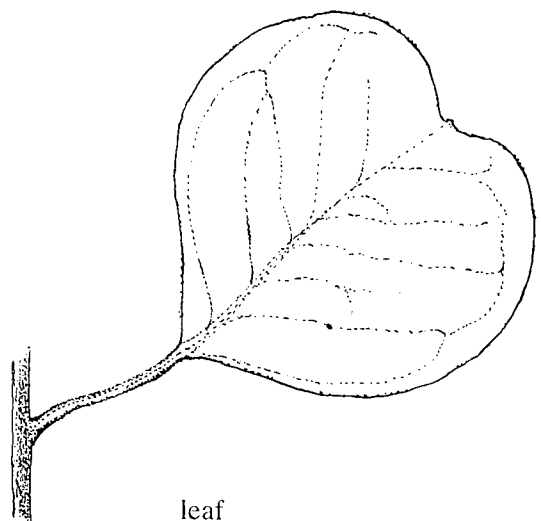
fruit



camphora
buds



fruit



leaf

Q. juvenile leaves not emarginate; adult leaves broad-lanceolate, to 2.5 cm wide

R. adult leaves without prominent oil glands; juvenile leaves entire; bark mostly smooth (Figure 6m)

E. ovata

R. adult leaves with prominent oil glands; juvenile leaves crenulate, bark rough at base, smooth above (Figure 6n)

*E. brookeriana**

P. adult leaves less than 2 cm wide; buds to 0.5 × 0.3 cm; fruit to 0.5 × 0.5 cm; juvenile leaves linear, or narrow to broad-lanceolate, never emarginate

S. juvenile leaves linear; all leaves bluish-green; fruit hemispherical or campanulate; fruit to 0.5 × 0.4 cm

T. bark rough, red-brown, fibrous

E. nicholii

T. bark smooth, white powdery

E. mannifera

(syn. *E. maculosa*)

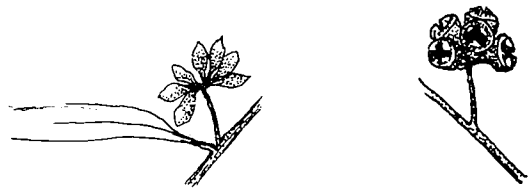
S. juvenile leaves elliptical to broad-lanceolate; all leaves green; fruit obconical, crowded; to 0.5 × 0.5 cm; with fine, rough bark

E. aggregata



brookeriana
buds

fruit



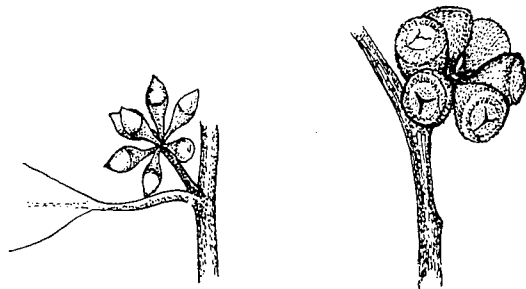
nicholii
buds

fruit



mannifera
buds

fruit



aggregata
buds

fruit

*This is a recently described species from Tasmania and southern Victoria. Many trees growing in southern Ireland belong to this species and are likely to have been grown from seed imported under the name *E. ovata* which has similar buds and fruits to *E. brookeriana* but is a tree of poor form, with entire juvenile leaves, and adult leaves without conspicuous glands.

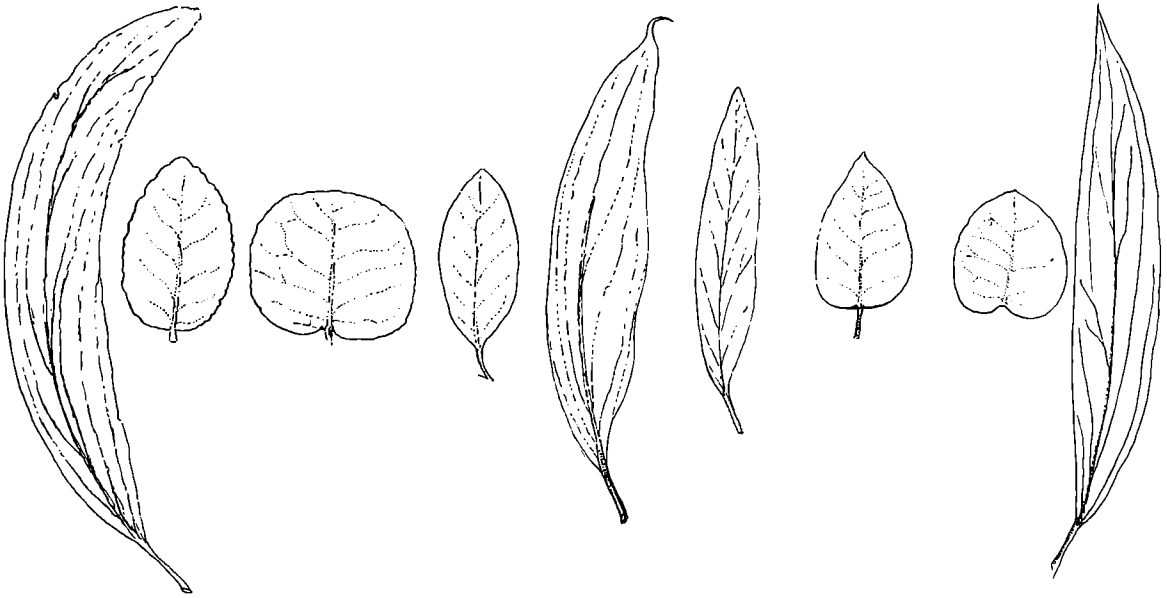


Figure 5. Various leaf shapes and ornamentation in eucalypts.

- a. oblique
- b. cordate
- c. ovate
- d. lanceolate
- e. uncinata
- f. elliptical
- g. orbicular
- h. crenulate
- i. falcate

Figure 6. Selected bark types in mature trees of *Eucalyptus*. (CSIRO)



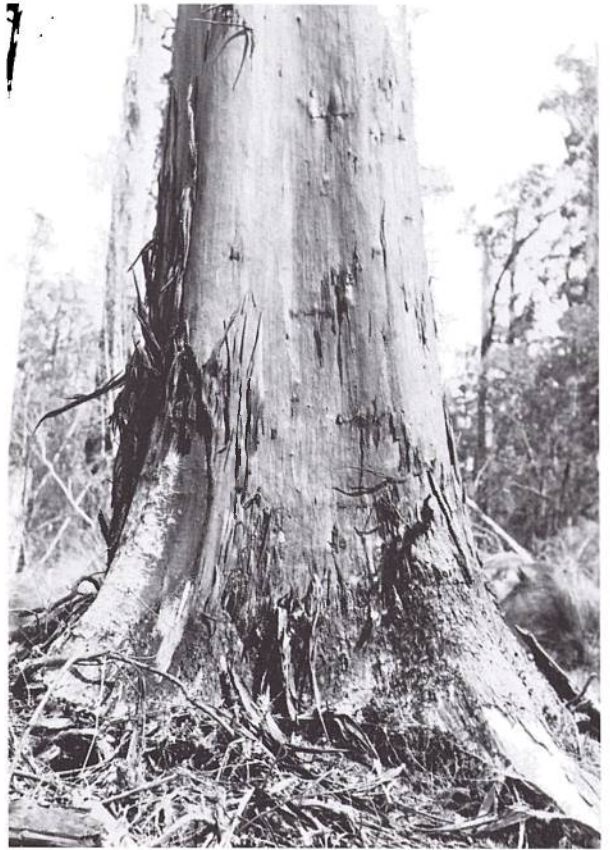
(a) *E. globulus* – most of trunk smooth
some rough slabs at base.



(b) *E. viminalis* – poor-formed tree with
rough basal bark, smooth bark above with
ribbons of imperfectly decorticated bark
characteristic of this and several other species,
e.g. *E. regnans*, *E. glaucescens*.



(c) *E. viminalis* – tall tree form, most of trunk smooth, some rough bark at base.



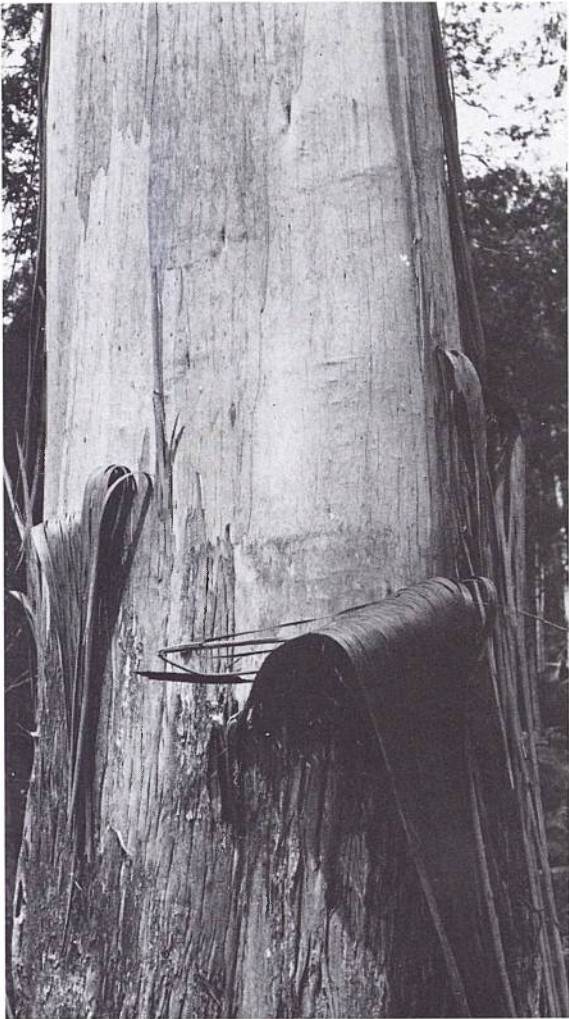
(d) *E. johnstonii* – most of trunk smooth, some rough bark at base.



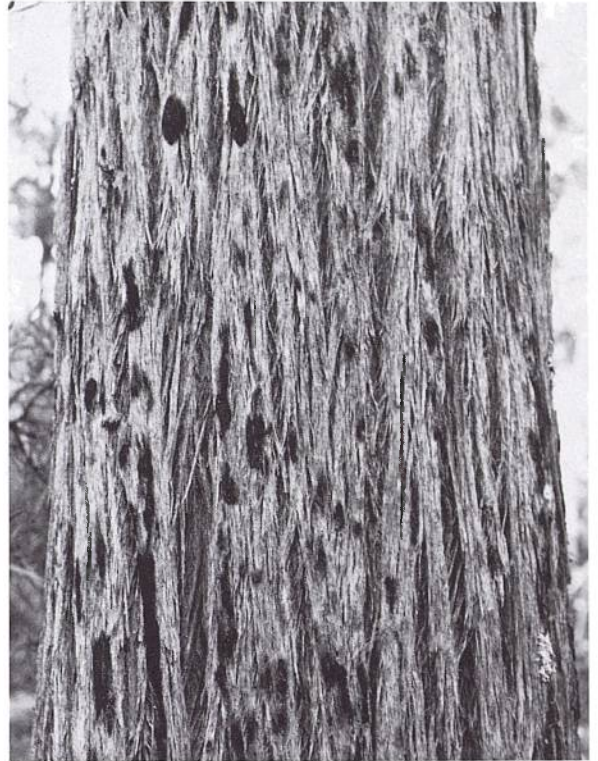
(e) *E. gunnii* – most of trunk smooth, some rough bark at base.



(f) *E. glaucescens* – upper bark smooth (lower trunk is usually rough).



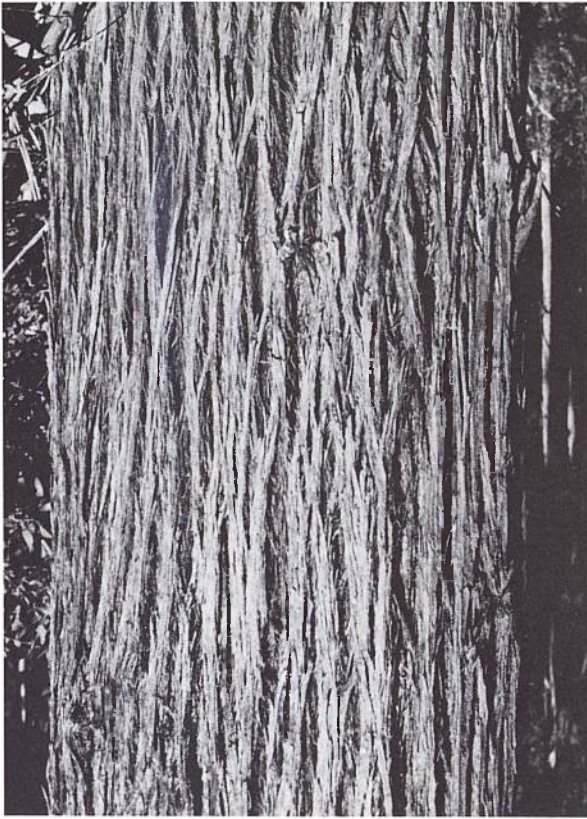
(g) *E. regnans* – upper bark smooth, lower trunk is usually rough and the rough bark comes away in ribbons.



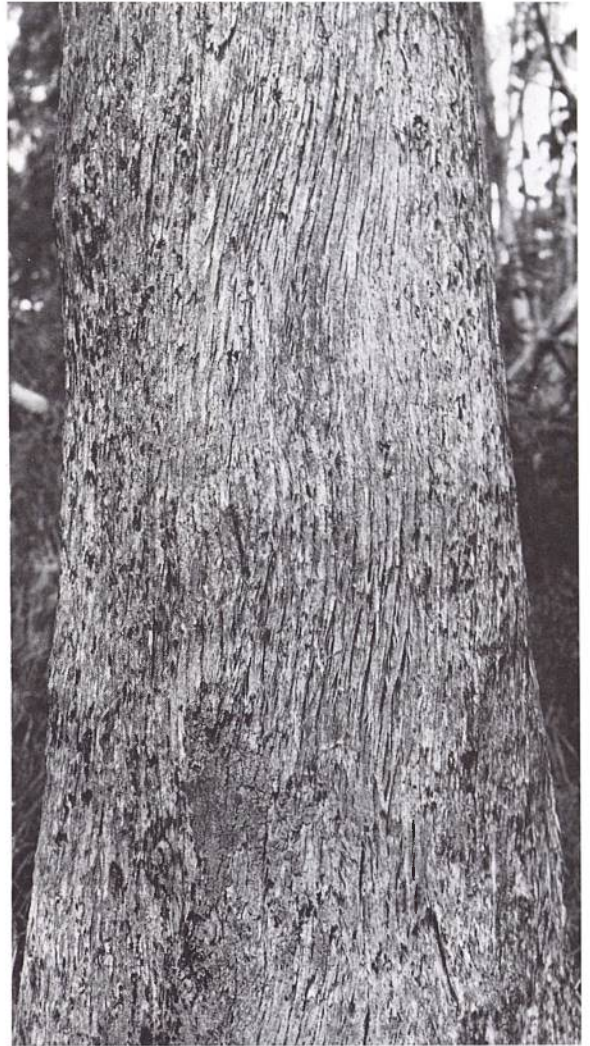
(h) *E. obliqua* – the thick, rough bark of the whole trunk.



(i) *E. delegatensis* – rough bark over part of trunk.



(j) *E. delegatensis* – the thick rough bark of the lower trunk.



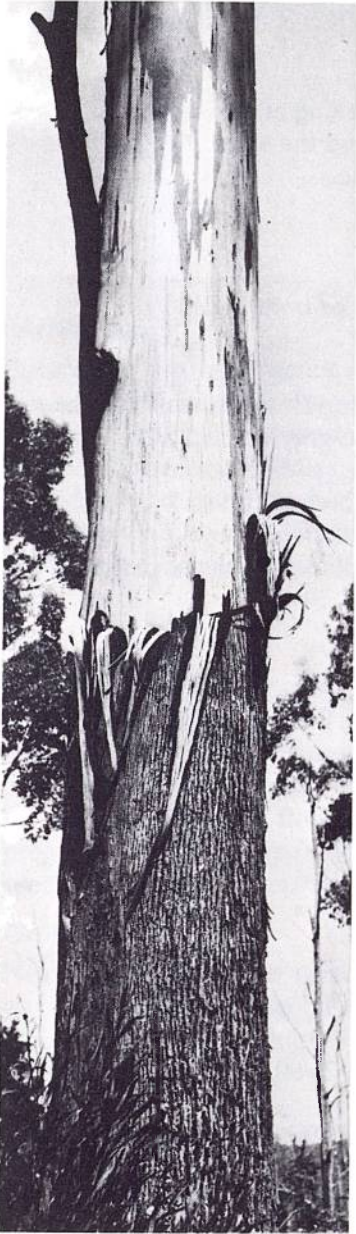
(k) *E. amygdalina* – rather fine rough bark of the whole trunk.



(l) *E. nitens* – most of trunk smooth, some rough bark at base.



(m) *E. ovata* – most of trunk smooth, some rough bark at base.



(n) *E. brookeriana* – bark rough at base,
smooth above.

Glossary

axil	—	angle between the petiole and the stem.
campanulate	—	bell-shaped (upside-down in the eucalypt fruit).
clavate	—	club-shaped, long and narrow at the base, broadening at the summit.
connate	—	when the bases of opposite leaves are fused around the stem.
cordate	—	heart-shaped, indented at the join with the petiole.
crenulate	—	with a scalloped margin.
cupular	—	cup-shaped.
decorticate	—	shedding of the bark.
elliptical	—	shaped like an ellipse, but pointed usually at one or both ends.
emarginate	—	indented at the end.
falcate	—	curved like the blade of a sickle.
glandular	—	with conspicuous oil glands, usually seen by holding fresh leaf to the light.
glaucous	—	covered with a white wax, giving a whitish or blue-grey colour.
hemispherical	—	fruit shaped like half a sphere, stalked at the base (pedicellate).
lanceolate	—	lance-shaped, broader below the middle, length: breadth up to 8:1.
obconical	—	cone-shaped but pointed at the base, broadening above.
oblique	—	when the bases of the two sides of the leaf blade do not meet the petiole at the same point.
operculum	—	bud cap, shed at flowering.
orbicular	—	round or almost round.
ovate	—	roughly egg-shaped, broader below the middle, length: breadth up to 3:1.
pedicel	—	bud, flower or fruit stalk.
peduncle	—	stalk subtending a whole inflorescence, i.e. group of flowers.
petiole	—	leaf stalk.
sessile	—	lacking a petiole or pedicel.
stellate	—	star-shaped or star-like (of the whole bud cluster).
uncinate	—	with a fine hook at the end.
undulate	—	with a wavy leaf surface.
urceolate	—	urn-shaped, narrowing at the top into a neck.

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NOTES ON GROWING EUCALYPTS IN BRITAIN

by J. Evans

Introduction

Eucalyptus is a large genus of over 500 species in the family *Myrtaceae*. Almost all species occur naturally only in Australia where they range from over 80 m tall forest trees to small shrubs called *mallees*. Eucalypts are found throughout Australia but only species growing in the colder mountainous regions of New South Wales, Victoria, and central Tasmania may be hardy enough to grow in Britain.

Many eucalypts have been tried in Britain, indeed numerous introductions were made in Victorian times, but only a very few proved sufficiently hardy to plant almost anywhere. In the mild localities of south west England, west Wales and west Scotland, several collections of 20–30 species have been established.

Habit

Eucalypts have great variety in leaf form and colour (juvenile and adult foliage), delicate clusters of white or creamy coloured flowers, often highly patterned and multi-coloured bark, and graceful shapes. It is not surprising, therefore, to find eucalypts being increasingly planted as garden ornamentals, and there are few towns in Britain where one or two cannot now be seen.

Most species will flower and set viable seed in this country. However, such seed often yields progeny not true to type owing to hybridization. This is particularly common where trees of several species are growing near to one another.

Growth

Nearly all species grow rapidly. Britain's fastest growing specimen was an *E. nitens* in Argyll which attained 19.5 m in 9 years. Provided eucalypts can survive the first few years many species will grow to a large size and 20 m high × 40 cm stem diameter in 25–30 years is not uncommon.

Cold hardiness

Eucalypts have a reputation for being frost tender. This is largely because *most* species introduced (but not all) have suffered damage or been killed in cold winters. But there are a few very hardy species, e.g. *E. debeuzevillei*, *E. niphophila*, *E. gunnii* (high altitude seed origins), *E. perriniana* and *E. parvifolia*, which can be grown in most parts of Britain.

Cold damage to eucalypts is not primarily from late spring frosts but from extreme cold in winter when either a spell of mild weather is followed by a very rapid temperature fall to many degrees below freezing point or when persistent, very cold, dry winds cause desiccation. Eucalypts have no overwintering resting bud and any spell of warm weather may encourage growth to begin again and render the foliage more susceptible to cold.

Table 1 classifies species into four categories of hardiness.

Establishing eucalypts

Sites

Two kinds of sites should be avoided: (a) frost pockets where cold air is likely to pond, e.g. valley bottoms next to streams and rivers; (b) exposed, windy sites. Eucalypts do not require fertile soils and *E. gunnii* may be found growing in gardens on both acid and moderately alkaline soils. Eucalypts are generally responsive to nitrogenous fertiliser but its use often causes excessive top growth resulting in instability and rocking.

Because they can grow into large trees, eucalypts should be given ample room to make the most of their graceful shape and they should be planted well away from buildings. Eucalypts appear to dry up soil fairly rapidly, therefore on shrinkable clays they should be planted at least 25 m from buildings which have only shallow foundations if it is intended to allow a tree to grow to full size.

Planting

For full details about propagating and planting see Evans, Haydon and Lazzeri (1983). The following points are important:

- (a) Seedlings should be planted in a position free from overhead shade.
- (b) For good growth and survival the planting spot, or preferably the whole site, should be well cultivated and kept weed free, especially of grass.
- (c) Ideal seedling size is 15 cm – 25 cm. If larger than this, the shoot may be out of balance with the root, whose development will often have been restricted in a container, and the seedling will not only take time to become established but also be unstable. When of the right size and well balanced, the seedling should grow away almost immediately after planting.
- (d) Plant in May. Remove the container, taking very great care not to damage the roots, and plant with the root collar level with the soil surface. If conditions are dry, thoroughly water seedlings before planting. Subsequent watering should not be necessary if competing weeds are kept fully in check.

Tending

- (a) Provided the points about planting are followed, seedlings should not require staking. However, if the seedling is rather tall, and perhaps pot-bound as well, the tree may need staking for two or three years. An alternative to staking is to cut back to half height if instability occurs in the first year or two.
- (b) By the end of the first year the plants should be 0.5 m – 1.5 m tall and rapidly overcoming competition from herbaceous weeds.
- (c) Eucalypts can be shaped by pruning, can be severely cut back, or even cut to ground level, and then generally they will produce an attractive flush of new foliage, vigorous epicormics, or coppice shoots. Pruning and cutting is best done in February or early March so that the new foliage/shoots emerge in late spring.

Uses

Eucalypts are first and foremost ornamental trees. They are more striking in appearance as well-shaped specimens rather than in a group or a woodland stand.

Glaucous juvenile foliage, which may be produced for the first three or four years after planting or following very severe pruning or cutting back, is much sought after for flower arranging. This also applies to mature leaves from *E. coccifera*.

Very little is known about the timber quality of eucalypts grown in Britain though there seems no reason why it could not be used for pulpwood as in many other countries. Eucalypts may also have a role to play in the production of firewood; the genus has desirable characteristics for this end-use, namely fast growth and coppicing ability. However, species differ in their firewood potential because of large differences in initial moisture content and rate of drying out. Both *E.nitens* and *E.coccifera* make excellent firewood, just like ash, but *E.gunnii* is not so good because the wood is very wet and needs to be dried for about a year, like elm, before it can be burnt efficiently. Three species with some potential in Britain (Table 1) *E.delegatensis*, *E.fraxinoides*, and *E.johnstonii* have a good reputation in Australia for sawtimber and high quality end-uses.

Other possible uses for eucalypts include extracting dyes and oils from their leaves or bark, and as bee pasturage. In several tropical and sub-tropical countries a variety of species is planted so that there is profuse flowering over long periods, thus making an excellent source of honey.

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TABLE 1

CHARACTERISTICS OF SOME COMMONER EUCALYPTS

<i>Species</i>	<i>Growth</i>	<i>Potential size</i>	<i>Amenity value</i>	<i>Habit</i>	<i>Comments</i>
Very hardy – likely to survive long cold spells of -10°C to -14°C , or short periods down to -18°C .					
<i>E. debeuzevillei</i>	M	M?		Very beautiful, patterned bark, shapely crown.	Little known, deserves wider planting. Plant origins from over 1,500 m altitude in NSW.
<i>E. gunnii</i> (central Tasmania origins from over 1,000 m altitude).	F	L		Slender, sometimes crooked stems, open crowns, grey-green to glaucous.	Most widely planted eucalypt in Britain.
<i>E. parvifolia</i>	S–M	S–M		Shrub-like, bushy, small leaves, feathery juvenile foliage.	Possibly useful for screening or hedging.
<i>E. niphophila</i>	S–M	S–M		Often multi-leaders, open crown, poor form, young bark bright grey, leaves dark green.	The hardiest eucalypt of all.
<i>E. perriniana</i>	M	M		Sinuuous; attractive creamy flowers.	Juvenile foliage completely encircles stem.
Hardy – as above, but unlikely to survive colder than -16°C .					
<i>E. archeri</i>	M–F	M		Small version of <i>E. gunnii</i> .	Affected by 'silver leaf' disease.
<i>E. coccifera</i>	M	M		Crown tends to be bushy and compact, attractive adult foliage.	
<i>E. glaucescens</i>	F	M–L		Good form, conical crown, glaucous, young leaves reddish or glaucous.	Plant 1,400–1,600 m altitude seed origins from New South Wales/Victoria.
<i>E. vernicosa</i>	S	S		Shrub-like, small dark green leaves.	
Moderately hardy – likely to survive long cold spells of -6°C to -9°C , or short periods down to -14°C .					
<i>E. aggregata</i>	M	M–L		Attractive green willow-like foliage.	
<i>E. dalrympleana</i>	F	M–L		Beautiful tree, long leaves, white bark, graceful shape.	Juvenile foliage green or glaucous, young leaves reddish or pink.
<i>E. delegatensis</i>	M–F	L		Elegant tree very long crinkly leaves, patterned bark.	Excellent timber.
<i>E. nitida</i>	M–F	L		Good form, green-glaucous graceful tree.	Syn. <i>E. simmondsii</i> .
<i>E. pauciflora</i>	M	M–L		Tends to be crooked. Attractive bark.	
<i>E. stellulata</i>	M	M		Attractive bundles of flowers in star shape.	Little planted in Britain.
<i>E. subcrenulata</i>	M	M		Good form, green foliage.	Intermediate form between <i>E. vernicosa</i> and <i>E. johnstonii</i> .
<i>E. urnigera</i>	F	L		Glaucous or green foliage mostly grey-green in appearance.	Similar to <i>E. gunnii</i> but with urn-shaped capsules.

Species	Growth	Amenity value		
		Potential size	Habit	Comments
Less hardy – likely to survive long cold spells down to -6°C , or short periods down to -9°C .				
<i>E. cordata</i>	M	L	Good form, glaucous foliage.	Good timber.
<i>E. fraxinoides</i>	F	M-L?	Good form.	Very little known in Britain. Use origins from over 1,500 m in NSW. Good timber quality.
<i>E. globulus</i>	VF	L	Glaucous, blue juvenile foliage and bluish-white bark.	The blue gum. Very frost tender.
<i>E. johnstonii</i>	F	L	Good form. Dark green foliage.	Good timber.
<i>E. nitens</i>	VF	L	Good form, long dark leaves.	Very fast growing, good timber and firewood.
<i>E. nicholii</i>	M	M-L?	Unusual foliage, juvenile very narrow.	Valuable to florists.
<i>E. pulverulenta</i>	S-M	S-M	Angular growth habit. Silvery-glaucous foliage clasping stem.	
<i>E. viminalis</i>	VF	L	Good form, similar to <i>E. darympleana</i> .	Bark sheds in ribbons.

Notes: (1) Species referred to in the key but not listed in the table all fall into the less hardy category.

- (2) Growth when young (metres/year)
- VF — Very fast, over 2 m.
 F — Fast, 1.5 m – 2.0 m.
 M — Moderate, 1.0 m – 1.5 m.
 S — Slow, less than 1.0 m.
- (3) Potential size in Britain
- L — Large, over 20 m.
 M — Medium, 10 m – 20 m.
 S — Small, less than 10 m.

TABLE 2

NOMENCLATURE OF SPECIES

<i>Species</i>	<i>Authority</i>	<i>Synonyms</i>	<i>Common Australian name</i>
Ash group			
<i>E. debeuzevillei</i> ^a	Maiden		Jounama snow gum
<i>E. delegatensis</i>	R. T. Bak.	(<i>E. gigantea</i>)	Alpine ash
<i>E. fraxinoides</i>	Deane et Maiden		White ash
<i>E. gregsoniana</i>	Johnson et D. Blaxell	(<i>E. pauciflora</i> var. <i>nana</i>)	Wolgan snow gum
<i>E. niphophila</i> ^a	Maiden et Blakely		Alpine snow gum
<i>E. obliqua</i>	L'Herit.		Messmate stringybark
<i>E. pauciflora</i>	Sieb. ex Spreng.		Snow gum
<i>E. regnans</i>	F. Muell.		Mountain ash
<i>E. stellulata</i>	Sieb. ex DC.		Black sally
Peppermints			
<i>E. amygdalina</i>	Labill.	(<i>E. salicifolia</i>)	Black peppermint
<i>E. coccifera</i>	Hook.f.		Tasmanian snow gum
<i>E. nitida</i>	Hook.f.	(<i>E. simmondsii</i>)	Smithton peppermint
<i>E. radiata</i>	Sieb. ex DC.		Narrow-leaved peppermint
True gums			
<i>E. parvifolia</i>	Camb.		Small-leaved gum
Blue gums			
<i>E. globulus</i>	Labill.		Tasmanian blue gum
<i>E. nitens</i>	Maiden		Shining gum
White gums			
<i>E. archeri</i> ^b	Maiden et Blakely		Alpine cider gum
<i>E. cinerea</i>	F. Muell. ex Benth.		Argyle apple
<i>E. cordata</i>	Labill.		Heart-leaved silver gum
<i>E. dalrympleana</i>	Maiden		Mountain gum
<i>E. glaucescens</i>	Maiden et Blakely		Tingiringi gum
<i>E. gunnii</i>	Hook.f.		Cider gum
<i>E. perriniana</i>	F. Muell. ex Rodway		Spinning gum
<i>E. pulverulenta</i>	Sims		Silver-leaved mountain gum
<i>E. viminalis</i>	Labill.		Manna gum
<i>E. urnigera</i>	Hook.f.		Urn gum

<i>Species</i>	<i>Authority</i>	<i>Synonyms</i>	<i>Common Australian name</i>
True gums (contd.)			
Yellow gums			
<i>E. johnstonii</i> ^c	Maiden	(<i>E. muelleri</i>)	Tasmanian yellow gum
<i>E. subcrenulata</i> ^c	Maiden et Blakely		Tasmanian alpine yellow gum
<i>E. vernicosa</i>	Hook.f.		Varnished gum
Swamp gums			
<i>E. aggregata</i>	Deane et Maiden		Black gum
<i>E. brookeriana</i>	A. M. Gray		Brooker's gum
<i>E. camphora</i>	R. T. Bak.		Moutain swamp gum
<i>E. mannifera</i>	Mudie	(<i>E. maculosa</i>)	Brittle gum
<i>E. nicholii</i>	Maiden et Blakely		Narrow-leaved black peppermint
<i>E. ovata</i>	Labill.		Swamp gum

Notes: 1) Classification. Pryor, L. D. and Johnson, L. A. S. (1971), in *A classification of the eucalypts*, Australian National University Press, Canberra, classify

'a' as subspecies of *E. pauciflora*

'b' as subspecies of *E. gunnii*

'c' as subspecies of *E. vernicosa*

2) Common Australian name. Most species have many names which may or may not relate to their classification, only what is probably the most well-known is given.

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