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Government Botantist, Western Australia, 1929-1960

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Western Australian Herbarium

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Eucalypts of Western Australia

Western Australian Department of Agriculture BULLETIN 4013

Eucalypts of Western Australia

by C. A. Gardner
Government Botanist
Western Australia, 1929-1960

Compiled, edited and revised by T. E. H. Aplin, Western Australian Herbarium. Original articles published in *The Journal of Agriculture of Western Australia,* 1952 to 1966.

66254—(1)

Preface

The series *Trees of Western Australia,* which appeared in *The Journal of Agriculture of Western Australia,* was commenced in 1952 by Charles Austin Gardner, Government Botanist and Curator of the Western Australian Herbarium from 1929 to 1960. Until his death in 1970 Gardner published in the series 29 articles, dealing with 117 species of *Eucalyptus,* the last article appearing in 1966.

The articles are of historical and scientific interest. They contain valuable original information on the phytogeography and taxonomy of over half of the Western Australian species of *Eucalyptus,* based largely on Gardner's personal observations made in the course of his extensive travels in Western Australia. Each species is illustrated by his own diagnostic line drawings.

Gardner was not able to treat all of the species of *Eucalyptus* recorded in Western Australia; an additional 90 species, many described since Gardner's death, are to be found in this State. None-the-less, the articles that were published serve to complement other publications on the eucalypts of Western Australia, and are of considerable assistance to people wishing to identify or to learn about this important group of plants.

There is an insistent demand for reprints of articles of the series *Trees of Western Australia,* many of which are out of print. This demand, in itself, is adequate justification for combining into one volume all of the articles in the series. On the more personal side this volume serves to highlight yet another of Gardner's contributions to taxonomic botany in Western Australia. He is already remembered for his many articles describing new plant species and for his published volumes on the poisonous plants and the grasses of Western Australia.

The text in this volume, except for editorial modifications and corrections, has been kept as near as possible to the original. The articles have been maintained in their original sequence, although the numbering for most species has had to be altered. Some sections of the text have been transposed to maintain clarity and uniformity while additions and alterations were made to bring the information up to date. The common names have been brought into line with current standard common names usage. Particular thanks go to Mr. M. I. H. Brooker, Division of Forest Research, C.S.I.R.O., Canberra, for bringing to notice several points of botanical nomenclature and to Dr. J. W. Green, Western Australian Herbarium, for helpful discussions during the preparation of this edition. Much of the additional data in this edition has been drawn from G. M. Chippendale's "Eucalypts of the Western Australian Goldfields (and the adjacent wheatbelt)" and from N. Hall and M. I. H. Brooker's "Forest Tree Series", both of which are published by the Australian Government Publishing Service, Canberra.

T. E. H. Aplin
Western Australian Herbarium,
June, 1979.

Introduction

This publication deals with over half the species of *Eucalyptus* found in Western Australia. They include trees, shrubs and mallees which together make up a considerable part of the vegetation of the northern and south-western part of Western Australia.

It is hoped that the publication will prove of interest and value, for apart from providing local and export timber, some *Eucalyptus* species yield valuable tannins, while others, especially the mallees, are valuable for the oil which is contained in the leaves, and for pollen and nectar, of primary importance to the apiarist.

Before dealing with individual species, it is as well to consider just what constitutes a *Eucalyptus.* It is a woody plant, that is a tree or a shrub, belonging to the Myrtaceae, Myrtle family. The name, given to the genus by Charles-Louis L'Héritier in 1788, means well covered and refers to the characteristic operculum or bud-cap, which drops off as the flower opens. The following notes explain the terminology used by the writer.

Leaves

The *Eucalyptus* leaf is simple, entire, of more or less leathery texture. It has a single midrib or *central nerve,* and typically what are termed *lateral nerves* which arise and diverge from this midrib usually to terminate in what is termed an *intramarginal nerve* which may be close to, or remote from, each leaf margin. In some tropical species there are two intramarginal nerves.

The lateral nerves may be more or less parallel, or they may *anastomose* with one another, forming a network of nerves, sometimes distinct and sometimes obscure. At times the intramarginal nerve may be so close to the leaf-margin as to be contiguous with it. The leaf consists typically of the leaf blade or *lamina* attached to the branchlet by the leaf stalk or *petiole,* frequently twisted so that the leaf assumes a vertical, pendulous position; at other times the leaf is stalkless or *sessile,* and in a few species with *perfoliate* leaves the two opposite leaves may be *connate* or joined at their bases to resemble a single leaf pierced by the branchlet. The position of the leaves is usually *alternate,* that is on opposite sides of the branchlet but placed one above the other. At other times they are strictly opposite to each other.

The presence of oil in the fresh leaves may be detected by holding them up to the light, when the immersed oil glands appear as translucent dots. In the dried leaves this character is not usually evident, but there may be some indication in the form of dark spots or minute depressions on the leaf-surfaces.

The leaves are usually of the same colour on both surfaces, when they are said to be *concolorous,* or they may be dark above and paler underneath. They are typically *glabrous,* that is, they are smooth and without hairs, or they may have a sparse covering of short rigid hairs.

The leaf may be *falcate,* sickle-shaped; *linear,* long and narrow; *lanceolate,* lance-shaped; *elliptical,* oval-shaped; *oblong,* longer than broad with nearly parallel sides; *reniform,* kidney-shaped; *spathulate,* spoon-shaped; to *orbicular,* circular in outline. The leaf base may be *cordate,* heart-shaped; *obtuse,* blunt; *cuneate,* wedge-shaped; or *attenuate,* gradually tapering.

Flowers

The arrangement of the flowers is usually constant in any given species, and the following explanation of terms used may be better understood by referring to the plates accompanying the articles. Usually the flowers are arranged at the top of a stalk which arises from the junction of the leaf and branchlet, the *leaf axil.* This stalk is termed the *peduncle.* The flowers may each possess their own special stalk or *pedicel* or they may be stalkless, when they are said to be *sessile.* The pedicels, or the sessile flowers, are clustered at the top of the peduncle. When pedicellate, the flower cluster or *inflorescence* is an *umbel.* When sessile the flowers are in a head and are termed *capitate.* In some groups, e.g. the bloodwoods, the flowers are borne in terminal *corymbs* or *racemes* in which the lower flowers are brought to the level of the upper flowers by virtue of longer stalks or pedicels, or they may be in *panicles* or more or less elongated conical inflorescences with each branch bearing more than two flowers.

The *Eucalyptus* flower is a superficially simple structure, for there are no obvious sepals and petals. The lower part of the bud, which becomes the cup of the flower, and enlarges or hardens to form the fruit is termed the *hypanthium* or *calyx-tube,* and is usually *truncate* or flat at the summit. Occasionally the sepals are represented by small teeth close to or at the summit of the calyx-tube. They are always four in number. They may be seen in a number of tropical species, and in Tallerack and Illyarrie. Petals are absent, their place being taken by a bud cap, called the *operculum,* and this is probably derived from the hardened and concrescent or fused petals. This operculum is the most characteristic feature of *Eucalyptus,* from which the genus derives its name, *eu,* well, and *kalyptos,* covered.

When the operculum falls off at *anthesis* or flowering time, the *stamens* expand. The stamens consist of a stalk or *filament* and, at the top, an *anther* which contains the pollen. The anther opens by two slits or by circular or elliptical pores. Most frequently these are longitudinally parallel to each other. Sometimes by upward confluence they appear as a single curved slit. The filament may be attached to the base of the anther, when the anther is said to be *basifixed,* or it may be attached at the back, when it is *dorsifixed* or *versatile,* and moves freely on its pivot. There is a large or small gland on the back of the anther.

Fruits and seeds

After pollination and fertilisation the stamens wither and may fall off, while the calyx-tube undergoes some modification to form the fruit, which is a *capsule,* popularly called a gum-nut. The capsule contains the seeds. The space at the top of the fruit between the place occupied by the stamens and the valves of the capsule is termed the *disc.* This varies considerably in the different species, being sometimes flat as in Tuart, domed as in Bullich, or it may extend vertically down to the capsule lining

the calyx-tube, as in Karri, or in Yorrel and Morrel. The seeds vary considerably both in size and in shape. Often they are minute, but sometimes as in Marri and Red-flowering Gum they are large, and sometimes winged.

In addition to the fertile seeds, usually found in the lower part of the capsule, there are a number of sterile seeds, differing considerably from the fertile seeds and usually narrow. These form what is called the chaff, packing the upper part of the capsule, and are the first to be shed when the capsule opens its valves.

The *cotyledons* or seed-leaves, are the first to expand when the seed germinates. Their shape is important in classification and consists of two main types: the broad cotyledons characteristic of Jarrah and Marri and the Y-shaped or forked cotyledons found in the Mallets and a large number of the inland trees and mallees.

Habit

Eucalyptus plants can be conveniently classified according to their growth form into trees and shrubs, the latter branching at or near the base, and without any distinct trunk. Of the shrubby forms we recognise *mallees* and *marlocks*. The former have a subterranean somewhat bulbous stock capable of putting forth new stems at intervals, as for example after bushfires, and repeating this performance indefinitely, in some cases for over a century. Those shrubby forms which do not possess a bulbous base are termed marlocks, examples being Mottlecah and Bushy Yate. Sometimes both forms may be found in the one species.

In Western Australia the term gum-tree is used in a very wide sense. In the other States, especially in Queensland and New South Wales, and also in the Kimberley district of Western Australia such terms as gum, box, stringy bark, etc., are in common use. The gum tree properly is a tree like Karri with a smooth bark, of which the outermost layers are shed annually. Marri is really a bloodwood, a tree with a friable rough bark, and usually kino or resin in the wood or bark; Tuart with a rough bark is a box, and York Gum, with a rough or box bark on the trunk and the branches smooth is a half-box. These terms will be explained under the various species discussed.

1. **Eucalyptus marginata** Donn ex Sm.

Jarrah

Jarrah, the principal timber tree of Western Australia, occurs in South-Western Australia, its boundary inland being determined by the annual isohyet of 600 mm.

It thus extends as far inland as Mooliabeenee, Clackline and Narrogin. Further south it appears east of the Great Southern Railway in the vicinity of Tenterden, embracing the Stirling Range and finally terminating near the Warriup Hills. An outlier of Jarrah occurs at Jilakin Rock near Kulin. Its northern limits are on Mount Peron, near Jurien Bay. It is typically associated with the ironstone soils of the Darling Range in the northern portion of its range, and is generally found, everywhere within its area of distribution, where ironstone is present. Jarrah is also found growing in the sandy soils of the coastal plain between Gingin and southwards to the Albany district.

Jarrah is a stringybark with a strong fibrous, longitudinally-fissured bark. The timber is deep red, and on this account earned for the tree the early name of Swan River Mahogany. In certain places mallee forms are to be observed, particularly on the southern slopes of Mount Lesueur and on the slopes of the Stirling Range. Otherwise it is a tree the largest forms being found in the southern parts of its range as a forest tree attaining a height of 40 m.

Jarrah timber has long been a popular article of commerce. It is hard, dense and easily worked and has a high degree of resistance to attacks of fungi and termites.

Before the development of concrete and asphalt road surfaces, many famous thoroughfares throughout the world were paved with Jarrah blocks, and its durability has led to its extensive use as railway sleepers.

Used as a general purpose timber in Western Australia, owing to the lack of indigenous softwoods, Jarrah is highly regarded in other States and countries where it is favoured for cabinet making, panelling and ornamental woodwork. The possession of a Jarrah-floored house is a matter for pride in other countries and of late years there has been an increasing demand overseas for Jarrah flooring boards.

Jarrah is a honey-yielding species. The Jarrah forests and the coastal stands yield fairly large quantities of a medium amber, nutty-flavoured honey. Jarrah pollen is apparently highly nutritious.

The leaves of Jarrah are alternate, stalked, and narrowly lanceolate, somewhat dull green above and paler underneath, the midrib prominent, the lateral nerves spreading, and the intramarginal nerve extending within the leaf margin and distinct from this margin.

The flowers are arranged in umbels of from four to eight flowers on slender pedicels thickening gradually upwards into the calyx-tube. The calyx-tube is obconical and the operculum narrow-conical and acute and longer than the calyx-tube. The stamens are numerous, in a continuous series, with white filaments sharply kinked when in the bud; the anthers are heart-shaped, and the two slits are contiguous at the summit, making as it were one

crescent-shaped slit. The attachment of the anther to the filament is close above the base, and there is a small gland at the top of the anther.

The fruit is pedicellate and more or less spherical, up to 2 cm in diameter, contracted at the top, with a narrow, usually flat, disc, and the valves of the capsule are enclosed. The seed-leaves are kidney-shaped and taper at their bases into the petiole.

Jarrah has been successfully grown in Chile and the Congo republic.

The Jarrah Forest is regarded as being one of the world's most unique forest ecosystems. It is a beautiful forest at all times but even more so in spring with its wealth of understorey wildflowers.

Jarrah dieback disease, caused by the fungus *Phythophthora cinnamomi*, has been killing Jarrah and many of the understorey species over several decades. The soil-borne causative fungus is carried by water, and lowland areas of forest have a very high susceptibility rating. It was estimated that 282 000 ha of forest had been affected by Jarrah dieback disease, as at 30 June 1974, and that the rate of increase is 20 000 ha per annum.

Competitive land uses vying for precedence in the northern Jarrah forest region (from Mundaring southward to Collie) include mining, agriculture, urban development, recreation, water supply, forestry and wildlife conservation. Non-compatible uses if given precedence, together with the depradations of Jarrah dieback disease, could completely destroy this unique forest.

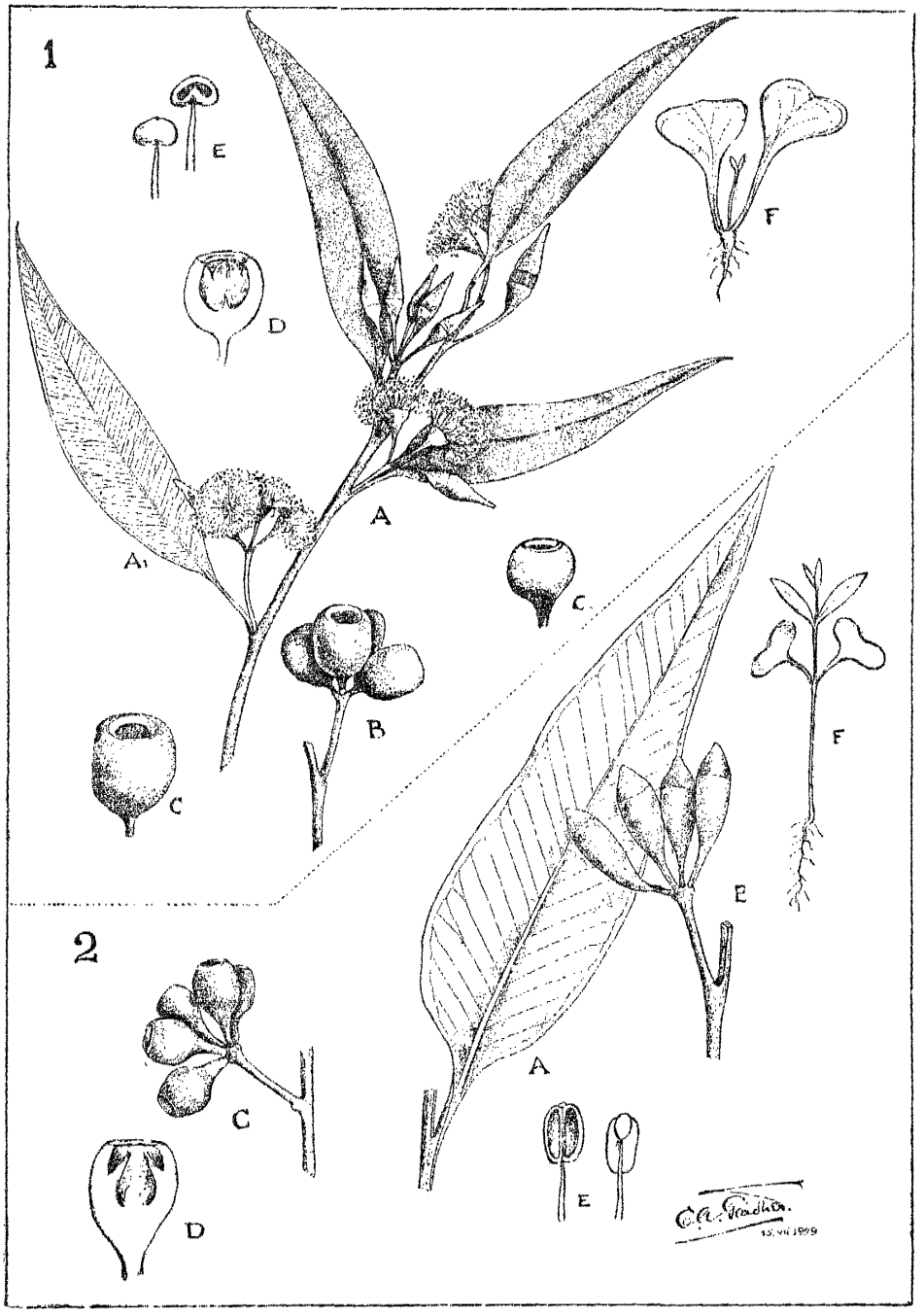

Fig. 1

1. *Eucalyptus marginata.* A—Flowering twig; A1—Leaf venation; B—Fruiting umbel; C—Fruits; D—Section through fruit; E—anthers; F—Seedling, showing expanded cotyledons.

2.—*Eucalyptus diversicolor.* A—Leaf; B—Umbel showing buds; C—Umbel of fruits; D—Longitudinal section of fruit; E—Anthers; F—Seedling showing expanded cotyledons and two pairs of young leaves.

2. **Eucalyptus diversicolor** F. Muell.

Karri

Karri is the largest, or more strictly the tallest tree of Western Australia, attaining a height of 80 m. It is a true gum tree having a smooth bark, the outer layer of which sheds annually in rather large thick plates. It received the name *diversicolor* because of the varying colours of the bark at the time of the year when the older bark is shed. At this time the new bark, a bright orange-yellow contrasts strongly with the newly exposed bark, while underneath the shedding plates the bark is white. Karri bark is thick, rich in tannin, and yellow when fractured.

The heartwood is red, and closely resembles that of Jarrah. The resemblance is so close that the two timbers are difficult to distinguish one from the other, and the bushman's test of a burning splinter leaving a white ash for Karri, and a black or grey ash for Jarrah is frquently employed to distinguish between them.

Although it lacks the high degree of termite-resistance which has made Jarrah famous, Karri timber is a valuable hardwood for superstructural work.

It is slightly more dense than Jarrah and considerably stronger. Its strength and rigidity and the extraordinarily long clean lengths which may be obtained have earned it the title of "The Beam Timber". It is widely used for flooring while in recent years peeler logs of Karri have been sliced for veneers and plywood.

Karri honey is a high-grade product widely recognised as the best honey produced in this State. It is a light-coloured clear honey with a mild but characteristic flavour and excellent consistency. During heavy flow periods 250 kg of excellent honey per hive may be produced.

The leaves of Karri are alternate and petiolate, rather broadly lanceolate, dark green above and paler underneath, and more spreading than pendulous, an unusual character in South-Western trees. The lateral nerves are fine, spread at a rather wide angle from the midrib, and the intramarginal nerve is removed from the leaf margin.

The umbels consist of from three to six flowers arranged at the summit of a terete or compressed peduncle, and the flowers are pedicellate. The calyx-tube is narrow, almost cylindrical, and tapers gradually at the base into the pedicel. The operculum is almost hemispherical or shortly and broadly ovoid-conical, much shorter than the calyx-tube. The numerous stamens are in a continuous ring, the white filaments being inflected when in the bud. The anthers are almost oblong in outline and attached near the middle of the back. They open in distinct parallel longitudinal slits. They possess a large dorsal gland.

The fruit is pear-shaped or pyriform and contracted at the summit, slightly more than 1 cm in diameter, with a narrow rim. The capsule is deeply enclosed within the fruiting calyx and the valves are also included. The cotyledons or seed-leaves, upon expansion after germination, are broadly kidney-shaped and taper into short stalks. The young leaves are broad and delicate, and persist until the young trees are several metres tall.

3. **Eucalyptus gomphocephala** DC.

Tuart

Early settlers of the Swan River Colony soon learnt to value the timber of a tree which the aborigines called Tooart. It ranked with that of Jarrah in local importance and, because of its toughness, was used for keelsons, stern posts, bridge supports, shafts and wheelwright's work, in short for all purposes where great strength, solidity and durability were needed.

Tuart is restricted naturally to the limestone areas of the western coastal plain extending northward from the Vasse district. Its southern limits are to be found along the Sabina River near Busselton, where the coastal limestone dips. To the north, Tuart extends as a large tree in an almost unbroken belt throughout the limestone country as far north as Yanchep. As a smaller tree, up to 12 m tall, it may be found well to the north of the Moore River.

The best specimens of Tuart are found in the Vasse district around Wonnerup and Ludlow, where individual trees attain a height of 45 m, the trunks being up to 15 m long and 8 m or more in girth. Tuart does not grow mixed with other *Eucalyptus* species except to a limited extent in the northern parts of its range where it occurs with Jarrah and Marri.

In the southern areas of its habitat where the largest trees are found and a true Tuart formation exists as a forest, the trees are associated with *Agonis flexuosa*, Western Australian Peppermint, and other smaller trees which form an understorey to the massive Tuarts. Unlike the Jarrah and Karri forests, the Tuart forest has comparatively little ground covering of small shrubs, and in consequence takes on a park-like appearance.

Tuart is what is sometimes termed a box tree. In other words, it is a completely rough-barked species with a pale grey, somewhat fibrous, close, dense bark which extends eventually to the branchlets.

The timber is pale yellow, and is very hard and dense with a strong interlocked grain. It is largely employed in the construction of railway wagons, and was formerly extensively used for the pins which supported telegraph insulators. The timber is reasonably termite resistant and is even stronger than that of *E. wandoo*, Wandoo.

The area of prime Tuart forest is of very limited extent, and the timber growing in State forests is reserved for Government requirements.

The flowers of Tuart yield a profuse good quality nectar; Tuart honey is light in colour, of a pleasing flavour, and fine-grained when candied. Nectar yields are affected by damage to the flower buds caused by the Tuart bud weevil which bores through the young buds and causes them to fall. Tuart leaves yield 0.03 per cent of oil.

Tuart is typically 15 to 35 m tall, with spreading or spreading-erect branches, covered throughout with a pale grey, rough, somewhat fibrous persistent bark. The leaves are alternate, pendulous, lanceolate curved like a sickle, the midrib prominent, the lateral nerves spreading at a fairly wide angle and the intramarginal nerve distinct from the leaf-margin.

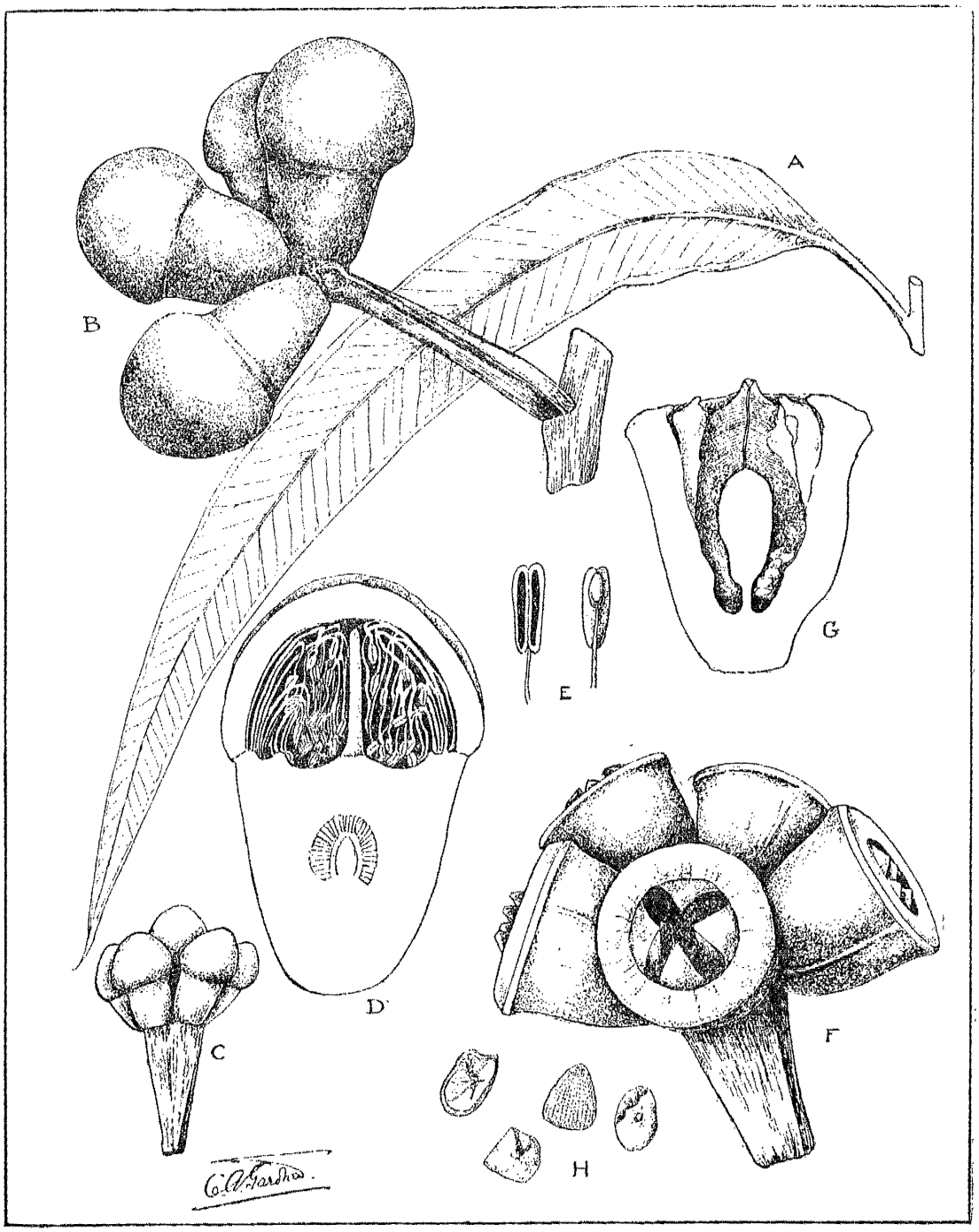

Fig. 2

Eucalyptus gomphocephala A—Leaf; B—Buds (x 1.5); C—Buds (x 0.5); D—Section of flower bud (x 2); E—Anthers (much enlarged); F—Fruits (x 1); G—Section of fruit (slightly enlarged); H—Seeds (much magnified).

The flowers are borne in axilary heads, the common stalk much flattened and thick, and supporting from three to seven flowers which are stalkless. The calyx-tube is bell-shaped. The operculum is hemispherical to ovoid-hemispherical, much broader than the calyx-tube. The stamens have yellowish-white filaments inflected in the bud, the anthers are versatile, oblong, opening in longitudinal parallel slits.

The fruits are stalkless, bell-shaped, smooth or with one faint rib, 2 cm long, the disc slightly raised narrow, the capsule deeply included in the fruiting calyx-tube and with broad triangular truncate valves almost level with the orifice of the fruit.

The name *gomphocephala*, meaning club head, refers to the shape of flower bud.

Tuart has been planted as a shade tree and windbreak in the Esperance region. It has become naturalized in this district and a grove of healthy saplings and trees has developed around an original plant close to the township.

Tuart has been successfully grown overseas, on a large scale, in Cyprus, Algeria, Tunisia and Libya. It has also been introduced into a number of other countries, e.g. New Zealand and Spain.

4. **Eucalyptus erythrocorys** F. Muell.

Illyarrie

Upon his return from a trip along the old stock route between Perth and Geraldton in December 1851, James Drummond, writing to William Hooker, Director of the Royal Botanic Gardens, Kew, mentions the discovery of a very striking *Eucalyptus* which he collected on limestone hills to the west of the Valley of the Lakes. This tree was distinguished by its brilliant scarlet bud caps and bright yellow stamens expanded in a cross-shaped pattern.

Shortly afterwards, Augustus Oldfield, a botanist collecting specimens between Port Gregory and Shark Bay, encountered the same tree which the local aborigines called Illyarrie.

It was not until 1860, however, that Ferdinand von Mueller gave the plant the name of *erythrocorys,* in reference to its bright red operculum.

The species remained in obscurity until in recent years it was found in some abundance at Bookara Siding not far from Dongara. Today it is found in many parks and gardens both in the city and in the country, and it is successfully cultivated abroad.

Illyarrie is of no value to the sawmiller, being a small tree with a brittle and short-grained timber. It is, however, one of the most decorative species of the genus and deserves to be better known. It is by far the most spectacular of those species of *Eucalyptus* in which the stamens, instead of being in a continuous series, extend in four radiating clusters. The contrast of scarlet, yellow and green found in the buds and flowers when the tree is in blossom make it a desirable specimen for any garden.

Illyarrie has proved its ability to adapt itself to many classes of soils and, although naturally restricted to the coastal limestone, it has proved hardy in cultivation in the low rainfall areas, in heavy soils and in granitic loams.

Nothing seems to be known concerning its value either as an oil-yielding tree or as a nectar producer, although the flow of nectar seems to be copious.

Illyarrie is easily recognised among other species of *Eucalyptus* because of its four-lobed, biretta-like, scarlet operculum together with its yellow flowers, the stamens of which are in four tufts giving the open flowers a cruciform appearance.

It is a tree 5 to 8 m tall with spreading branches and opposite pendulous narrow green leaves. The bark is white, occasionally with older bark forming a persistent covering in patches, at other times it is clean and white. The timber is pale and brittle and of no commercial value.

The young leaves of coppice shoots or seedlings are broad and rigidly hairy, and pale green or grey. The narrow pendulous leaves are indistinctly veined and the intramarginal nerve is at some distance from the margin of the leaf. The leaf is fairly copiously dotted with oil cavities.

The flowers are produced in umbels of three, the common stalk or peduncle being thick, flattened and purplish, as are the individual flower-stalks or pedicels. The buds are large and

the green calyx-tube is four toothed. Each tooth is continued downwards as a rib on each side of which is another rib which unites with the central rib some distance below the tooth.

The operculum is of brilliant scarlet in marked contrast to the green calyx, and is cross-shaped and more or less transversely wrinkled or warted with a narrow median crest. Alternating with these four lobes are four erect ridges which protrude slightly above the general level of the operculum. It is indeed an exact replica of a biretta.

The stamens are inserted on the margin and inner side of a four-lobed ridge immediately inside the operculum, and are in four clusters so that when the flower opens, the sulphur-yellow filaments expand in a cruciform pattern.

A section of the bud shows a circular ridge between the staminal ring and the style, and this in fruit develops into the raised summit of the disc. The stamens have versatile oblong-shaped anthers which open in parallel longitudinal slits. They are all fertile.

The fruit is widely bell-shaped and exhibits the same ribbing as the calyx-tube when in the bud stage; the disc or summit of the fruit has four depressions corresponding to the intervals between the tufts of stamens, while inside there is a convex elevation dipping in the centre towards the capsule. The fertile seeds are almost black and more or less pyramidal in shape, while the sterile seeds are narrowly wedge shaped.

The tree is not uncommon in various places between the Murchison River and Jurien Bay. It is common at Bookara Siding near Dongara, and in large tracts of woodland on the limestone to the west of the Brand Highway between Encabba and Dongara. South-west of Cockleshell Gully the trees are found in a reduced form on steep limestone hills.

Illyarrie is grown as an ornamental in eastern and western Australia and overseas in California and New Zealand.

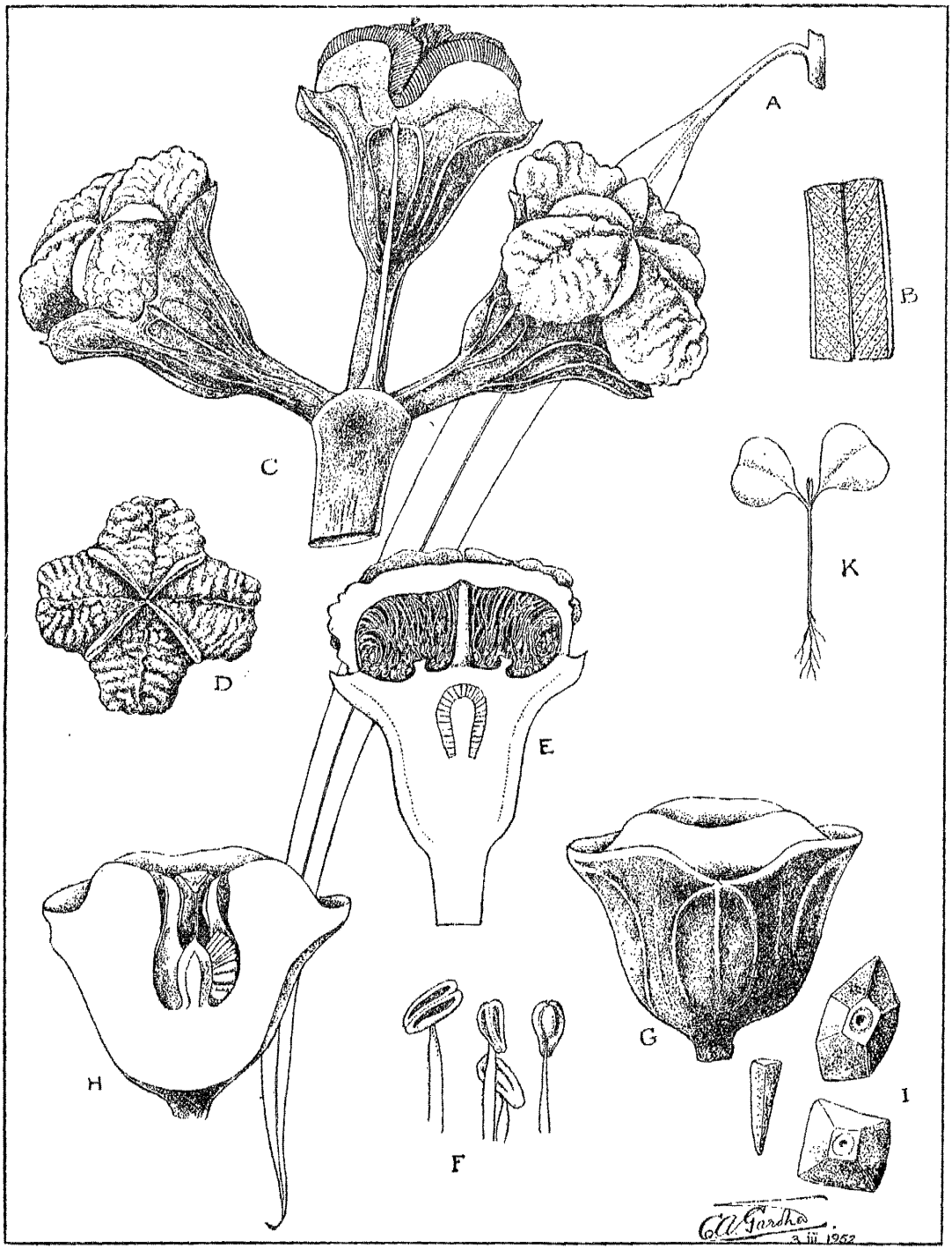

Fig 3

Eucalyptus erythrocorys A—Leaf (slightly reduced); B—Portion of leaf showing nervation and oil dots; C—Umbel of buds in various stages of development, the central one showing the bud-cap fallen (× 1.5); D—Operculum or bud-cap; E—Section of bud (almost × 2); F—Stamens (much enlarged); G—Fruit (× 1); H—Section of fruit showing seeds; I—Seeds (much enlarged); K—Seedling, showing expanded cotyledons.

5. **Eucalyptus salmonophloia** F. Muell.

Salmon Gum

The name *salmonophloia,* meaning salmon-barked, was given to this tree in 1878 by Ferdinand von Mueller, the famous Australian botanist. The title of Salmon-Barked Gum Tree had already been bestowed upon this tree by the early settlers, a name which apparently referred to the colour of the bark in fracture when it resembles the colour of cooked salmon flesh. The external coloration varies from a brownish pink at the end of summer to almost white in winter, usually with greyish-purple patches.

From the early days of agricultural settlement in Western Australia, the presence of Salmon Gum has been taken as an indication of a good class of loamy soil suitable for wheat growing.

Where it is associated with Gimlet the soil is of a close texture and a heavy clay; where the Salmon Gum occurs in pure stands, the soil is of a lighter nature. Early land classification was often based on the presence of one or both of these trees as indicating first-class agricultural soil.

In the agricultural areas today the Salmon Gum is becoming rare except for its occurrence along roadsides, and even there many trees are being sacrificed to make way for telephone lines. One sometimes sees clusters of trees or isolated examples which have been left to provide shade and shelter for stock, and where this occurs one sees the Salmon Gum at its best.

Perhaps no other *Eucalyptus* tree is more attractive than Salmon Gum which is noteworthy for its clean seasonal-changing bark combined with a heavy, deep green foliage, the lustre of which has a burnished appearance. Seen in the woodland the crowded trees possess relatively small crowns of an umbrella-like appearance, but when well-spaced, the trees branch widely and provide good shade. Of all the trees of the drier areas none is more suitable for planting or more decorative than Salmon Gum, if we except *E. brockwayi,* the Dundas Mahogany of the Norseman district.

The habitat of Salmon Gum extends from Mullewa district southwards to the vicinity of Ravensthorpe and the Oldfield River. Its western boundary extends through Carnamah and Moora, to Seabrook, Brookton, Wagin and Gnowangerup, eastwards to Borden and Ravensthorpe. Its eastern limits are not well defined.

At Mount Gibson, in the Ninghan district, forest areas occur, and the tree is found commonly around Southern Cross and Kalgoorlie, and perhaps as far east as Goddard's Creek. It does not extend into South Australia. The township of Salmon Gums appears to be its southern limit on the Coolgardie-Esperance Railway, and it is found some distance to the east of Norseman.

The tree occurs usually pure in open woodland formations in red loamy or light clay soils, sometimes mixed with Gimlet, sometimes mixed with Morrel and Yorrel or, in the Eastern Goldfields districts, mixed with many other species. Characteristic of the Salmon Gum woodland is the absence or paucity of mallees as an understorey, and the open low scrub which provides the ground flora.

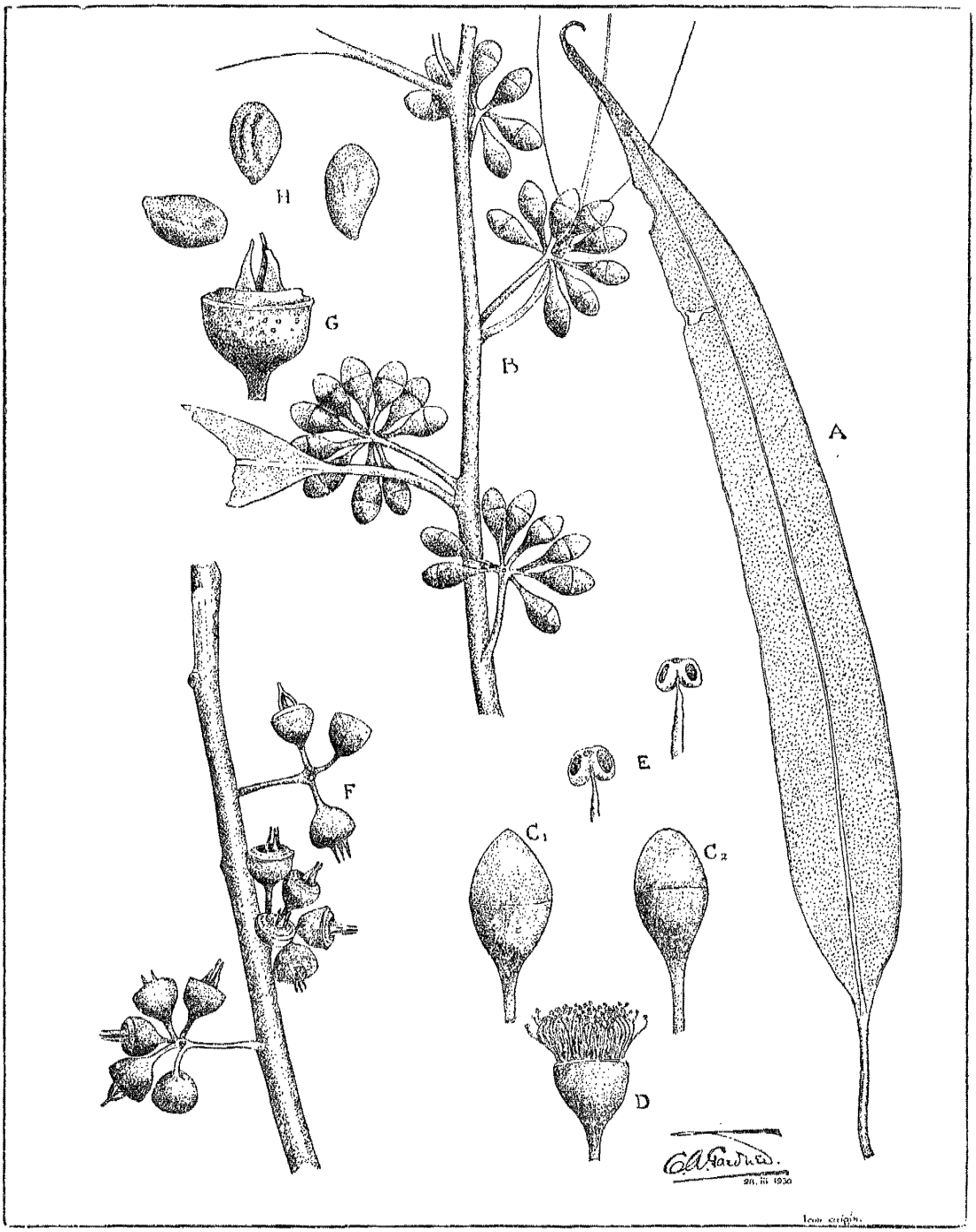

Fig. 4

Eucalyptus salmonophloia A—Leaf; B—Flower buds; C1 and C2—Flower buds showing variation in shapes; D—Flower; E—Anthers; F—Fruits; G—Fruit, showing detail; H—Seeds.

Salmon Gum is a tree attaining a height of up to 25 m, with a trunk up to 12 m long, and spreading-erect branches. Its burnished or lacquered, dark green foliage is a feature possessed by but few other trees. The bark is smooth throughout and yellowish-pink. Its outer layers, then white or pale grey are shed in March and April, revealing a light red new bark which in time fades to a pale pink or almost white, the old bark shedding in rather thick plates.

The timber is deep red when fresh, but fades to a reddish-brown when dried. It is straight-grained and strong, and is used for domestic structural purposes, but will not withstand the ravages of termites. The sapwood is almost white. Trunks up to 1 m in diameter are not uncommon in the southern regions of its area of distribution. The timber is used for mining purposes, and to a lesser extent for firewood.

The tree usually flowers in summer, between November and March, and the nectar of its blossoms is much sought after by birds and bees. It provides a mild-flavoured, fine, clear, light amber honey valued by the apiarist, and hollow trunks provide suitable hives for the naturalised bees.

Although in the woodland formation this tree has a narrow, umbrella-shaped crown, given space for lateral development, cultivated trees are of value for shade purposes. The tree is eminently suitable for cultivation as an ornamental or shade tree in the agricultural districts generally, and is of rapid growth. Individual, well-spaced trees may develop a crown spread of upwards of 10 m and such trees provide much shade. The tree is shallow-rooted, and its roots extend radially from the stem for very considerable distances. The presence of these roots in the superficial layers of the soil after the trees have been destroyed has provided farmers with excellent firewood for many years after the destruction of the trees during clearing operations.

In common with a number of other inland *Eucalyptus* species Salmon Gum foliage yields an oil which is rich in cineole (Eucalyptol) of the cineole-pinene type. Yields of 3.6 per cent have been obtained, the oil having a cineole content of 77 per cent, but some give a yield as low as 1.4 per cent, with a cineole content of 46.4 per cent. Its commercial exploitation has not been extensively developed.

The branches of Salmon Gum are spreading-erect, the branchlets reddish, somewhat angular. The leaves are borne on slender petioles, alternate, lanceolate or oblong-lanceolate, 7 to 12 cm long, thick, the same colour on both surfaces, dark green, lustrous, somewhat sickle-shaped, copiously oil-dotted, the midrib fine, the lateral nerves inconspicuous and diverging from the midrib at a wide angle and the intramarginal nerve close to the margin.

The flowers are borne in axillary or lateral umbels of usually five to seven flowers, the peduncle slender, and about 2 cm long, the pedicels short and slender. The buds are obovoid. The calyx-tube is almost hemispherical, tapering shortly into the pedicel, smooth. The operculum is hemispherical, about as long as the calyx-tube, smooth, obtuse. The stamens are all fertile, the filaments white sharply inflected in the bud, the anthers short and broad, opening in parallel longitudinal slits.

The fruit is small and hemispherical. The capsule is three to four valved, the valves prominently exserted within the narrow, flat, annuar disc. The seeds are small, ellipsoidal, reddish-brown. The cotyledons are V-shaped.

Salmon Gum has been successfully grown in eastern and western Australia and overseas, e.g. in India, Ghana, South Africa, Israel and the United States. In California a tree grew to 4.3 m after 5 years while in Kenya seedlings attained a height of 2.1 m in 14 months.

6. **Eucalyptus stoatei** C. A. Gardn.

Scarlet Pear Gum

Named after T. N. Stoate, a previous Conservator of Forests in Western Australia, who first secured specimens of this tree, Scarlet Pear Gum ranks among the most decorative of the smaller *Eucalyptus* trees of Australia. Its stature and habit render it an ideal subject for street planting and for parks and gardens. Of erect habit and small size, its dense dark green foliage and the brilliant scarlet buds and young fruits render it at once conspicuous and attractive, and it deserves a place in any garden.

It is especially recommended for planting in the agricultural areas as it appears to thrive in both sandy and loamy soils. Its denseness and low branching habit make it highly suitable for windbreaks.

When used as a street tree it is attractive in appearance and, as it does not usually attain proportions which would interfere with overhead wiring, lopping is seldom necessary.

Trees should not be transplanted until the first winter rains. In common with other *Eucalyptus* species the roots of *E. Stoatei* will not tolerate interference when transplanting. It is important that the soil surrounding the roots be disturbed as little as possible in transplanting.

The species is in cultivation in Western Australia and in Victoria, where it is proving very popular. It has been grown successfully in a number of places in this State, in the sandy soils of the Perth metropolitan area and on the heavy soils of the Eastern Goldfields in the vicinity of Kalgoorlie.

The tree has been found in only one locality, an area to the east of Kundip, between Ravensthorpe and Hopetoun, in open scrub country on the tributaries of the Jerdacuttup River. The total area of its habitat is very small, amounting only to several hundred hectares. It has also been collected nearer Ravensthorpe. The locality from which the first fruits were collected remains obscure.

The tree attains a height of about 6 to 8 m, with a single straight trunk and numerous short leafy branches, making a compact, narrow and dense crown with dense branches and foliage. The leaves are alternate, stalked, the leaf-blade being oblong to oblong-lanceolate, thick, the same colour on both surfaces, deep green and somewhat lustrous, obtuse at the tip or with a short point, the lateral nerves indistinct and spreading, the intramarginal nerve distant from the thick, pale margin.

The flowers are produced singly on a long recurved flower-stalk which is broadened and flattened upwards or sometimes two-winged below the flower. The buds are pear-shaped and up to 6 cm long, conspicuously longitudinally and deeply ribbed, a number of the ribs often bifurcated upwards, and the operculum ovoid-conical, usually black at the tip and often somewhat cleft, either smooth or somewhat ribbed, very thick, and inserted like a plug in the orifice of the calyx-tube. This thick, almost solid, operculum and its method of attachment are unique in the genus *Eucalyptus.*

The stamens are not numerous, and are deeply inserted in the calyx-tube, the yellow filaments being incurved in the bud and comparatively short. The fruit is pear-shaped, 5 to 8 cm

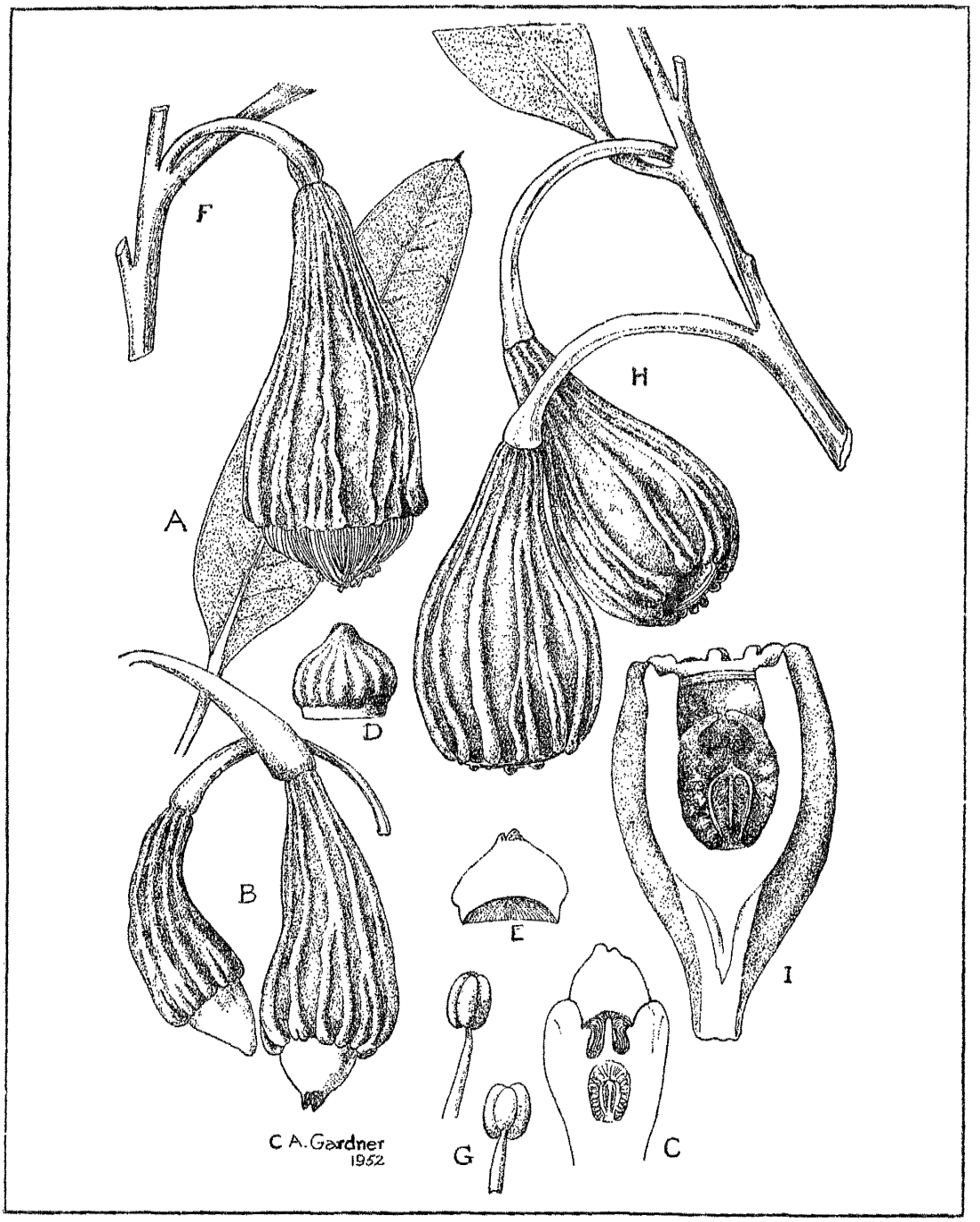

Fig. 5

Eucalyptus stoatei A—Leaf; B—Flower buds; C—Section of flower bud; D—Operculum; E—Longitudinal section of operculum; F—Flower; G—Stamens; H—Fruits; I—Longitudinal section of fruit.

long and up to 3 cm broad, scarlet when fresh, but becoming brown in age, conspicuously ribbed like the buds and calyx in flower, but more contracted at the orifice, the conspicuous ribs curving over to the orifice, the disc narrow and horizontal, the capsule four valved, deeply sunk with deeply included short valves. The fertile seeds are black, somewhat pyramidal, with an irregular wing.

A feature of Scarlet Pear Gum is its ability to produce blossoms while the tree is still very small, often when less than 1 m tall.

A high decorative species, it is cultivated in many parts of southern Australia.

It is listed in nursery catalogues in both western and eastern Australia.

7. **Eucalyptus salubris** F. Muell.

Gimlet

Next to Salmon Gum, the Gimlet is perhaps the best-known of the trees of the Eastern Agricultural Districts and the Eastern Goldfields. A thin reddish-brown bark, and a fluted or spirally twisted trunk, especially in the young trees, distinguish at a glance the Gimlet or fluted gums from all other *Eucalyptus* species. This bark has a thin outer layer which when removed reveals a sappy pale green, inner bark, and sometimes this inner green bark is exposed when the trees shed their reddish-brown outer bark towards the end of summer.

The bark is clean and smooth throughout, although occasionally there remain pieces of ribbony bark persisting at the base of the trunk.

The timber is pale brown, straight-grained, very strong and durable, and for this reason, as well as for the fact that the young trees, especially when growing close together, have slender straight trunks, they are sought-after for rails and for poles. The timber is not termite-resistant, and the older trees are frequently hollow as a result of termite infection.

The presence of Gimlet is an indication of good loamy soils, often with a large proportion of clay, and the tree usually occurs with Salmon Gum, forming an open woodland. When they grow separately, it is usually found that Gimlet inhabits the heavier soils. Salmon Gum and Gimlet country is usually regarded as being first-class for wheat-growing.

Gimlet enjoys a wide range extending from Mullewa and Mount Gibson near Ninghan eastwards to the north of Kalgoorlie; southwards through Dowerin and Cunderdin as far south as Lake Grace, and eastwards to Ravensthorpe and Salmon Gums. Its eastern extremities are found as far inland as Ularring and Queen Victoria Spring, always occurring on low lying areas, frequently in association with Salmon Gum.

Gimlet was named *salubris* by Ferdinand von Mueller because of what he termed its sanitary importance, its health-giving properties, ascribed to what he regarded, from its very numerous oil-glands, as the high yield of eucalyptus oil. Examinations of the oil made by Baker and Smith from trees grown in the Hines Hill district have scarcely confirmed this, the yield being 1.4 per cent, the cineole content of the oil being 10 per cent, with much cymene and high boiling aldehyde. Further examinations from other trees and districts may result in a higher production of oil, as is the case with Salmon Gum.

The bark is rich in tannin, containing up to 18.6 per cent. When dry it is very friable, and its action as a tanning agent is said to be rapid. The native name of Gimlet is given as Gnardarup.

Gimlet flowers from October to January. It produces a light amber honey and an abundance of pollen.

Gimlet is a tree 20 to 25 m tall, attaining a diameter of 80 cm and a trunk up to 15 m long, but usually much smaller, the branches erect, usually slender. The trunk of the young plant is typically fluted or spirally twisted, but this is not always

the case, and old robust trees usually have a smooth cylindrical trunk. The bark is thin, smooth, greenish-red or reddish-brown and shining.

The timber is pale, hard and dense, strong, with a narrow white sapwood. The leaves are alternate, petiolate, erect, narrow-lanceolate, shining on both surfaces, deep green, acute or attenuated into a long hooked point, the midrib narrow and conspicuous, the lateral nerves not very distinct, making a rather wide angle with the midrib, and the intramarginal nerve close to the leaf margin.

The flowers are in axillary umbels, the peduncle more or less flattened, rather long, or sometimes short, bearing four to seven flowers on slender pedicels. The calyx-tube is smooth, obovoid to hemispherical. The operculum is ovoid to almost cylindrical, smooth, usually red and obtuse. The stamens are numerous, the filaments inflected in the bud, anthers white, opening in longitudinal slits.

The fruit is obovoid to hemispherical, often slightly two angled, with a narrow convex rim or disc, and with prominently exserted deltoid valves typically four in number. The seeds are minutely fringed.

Gimlet has been successfully grown in eastern and western Australia as well as in a number of overseas countries, e.g. in Cyprus, India and southern and eastern Africa.

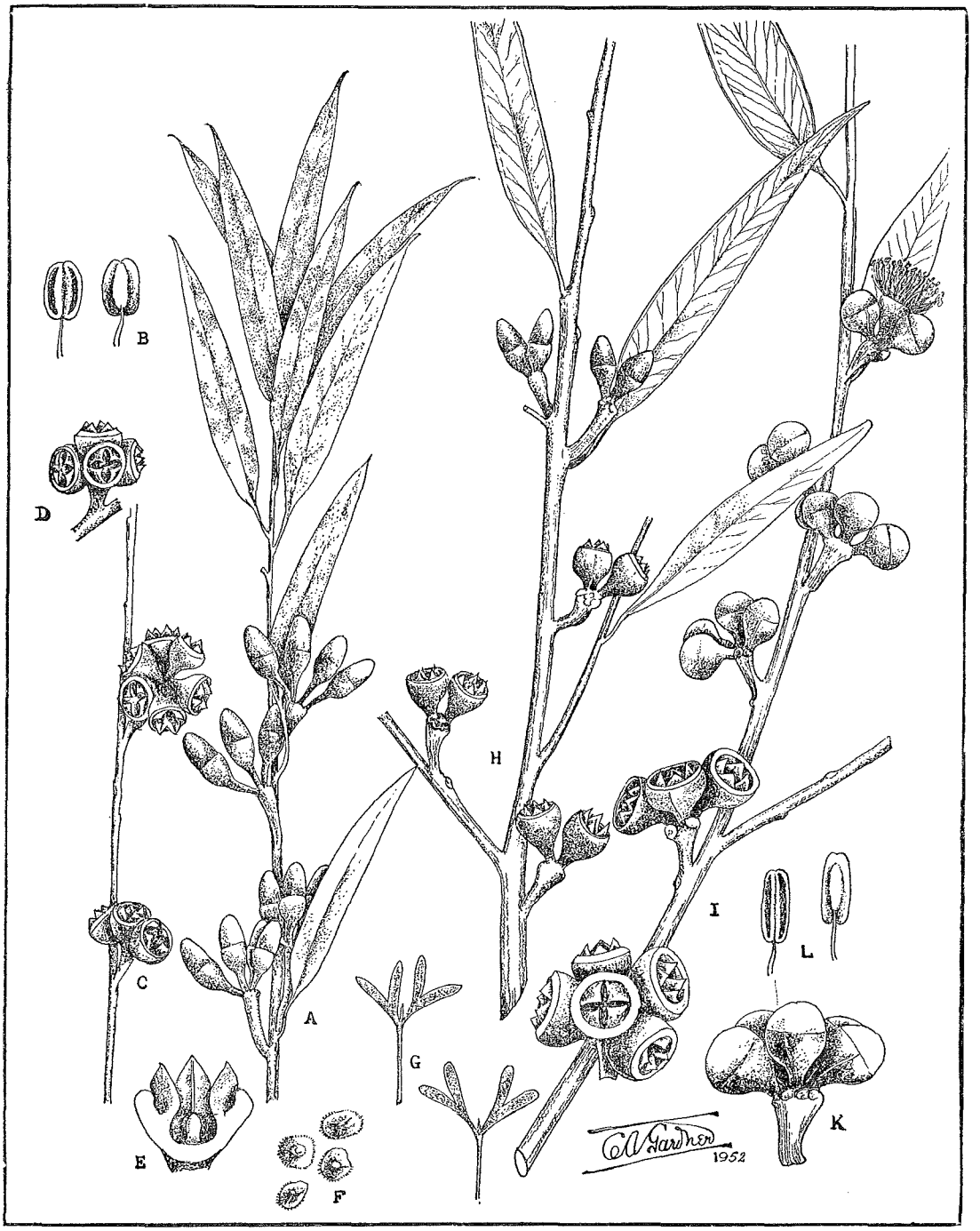

Fig. 6

Eucalyptus salubris A—Branchlet with leaves and buds; B—Anther; C and D—Fruits; E—Fruit in longitudinal section; F—Seeds; G—Expanded (seedling) cotyledons.

Eucalyptus campaspe H—Branchlet with leaves, buds and fruits of the Higginsville form; I—Branchlet with buds and fruits of the Coolgardie (Montana Hill) form; K—Anthers of the Coolgardie form.

8. **Eucalyptus campaspe** S. Moore

Silver-topped Gimlet

Silver-topped Gimlet is confined to the Eastern Goldfields, and is recorded from the Bullabulling and Coolgardie districts as far south as Higginsville. This species and Gimlet are very closely related, and in their appearance and floral structure the essential differences between them are restricted to the smaller branches and twigs, the leaves and the anthers. In Gimlet the branchlets are reddish and shining, the leaves of a deep lustrous green, and the anthers broad. The fruits are usually small.

In the Silver-topped Gimlet the smaller branches and twigs are covered with a white powder, giving them a silvery or frosted appearance. The leaves are glaucous or a pale bluish green, the anthers long and narrow, and the fruits typically larger than those of Gimlet. The trunk, bark and branching habit of the two are similar.

Silver-topped Gimlet was named *campaspe* from the fact that on the Eastern Goldfields it grows on plains or level stretches of soil. Variations in its oil-yield are rather interesting. Trees from Higginsville gave a yield of 0.72 per cent of oil of a terpene type, with a cineole content of 15 per cent and alcohols about 20 per cent. Trees from near Coolgardie on the other hand gave a yield of 1.2 per cent of an oil of a pinene type, with a cineole content of 64 per cent, and alcohols about 10 per cent. There are distinct differences between the two forms as shown by the illustrations, and the species requires further investigation, both botanically and chemically.

Both Silver-topped Gimlet and Gimlet are eminently suitable for planting in parks, in gardens, and as street trees. Trees planted in Tammin are proving very successful as street trees. They are also suitable for windbreak and shade purposes.

Silver-topped Gimlet flowers from November to January. Its honey and pollen potential is not known.

Silver-topped Gimlet is a slender tree 8 to 10 m tall, with the typical appearance of the common gimlet, but the upper parts of the branches and the branchlets covered with a white powder. The leaves are petiolate, alternate, erect or spreading, usually broader than those of *E. salubris*, and blue-green, never deep green and lustrous.

The flowers are in axillary umbels, the peduncles usually short and broad, the flowers almost sessile, the whole inflorescence powdery-white, the calyx-tube hemispherical to shortly obovoid, the operculum smooth, conical to hemispherical, rarely longer than the calyx-tube. The stamens are numerous, the white filaments inflected in the bud; anthers versatile, rather narrow, opening in parallel longitudinal slits.

The fruit is hemispherical to obovoid-turbinate, 7 to 10 mm long, the disc flat, the valves, usually four, broadly deltoid and exserted. Seeds are brown, irregularly D-shaped, with a honeycomb-like pattern.

9. **Eucalyptus pyriformis** Turcz.

Pear-fruited Mallee

Pear-fruited Mallee, named by the Russian botanist Turczaninow, takes its name *pyriformis* from its pear-shaped buds. It is a shrubby eucalypt, and hence a mallee, rarely exceeding 4 m tall, with a smooth bark and smooth stout branches, often a shining red. The leaves are alternate, rigid, erect, thick, pale grey-green on both surfaces, ovate-lanceolate in shape, the midrib conspicuous, the lateral nerves only moderately so and diverging from the midrib at a wide angle, the intramarginal nerve distinctly removed from the leaf-margin.

The species occurs in poor sandy country over a wide expanse of country. From the lower Murchison River in the north it extends southwards to near Goomalling. A form from the Goomalling-Dowerin district, called the Dowerin Rose, has elongated buds tapering into a long pedicel.

Pear-fruited Mallee is suitable for planting in parks and gardens, being exceptionally hardy and among the most decorative of all the species of *Eucalyptus.* It is always a shrub and does not produce a large bulbous stock, but remains shrubby, branching from the ground. It yields 1.1. per cent of oil of a cineole-pinene-eudesmol type, with a cineole content of 56 per cent.

Already common in certain parks, this species should be more extensively planted in the agricultural areas, especially in areas free from frost. Its floriferous habit and large blooms promise well for its value as a pollen and nectar producer, and it should be of value to the apiarist. In the size of its blossoms it is little smaller than *E. macrocarpa,* and where the latter thrives, *E. pyriformis* should also succeed.

The oil-glands in the leaves of Pear-fruited Mallee are concealed, but numerous. The flowers are very large, usually two or three together on thick recurved peduncles, very rarely solitary, the pedicels robust, as long as or longer than the calyx-tube or sometimes shorter. The calyx-tube is from obconical to depressed-hemispherical, with several longitudinal ribs; usually pale or glaucous in the bud, operculum hemispherical to shortly conical, usually beaked, longitudinally ribbed, but usually less markedly so than the calyx-tube, very thick and with a broad base. The stamens are numerous, long, the filaments yellow, pink or red, inflected in the bud; anthers oval in outline, versatile (attached above the base), opening in longitudinal parallel slits; style thick and straight.

The fruit is very large, 4 to 7 cm in diameter, varying in shape from elongated obconical to depressed hemispherical, strongly and irregularly longitudinally ribbed, either tapering into the pedicel at the base or, when broad, almost sessile, the disc very broad, abruptly raised above the rim, and depressed in the middle, capsule four to six valved, the valves broadly deltoid and not exserted. The fertile seeds are more or less pyramidal, and winged on the margins, dark brown or black; sterile seeds very narrow. The cotyledons are bifurcated.

Pear-fruited Mallee is available in both eastern and western Australia. It is cultivated overseas e.g. in New Zealand and California. A sketch of the buds and fruits of this species is on a panel on the current Australian five dollar note.

Editor's Note: *E. youngiana,* Large-fruited Mallee, at one time regarded as a subspecies of *E. pyriformis,* is found north and east of Kalgoorlie. It is found in a very arid environment with its range extending into similar areas in South Australia. It has a rough bark, short pedicels and a short calyx. Gardner considered it a form of *E. pyriformis.*

Large-fruited Mallee is available as an ornamental in nurseries in both eastern and western Australia.

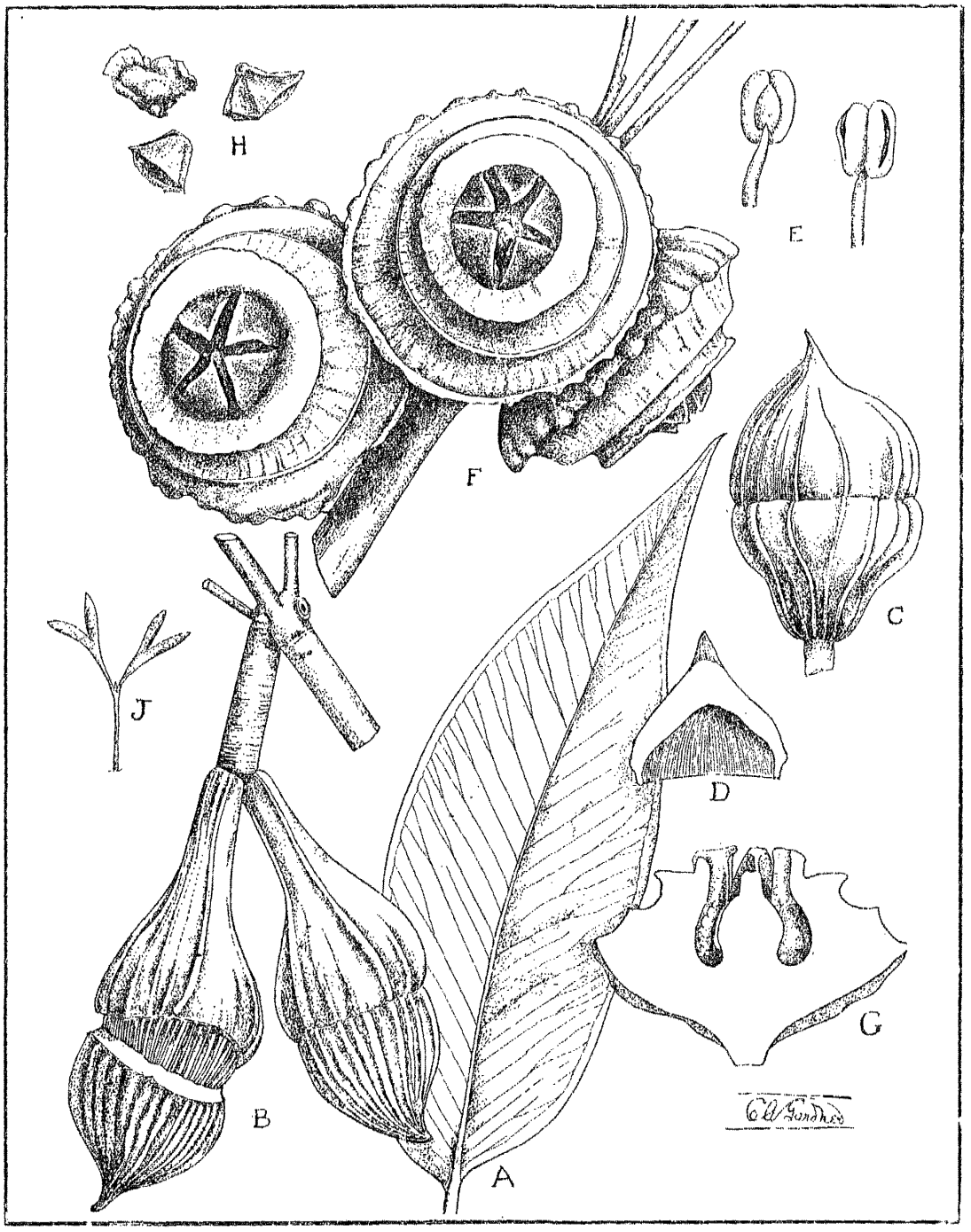

Fig. 7

Eucalyptus pyriformis A—Leaf; B—Buds; D—Operculum in longitudinal section; E—Anthers; H—Seeds; J—Cotyledons (seed leaves).

Eucalyptus youngiana C—Bud; F—Cluster of fruits; G—Longitudinal section of the fruit.

10. **Eucalyptus occidentalis** Endl.

Flat-topped Yate

Flat-topped Yate or Swamp Yate is a tree growing to about 20 m tall with a trunk up to 50 cm in diameter and a rough flaky-fibrous bark covering the whole of the trunk and the lower parts of the main branches. The branches have a smooth yellowish-grey bark, and usually spread widely giving the crown of the tree a typically broad and flat appearance, hence the common name of Flat-topped Yate.

The rough bark where it meets the smooth bark is frequently ribbony and adheres in rough-looking masses, while the trunk itself has a thick, persistent dark grey, rough, fissured bark. The trunk is usually thickened or almost buttressed at the base. The timber is pale, hard, and somewhat straight-grained, somewhat like that of Yate but inferior to it in strength and durability.

Flat-topped Yate is found as far north as Wagin and Dumbleyung growing on alluvial flats which are subject to flooding, as for example the margins of the Wagin and Dumbleyung lakes. From there southward the species is common in similar situations, especially around Katanning and Cranbrook.

From the latter locality, Flat-topped Yate extends almost to the south coast and eastward to Esperance and beyond. It is usually associated with wet depressions or clay flats. These Flat-topped Yate woodlands have a characteristically sparse undergrowth of low shrubs and cushion-like or mat-like plants. Flat-topped Yate soils are cold soils, in which the annual plants germinate late in the season. They dry out earlier than in the lighter soils close to swamps and depressions. While this soil requirement remains fairly constant there is one notable exception. At Jerramungup on the Gairdner River the tree is found on high undulating country.

The late E. A. Hassell, who owned, and for many years lived at Jerramungup, told me that the name Jerramungup was a corruption of the native Yarramoitch which means Moitch standing up, or Moitch on high ground. The natives had noticed this peculiarity in the tree, which here occurred on granitic country practically devoid of shrubs and carrying excellent natural pasture of Wallaby Grass and other grasses. Jerramungup was a place famous for game. Moitch was the native name of the tree, and it would be well if this name were restored in place of Flat-topped Yate. According to the same authority, Poot was the local name for *E. longicornis,* Red Morrel, and Moe the name for *E. rudis,* Flooded Gum.

Apart from a limited value as a source of timber the tree is of little importance. Owing to the confusion between Brown Mallet and Flat-topped Yate, the figures available concerning its essential oils must be disregarded, and the bark, in marked contrast to that of Brown Mallet, is very low in tannins. On the other hand it is a tree which flowers profusely, and produces a good honey flow.

The vernacular name of Flat-topped Yate is used in reference to the flat-topped appearance when contrasted with that of *E. cornuta,* Yate, which it somewhat resembles. It can also be distinguished from Yate by its smooth branches.

Flat-topped Yate is a tree attaining a height of 15 to 20 m or a shrub, often flowering when very young; bark rough on the trunk, dark grey, fissured, the branches smooth. The leaves are alternate, stalked, spreading, the leaf-stalks 2 cm long, the blade lance-shaped, somewhat curved, 10 to 20 cm long, leathery, shining, oil-dotted, the midrib conspicuous, the lateral nerves diverging from the midrib at an acute angle, the intramarginal nerve distant from the margin.

The umbels are axillary, three to seven flowered, the peduncle flattened upwards or at least compressed, sometimes rather broad, 3 to 5 cm long, spreading or recurved. The pedicels are nearly 1 cm long, slender, gradually thickened upwards into the calyx-tube. The calyx-tube is bell-shaped, less than 2 cm long, the rim expanded when in flower.

The operculum is cylindrical, rather acute, usually somewhat dilated at the base, 1 to 2 cm long. The stamens are numerous, the filaments erect in the bud, white, the anthers narrow and opening in parallel longitudinal slits.

The fruit is bell-shaped, smooth, from above 1 cm to nearly 2.5 cm long, the rim prominent and flat, the capsule slightly sunk, with usually four strong broad acutely pointed valves with slightly spreading tips. The fertile seeds are pale brown, small, variously shaped with thin margins. The seed-leaves are Y-shaped.

Flat-topped Yate has been successfully grown overseas, e.g. in Hawaii, Ceylon and Algeria.

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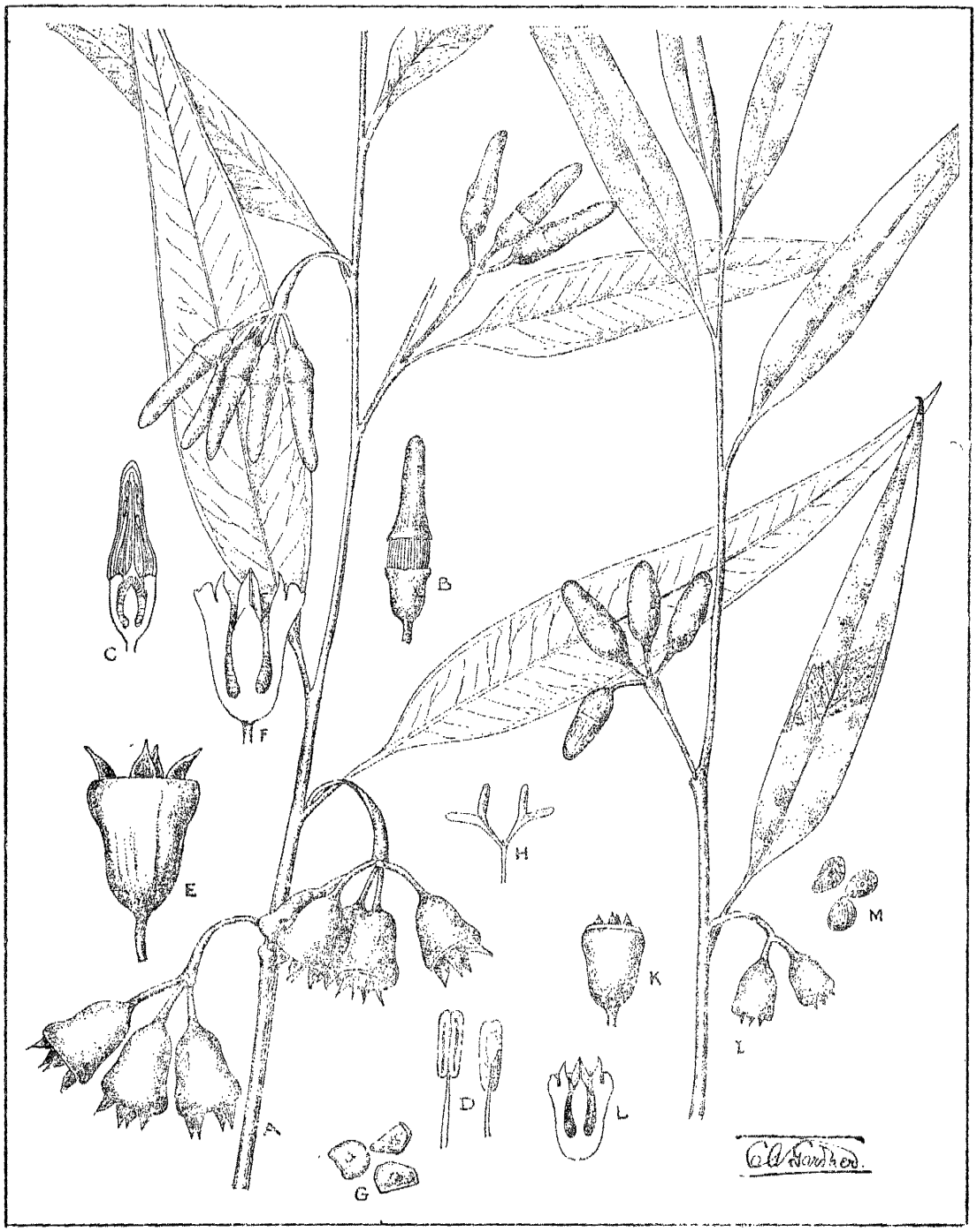

Fig. 8

Eucalyptus occidentalis A—Branchlet with leaves, buds and fruits; B—Bud in the opening stage; C—Section of bud showing the erect filaments; D—Anthers; E—Fruit; F—Longitudinal section of fruit; G—Seeds; H—Cotyledons.

Eucalyptus astringens I—Branchlet showing leaves, buds and fruits; K—Fruit; L—Section of fruit; M—Seeds.

11. **Eucalyptus astringens** (Maiden) Maiden

Brown Mallet

Brown Mallet was formerly known as *E. occidentalis* var. *astringens*. This tree is valuable because of the high tannin content of its bark. Although now rarely seen in a fully developed condition in the field, the tree attains a height of 15 m with a trunk up to 60 cm or more in diameter, and erect branches.

The bark is smooth and brown or grey or usually both colours are present but with small flakes of unshed bark usually adhering in small patches, especially near the base. The bark is thin, usually with kino vessels running longitudinally through it, somewhat gummy and, during the winter and spring weather, easily stripped. It is rich in tannins and astringent to the taste, hence the specific epithet *astringens*. The timber is pale brown, very strong, straight-grained and somewhat like that of Gimlet. Young trees have a dense bushy crown but trees in woodland formation become sparsely foliaged with age.

Brown Mallet occurs typically on lateritic soil, usually on hills, its range extending from near York southwards to near Mount Barker, thence eastwards to Gnowangerup and Ravensthorpe to near Hopetoun. In the northern part of its range, southwards to Highbury, it is found on the ironstone hills only, but to the south it is found also on the level clay soils. Between York and Wagin its presence usually indicates poison country, several toxic plants being found in association with the thickets of the trees, but this is not so to the south. Its eastern limits have not been accurately defined, but the tree remains fairly common in gravelly soils near Quairading and Bendering, and small areas are found in the Ravensthorpe Hills.

It is mainly in the eastern areas that the mallee forms of Brown Mallet and Flat-topped Yate are found, and these can be separated by the comparative breadth of the leaves, the somewhat longer operculum of *E. occidentalis* together with large fruits and broader stronger valves. The fruits of *E. astringens* are smaller, somewhat rounded at the orifice, and the valves are more slender. The plate illustrates these small differences.

Brown Mallet is valued for its bark, and is cultivated. The Forests Department maintains plantations of the tree in several areas. The bark is stripped at certain times of the year when, because of its moisture content, it strips easily: in the summer it cannot be so stripped. The tannin content varies from 40 to 57 per cent. The tree, like Gimlet, very rarely suckers but propagates freely from seeds. Brown Mallet flowers in October and November producing pollen and a honey flow.

Apart from the mallees there are three trees having somewhat similar buds and fruits, and with which Brown Mallet might be confused. Brown Mallet, which has erect branches and a smooth bark throughout, grows in high situations. Flat-topped Yate, similar to Brown Mallet, has a rough bark on the trunk, smooth branches of a pale colour, and occurs in low-lying situations not far removed from fresh water during the winter months. *E. sargentii*, Salt River Gum, has a rough-barked, usually short trunk, the bark being almost black and very curly, the branches smooth and reddish. It grows in saline soils and is usually the last tree to perish when land becomes

salty. Hence it has potential value in its ability to tolerate salt. *E. gardneri,* Blue Mallet, differs from Brown Mallet, in its blue-grey leaves and narrow acutely-pointed bud cap. It has fruits not unlike those of *E. wandoo*, Wandoo.

Brown Mallet is a tree 10 to 15 m tall, with a straight trunk and erect branches, reddish-brown and grey, sometimes with persistent patches of curly crisped bark adhering in spots, the trunk cylindrical or rather angular. The timber is pale brown, straight-grained and strong. The branches are angular. The leaves are alternate, stalked, erect, leathery, lance-shaped, the same colour on both surfaces, somewhat shining, the veins not very prominent, usually finer and less spreading than in *E. occidentalis*, acute, the midrib prominent. Oil dots are fairly numerous on the leaf which is 10 to 15 cm long.

The umbels are three to seven flowered, the peduncles at first erect, later spreading or recurved, terete or angular. The calyx-tube is bell-shaped, about 1 cm long, smooth. The operculum is cylindrical, from as long as to half as long again as the calyx-tube, usually blunt. The stamens are as in *E. occidentalis.* The fruit is bell-shaped, about 1 cm long, the rim raised above the ovary, but more or less rounded and not expanded as in *E. occidentalis,* the valves fine and much less exserted than in *E. occidentalis.* The seed-leaves are Y-shaped.

Brown Mallet has been cultivated overseas, e.g. in Israel, Cyprus and Morocco, as well as in eastern and western Australia.

12. **Eucalyptus tetraptera** Turcz.

Four-winged Mallee

Four-winged Mallee, a small shrub, was first discovered by James Drummond in 1847 between Cape Riche and Doubtful Island Bay, and was named by the Russian botanist Turczaninow from the four-winged buds and fruits. It is now fairly common in cultivation, being attractive when in bud and in flower, and always a curiosity because of its large square fruits and large, very thick, bright green leaves, which are the thickest of any species of *Eucalyptus*. The plant is deserving of a place in any garden, and will thrive in poor sandy soils.

E. tetraptera is confined to a stretch of country extending from the Stirling Range eastwards to Israelite Bay to the east of Esperance. It rarely exceeds 3 m tall, and is rendered conspicuous and distinctive by reason of its thick branches, usually of a dark colour, very thick and leathery large bright green leaves with only the midrib discernible, and its solitary flowers in which there is a remarkably broad and somewhat folded or twisted foot-stalk or peduncle without any pedicel or individual flower-stalk under the flower. The peduncle is closely recurved, so that the flowers hang downwards.

The bud is bright scarlet, the almost square calyx-tube with four equal fleshy wings, and the operculum distinctly pyramidal. The buds are frequently 10 cm long. The filaments are red or pink and incurved in the bud, relatively small for the size of the flower, but rendered conspicuous by their colour. The anthers are oblong, versatile or attached near the middle, and open in parallel longitudinal slits.

The fruit is large, up to 8 cm long, four-winged and square in section, with a broad flat disc, and the orifice varies from circular to almost square; the capsule is deeply included together with the four valves. The fruit, at first scarlet, becomes brown with age, and the large seeds are irregularly shaped and winged at the angles, the seed-leaves being broad upwards and not lobed.

Four-winged Mallee is grown as an ornamental in eastern and western Australia and in California.

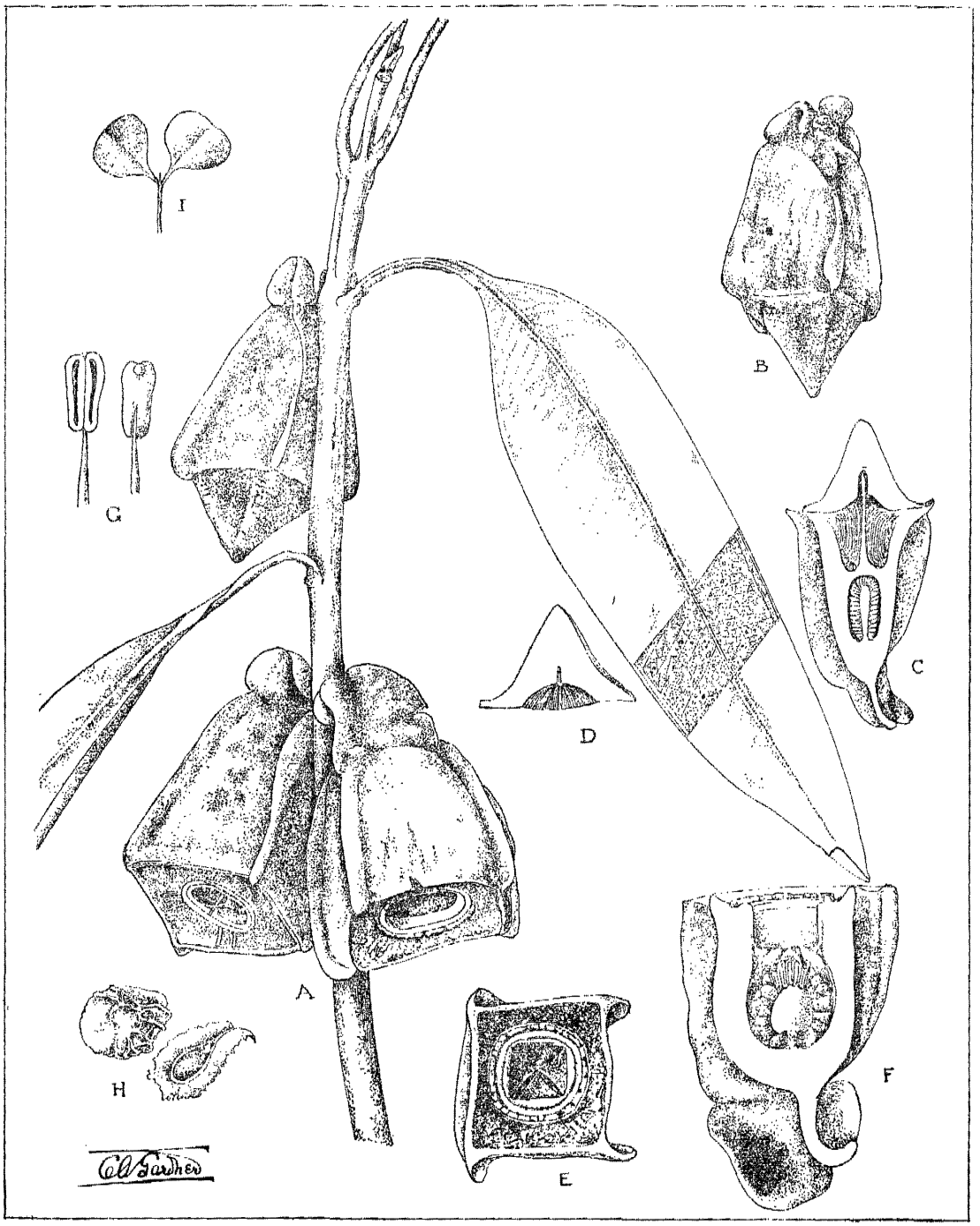

Fig. 9

Eucalyptus tetraptera A—Branch with leaves, buds and fruit; B—Flower bud; C—Section of flower bud; D—Operculum in longitudinal section; E—Apical view of ripe fruit; F—Section of the fruit; G—Anthers; H—Seeds; I—Cotyledons.

13. **Eucalyptus torquata** Luehm.
Coral Gum

Among the more decorative small trees available for planting in the Eastern Agricultural Areas, there are few more suitable than *E. torquata.* This tree, known also as the Christmas Tree of the Coolgardie and Dundas districts, usually blooms during December, and its handsome drooping coral-pink blossoms make it a conspicuous object in the woodlands at that season of the year. It was first discovered by L. C. Webster near Coolgardie in 1901 on a stretch of stony dioritic country 40 km long by about 0.5 km wide. Its range extends as far south as Norseman.

Although known as a gum tree, Coral Gum is rough-barked on the trunk and lower parts of the main branches. Except when in flower it is not a particularly attractive tree, although its dark, rough bark and blue-grey foliage make a pleasing contrast when grown with smooth-barked trees. Its widely spreading branches make it a useful shade tree, but perhaps its chief value, apart from the colour of its blossoms, is its habit of blossoming when very young. Trees three or four years old and less than 1 m tall may sometimes be seen in full blossom under cultivation.

The plant was named by J. G. Luehmann, of Melbourne, the name *torquata,* from *torquis,* a collar or ring, being in reference to the ribbed swelling found at the base of the calyx and fruit, a character unique in the genus and readily recognised.

The tree sometimes attains a stature of 10 m, but usually it does not exceed 6 to 8 m. It has widely-spreading branches, a relatively thick and short trunk covered with a dark grey or almost black longitudinally fissured friable bark, a dark brown, hard and dense timber and blue-green pendulous leaves. The larger trees appear to be susceptible to termite attacks, for they are usually hollow. It is thus of little value as a timber tree, but as a decorative subject it has few rivals.

The pink blossoms are produced in pendulous clusters in considerable abundance, and remain attractive from the time the yellow and red buds are formed until the flowering season is completed.

The filaments are usually reddish-pink, but not so attractive white-flowered or yellowish-white forms are not uncommon. In this connection it is as well to mention that several *Eucalyptus* species which possess pink or red flowers also produce yellow or yellowish-white flowers.

Coral Gum has reddish branches, scarcely angled. The mittently for most of the year. The flowers produce abundant nectar and pollen. This tree is of considerable value to the bee-keeper, especially since it flowers profusely when still small. For this reason, it may be worth planting.

No information is available regarding its value as an oil producer, but from the number and density of the oil cavities in its leaves, it may well be that the species has a value in this respect.

It is, however, as a decorative species that the tree is of greatest value. An inhabitant of fairly heavy soils on stony hills, it has proved its ability to thrive both in the sandy and loamy soils of the wheat belt, as well as in the sands of the Perth metropolitan area. Young plants should be transplanted not later than

the middle of May. The species is probably self sterile, so that it is advisable to grow two or more trees to secure fruits and seeds, for the fruits are also attractive.

Coral Gum has reddish branchlets scarcely angled. The leaves are alternate, petiolate, spreading or pendulous, glaucous, firm, flat, concolorous, lanceolate, somewhat curved, the petiole rather long, the base of the leaf tapering into the petiole, the apex fine and often hooked or uncinate, the midrib conspicuous on both surfaces, the lateral nerves not prominent, diverging from the midrib at a wide angle, the intramarginal nerve removed from but parallel to the margin; oil cavities numerous.

The flowers are in umbels in the leaf-axil and the peduncle is recurved, slender and terete, bearing five to seven flowers on elongated slender pedicels. The calyx-tube is cylindrical-urceolate, somewhat contracted at the top, smooth except for a swollen conspicuously corrugated base, yellow or pink when in bud. The operculum is depressed-hemispherical but abruptly tapering into a rather long beak, broader than the calyx-tube at the base and coarsely ribbed or corrugated, smooth upwards, the beak enclosing the elongated style. The stamens are incurved in the bud and descending into the deep calyx-tube, all perfect, the filaments pink or yellowish-white; anthers versatile, obovoid-oblong in outline, opening in distinct parallel longitudinal slits.

The fruit is globular with a cylindrical-ovoid limb, deeply corrugated in the globular portion, the limb smooth, rather more than 1 cm long, the rim narrow, the capsule deeply included, the valves broad with fragile subulate points which do not protrude. The seeds are ovoid to elliptical, radially striate. The cotyledons are orbicular to orbicular-reniform.

Coral Gum has been cultivated as an ornamental in southern Australia and overseas e.g. in California and Arizona.

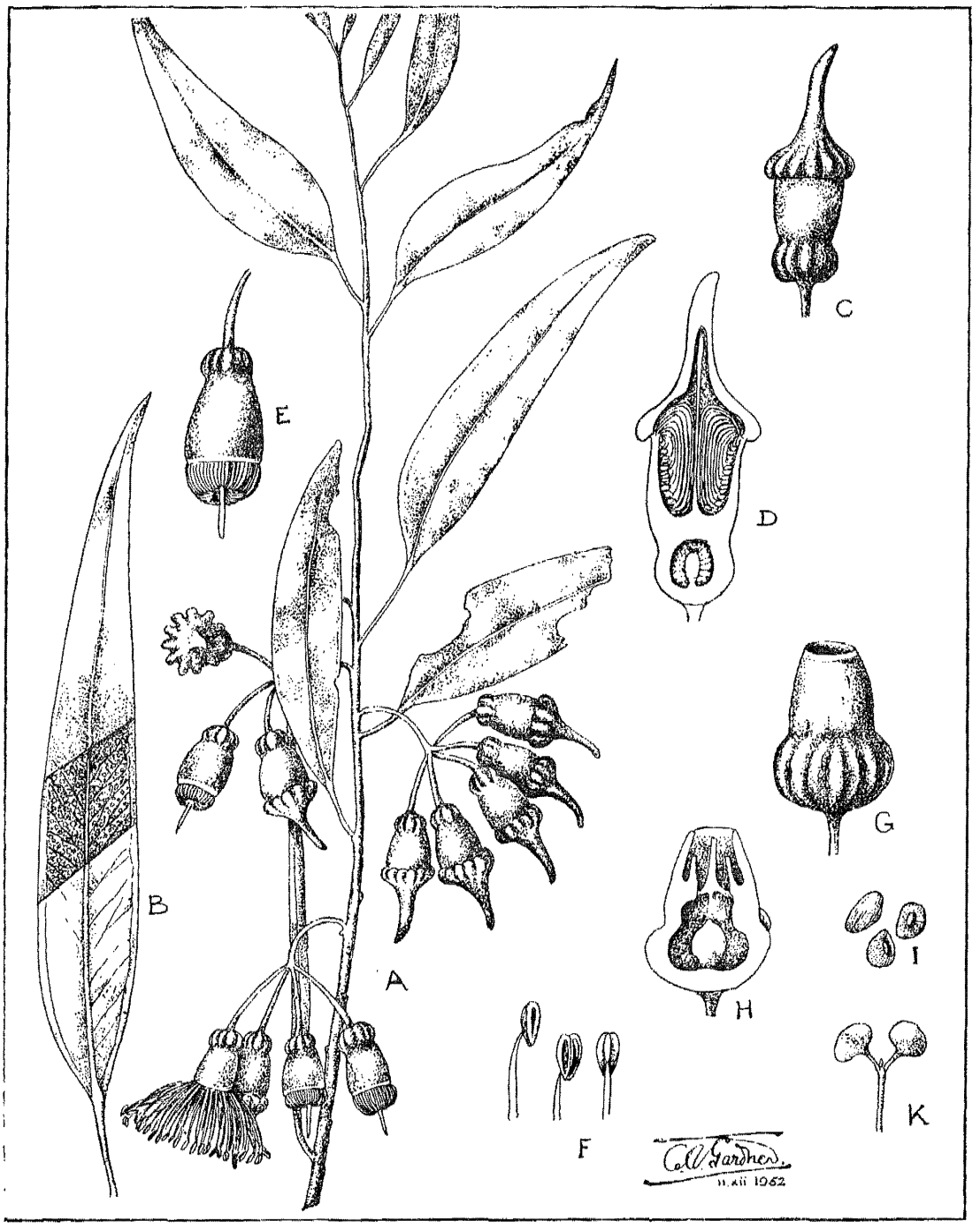

Fig. 10

Eucalyptus torquata A—Branchlet with buds and flowers; B—Leaf; C—Flower bud; D—Flower bud in section; E—The same with the operculum removed; F—Stamens; G—Fruit; H—Fruit in section; I—Seeds; K—Cotyledons. All below natural size except D. F, and I.

14. **Eucalyptus woodwardii** Maiden

Lemon-flowered Gum

The Lemon-flowered Gum is one of the lesser-known trees of the Eastern Goldfields. Originally discovered by Richard Helms, botanist to the Elder Exploration Expedition, 100 km to the south of Queen Victoria Spring, in 1892, it was not rediscovered until specimens were collected by Henry Dean, consulting engineer for the Trans-Australian Railway, near Zanthus in 1909. In that year it received from J. H. Maiden, Government Botanist of New South Wales, the name which commemorates Bernard H. Woodward, then Director of the Museum and Art Gallery in Perth.

The species would perhaps have remained in obscurity had it not been for the action of officers of the Western Australian Forests Department who collected seeds, and made specimens of this attractive tree available to the public.

The known range of the tree extends from about 160 km to 200 km east of Kalgoorlie along the Trans-Australian Railway, and some distance to the north, where it is found growing with other *Eucalyptus* species in sandy soil with small spinifex clumps.

In the field it is a somewhat untidy tree, producing masses of blossoms and little foliage, with straggling branches and pendulous branchlets. The trunk and branches are covered with a white or yellowish-white smooth bark, the outer layers of which shed annually in long ribbony strips. The timber is brown, hard and straight-grained, but apparently of no commercial value. Apart from its straggling habit and white bark, the principal features of the tree in the field are its paucity of foliage, rather broad, grey, thick leaves, frosty-white branchlets and buds, and its striking pale yellow blossoms.

This tree is recommended for planting in the eastern farming areas as a decorative subject. Like *E. torquata,* Coral Gum, it flowers while in its youth, and trees 2 m tall carrying blossoms are not uncommon in cultivation.

The aridity of its habitat suggests that it will prove one of the most hardy of *Eucalyptus* trees in cultivation but, on account of its heavy blossoming and weak branches, it may be somewhat untidy in appearance. This disadvantage is, however, more than compensated for by its extreme fecundity.

Its chief advantage lies in the abundance of its clear lemon-yellow flowers which contrast charmingly with its frosted buds and branchlets.

Lemon-flowered Gum is a tree 12 m to 15 m tall, with a smooth white bark, the branches spreading, the branchlets sometimes pendulous, powdery-white. The leaves are alternate, petiolate, spreading, the petiole thick and rigid, the leaf-blade ovate to ovate-lanceolate or rarely lanceolate, glaucous, unequal-sided at the base and abruptly contracted into the petiole, the apex abruptly narrowed and acute, the midrib thick and prominent, the lateral nerves diverging from the midrib at a wide angle, not numerous, the intramarginal nerve distinct from the thick margin.

The flowers are in axillary umbels, or the upper umbels lateral through leaf-abortion, appearing paniculate. The peduncles are recurved or spreading, not stout but thickened upwards, bearing an umbel of from three to six flowers on short pedicels. The

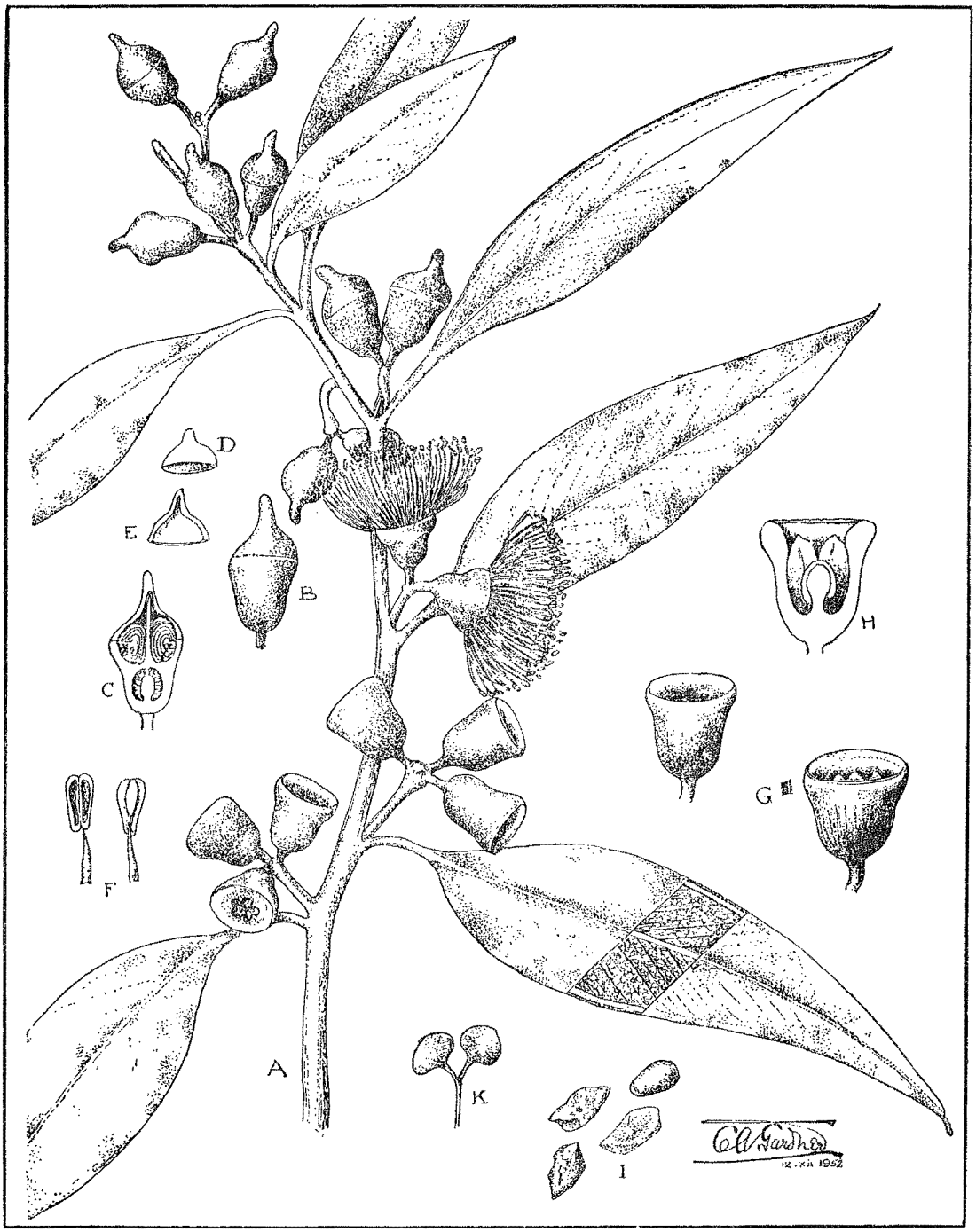

Fig. 11

Eucalyptus woodwardii A—Habit; B—Flower bud; C—Section of bud; D—Operculum; E—Operculum in section; F—Anthers; G—Fruits; H—Section of fruit; I—Seeds; K—Cotyledons.

buds are powdery-white or pruinose. The calyx-tube is more or less bell-shaped, about 1 cm long, smooth, but appearing wrinkled when dry. The operculum is hemispherical, abruptly contracted into a long or short usually curved beak. The stamens are numerous, the filaments incurved in the bud, bright yellow; anthers oblong, versatile, opening in longitudinal parallel slits.

The fruit is campanulate, quite smooth or very faintly striated, nearly 2 cm long, the rim rather narrow, the summit concave, the valves broadly deltoid, not exserted. The seeds are angular.

Hybrids between *E. woodwardii* and *E. torquata* have been produced. One of these hybrids has been given the name "Torwood".

Lemon-flowered Gum is cultivated in many parts of southern Australia and is available in nurseries in both eastern and western Australia.

15. **Eucalyptus erythronema** Turcz.

Red-flowered Mallee

Red-flowered Mallee is usually found in mallee form, growing from 3 to 6 m tall, but may at times possess a single stem, and is thus a small tree. Both mallee and tree forms have characteristically a broad base or stock, so that frequently in the mallee forms individual stems arise well above the soil level from a large dome-like base. As a tree the stem may be as much as 45 cm in diameter.

The species is characterised in the field by its white or pink bark which is covered throughout externally with a white, smooth talc-like powder. The inner bark is pale green, and when the outer layers peel or decorticate in thin plates, patches of purplish old bark, white or pink bark and new pale green bark make the tree very striking and handsome. The bark is thin, but does not strip very readily.

The species was named by the Russian botanist Turczaninow in 1852, the name *erythronema* being derived from two Greek words: *erythros,* red, and *nema,* a thread, in allusion to the blood-red filaments common in the species, although occasionally pale yellow-flowered forms occur. No other *Eucalyptus* has such an intense red in its blossoms.

Red-flowered Mallee has an extensive range, but never seems to be common or widespread in its area of distribution. Its western boundary extends from about Wongan Hills southward to south-east of Corrigin, while eastwards it extends to Southern Cross. It inhabits heavy, usually grey, clay soils, and is thus frequently associated with Gimlet; rarely is it found in stony soils, and usually it is indicative of excellent farming land.

The variety *marginata,* described by Bentham, occurs to the north, being common around Elphin, Manmanning, and Pithara, as far north as Wubin, and as far south as Goomalling. It extends eastward nearly to Beacon. It is usually smaller than the typical form of the species, and has a less developed stock. It also occurs frequently in stony soils.

The species flowers from late November until the middle of January, and has much to recommend it as an ornamental subject because of its white bark, deep green glossy leaves and deep red blossoms. These blossoms are eagerly sought by bees, either for pollen or nectar, probably both, but its value to the beekeeper is comparatively low except in a few localities, because it seldom occurs abundantly.

The bark is rich in a pale yellow tannin, the tannin content being 30.4 per cent in a sample examined. The leaves are rich in oil of good colour and quality, the oil yield from a sample from Merredin being 2.5 per cent on air-dried material, of a cineole-pinen type, containing 71 per cent cineole, with hydrocarbons largely sesquiterpenes and about 12 per cent alcohols. Phellandrene is absent. An air-dried sample from Dowerin, of the variety *marginata,* gave a yield of nearly 3 per cent, with a cineole content of 33.7 per cent, and a substance, probably a d-pinene, in quantity.

From the above it would appear that the Red-flowered Mallee, quite apart from its attractions as an ornamental subject, has a definite commercial value, if occurring in abundance in a given area.

Red-flowered Mallee may be a mallee with a few stems from a broad stock, or a small tree with a dilated base to the trunk, the branches erect. The bark is smooth, externally white or pink, covered with a white talc-like powder which can be rubbed off; inner bark pale green, the outer bark shedding in small thin plates. The timber is pale brown, hard and dense, straight-grained, not termite-resistant and frequently piped.

The leaves are erect, alternate, petiolate, the petiole erect, usually short, the blade narrow-oblong to lanceolate, acute or obtuse, thick, lustrous, the midrib narrow but distinct, the lateral nerves either very obscure or not superficially evident, diverging from the midrib at a wide angle, not numerous, the intramarginal nerve distant from the leaf-margin. The oil cavities are numerous.

The peduncles are axillary or lateral, spreading or recurved, terete or nearly so, bearing an umbel of three to five flowers on rather long pedicels. The calyx-tube is obconical or reversed conical, smooth or few-ribbed, exceeding 1 cm long and barely as broad; tapering at the base into the pedicel. The operculum is broadly conical, smooth, thin, especially at the base, and acute, reddish. The stamens are all fertile, sharply inflected in the bud, raised on an elevated staminal ring within the base of the operculum, the filaments deep red or yellow; anthers versatile, oblong, opening in distinct longitudinal slits.

The fruit is turbinate-obconical to almost subcampanulate, about 1 cm long and nearly as broad, the rim raised above the staminal ring, and usually separated from the lower calycine rim by a narrow constriction, the disc flat or slightly concave, the capsule level with the disc, the valves broadly deltoid, not or scarcely protruding. The seeds are ellipsoidal, minutely striate, not winged. The cotyledons are Y-shaped.

The variety *marginata* has the calycine rim expanded into a prominent horizontal or reflexed ring or wing.

Red-flowered Mallee is cultivated in inland areas of most Australian States. A cultivar "Augusta Wonder" is a hybrid probably *E. erythronema* x *E. torquata*. Another known as "Urrbrae Gum", was derived from a chance seedling in Adelaide.

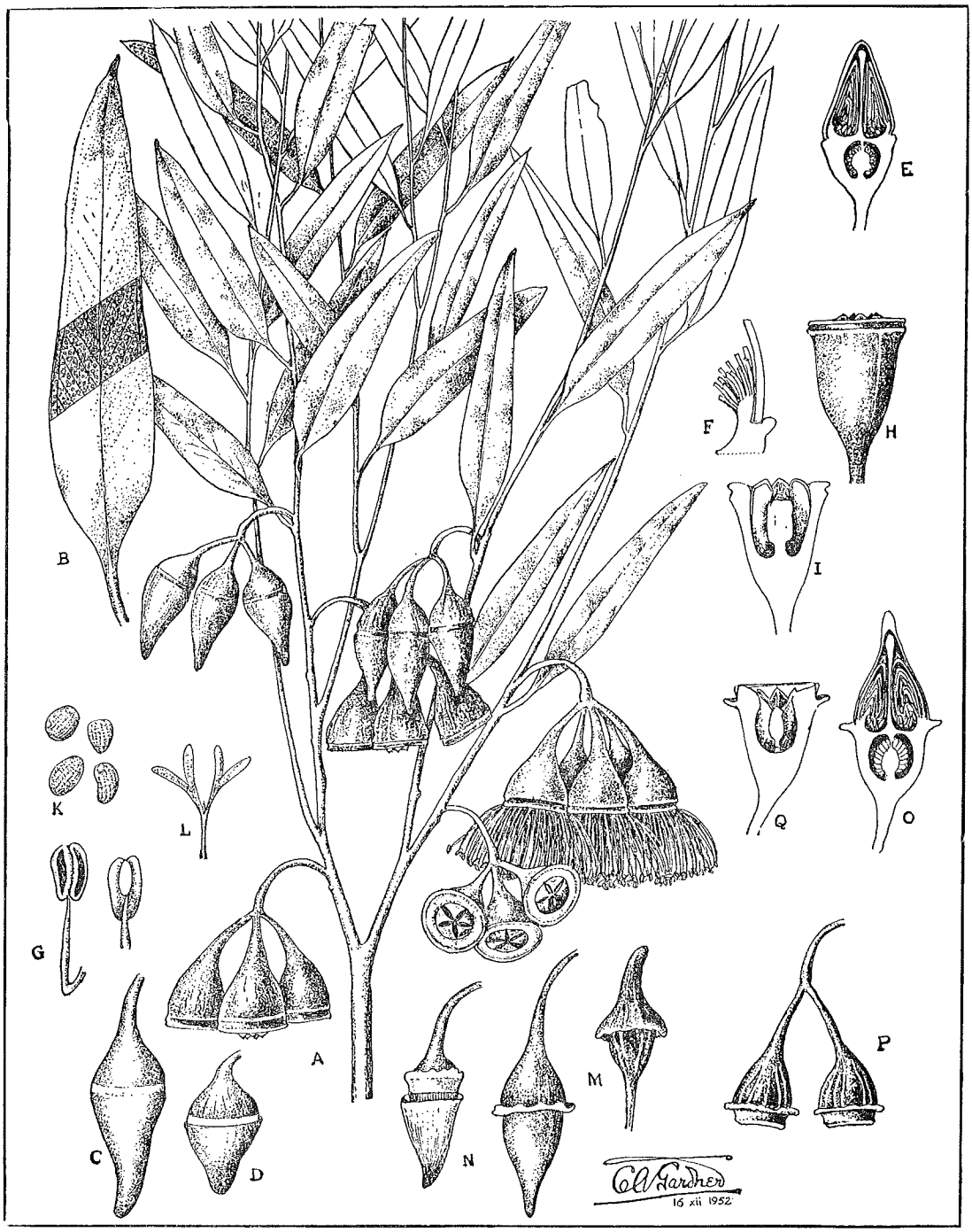

Fig. 12

Eucalyptus erythronema A—Branchlets with leaves, buds, flowers and fruits; B—Leaf (portion of surface removed to show nervation); C and D—Flower buds; E—Section of flower bud; F—Section through bud showing staminal ring in relation to the side of the operculum and the calycine rim; G—Anthers; H—Fruit; I—Fruit in section; K—Seeds; L—Cotyledons.

Eucalyptus erythronema var. *marginata* M—Bud showing operculum extending over calycine rim (an unusual form); N—Flower buds (that to the left shows a falling operculum to exhibit staminal ring); O—Section of flower bud; P—Fruits; Q—Section of fruit.

16. **Eucalyptus microtheca** F. Muell.

Flooded Box

Editor's Note: Gardner included *E. coolabah* in the species *E. microtheca*. In this volume they are treated as separate species and all references to *E. coolabah* which appeared in the original article have been deleted.

The Flooded Box of the Kimberley region always has a rough persistent bark except on its smaller branches, although even these are occasionally rough-barked. The bark of larger Flooded Box trees is often deeply fissured.

Flooded Box has a deep sepia-brown extremely hard timber with an interlocked grain traversed by numerous whitish threads. In hardness it is unsurpassed among Australian eucalypt timbers, being about as hard as the famed lignum-vitae of tropical America, but lacking the oily character of the latter.

Flooded Box attains a diameter of up to 1 m. The timber is used for buildings, especially for posts in the soil, and for stock yards. No visitor to the Kimberley region can fail to be impressed by the amount of labour expended on the construction of these massive post-and-rail stock yard fences which are 2 to 3 m high and of extraordinary strength and solidity.

Flooded Box is found exclusively near rivers and water courses on alluvial soils subject to periodic inundation and appears to favour a clay sub-soil. Extensive areas of Flooded Box occur throughout the length of the Fitzroy River to the south of the Geikie Gorge and along the plains of its principle tributaries, the Margaret, Mary and Louisa Rivers, and Christmas Creek. It is also common along the Lennard River and lower Ord River, but much less common on the streams of the Hann plateau to the north of the King Leopold Range.

Flooded Box is a tree attaining a height of over 25 m, but more frequently 12-20 m tall, with widely spreading branches, more richly branched than most tropical *Eucalyptus* trees, the crown as broad as the tree is tall, the trunk relatively short, up to 1.2 m in diameter, and together with the main branches covered with a grey, hard, fibrous-flaky, usually deeply-fissured bark, brown in fracture, the bark of the upper branches and branchlets usually smooth. The branchlets are slightly angular.

The leaves of Flooded Box are alternate, stalked, lanceolate to oblong, acute or more frequently obtuse, straight or sickle-shaped, 6 to 15 cm long, the same colour on both surfaces, dull, leathery, the midrib prominent, the lateral nerves widely diverging from the midrib and loosely anastomosing, forming an open network the intramarginal nerve distant from the leaf-margin.

The umbels are three to seven flowered, arranged in small terminal or axillary panicles, the peduncles and pedicels short, the pedicels usually shorter than the calyx-tube. The calyx-tube is almost hemispherical, 3 to 4 mm long or more, smooth. The operculum is hemispherical, obtuse or umbonate, smooth, varying from slightly shorter, to slightly longer than the calyx-tube. The stamens are in a continuous ring, all perfect, the filaments

inflected in the bud, yellowish-white; anthers basifixed, ovoid to almost globular, opening longitudinally in short broad slits which almost converge upwards, but remain quite distinct.

The fruit varies from hemispherical to cup-shaped, rather thin, falling after the seeds have matured, or perhaps before, 3.5 mm long and about as broad, often slightly contracted at the top, the rim thin, the disc lining the calyx-tube. The capsule is more than half free, three to four locular, the broadly ovate valves flush with the rim or slightly protruding. The fertile seeds are elliptical; cotyledons broadly cordate-reniform. The flowering season is January to February.

Flooded Box has been introduced to overseas countries like Iraq and Kenya. Seeds of this species are difficult to harvest as they are not held for any period in the fruit.

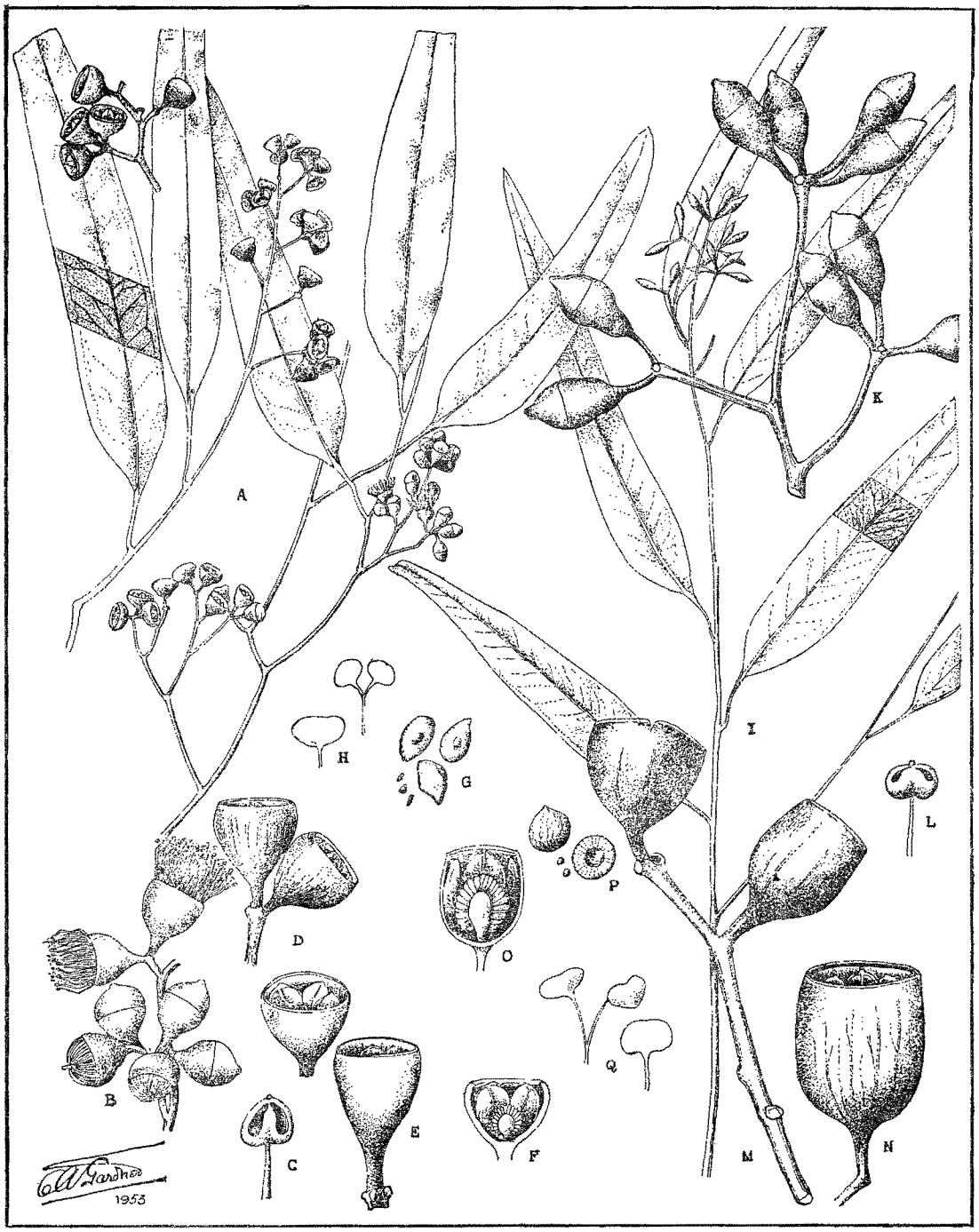

Fig. 13

Eucalyptus microtheca A—Twigs with buds, flowers and fruits; B—Flower buds (much enlarged); C—Anther; D and E—Fruits (much enlarged); F—Fruit in section; G—Seeds (much enlarged); H—Cotyledons.

Eucalyptus tectifica I—Branchlet with young buds; K—Panicle with buds (much enlarged); L—Anther (much enlarged); M and N—Fruits (enlarged); O—Fruit in section; P—Seeds (much enlarged); Q—Cotyledons.

17. **Eucalyptus tectifica** F. Muell.

Darwin Box

In Darwin Box the rough bark extends to the ultimate branches, unlike that of the Flooded Box where the smaller branches are usually smooth.

Darwin Box is common in the basalt areas to the north of the King Leopold Range, but unlike Flooded Box it is not found along the streams but is more typical of the stony hills and undulating country. Its occurrence is so closely connected there with basalt and andesite, that this particular soil type can at once be mapped by reference to it.

To the south and to the east of the Hann Plateau Darwin Box is found in very different soils and does not appear to be common in these areas. Apart from isolated specimens the tree is found only on the sandstone soils at Carlton Hill Station, the high sandy ground along the Fitzroy River between Fitzroy Crossing and Ellendale Station, and the red sandy country close to Yeeda Station and on the plains of the Lennard and Barker Rivers between the King Leopold Range and the Lennard River.

Its value as a timber approaches that of Flooded Box. Darwin Box timber is deep red and lacks the white threads so characteristic of Flooded Box. Darwin Box is stated to be a valuable nectar-producing species.

No information is available concerning the oils of the two species but from field observations it is doubtful whether they have any value in this respect. The young leaves of Darwin Box have a pleasant odour, suggesting the presence of limonene, but this requires confirmation.

Both species have fruits which fall during the same season as flowering, but they do not persist like those of the southern *Eucalyptus* species. Those of the Darwin Box are fragile and of a thin almost eggshell-like consistency, being easily crushed between the fingers. In this, the species resembles Apple Gum, Ghost Gum and some other tropical species.

The fruit of the Flooded Box is much smaller and less fragile but equally deciduous.

Darwin Box is a tree attaining a height of 12 m, usually 6 to 10 m tall, with a proportionately longer and more slender trunk than that of Flooded Box, and rarely exceeding 45 cm in diameter, the branches remaining erect and relatively few, the crown open. The bark is persistent throughout, pale grey, fibrous-flaky and narrowly fissured, hard, deep brown in fracture; timber deep red, hard and dense. The branchlets are subterete.

The leaves are alternate, stalked, lanceolate to oblong-lanceolate, the same colour on both surfaces, dull green or glaucous, leathery, usually pendulous, 8 to 17 cm long, acute or acuminate, the midrib alone prominent, the lateral nerves less widely divergent than in the Flooded Box, and usually more numerous, not close, loosely anastomosing, the intramarginal nerve usually rather close to the margin, except in broad leaves.

The umbels are three to five flowered, in terminal panicles, or rarely the panicle axillary, shorter than the leaves, the peduncles rather slender, the pedicels short. The calyx-tube is pyriform-campanulate, smooth, more or less tapering into the

short pedicel, 4 to 5 mm long. The operculum is hemispherical, apiculate or umbonate, not broader than the calyx-tube and shorter than it, rarely the operculum almost conical. The stamens are all perfect, in a continuous series, the filaments white, inflected in the bud. The anthers are basifixed, globular-reniform, opening in almost transverse slits which almost converge at the top, with the gland terminal.

The fruit is pedicellate, cupular to cupular-cylindrical, usually slightly contracted at the orifice, 4 to 8 mm long, thin and fragile, and falling after the seeds mature, the rim very thin, the capsule more than half free, three to four locular, the valves broad and obtuse and almost flush with the rim, or more deeply included. The seeds are spherical. The cotyledons are cordate-reniform.

Darwin Box occurs across the north of Australia from Broome in Western Australia to Normanton in Queensland. Like Flooded Box the seeds are shed early.

Darwin Box is related to *E. argillacea*, Northern Grey Box. The latter species has buds that are always glaucous and the leaves and fruit to a varying degree, while the fruit are larger and the valves about rim level or distinctly exserted.

18. **Eucalyptus longicornis** (F. Muell.) F. Muell. ex Maiden

Red Morrel

(Syn. **E. oleosa** F. Muell. ex. Miq. var. **longicornis** F. Muell., **E. grasbyi** Maiden et Blakely)

Red Morrel, known in the southern districts as Poot, is 20 to 25 m tall, with a rough-barked trunk and reddish-grey smooth branches. The timber is reddish-brown, hard and durable. The leaves are spreading, deep green and shining, rather broad, and covered with numerous oil-cavities. The buds, flowers and fruits are on long pedicels, the operculum varies from conical to almost horn-shaped, but exhibits some variation. It lacks the white powdery appearance of *E. transcontinentalis,* Redwood, and the operculum is not abruptly contracted above the base into a beak. The fruit is usually distinctive, being broadest in the upper half, or sometimes almost globular, especially in the forms from the Salmon Gums district, where a mallee form is to be observed.

E. grasbyi, which was described from a fragment received from Lake Barlee, is synonymous with *E. longicornis.*

Red Morrel flowers from November to March and produces a good honey flow.

The name *longicornis,* meaning long horn, refers to the horn-like buds. Red Morrel has been successfully cultivated in eastern and western Australia. It is grown overseas, e.g. in Cyprus and Kenya.

Red Morrel occurs over most of the wheatbelt and the goldfields. It is found on loam or clay loam on flat country which often has a calcareous subsoil. It may be associated with *E. melanoxylon,* Black Morrel or *E. salubris,* Gimlet.

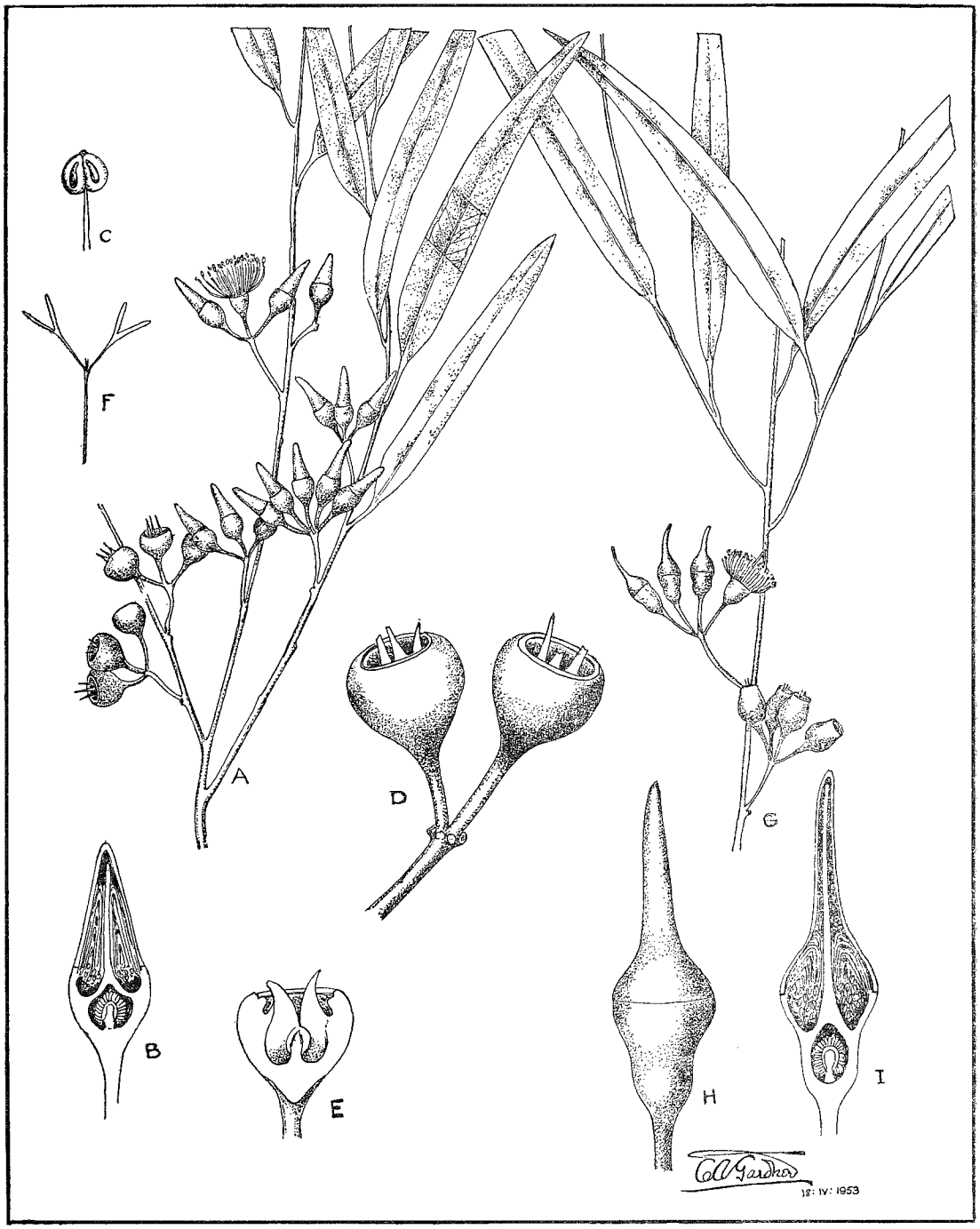

Fig. 14

Eucalyptus longicornis A—Branchlets with buds and fruits; B—Flower bud in section; C—Anther; D—Fruits; E—Fruit in section (note the greatest width in the upper half); F—Cotyledons.

Eucalyptus transcontinentalis G—Branchlet with buds and fruits; H—Flower bud; I—Flower bud in section.

19. **Eucalyptus transcontinentalis** Maiden

Redwood

(Syn. **E. oleosa** F. Muell. ex Miq. var. **glauca** Maiden)

Redwood is a tree 15 to 20 m tall, with a smooth slender trunk of 10 to 12 m and a white bark, or sometimes the bark rough and grey on the trunk, the branches typically smooth, or sometimes the bark in Goldfields trees is rough at the base only. The timber is reddish-brown, very hard, tough and durable. The leaves are spreading, and blue-green or glaucous.

The inflorescence, including the flower-stalks, buds and fruits, is powdery-white. The calyx-tube at the time of flowering is somewhat campanulate; the operculum somewhat broader than the calyx-tube above the base, and abruptly contracted into a long or short somewhat slender beak. The fruits are urceolate, thin-rimmed, and on rather long, slender stalks.

The tree is common in reddish sandy loam, the typical form being found on the Eastern Goldfields, from Comet Vale southwards to Higginsville, and as a morrel-like tree as far west as Westonia. Mallee forms are found towards the south coast.

Redwood flowers from September to December and produces a honey flow and abundant pollen.

The name *transcontinentalis*, meaning across the continent, is a misnomer because this species is confined to Western Australia.

Redwood is often associated with *E. salmonophloia*, Salmon Gum, and sometimes with *E. salubris*, Gimlet and *E. celastroides*, Mirret.

Redwood is suitable both as a shade tree and an ornamental tree. It is successfully grown overseas, e.g. in California, Cyprus and South Africa.

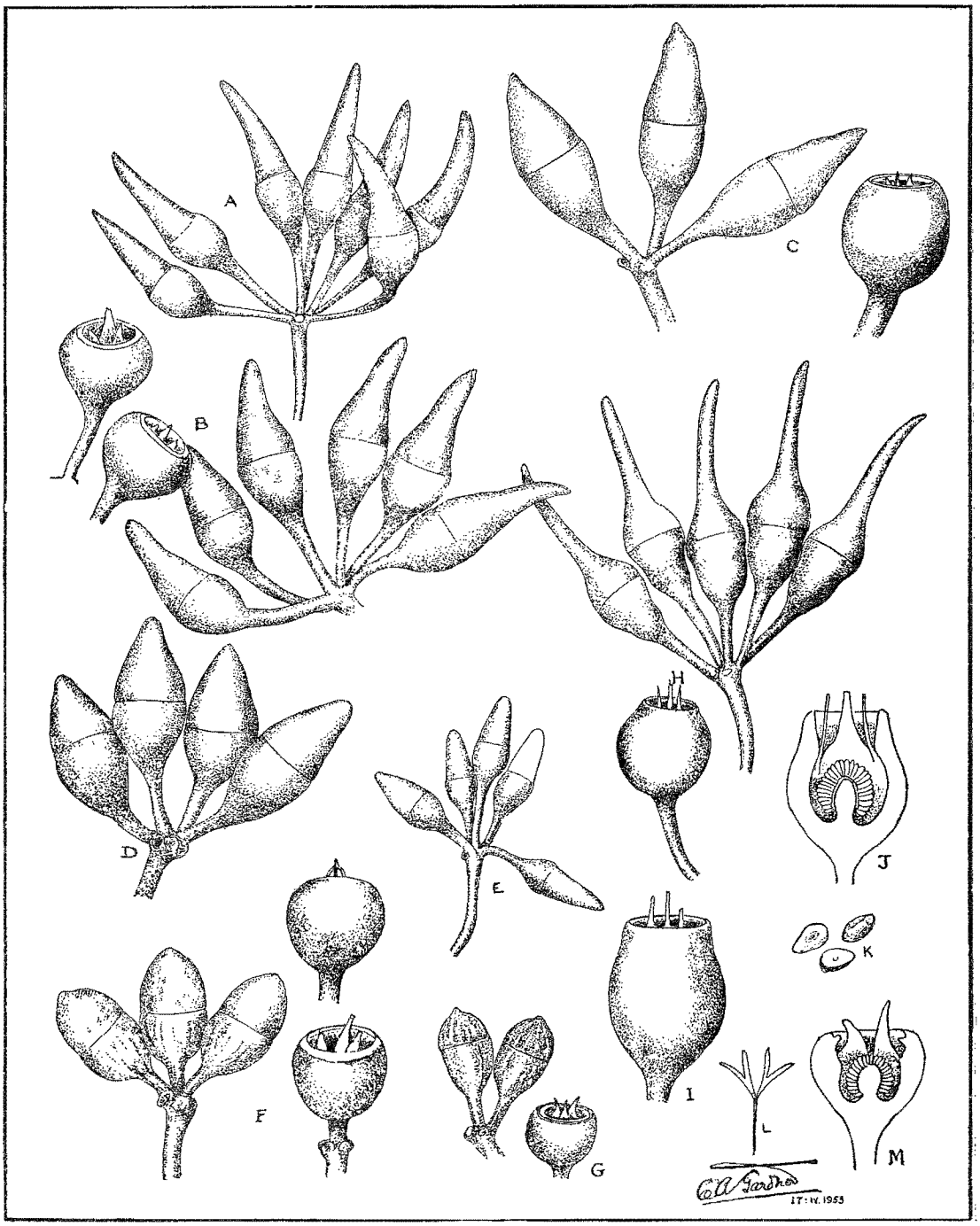

Fig. 15

Eucalyptus longicornis A—Flower buds from Wagin (Gardn. 1234); B—Flower buds and fruits from Westonia (Gardn. 1100); C—Flower buds and fruit from Salmon Gums (Gardner and Brockway); D—Flower buds from Tammin (Gardn. 1139); E—Flower buds from Lake Barlee (Fitzgerald Fraser); M—Section of fruit.

Eucalyptus oleosa var. *oleosa* F—Flower buds and fruits from Coolgardie (Gardn. 1839); G—Flower buds and fruit from the Bremer Range (Gardner).

Eucalyptus transcontinentalis H—Flower buds and fruit; I—Typical fruit (Widgiemooltha); J—Section of fruit; K—Seeds; L—Cotyledons.

20. **Eucalyptus oleosa** F. Muell. ex Miq.

Editor's Note: Gardner included *E. transcontinentalis* (No. 18), *E. longicornis* (No. 19), *E. plenissima* (No. 21), and *E. kochii* (No. 22) in the *E. oleosa* species complex. In this edition they are recognised as distinct species.

The following key when used in conjunction with the illustrations, will help the student recognise the varieties of *E. oleosa* and related species.

A. Pedicels as long as or longer than the fruits.

B. Operculum abruptly contracted into a slender beak; buds and fruits more or less powdery-white; leaves blue-green, not shining .... *E. transcontinentalis* Maiden

B. Operculum shortly conical to elongated-conical, not contracted above the base; buds and fruits not powdery-white; leaves lustrous deep green, shining .... *E. longicornis* (F. Muell.) F. Muell. ex Maiden

A. Pedicels not longer than the fruits.

C. Fruit hemispherical or subglobular; leaves deep green and lustrous; trees or large mallees of the eastern Goldfields and areas to the south .... *E. oleosa* F. Muell. ex Miq. var. *oleosa*

C. Fruit urceolate, broadest in the lower half; trees or mallees of the Northern districts.

D. Operculum conical, as long as, or nearly as long as the calyx-tube; calyx-tube at the time of flowering abruptly narrowed into its pedicel

E. Operculum contracted about the middle; leaves rather broad, lustrous. Tree with flaky bark .... *E. oleosa* F. Muell. ex Miq. var. *borealis* C. A. Gardn.

E. Operculum not contracted at the middle; leaves narrow, somewhat dull; mallees with pale grey spirally-fissured bark .... *E. kochii* Maiden and Blakely

D. Operculum hemispherical or depressed hemispherical, much shorter than the calyx-tube; calyx-tube at the time of flowering tapering gradually into the pedicel. Very young buds surrounded by early-falling bracts .... *E. plenissima* (C. A. Gardn.) Brooker

Eucalyptus eleosa var. *oleosa,* Giant Mallee.
(Syn. *E. oleosa* F. Muell. *ex* Miq. var. *obtusa* C. A. Gardn.)

Giant Mallee is a tree or a mallee, usually of fair stature, and differs from Morrel in its obtuse operculum, short pedicels, and hemispherical or subglobular fruit. It is found extending from Coolgardie southwards to Salmon Gums and the Bremer Range, and eastwards across the Nullarbor area. On the Goldfields it is known as a Morrel, and can only be distinguished from *E. longicornis* by its distinctive buds and fruits with their short stalks.

Giant Mallee flowers from February to May and produces a good honey flow.

Eucalyptus oleosa var. *borealis* C. A. Gardn., Ninghan Mallee.

Ninghan Mallee when a tree has the appearance of a Red Morrel, but the bark is darker and more flaky. It occurs from the Murchison River southwards to Broome Hill and eastwards to the goldfields region. It has the foliage of Morrel, with its leaves very rich in oil. The operculum is somewhat contracted at the summit, while the fruits are distinctly urceolate, i.e., globular at the base, but contracted upwards. A mallee form occurs, but is large, with spreading branches.

Eucalyptus oleosa can usually be distinguished from related species by its typically globular or urceolate smooth fruits with a narrow rim and deeply included valves, the needle-like points of which protrude, but are somewhat brittle and easily broken off in the older fruits. The filaments are incurved or inflected in the bud, and the anthers are short and broad, attached to their filaments by the back, and open longitudinally in short parallel slits. The species, especially inland forms, has been confused with *E. foecunda* on the one hand, and *E. uncinata* on the other. In both *E. foecunda* and *E. uncinata* the anthers are attached to their filaments at the base, and open in terminal pores. In *E. foecunda* the fruit is hemispherical to globular-hemispherical, with a rather broad rim and much more slender, scarcely protruded valves. In *E. uncinata,* which may be also confused with *E. foecunda,* the fruits are sessile, barrel-shaped, lined with a deep whitish disc and with the valves well-included.

Eucalyptus oleosa was so named from the copious oil cavities of its leaves, first observed in the forms from the Murray River in Eastern Australia. It was largely used for the production of eucalyptus oil.

Here and elsewhere references have been made to mallee forms of certain species. The term mallee is given to those species and forms of *Eucalyptus* in which there is no definite leading stem or trunk. The plants branch from about ground level with the stems frequently arising from a woody often bulb-like stock.

While it is true that certain species such as Karri, Salmon Gum and Gimlet never possess a mallee form, others, such as Jarrah and several inland species, especially *E. goniantha* and *E. oleosa,* occur as trees or as mallees. In many cases the mallee form in such species is entirely the result of circumstances. A tree, especially one which has a dilated base to the trunk may, after injury from fires, termites or from cutting down, produce a number of coppice shoots from its stock or base. These, or at least the stronger shoots, develop as independent mallee stems. The term mallee is therefore often of loose application.

Certain species of *Eucalyptus* are found only in mallee form. These are characteristic of the dry regions, or regions of dense scrub or thicket, and there is a distinct probability that fires have been a factor in the development of this type of growth.

21. **Eucalyptus plenissima** (C. A. Gardn.) Brooker

Oil Mallee

Typically a very densely and erectly branched mallee, Oil Mallee is sometimes a small tree, with dull green erect, rather thick foliage very rich in oil, hence the name *plenissima.*

It can be distinguished by its calyx-tube in the flowering stage tapering into the pedicel, and by its short and very obtuse operculum, together with the presence, when in very young bud, of a number of scale-like bracts which surround the young buds, protecting them before later development. The fruits are similar to those of *E. kochii* and shortly stalked.

This species occurs typically in the Kalannie-Kulja districts, extending eastwards to Beacon, Campion Carrabin, Warralackin, and southwards to Dowerin, Nembudding, Yorkrakine and Hines Hill.

There is a second form very closely allied to the typical form of *E. plenissima*, but the foliage and the young flower buds are shining. It has the early falling bracts observed on the typical form. The young flower buds of the second form are constricted below the blunt operculum in a curious manner, and the fruits are almost without stalks. This form is usually a small tree or a large mallee with spreading leaves and this character lends it a distinctive aspect in the field. It is known to occur in areas further inland than the typical *E. plenissima,* as far eastwards as Wiluna.

Oil Mallee has been grown in South Australia and overseas, in California. It will coppice readily when cut. The leaves of Oil Mallee contain about 4.2 per cent of oil, which is predominantly cineole.

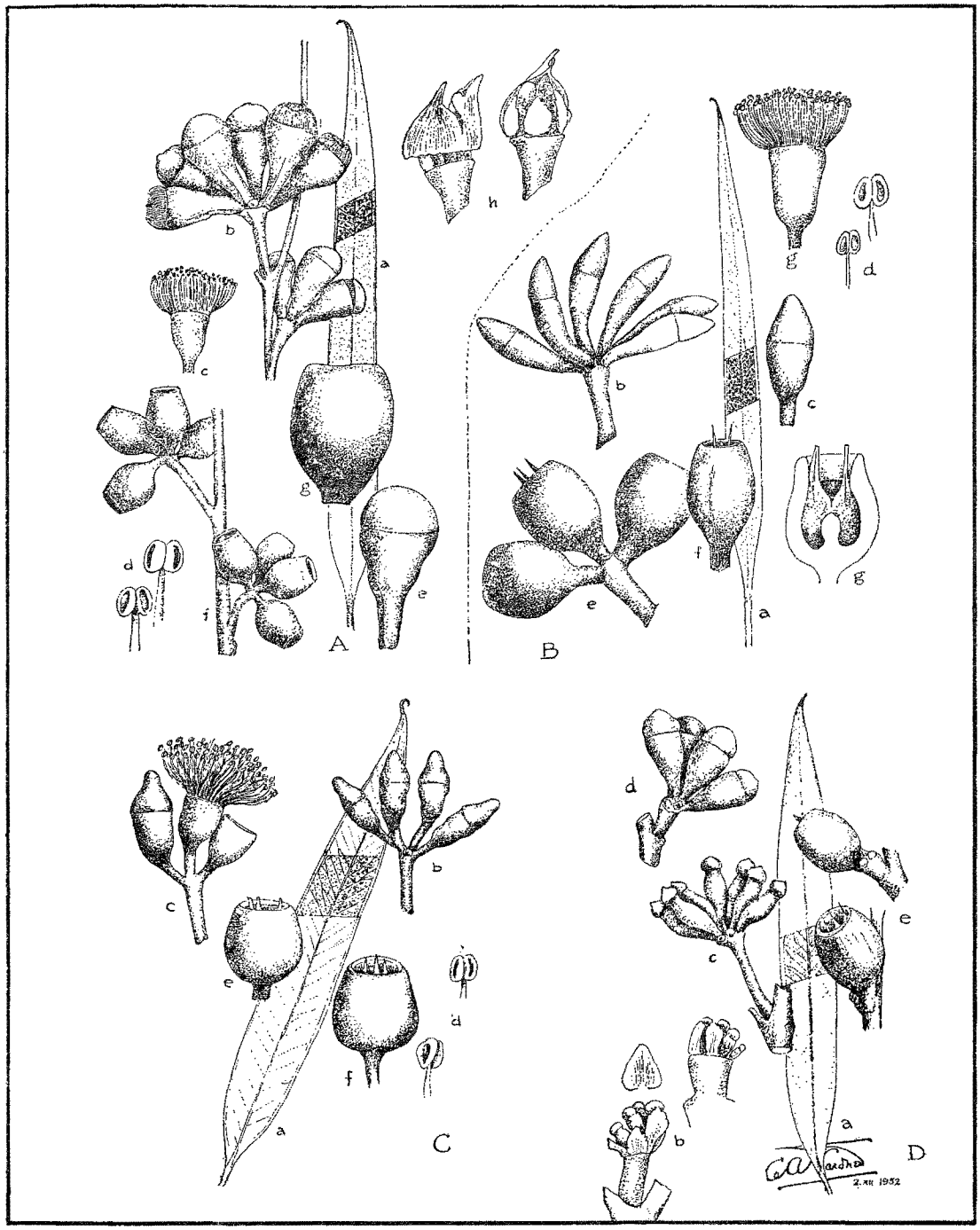

Fig. 16

Eucalyptus plenissima A—(a) Leaf; (b) Flower buds; (c) Flower; (d) Anthers; (e) Flower bud; (f) Fruits; (g) Fruit; (h) Cluster of buds surrounded by bracts. D—Shining form (a) Leaf; (b) Young flower buds surrounded by bracts; (c) Immature flower buds; (d) Mature flower buds; (e) Fruits.

Eucalyptus kochii B—(a) Leaf; (b) Flower buds (immature); (c) Flower bud; (d) Anthers; (e) Fruits; (f) Fruit; (g) Flower.

Eucalyptus oleosa C—(a) Leaf; (b) Flower buds; (c) Flower; (d) Anthers; (e and f) Fruits.

22. **Eucalyptus kochii** Maiden et Blakely (Syn. **E. oleosa** F. Muell. ex Miq. var. **kochii** (Maiden et Blakely) C. A. Gardn.)

Eucalyptus kochii is more or less restricted to a narrow belt of country between Pindar and Kondut, usually in sandy soil. The plant is a mallee or a small tree with rough, pale-grey, more or less fibrous and spirally-twisted bark on the lower parts, and smooth, reddish-grey bark above. The leaves are narrow, rich in oil, spreading or almost erect, and dull, pale-green. The conical, usually pale operculum and narrowly urceolate, shortly-stalked fruits are distinctive.

The name commemorates Max Koch, a collector who found this plant on the Rabbit Proof Fence eastwards of Dalwallinu, where it was formerly common.

E. kochii has been grown as a shade tree. It is suitable as a windbreak species, if grown as a shrub. It produces in plentiful supply a good quality nectar.

There are up to eleven pedicellate flower buds to each umbel. The urn-shaped or oval fruits are about 6 mm long and about the same width.

23. **Eucalyptus jacksonii** Maiden

Red Tingle

Although not perhaps as tall as the largest Karri trees, the Red Tingle is certainly the largest in girth of any of the *Eucalyptus* trees of Western Australia. Attaining a height of upwards of 60 m, the trees swell out towards the base, and a girth 20 m has been measured at the ground level by the writer. The tree closely resembles Jarrah or Blackbutt in appearance, but is much larger than either, and its grey, fibrous, persistent, furrowed bark is often blackened in the lower parts by fire. There is, however, a certain red character in this bark, which is more friable than that of Jarrah.

In its buds, anthers and fruits the tree stands in close relationship to both Jarrah and Blackbutt, but its leaves are different. They are dark green on the upper-surface, and much paler below, a character which indicates a leaf of horizontal orientation like that of Karri. The timber is like that of the Jarrah, red although perhaps somewhat paler, and much lighter in weight. It will probably be preferred to Jarrah for cabinet work on this account, but the presence of gum cavities is said to affect the value of this otherwise most desirable hardwood. Red Tingle yields nectar and pollen.

Red Tingle or, as it is sometimes known, Red Tingle-tingle, does not have an extensive range. It is found in high forest along the lower reaches of the Deep, Frankland and Bow Rivers, growing mostly on the hills. Examples growing between the Bow and Frankland Rivers are familiar to tourists.

The tree commemorates the name of Sydney W. Jackson who collected specimens about 1912. Forester Brockman, who inspected the area shortly afterwards, drew attention to its similarity to Western Australian Blackbutt, and subsequent work has confirmed this statement.

Compared with Jarrah, Red Tingle has much smaller fruits, smaller buds with obtuse caps, stalked cotyledons, broader leaves of thinner texture and of different colours on the two surfaces and much more spreading lateral nerves. There is a tendency for the flowers and fruits to be arranged in panicles, but these, it should be noted, are not terminal in origin, but owe their character to leaf suppression, since the branchlet often terminates above the flowers.

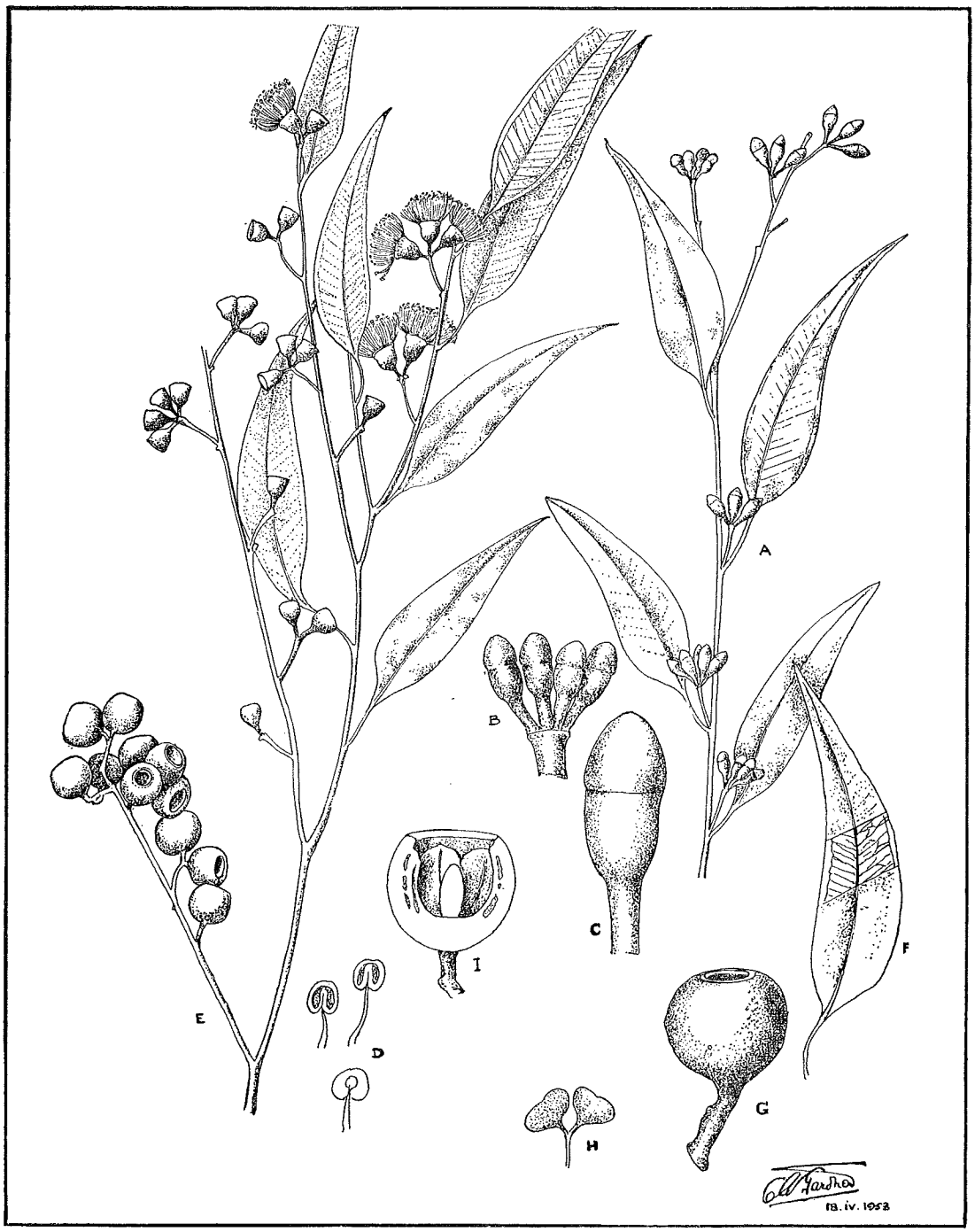

Fig. 17

Eucalyptus jacksonii A—Branchlets with leaves and flower buds (immature); B—Umbel of immature buds (mature buds are unknown); C—Flower bud; D—Anthers; E—Branchlet with flowers and fruits; F—Leaf showing nervation; G—Fruit; H—Cotyledons; I—Fruit in section.

24. **Eucalyptus intertexta** R. T. Baker

Gum-barked Coolibah

Gum-barked Coolibah, now claiming some attention in South Australia and New South Wales as a desirable subject for cultivation in the drier areas, is native to a large tract in eastern and central Australia. It is included in this series as a Western Australian tree because it was found at Mount Cooper in the Cavanagh Range by Helms of the Elder Exploring Expedition in July 1891 at an elevation of 760 m. The Cavanagh Range lies to the east of the Warburton Range, close to the South Australian boundary.

The writer saw this tree in several spots in the Macdonnell Ranges and close to Alice Springs, and was attracted by its handsome appearance, its stature, and its hardiness. It was found growing at various places between Alice Springs and the Hermannsburg Mission to the west, on alluvial flats and close to watercourses, thriving in a rainfall area of about 280 mm in a district where the rainfall variability is fairly high. Under such conditions, its suitability for planting in our drier agricultural and pastoral areas was at once apparent.

Trees 15 to 20 m tall were not uncommon and, apart from its attractive appearance, its dense canopy, affording a wide shade, makes the tree particularly suitable for planting for shade purposes.

The tree possesses several common names, such as Red Box, Yellow or Spotted Gum, Coolibah, Bastard Red Gum and White Gum. The town Coolabah in New South Wales is said to be named after the local name for this species. It owes its botanical name *intertexta* to the very closely interlocked grain of its timber which is said to be so tough that there is difficulty in splitting it; on this account it is not used for timber, except mining timber, but makes an excellent charcoal.

Although popular as a tree in cultivation in the interior of New South Wales and in South Australia, this species is practically unknown in Western Australia, and is included in this series partly because it is indigenous here, and partly because it shows promise of becoming one of the most popular of all eucalypt trees for planting in the interior.

No definite information can be obtained regarding the value of this tree for the bee-keeper, but it has been observed locally that young trees in blossom are visited by numerous insects, including bees. In some areas in New South Wales, where no other source of pollen and nectar is known other than a Cypress Pine, bees thrive in Gum-barked Coolibah country.

Baker and Smith, who examined the oil of this tree from Nyngan in New South Wales, found the average yield to be 0.2 per cent. The crude oil was of an orange-brown colour with an odour resembling that of the better class eucalyptus oils. Phellandrene was quite absent; a fair amount of cineole, 35 per cent, was found, also pinene, and the third-class fraction consisted mainly of sesquiterpene. From the point of view of oil production, it is poor.

Gum-barked Coolibah is a tree up to 25 m tall, the trunk up to 1 m or more in diameter; bark typically hard, rough and persistent on the lower part of the trunk, or extending throughout

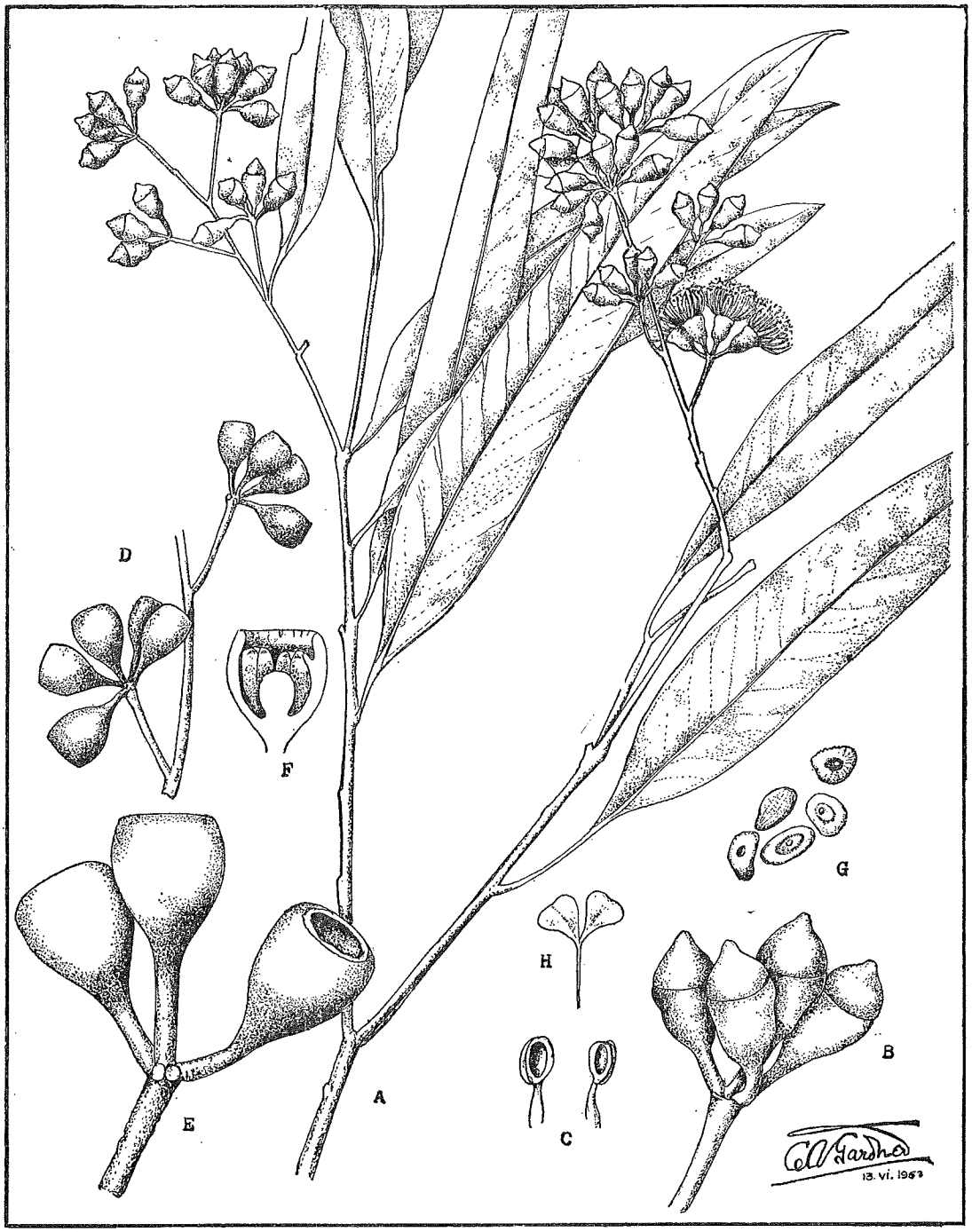

Fig. 18

Eucalyptus intertexta A—Branchlet with leaves and panicles of buds and flowers; B—Umbel of flower buds; C—Anthers; D—Portion of panicle with fruits; E—Fruits; F—Section of fruit; G—Seeds; H—Cotyledons (Alice Springs, Gardner 11742).

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its greater length, otherwise smooth and chalky white or yellow, and spotted or blotched with patches of purple-grey bark. The timber is red.

The leaves are alternate, petiolate, lanceolate, acuminate, mostly less than 15 cm long, pale yellowish-green or glaucous on both surfaces, not lustrous, the lateral nerves spreading, obscure, the intramarginal nerve close to the margin or contiguous with it.

The umbels are four to seven flowered, arranged in terminal panicles, the branches and pedicels of which are slender. Buds pyriform, 8 to 12 mm long. The calyx-tube is pyriform; operculum hemispherical or conical, obtuse or apiculate-umbonate, shorter than the calyx-tube and not greater than it in diameter. The stamens are all perfect; filaments white, inflected in the bud; anthers versatile, obovoid, opening in parallel broad longitudinal slits, the gland almost terminal. The ovary flat-topped.

The fruit is obovoid-pyriform, tapering into the slender pedicel, contracted at the summit, 4 to 8 mm long, the rim rather narrow, the disc vertical, the valves of the capsule included.

The fertile seeds are ovate to ellipsoidal in outline, up to 2 mm long, finely longitudinally striate, somewhat angular, wingless, pale to dark brown, the hilum ventral, almost central and rather large. The cotyledons are cuneate, retuse, shortly stalked, glabrous, pale green.

The flowering season is April-May.

25. **Eucalyptus forrestiana** Diels

Fuchsia Gum

Fuchsia Gum, an attractive shrub or small tree, is one of the most widely-cultivated of all the smaller Western Australian species. Known by many as the Fuchsia Mallee, Mallee Fuchsia or Forrest's Mallee, it has found a place in many public and private gardens, and is at once attractive and conspicuous by reason of its pendulous, brilliantly scarlet flower buds and young fruits, the latter fading to a pale chestnut brown at maturity.

It was named by the renowned German botanist Ludwig Diels in honour of John Forrest, who in 1900, when Premier and Treasurer of Western Australia, afforded Diels and his companion, Pritzel many facilities for travel in their extensive botanical explorations in South Western Australia.

Those who know this plant in cultivation, when it grows as a small spindly tree, would scarcely recognise it in the field. In the alluvial clay, and often sub-saline soils between Salmon Gums and Grass Patch, this attractive plant grows to about 6 m tall. Its dense branches and the dark green foliage, among which the scarlet buds emerge, making it at once a most attractive plant.

Nowhere in cultivation does one see such specimens, and the reason for this may be the sandy nature of the soil in which it is frequently cultivated or the lack of some necessary soil constituent.

E. forrestiana can be easily distinguished from its relatives *E. tetraptera, E. stoatei* and *E. steedmanii* by its flowers which are solitary, four-winged, on long drooping peduncles or foot-stalks, the valves of the fruit deeply included within the fruiting calyx. The filaments when in open flower, are a rich yellow like those of *E. stoatei.*

Fuchsia Gum is found along the Norseman-Esperance road extending from Salmon Gums to Scaddan. It is also seen for about 100 km to the east and west of the road. It is restricted to loamy or clay soils. The relatively thick leaves are copiously oil-dotted, but the yield and nature of the oil are not known. To the beekeeper the plant would be of very little value, since it is not particularly floriferous and its stamens are relatively few in number compared with some species. On the other hand it is worthy of a place in any garden, and should do well in the lighter loamy soils of the eastern agricultural areas.

Fuchsia Gum is a small tree or shrub attaining a height of 3 to 6 m, densely branched, the branches usually short and spreading, the bark smooth, pale grey, shedding in thick flakes, the new bark brown.

The leaves are stalked, alternate, erect, the blade 7 to 10 cm long, broadly lanceolate or oblong-lanceolate, abruptly acute, leathery, the same colour on both surfaces, deep green, the midrib prominent the leaves copiously oil-dotted the lateral nerves spreading from the margin.

The peduncles are axillary, solitary, one-flowered, at first erect or spreading, later recurving, elongated, much compressed but rather slender, thickened upwards and almost obpyramidal at the apex, 3 to 5 cm long. The flowers are sessile, but the

calyx-tube so much attenuated towards the base as to appear stalked; buds scarlet. The calyx-tube is obovoid-pyramidal, contracted at the summit and gradually tapering towards the base, conspicuously four-winged, 3.5 to 4 cm long. The pyramidal operculum is somewhat narrower than the calyx-tube and of the same colour. The stamens are all perfect the filaments yellow, incurved in the bud, the anthers are orbicular, versatile, opening in relatively short parallel slits, the gland small.

The fruit is brown when ripe, lustrous, quadrangular-pear-shaped, 4 cm long, with an elongated tapering base, extending from the base to apex, the rim rather broad, the disc vertical, the capsule and valves deeply included. The fertile seeds are dull black, roundish, the margin winged, and with two or three vertical wings dividing off cavities in the seed. The cotyledons are kidney-shaped.

The subspecies *dolichorhyncha,* shown in the illustration, has the operculum contracted into a conical beak 1 to 3 cm long. This subspecies differs from the subspecies *forrestiana* in having smaller buds, and fruit with shorter pedicels.

Fuchsia Gum is widely cultivated in southern Australia. It has also been grown in California.

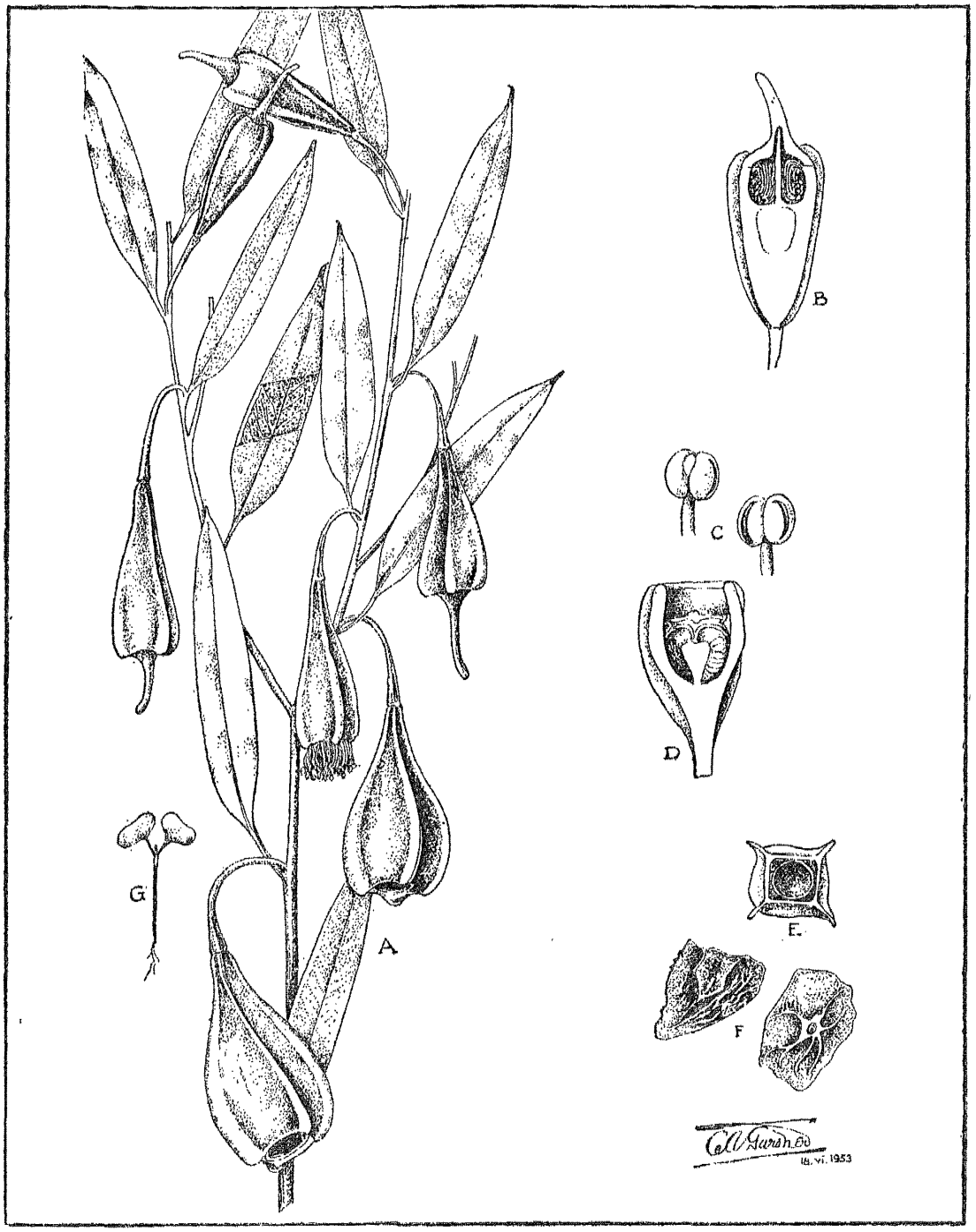

Fig. 19

Eucalyptus forrestiana subsp. *dolichorhyncha* A—Branchlet with leaves, buds and fruits; B—Flower bud in section; C—Anthers; D—Fruit in section; E—Apical view of fruit, showing the four wings; F—Seeds (much enlarged); G—Cotyledons of the seedling (Grass Patch, Gardner 2225).

26. **Eucalyptus brockwayi** C. A. Gardn.

Dundas Mahogany

Among the more popular trees for planting in the agricultural areas is the Dundas Mahogany which, while closely resembling the Salmon Gum superficially, is even more attractive because of its deeper green crown and paler bark. Like the Salmon Gum it thrives in low rainfall areas in loamy or sandy loamy soil.

The tree is indigenous to the Norseman district where it attains a height of 25 m when well grown, with a broad crown of deep lustrous foliage and a smooth-barked trunk up to 1 m in diameter. Resembling the Salmon Gum in general appearance, the species may be distinguished in the field by the usually paler bark, and particularly by the bark characteristics: in fracture it is a deep blood-red, gummy and very astringent to the taste. This gummy character is associated with a high tannin content, which is as much as 42 per cent in samples tested.

The timber is red like that of the Salmon Gum, and straight-grained, but with longer fibres, and when axe-handles were in short supply during World War II, this species provided a useful timber for the purpose, being much like that of Brown Mallet. This indicates an elasticity which may be valuable when the tree is considered as a source of timber. It is apparently no more termite-resistant than Salmon Gum.

Dundas Mahogany occurs freely in the Norseman district where it is associated with the greenstone rock formations of the area. It grows usually on flats or the lower slopes of hills, associated with Salmon Gum, Morrel, Merrit and Dundas Blackbutt.

The young plants are distinctive by reason of their very narrow and somewhat crowded foliage, and until they attain a height of about 40 cm they resemble a Tea-tree rather than a *Eucalyptus*. Later on they change abruptly from this narrow form of leaf to the normal form.

Farmers will find this species a useful shade tree for the agricultural areas, especially in the loamy soils of Salmon Gum country. It is of fairly rapid growth, provides a broad crown (provided the trees are well spaced), and the indications are that it is fairly salt-tolerant. Planting should be done in late April or early May for the best results.

The specific name commemorates George Ernest Brockway, who first collected specimens of this tree in 1940.

Dundas Mahogany is a tree 20 to 25 m tall, the trunk up to 8 m long and 0.5 to 1 m in diameter. The bark is smooth throughout, white or salmon-coloured the outermost layers peeling off in thin purple patches, the new bark white, deep red in fracture, gummy, and astringent. The timber is red. Branchlets reddish, acutely angular.

The leaves are alternate, stalked, spreading or drooping, narrow-lance-shaped, rather thick, deep green on both sides lustrous, copiously oil-dotted the lateral nerves relatively few and diverging from the midrib at a rather wide angle, the intramarginal nerve distant from the leaf-margin.

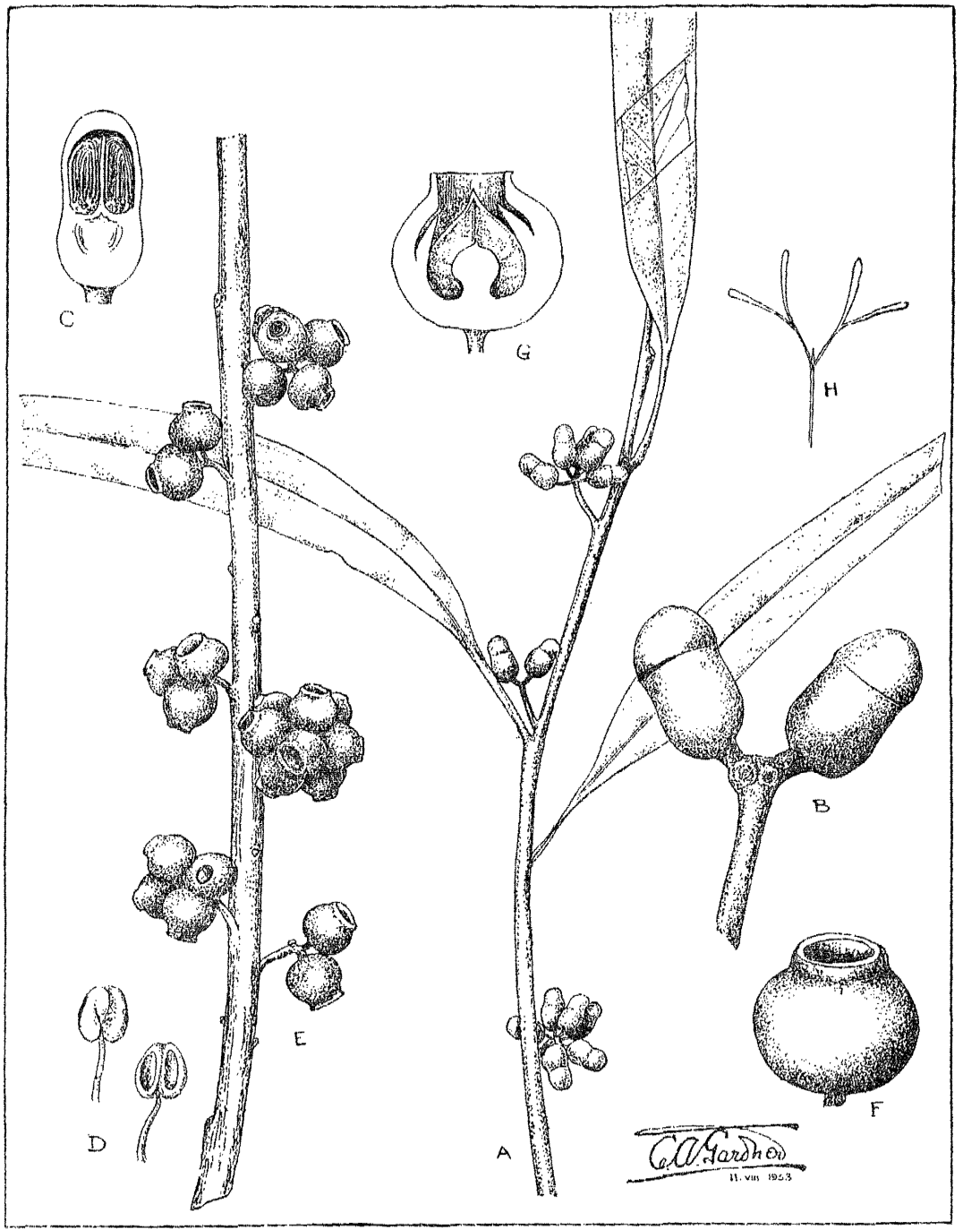

Fig. 20

Eucalyptus brockwayi A—Branchlet with leaves and flower buds; B—Flower buds; C—Flower bud in section; D—Anthers; E—Branchlet with fruits; F—Fruit; G—Fruit in section; H—Cotyledons. (B, C, F and G enlarged). (16 km N.W. from Norseman, Brockway and Gardner).

The umbels are axillary and lateral, solitary, mostly five to eight flowered, the peduncle spreading, slightly compressed, 1 cm long; pedicels short, mostly 1 mm long, slender. The buds are smooth. The calyx-tube is shortly cylindrical, broad and rounded at the base, 4 mm long; operculum hemispherical or broadly ovoid, much shorter than the calyx-tube, obtuse. The filaments are yellowish-white inflected in the bud; anthers ovoid, versatile, opening in distinct longitudinal separate slits.

The fruit is urceolate-globular, smooth, much contracted and shortly cylindrical at the summit, 6 mm diameter, the margin elevated, the disc vertical and lining the orifice of the calyx-tube, the valves included, broadly deltoid. The fertile seeds are black, ovoid, smooth. The cotyledons are Y-shaped.

Dundas Mahogany is cultivated in both eastern and western Australia. It has been introduced successfully in North Africa and Cyprus. This species is an excellent ornamental tree and is also suitable for shade and windbreaks.

27. **Eucalyptus caesia** Benth.

Gungurru

For the want of a good descriptive common name for this handsome mallee I have used the name, Gungurru, which Richard Helms stated was used by the aborigines of the Fraser Range district. Helms stated that the natives ate the roots of this species. As far as I can ascertain, the specimens recorded by Helms were from 65 km N.W. from Fraser Range. Gungurru is sometimes also called Gungunnu. The specific name is from the Latin *caesius,* blue of the eyes, and refers to the blue-grey or pale grey powdery appearance of the leaves, and more particularly the branchlets, buds and fruits. The flowers are a pale rose-pink.

This species, usually a mallee 6 to 8 m tall, but with the branches and foliage often measuring more in diameter, is well known in cultivation. It is particularly handsome in that it combines an attractive bark with white branches, blue-green leaves, masses of rose-pink blossoms and attractive fruits.

It is one of the few *Eucalyptus* species which confine themselves under natural conditions to the vicinity of granite outcrops, hence we find it recorded from a few widespread localities, such as Uberin Hill near Dowerin, Mount Caroline southwards from Kellerberrin, the rocks of Warren Double Cunyan northwards from Westonia and the vicinity of the Fraser Range. In all of these it is nowhere so common as around Mount Caroline, and perhaps there are no more beautiful examples than the small, broad-leaved mallee form that is found northwards from Westonia.

The plant was first collected by James Drummond when he made his Fifth Collection, a trip that took him from Toodyay through Tammin, Karlgarin and Mount Short to the Ravensthorpe district and Middle Mount Barren in 1849.

The bark is longitudinally crisped, the narrow flakes of cinnamon coloured bark disclosing an under-bark of pale green. An exactly similar bark is to be found in other inland species associated with granitic rocks, namely, *E. kruseana, E. crucis, E. orbifolia, E. websterana* and some forms of *E. leptopoda.*

Gungurru has no close relatives. The fruits are shaped something like those of Marri, but the flowers and foliage are entirely different. It also has a general resemblance to *E. sepulcralis,* a small tree of the Ravensthorpe district, but the resemblance here also is restricted to the shape of the fruits. It is really an anomalous species scattered over a wide area with a very restricted soil type. This, however, does not prevent its being cultivated in many types of soil. It thrives, for example, in the sands of the Perth metropolitan area, and equally well in the sandy loams of the interior. It is recommended for planting for ornamental purposes.

Gungurru is a shrub or mallee, 5 to 8 m tall, rarely a small tree. The bark of the stem and branches is rough, with longitudinal strips of cinnamon-brown bark with crisped margins revealing a pale green, smooth, inner bark. The timber is pale brown. The branchlets are smooth, covered with a white or blue-white powder.

The leaves are alternate, stalked, spreading or drooping, ovate-lanceolate to lanceolate, tapering at the apex, grey-blue on both surfaces, the midrib prominent, the lateral nerves not numer-

ous and diverging from the midrib at a moderately wide angle, the intramarginal nerve remote from the leaf-margin. Oil-dots are few and scattered.

The umbels are axillary, lateral, or rarely forming terminal panicles by leaf-abortion, the slender peduncles recurved, 2 to 3 cm long; pedicels slender, 10 to 15 mm long, thickened upwards. The buds are powdery-grey. The calyx-tube is campanulate, striate with fine longitudinal lines otherwise smooth; 10 to 15 mm long. The operculum is umbonate-hemispherical, smooth, the umbo somewhat broad and very obtuse. The filaments are incurved in the bud, rose-pink; anthers nearly orbicular, versatile, opening in broad lateral slits.

The fruit is urn-shaped, 18 to 20 mm long, powdery-grey-white, striated with fine lines, the disc broad and sloping inwards, the capsule with broad included valves. The seeds are hemispherical-ovoid. The cotyledons are Y-shaped.

Gungurru has been cultivated in most parts of Australia and also in California. There is a naturally occurring robust form of Gungurru, with leaves up to 23 cm long and 4.5 cm wide.

The cultivar known as "Silver Princess" is notable for its long pendulous branchlets which bear a profusion of blossoms.

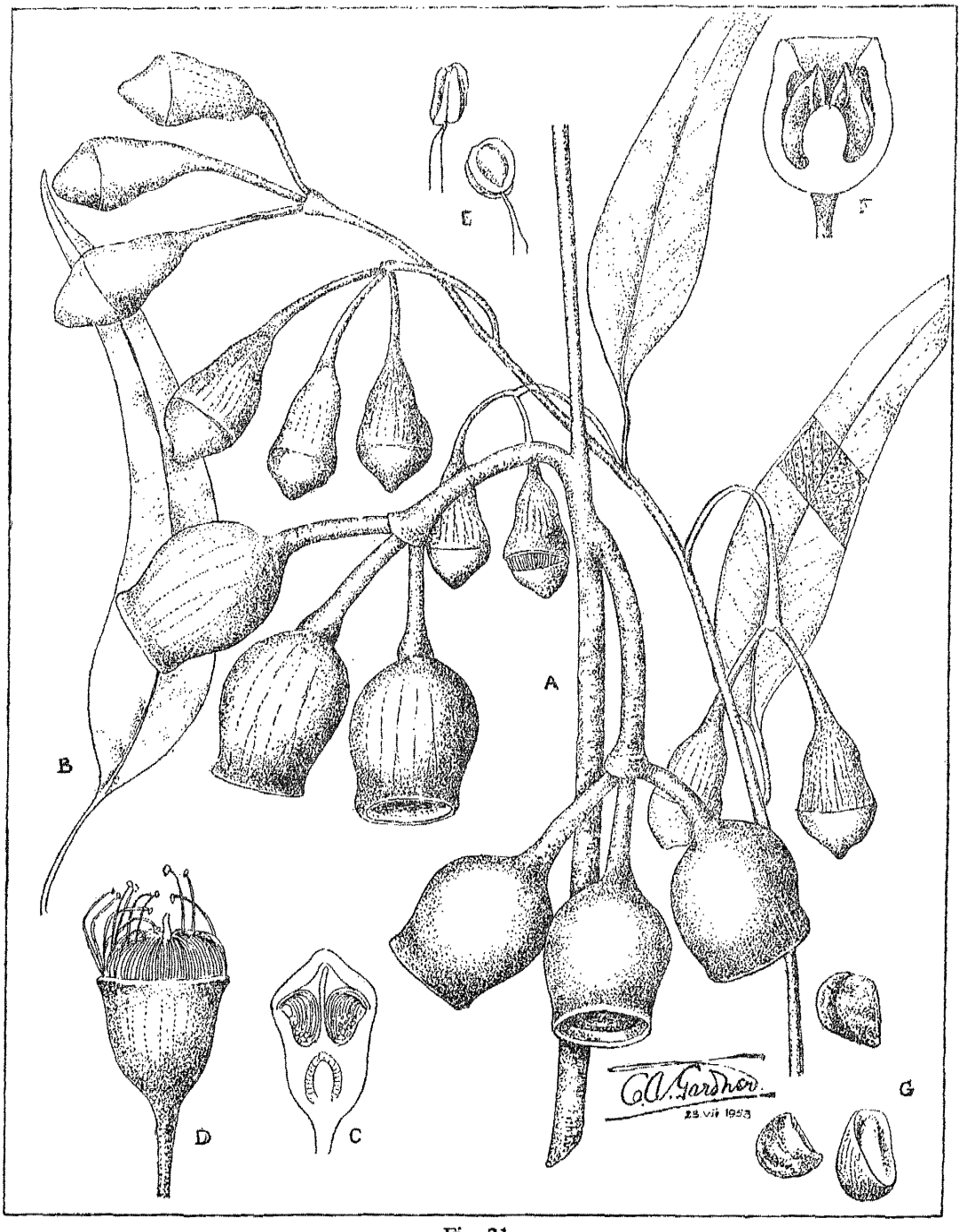

Fig. 21

Eucalyptus caesia A—Branchlets with buds and fruits; B—Leaf; C—Flower bud in section; D—Flower with the filaments commencing to expand; E—Anthers; F—Fruit in section; G—Seeds. (Perth).

28. **Eucalyptus orbifolia** F. Muell.

Round-leaved Mallee

In 1865, Charles Harper, while exploring country to the east in search of land suitable for grazing, collected at the foot of granite rocks in latitude 30° 47′ and longitude 119° 25′ a small fragment of *Eucalyptus* consisting of two or three leaves, one flower bud and one expanded blossom. There were no fruits collected. This fragment was described by the Government Botanist of Victoria, Ferdinand von Mueller, under the above name, and the specimen was sent to the Royal Botanic Gardens, Kew, where it exists today.

The original locality is close to Tin Hill on the track leading from Southern Cross to the Koolyanobbing Range, but it remained undiscovered despite searches for it until May, 1940, when G. E. Brockway found it at Hospital Rock to the west of Menzies, and at Pigeon Rock and northwards from Bullfinch. It has also been found 20 km north-easterly from Weira Siding, westwards from Bullfinch.

Round-leaved Mallee is of attractive appearance by reason of its striking bark, like that of *E. caesia,* its white branches, buds and fruits and particularly its curiously rounded notched leaves. A characteristic not observed in any other *Eucalyptus,* and noted by the botanists of the last century is the extraordinary thickened style and the very rigid and prominent valves which protrude from the hemispherical bell-shaped fruits.

As observed by Charles Harper, the species is as far as we know restricted to granite outcrops, but this should not prevent it from being cultivated in many types of soil in gardens.

Round-leaved Mallee is a mallee attaining a height of 8 m, although usually about 6 m tall the stems 5 to 6 cm thick, with a warm red flaky striated thin persistent bark which decorticates leaving a pale green bark between the persistent strips. Branchlets are reddish and covered with a powdery-white bloom.

The leaves are alternate, petiolate, broadly obovate-orbicular, shortly tapering at the base, 3 to 7 cm long, obtuse or retuse, grey-green, the lateral nerves parallel, not numerous, the intramarginal nerve irregular and remote from the margin. The peduncles are axillary or lateral erect-spreading straight slightly angled, 15 to 25 mm long, bearing an umbel of from two to five flowers; pedicels 5 to 9 mm long.

The calyx-tube is almost hemispherical, 5 mm long and 8 mm diameter; operculum hemispherical-conical to ovoid-conical, longitudinally striated, longer than the calyx-tube. The filaments are yellowish-white, inflected in the bud; anthers ovoid-orbicular, opening in distinct longitudinal slits; style thick and turgid in the lower part, contracted above the middle.

The fruits are companulate-hemispherical, woody, 1 cm long, 1.7 cm broad, flat-topped, the disc covering the top, the valves deltoid-subulate, very rigid and exserted. Fertile seeds are black, not winged. The cotyledons are Y-shaped.

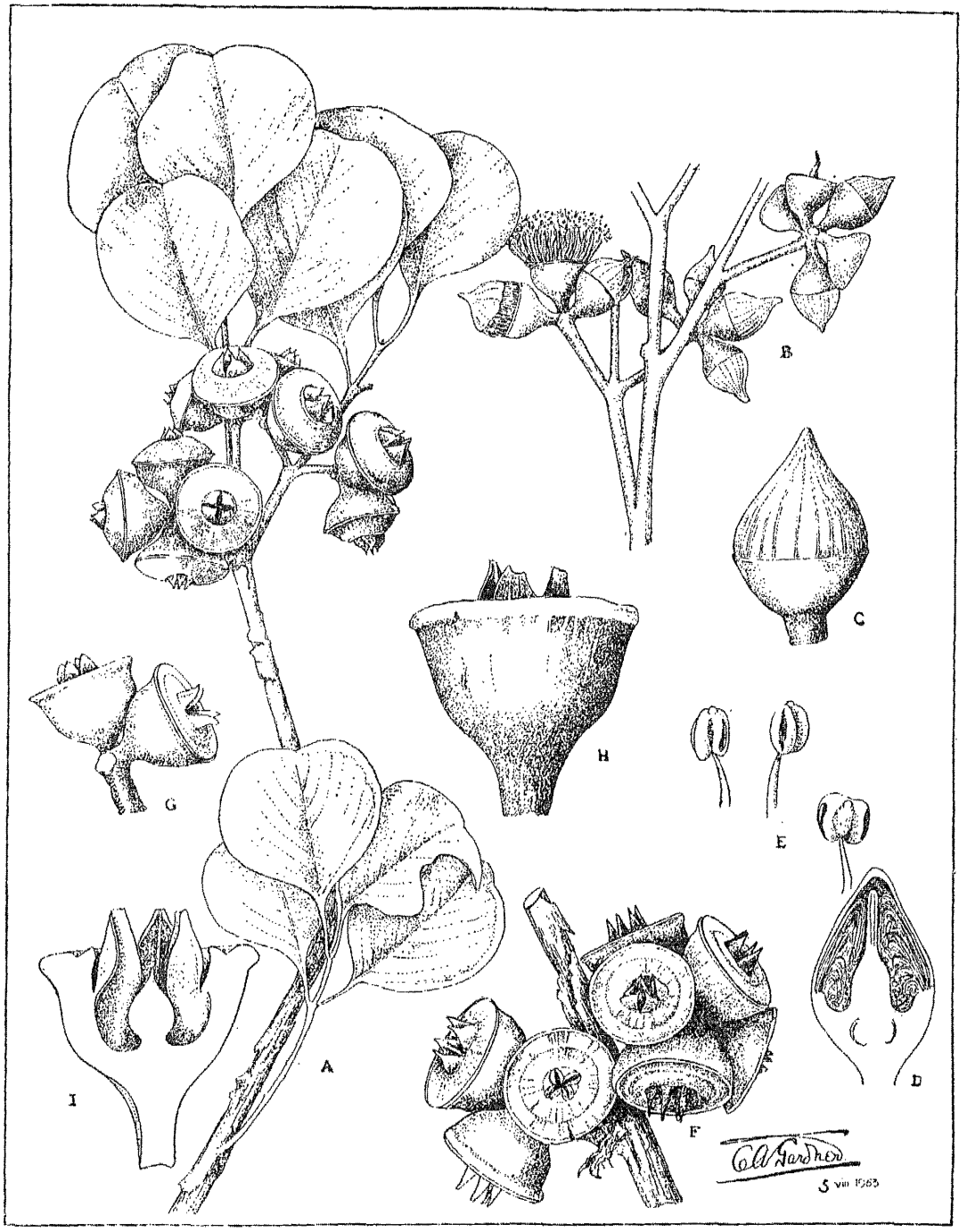

Fig. 22

Eucalyptus orbifolia A—Branchlets with leaves and fruits; B—Flower buds; C—Flower bud; D—Flower bud in section; E—Anthers; F—Fruits; G—Two buds detached from the umbel; H—Fruit (enlarged). (Pigeon Rocks, G. E. Brockway, 1940).

29. **Eucalyptus calophylla** Lindl.

Marri

Marri is one of the commonest and best-known of the large trees of South-Western Australia. It has a range of distribution extending from Port Gregory near the Murchison River, to Cape Riche, westward and southward to the coast, and inland slightly beyond the eastern limits of the Jarrah zone. Tincurrin is probably the most inland of the areas in which it is found.

Although one of the largest trees of the Jarrah forest, it occurs as a small tree or a shrub in its eastern limits on the south coast, while to the north of the Hill River it suffers considerable reduction in stature. In the forest areas however, it attains a height of well over 35 m.

Marri belongs to the group of *Eucalyptus* which are called bloodwoods. The term bloodwood is given to a number of species which have certain characteristics in common. The bark varies from smooth throughout, or with small adherent spots or patches of reddish, subpersistent bark to a rough, reddish-brown bark which is more or less friable, so that when rubbed by the hand, the surface layers become detached in the form of small fine splinters. The leaves have either a widely divergent, almost transverse nerve pattern, or the venation is open and netted. The fruits are woody and globular to urn-shaped, with large, often winged seeds.

In the field the many species of *Eucalyptus* are capable of a rough classification into groups according to bark. Although this character varies to a certain extent, it does serve as the basis of a very useful classification. Thus the terms ironbark, box, blackbutt, bloodwood, stringybark, gums, and many others are used to designate groups of *Eucalyptus* species which have similar bark characteristics. Amongst the *Eucalyptus* species of the South-West, *E. calophylla* represents an extreme form of bloodwood. *E. marginata* on the other hand is a typical stringybark.

The bloodwood group consists very largely of species which are northern in distribution and their identification has long been a difficult matter. This is due mainly to the paucity of material available for study as many of the species occur in inaccessible country where few botanical collections have been made. Since the 1950's extensive collections of these little-known species have made possible a better understanding of this difficult group.

The majority of *Eucalyptus* trees in the tropics are either smooth-barked gums or friable-barked bloodwoods.

There are about 20 bloodwood species found in tropical Western Australia, and only three in South-Western Australia, the latter being Marri, Red-flowering Gum and Mountain Gum. Marri can usually be recognised at once by its large leaves which are dark green above and paler underneath; its wide spreading, often horizontal, thick branches; its large white or pale pink flowers, and its urn-shaped fruits of large size, typically with a constriction below the wide terminal orifice.

Marri which occurs freely in the Jarrah and Karri forests, favours the lighter, somewhat sandy soils, a fact which no doubt accounts for its prevalence in the sandy coastal areas, and its comparative absence from the clay soils of the Wandoo forest.

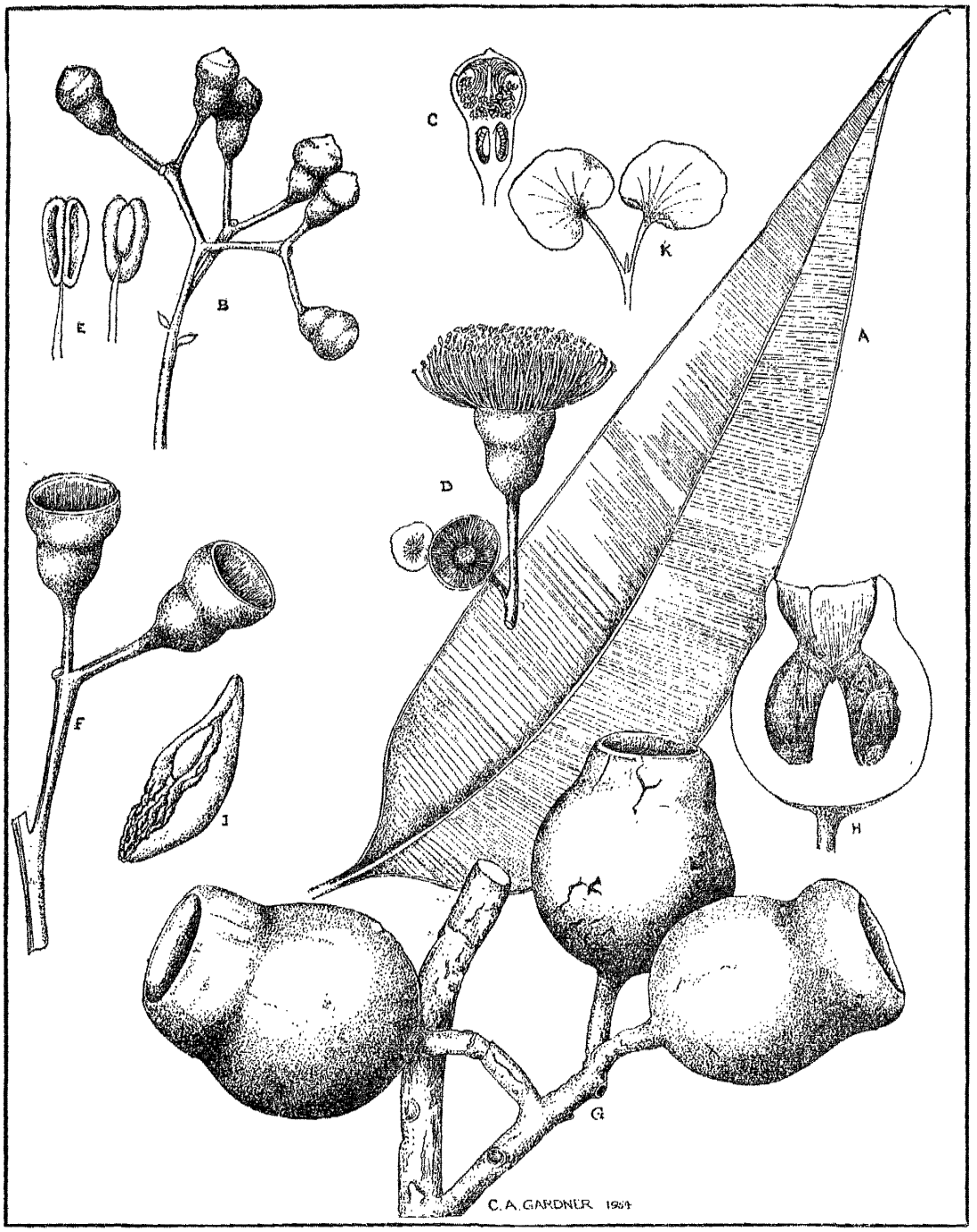

Fig. 23

Eucalyptus calophylla A—Leaf; B—Portion of inflorescence with flower buds; C—Flower bud in section; D—Flower and calyx after flowering with the operculum still attached; E—Anthers; F—Young fruits; G—Cluster of fruits; H—Fruit in section; I—Seed; K—Cotyledons. (Perth).

A gum-resin or kino is formed in cavities in the wood or in vessels below the bark, and is sometimes exuded in fair quantities. This kino has a value as a tanning material, but its collection today for this purpose is uneconomical.

Marri is well known to the apiarist, giving a copious supply of nectar in most seasons. The light amber honey is of excellent flavour. Marri pollen is highly nutritious and is excellent for queen-raising and brood-rearing. Marri flowers during summer, usually in February and March, but may continue until April or May. The leaves yield small quantities of an oil which consists mainly of terpene and is of no commercial value.

The name *calophylla,* given to this species by Robert Brown who was the botanist accompanying Flinders in 1801-1802, signifies beautiful leaf. Brown remarked that the tree was the only useful timber tree growing on the shores of King George's Sound.*

As early as 1838 the early settlers knew the tree under the name of Red Gum, but the Swan River natives called it N'gumbat. Other native names were Kurden, or Karden and Marri or Marree. C. E. Lane-Poole, a former Conservator of Forests, initiated the substitution of the name Marri for Red Gum, to avoid confusion with *E. camaldulensis,* River Red Gum of Victoria and South Australia, and after 40 years this name has now a general application except amongst some of the older residents, who continue to call it Red Gum. Children know the fruits as honkey nuts.

On account of its singularly attractive habit of growth and dense crown, and its large white or pale pink flowers, the tree is of considerable value to the farmer and country dweller as a shade tree. Indeed, the prevalence of this tree in farming lands along the lower Great Southern districts adds very considerably to the beauty of the landscape, and its value there for shade purposes for stock is obvious. Like other species of *Eucalyptus,* it develops best when given space in which to spread its roots and lateral branches.

The two most closely-related species to the Marri in South-Western Australia are *E. ficifolia,* Red-flowering Gum, and *E. haematoxylon,* Mountain Gum. The former, now widely planted in many parts of the world, differs from Marri in being a smaller tree with smaller, more rigid and deeper green leaves, flowers of a brilliant vermillion or sometimes crimson, fruits usually without any neck and brown winged seeds. Like Marri it has a pale timber. Mountain Gum has red timber, oil-dotted leaves and reddish-brown winged seeds. It much resembles Marri, but is a smaller, crooked tree.

When not in flower, Marri and Red-flowering Gum may very closely resemble each other, but the latter can usually be distinguished by the absence of oil-dots in the leaves, and by its

*Editor's Note: Brown did not validly publish the name and the species was later validly described by John Lindley, in 1841, who stated that the appearance of the foliage was that of a *Calophyllum,* a tropical genus belonging to the family Clusiaceae. Lindley obtained his specimens from a cultivated plant, the seeds of which were obtained by Captain Jas. Mangles, R.N. from Mrs. Molloy of Augusta, a lady enthusiastically fond of flowers.

reddish branchlets, often purple, which bear smaller and narrower leaves.

Marri timber is not used in contact with the ground because of its lack of durability. It may however be used in situations where strength and elasticity are required. The timber is straight-grained, light brown, easily worked and is increasing in economic importance since low quality logs are used in the woodchip industry while better quality logs are diverted to the sawmilling industry.

Marri woodchips are the raw material for the manufacture of high-quality writing papers.

30. **Eucalyptus ptychocarpa** F. Muell.

Spring Bloodwood

Spring Bloodwood is one of the most attractive of trees in the genus *Eucalyptus*. In appearance it much resembles Marri, but is of still broader branching habit and has broad leaves which are not usually thick, are bright green on the upper surface and vary from about 12 to 30 cm long. This magnificent tree occurs in the Kimberley Division in a few favoured spots asociated with fresh water at shallow depths, and may be used as an indicator of such. It rarely exceeds 10 m tall but the trunk is frequently 1 m in diameter. The bark is rough and fibrous-flaky like that of Marri, and is deep brown. The branches are widely spreading or drooping, and the timber is soft and deep red.

In Western Australia the Spring Bloodwood is only found in a few areas, including the Drysdale River district, the Lawley and Prince Regent Rivers, the Isdell and Charnley Rivers and their tributaries, and Cockatoo Spring near the lower reaches of the Ord River. It has all the characteristics of the bloodwood subgenus, the *Corymbia,* as discussed under Marri, but differs from them all in its eight-ribbed fruit. The name *ptychocarpa,* given to it by Ferdinand von Mueller, means folded fruit. These ribs, present also on the flower-buds, I have always found to be eight in number but, although typically narrow and prominent, they may be occasionally obscure. The flowers are usually white or a pale pink, and the tree flowers in March and April.

There has been much discussion as to the colour of the flower filaments. In Western Australia only white, or a very pale pink colour, has been observed. Leichhardt described a specimen from Port Essington, an old settlement east of Darwin, as carrying scarlet blossoms, while more recent observers have described both crimson and scarlet blossoms, as well as white.

When travelling along the upper country of the Roper River about 95 km from Katherine, I saw a sight that cannot easily be forgotten, a grove of these trees with massive trusses of brilliant crimson flowers in great profusion. The filaments were the colour of blood, and their presence in such abundance made the tree a splendid sight. Spring Bloodwood could be a powerful rival to the well-known Red-flowering Gum in cultivation, as the combination of crimson flowers and heavy foliage makes the tree particularly attractive.

The blossoms were very rich in nectar, and the tree would be of value to the apiarist were it to occur in sufficient numbers. Where sufficient moisture occurs, this tree should have a prominent place in tropical gardens, surpassing in habit, density of crown, colour and massiveness of its inflorescences, the better-known *E. miniata,* Darwin Woollybutt.

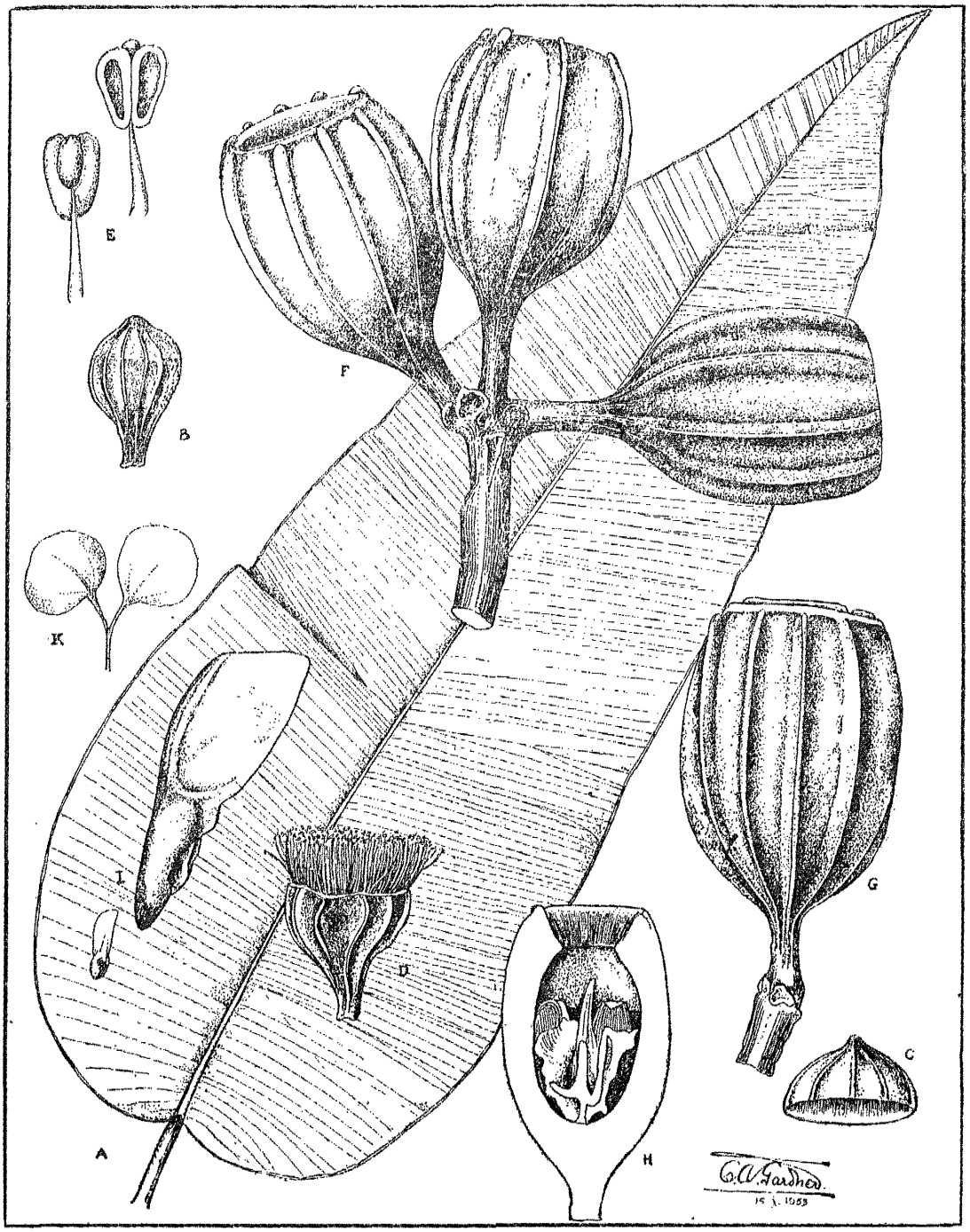

Fig. 24

Eucalyptus ptychocarpa A—Leaf; B—Flower bud; C—Operculum (bud-cap); D—Flower (less than natural size); E—Anthers; F—Fruits; G—Single Fruit; H—Fruit in section; I—Seeds; K—Cotyledons. (Lawley River, Gardner 1458).

31. **Eucalyptus perfoliata** R. Br. ex Benth.

Twin-leaved Bloodwood

The Twin-leaved Bloodwood inhabits stony hills and rises in the Kimberley Division. With the single exception of *E. gamophylla,* a tree of the desert and the Hamersley Range, it stands unique amongst Western Australian species in having its paired mature leaves united at the base so that the stem or branch appears to grow through the leaf. The name *perfoliata* refers to this characteristic.

It is fairly abundant along the Roe and Moran Rivers in North Kimberley, where it appears as a crooked tree 5 to 7 m tall. Twin-leaved Bloodwood is also found on the sandstone ranges southward from the King Leopold Range, notably on the St. George Range, and on the hills around Gogo Station. It is of little commercial value, and is remarkable rather than handsome.

Twin-leaved Bloodwood has connate leaves to 25 cm long and 7.5 cm across. The flower buds, which are obovoid to shortly pyriform and in 7-11 umbels, are borne in terminal panicles or corymbs. The fruit are truncate-ovoid, sometimes slightly urceolate, to 3.8 cm long. The timber is red.

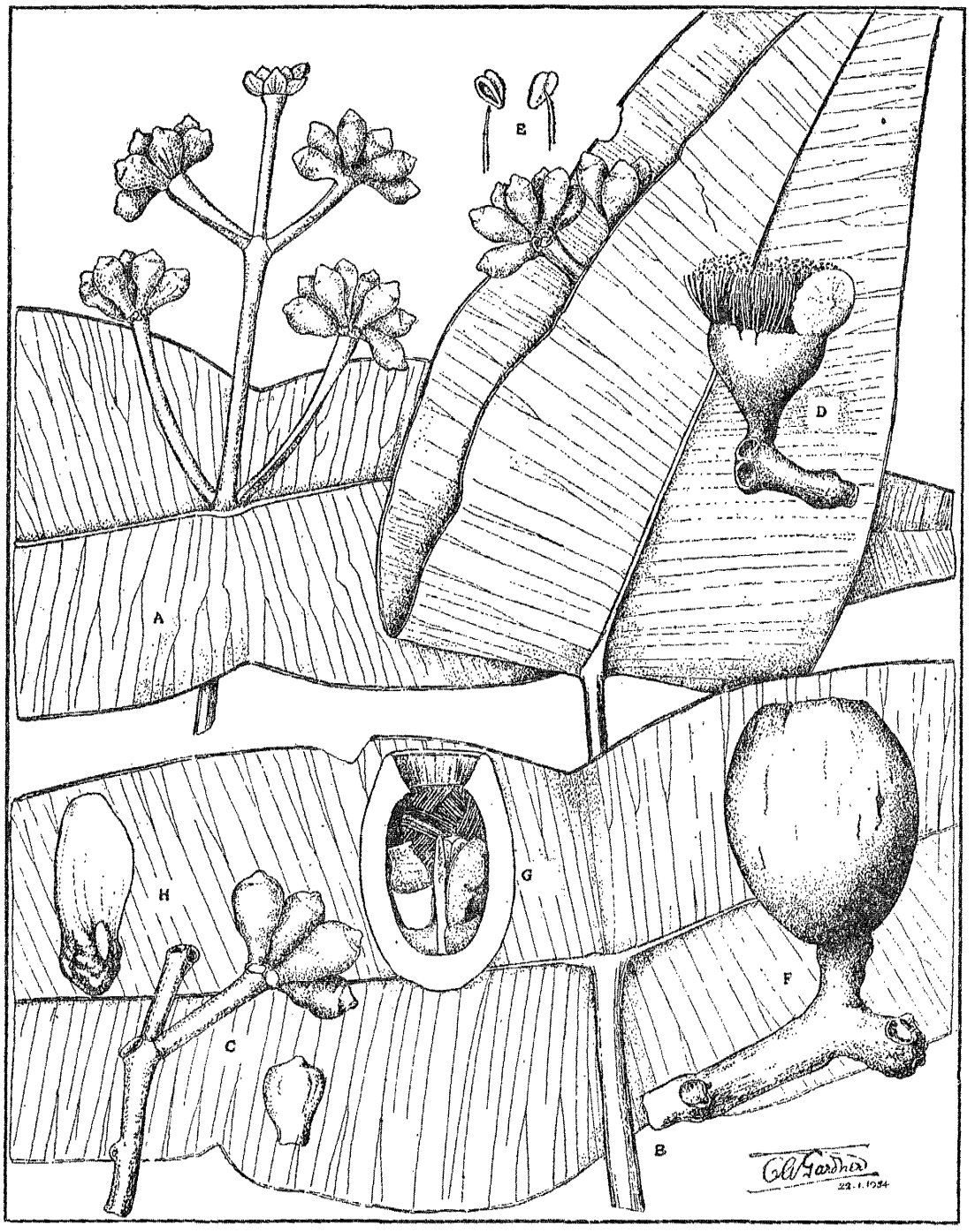

Fig. 25

Eucalyptus perfoliata A—Leaves and inflorescence with buds; B—Leaves; C—Flower buds; D—Flower; E—Anthers; F—Fruit; G—Fruit in section; H—Seeds (Gogo, Fitzroy River, Gardner 9795). (Roe River, Gardner—fruits).

32. **Eucalyptus setosa** Schau.

Rough-leaved Bloodwood

The Rough-leaved Bloodwood is a small to medium-sized tree, 5 to 12 m tall with bark rough-scaly on the trunk and branches. The timber is reddish, moderately hard and tough.

The leaves are opposite, thick, spreading stiffly, stalkless, the bases produced into stem-clasping lobes. They are ovate to lanceolate in shape, more or less hairy, 5 to 10 cm long and a little more than 3 cm wide. The midrib is prominent, the secondary nerves diverging at an angle, the intramarginal nerve sometimes indistinct and close to the margin.

The umbels are two to three flowered, arranged in a corymbose inflorescence. The peduncles are terete and not flattened, up to 3 cm long and setose with bristly hairs. The buds are globular to pyriform, pedicellate, thickly covered with bristly hairs, and approximately 2 cm long and wide. The operculum is hemispherical, not half as long as the calyx tube. The anthers are rather large, oblong, lobed at the extremity, the cells splitting down the whole length when liberating the pollen.

The fruit is ovoid to urn-shaped, up to 3 cm wide and long, more or less rigid-hairy when young, becoming glabrous, three to five locular, the valves deeply included. The flowering season is in May and June.

Rough-leaved Bloodwood is common in the Pindan between Broome and Derby. Its range extends southwards to the Ashburton River. It is a small, crooked tree rarely exceeding 6 m tall, and receives its name *setosa* from the bristly hairs found on the younger foliage and flower buds. This character which is an unusual one in the genus, makes the species easily recognisable in the field.

This bloodwood is distributed over a large part of northern Australia. The type material was collected by Ferdinand Bauer in 1802 when he was working with Robert Brown in the Gulf of Carpentaria.

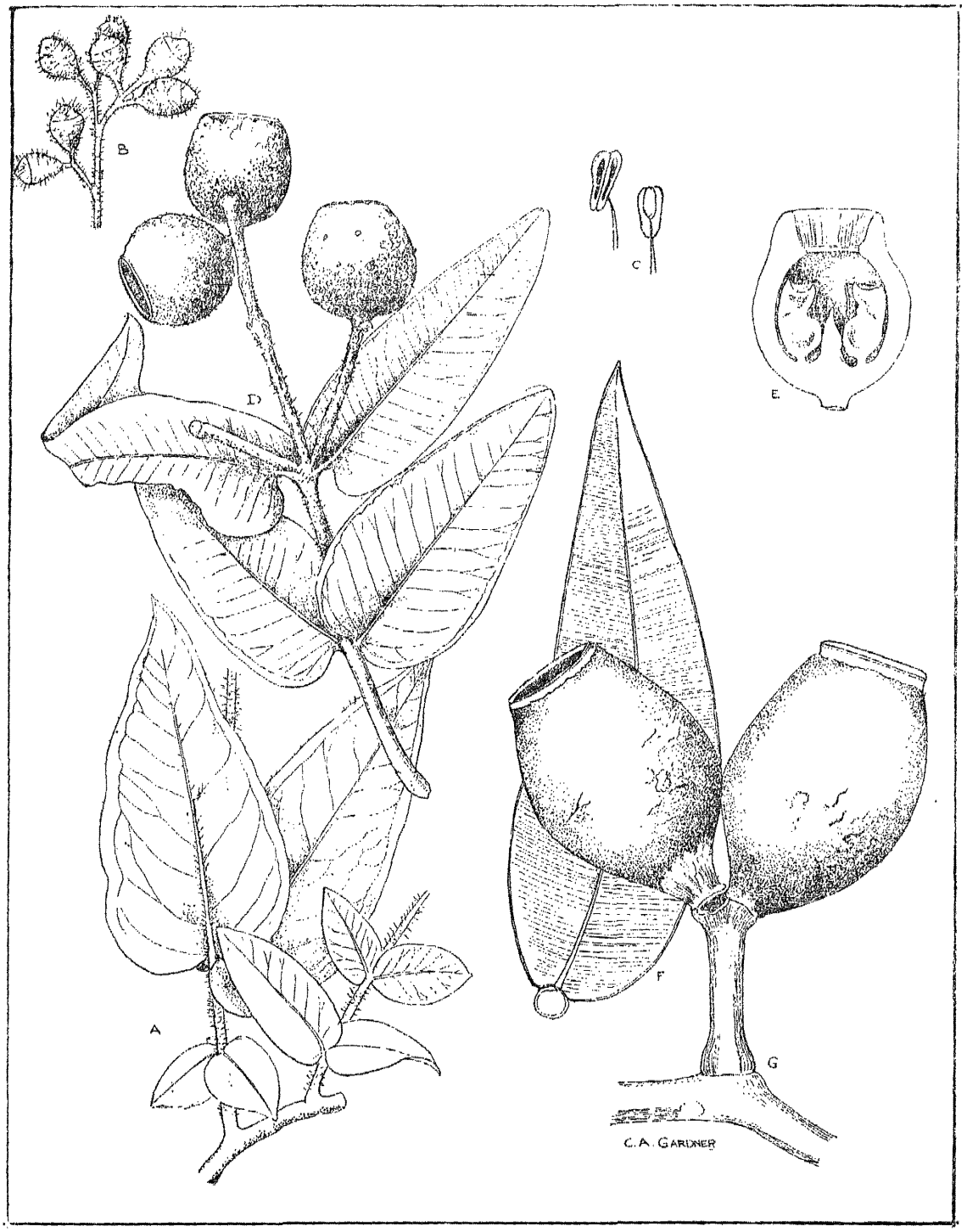

Fig. 26

Eucalyptus setosa A—Young foliage; B—Buds; C—Anthers; D—Adult foliage and fruits; E—Section of Fruit.

Eucalyptus zygophylla F—Leaf; G—Fruits.

33. **Eucalyptus zygophylla** Blakely

Broome Bloodwood

Broome Bloodwood is a small to medium-sized tree up to 12 m tall, with a persistent bark. The branchlets are terete and glabrous.

The leaves are opposite, without stalks, and with the same basal lobes as *E. setosa*. They are ovate-oblong to lanceolate, thick, leathery, without hairs, up to 15 cm long and sometimes more than 3 cm wide. The midrib is prominent, the secondary nerves fine, almost at right angles to the midrib, the intramarginal nerve fine and close to the margin.

The umbels are three to five flowered, arranged in a short terminal corymbose inflorescence, the peduncles elongated, robust and usually much enlarged under the fruit. The buds are with a more or less turbinate calyx tube about 2 cm in diameter, and with a short operculum. The anthers are smaller than those of the related species. The fruits are woody, subglobose or urn-shaped, nearly 5 cm long and 2 cm wide, with a very thick rim, four to five locular, with deeply enclosed valves. The seeds have a long terminal wing. Flowering occurs during February.

Eucalyptus zygophylla is found between Derby and Anna Plains on the 80 Mile Beach. It much resembles *E. setosa* but has no bristly hairs and the leaves have a close parallel secondary nervation. In both *E. setosa* and this species the leaves possess no stalk. *E. zygophylla* is very close to *E. perfoliata* but the leaves are smaller and not united at the base, while in habit it is a much larger tree, growing to 12 m or more tall. It is a common tree between Derby and Yeeda on the lower Fitzroy River.

34. **Eucalyptus ferruginea** Schau.

Rusty Bloodwood

Rusty Bloodwood is a medium sized tree 10 to 12 m tall with a usually widely spreading crown. The bark on the trunk is grey, shortly fibrous and flaky. The twigs, foliage and inflorescence are covered with a close, dense rusty-coloured indumentum of small, more or less branched or star-shaped scales mixed with short bristles. The indumentum tends to wear off with age, the plant then often becoming somewhat silvery.

The leaves are opposite, without or with only short leaf stalks, lanceolate in outline with a lobed or heart-shaped base up to 20 cm long and 5 cm wide. The midrib is prominent, the secondary nerves very few, curved, with smaller anastomising nerves between them, the intramarginal nerve not evident.

The umbels are three to six flowered, in a large, terminal, corymbose inflorescence. The buds are scaly, more or less pyriform, up to 2 cm long, the operculum short. The anthers are obovate, attached by the middle, the cells long and broad. The fruit is ovoid to cup-shaped with a rather thin rim, three to five locular with deeply enclosed valves. The seed has a terminal wing. The flowering season is in January-February.

In Western Australia, Rusty Bloodwood appears to be restricted to quartzite ridges in the Kimberley region.

It is found scattered over the north of Australia to as far east as the islands in the Gulf of Carpentaria, west of Burketown in Queensland.

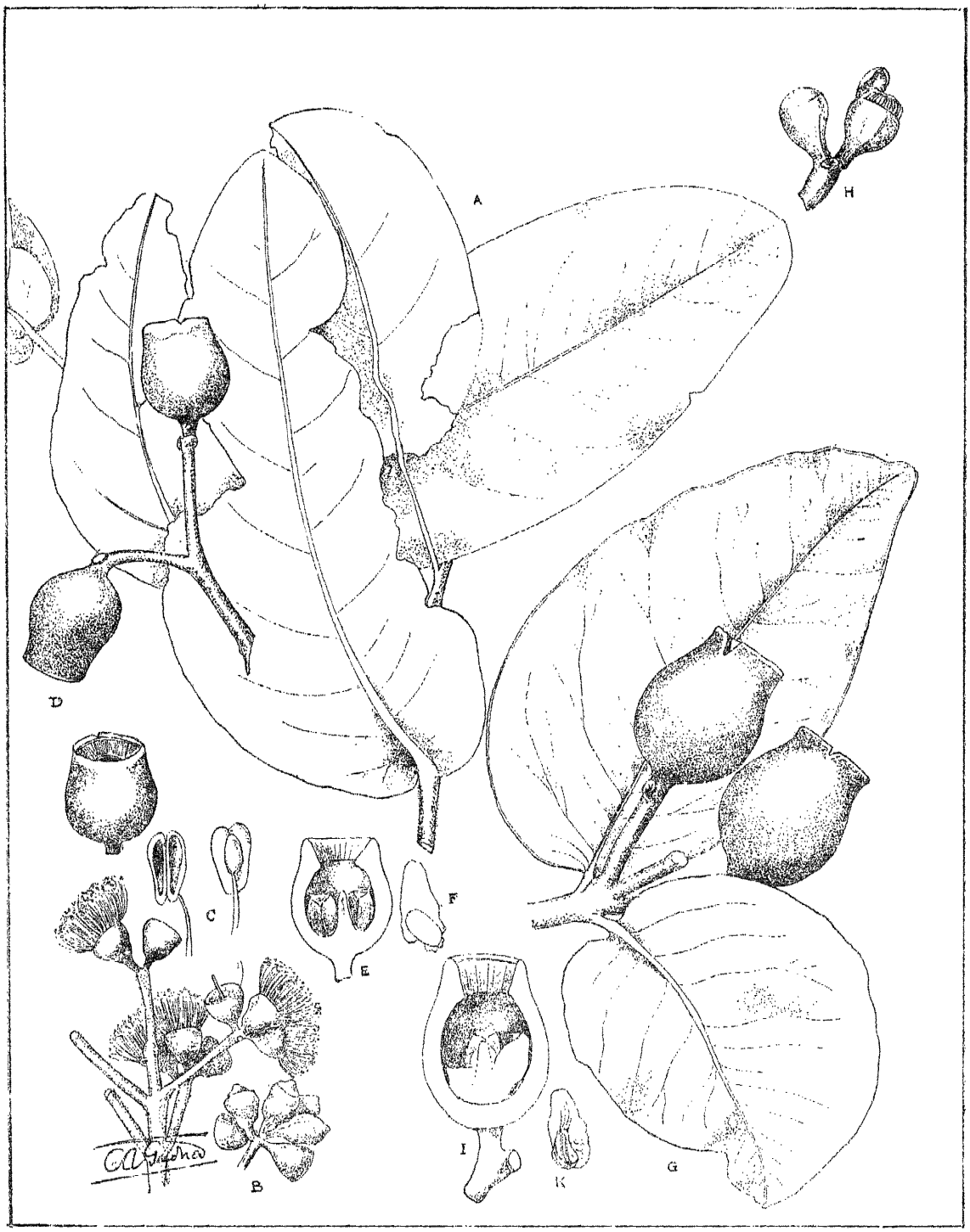

Fig. 27

Eucalyptus ferruginea A—Leaves; B—Inflorescence and flower buds; C—Anthers; D—Fruits; E—Section of fruit; F—Seed (enlarged).

Eucalyptus abbreviata G—Branchlet with leaves and fruit; H—Flower buds; I—Section of fruit; K—Seed (enlarged).

35. **Eucalyptus abbreviata** Blakely et Jacobs

Scraggy Bloodwood

Scraggy Bloodwood is a small tree up to 6 m tall with a deeply furrowed, flaky, persistent bark. The timber is dark red.

The leaves are opposite or more or less so, stalkless or very shortly stalked, thick, rigidly coriaceous, yellowish green, paler on the lower surface, more or less covered with a fine white tomentum or almost glabrous, narrowly ovate to lanceolate, 18 to 20 cm long. The midrib is distinct, the intramarginal nerve irregular, and close to the margin.

The umbels are three to five flowered in an abbreviated corymb. The buds are obovoid slightly scurfy, about 2 cm long, with a short operculum. The anthers are oblong, attached in the middle, the parallel cells opening in longitudinal slits. The fruit is thick and woody, broadly urn-shaped, up to 4 cm long with a thick obtuse rim, four to five locular, the valves deeply enclosed. The seeds have a terminal wing. The flowering season is July and August.

Like *E. ferruginea,* Scraggy Bloodwood appears to be restricted, in Western Australia to the quartzite ridges in the north and east Kimberley region. In both species the leaves are a yellowish-green, and covered with a close reddish scurf, at least when young. The differences between the two are very slight, *E. abbreviata* having a white rather than a rusty tomentum and a slightly larger fruit. Both trees are small and straggling in growth with a rough friable bark typical of bloodwoods.

The type material of Scraggy Bloodwood was collected by M. R. Jacobs in July 1933 near Katherine in the Northern Territory. The species has a limited distribution in the Katherine area and in the Kimberley region.

36. **Eucalyptus miniata** A. Cunn. ex. Schau.

Darwin Woollybutt

Darwin Woollybutt grows to about 12 m but a fair average is about 10 m tall, the trunk being up to 6 m long and up to 60 cm in diameter. The timber is red and hard but susceptible to attacks from termites. The branches spread widely.

A characteristic of the species is its ability to flower freely when small. Plants 1.5 to 2 m tall and probably three to four years old from seed, are often very floriferous, bearing flowers larger than those seen on older trees. These orange-vermilion blossoms, contrasting vividly with the powdery-white calyx, bud and branchlets, make the tree very attractive. Darwin Woollybutt and Scarlet Gum are the only two species which have these orange-vermilion flowers.

The home of Darwin Woollybutt in Western Australia is the Kimberley region where it is one of the commonest trees of the rough sandstone and quartzite country of the Hann Plateau which lies to the north of the King Leopold Range. Isolated areas carrying these trees occur on the Cockatoo Sands near the lower reaches of the Ord River, also near Elephant Hill in the same district. To the south and west we encounter woodlands of Darwin Woollybutt north of Derby and between Derby and Yeeda.

In its main area of distribution Darwin Woollybutt is frequently associated with *E. tetrodonta,* Darwin Stringybark, but it usually occurs as the principal and dominant tree of the sandstone range country. It extends across the Northern Territory into Northern Queensland.

Darwin Woollybutt was first collected in about 1820 by Alan Cunningham who was the botanist with Captain Phillip King. He found it in craggy declivities near York Sound.

This striking tree flowers from about the commencement of June until the end of July. It produces nectar in abundance and the blossoms are much sought after by small birds of the parrot family, especially budgerigahs.

The species name is taken from the Latin *miniatus*, coloured with cinnabar, a reference to the colour of the filaments of the flowers.

The preferred common name of Darwin Woollybutt refers to the bark fibres which vaguely resemble wool. The alternative common names Melaleuca Gum and Cadjeput Gum are less appropriate because the flakes of bark, although the consistency of paper, are much more friable than those of the Teatree.

The young flakes of bark are yellow but become reddish-pink with age, and the more persistent fibres are pale brown. The upper part of the trunk and the branches are smooth and yellowish to white and the branchlets are powdery white.

Darwin Woollybutt is a tree attaining a height of about 12 m with a trunk up to 60 cm in diameter, the bark persistent on the greater part of the trunk. The bark fibres are straight and friable. The timber is reddish-brown, hard and dense. The leaves are alternate, broadly lance-shaped or ovate-lanceolate, stalked, the blade narrowed into the stalk, the apex acute, dark

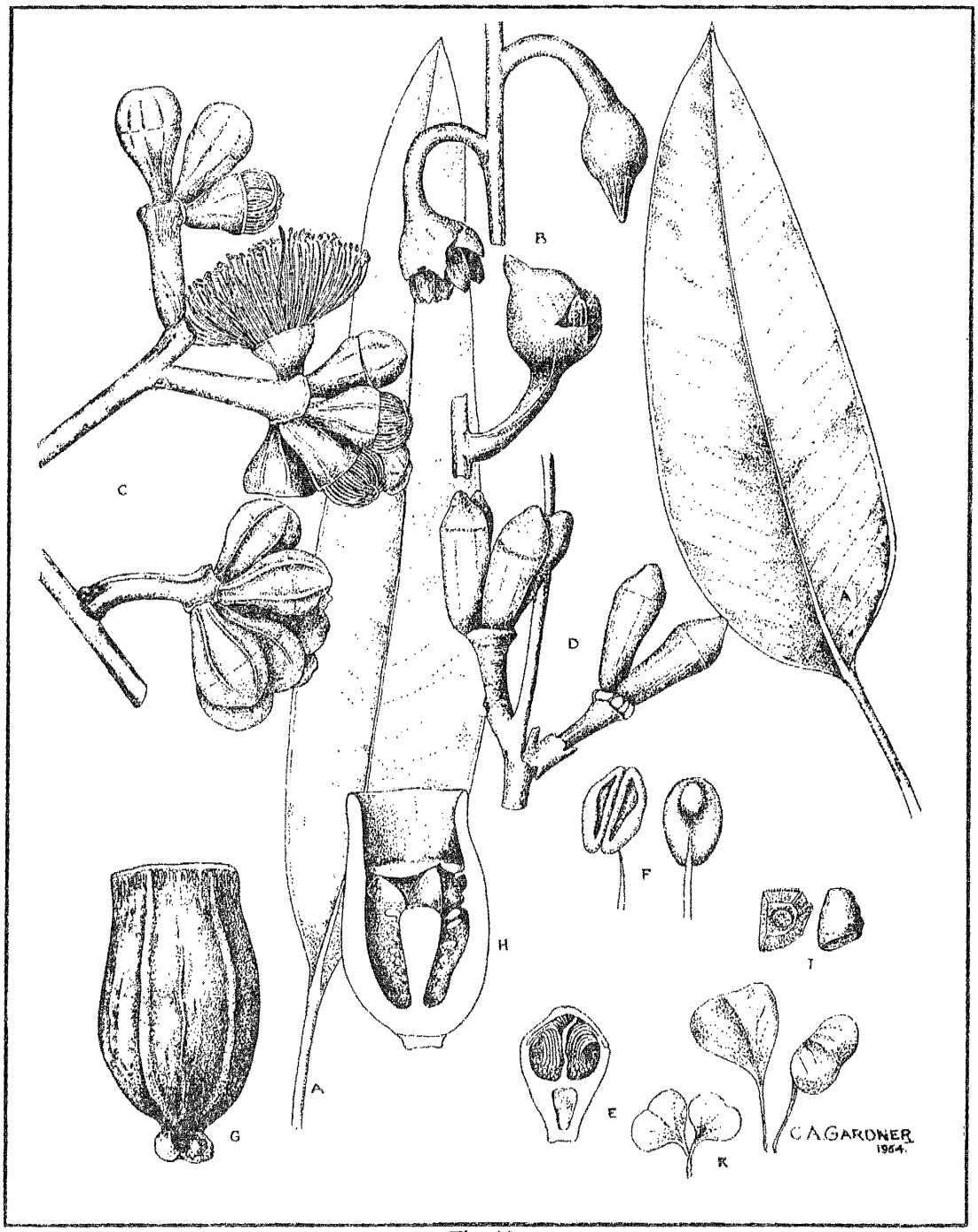

Fig. 28

Eucalyptus miniata A—Leaves; B—Young inflorescences (see below); C—Flowers and flower buds; D—Flower buds from the Prince Regent River (an elongated form); E—Section of flower bud; F—Anthers; G—Fruit; H—Section of fruit; I—Fertile seeds; K—Cotyledons. All except B and D are from the Cockatoo Springs (Gardner 7325); D shows buds from the Prince Regent River (Gardner 1358). B represents material from Goody Goody (Fitzgerald 296). The young buds are enclosed in a hard globular structure which ruptures as the buds expand. It may, or may not be normal.

green and almost shining on the upper side, paler underneath, the lateral nerves spreading and fine and the intramarginal nerve close to the leaf-margin.

The flowers are in umbels of three to seven, lateral or in the axils of the leaves, the peduncle stout, spreading or recurved, terete or slightly flattened and expanded at the summit. The flowers are on very short pedicels scarcely distinguishable from the base of the calyx, the buds six to ten ribbed, the calyx-tube narrow-campanulate and the hemispherical or ovoid operculum is about half as long as the calyx-tube and comparatively thin. The stamens are numerous, the filaments incurved in the bud, the anthers large, attached by the middle, opening in distinct longitudinal slits. The style is elongated, rather slender, the upper portion external to the stamens in the bud and then recurved, later straight or flexuose.

The fruit is urn-shaped or almost cylindrical, more than 2 cm long, contracted at the summit, the capsule deeply sunk, three valved with the valves short and deeply included.

37. **Eucalyptus phoenicea** F. Muell.

Scarlet Gum

Scarlet Gum, also known as Gnainggar, is much like Darwin Woollybutt in appearance but is a much smaller tree with branchlets which are reddish and angular and not powdery-white. The flowers also are very different in shape and much more numerous in clusters, although they resemble those of the Darwin Woollybutt in their orange or vermilion tonings.

Ferdinand von Mueller, who described this species from a specimen collected in the vicinity of the Victoria River named it *phoenicea* from the cinnabar colour of the filaments, in allusion to the fiery crimson plumage of the mythical bird, the phoenix.

Scarlet Gum was collected by R. A. Perry in the vicinity of the Chamberlain River in East Kimberley region. Excellent flowering material has been collected at Karungie on the Durack River by David Rust. The bark supplied by Rust is very much like that of Darwin Woollybutt. Scarlet Gum is associated with Darwin Woollybutt and this also holds good for its distribution in the Northern Territory.

Scarlet Gum is a tree usually of slender growth, up to 8 m tall, the trunk with a papery-flaky somewhat fibrous bark, the upper portion and branches smooth and the branches reddish, slender, and angular. The leaves are much like those of *E. miniata* but smaller, pale green, alternate or here and there opposite, of the same colour on both surfaces, on rather long stalks, the middle rib prominent, the lateral nerves fairly numerous and irregular, the intramarginal nerve subcontiguous with the leaf-margin.

The flowers are in axillary clusters, on long slender peduncles, the flowers up to 16 in the umbel, on slender pedicels, the buds pear-shaped. The calyx-tube is narrowly bell-shaped or almost pear-shaped, smooth, the operculum very much shorter and obtusely hemispherical to ovoid. The stamens are numerous, all perfect, the filaments inflected in the bud, anthers versatile, broad, and opening in longitudinal distinct slits. The style is slender-straight.

The fruit is narrowly urn-shaped to ellipsoidal or almost cylindrical, usually with a distinct neck below the orifice, 3 to 4 cm long, many-ribbed, abruptly contracted into the stalk with the capsule deeply included with very short obtuse valves.

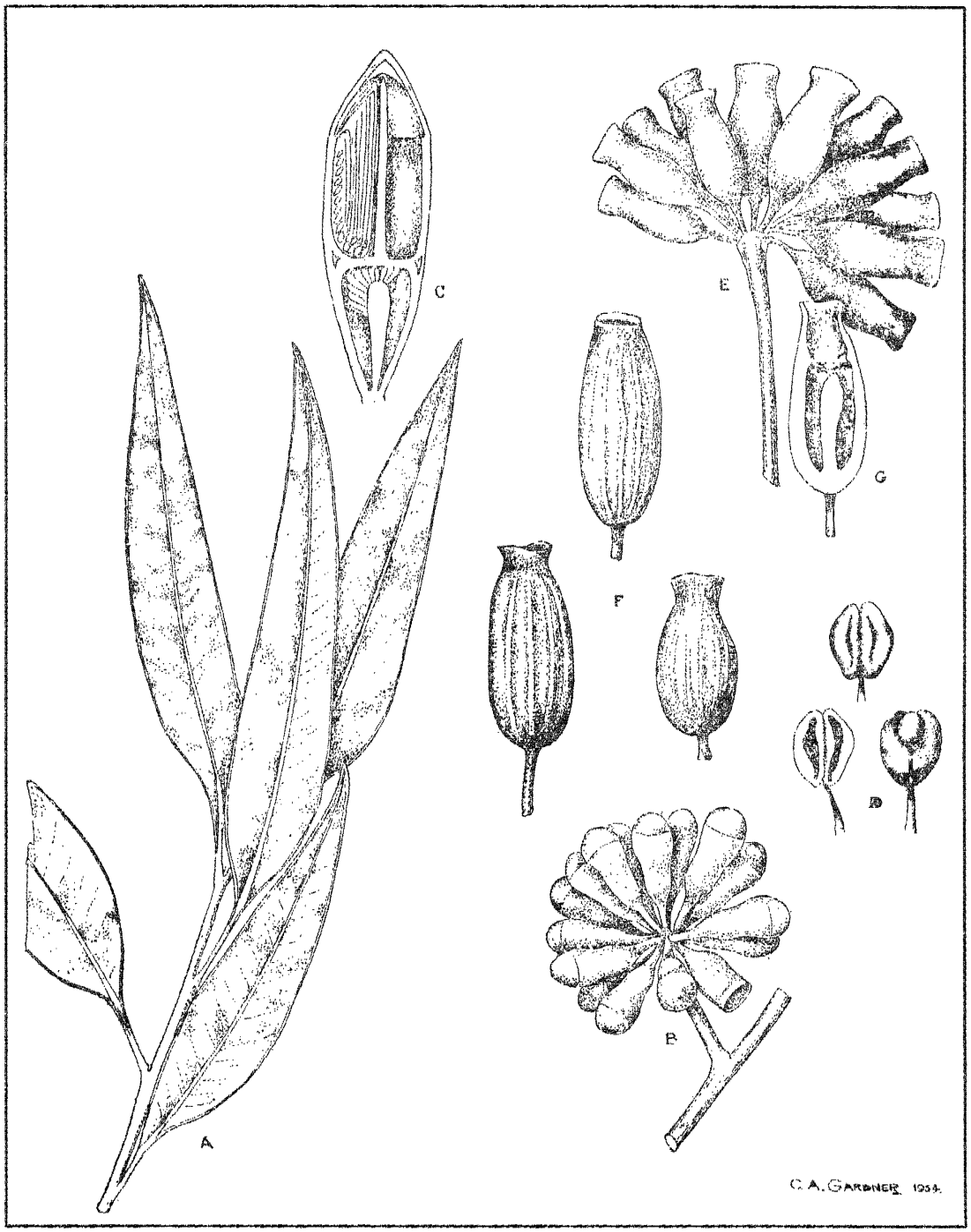

Fig. 29

Eucalyptus phoenicea A—Branchlet and leaves; B—Flower buds and peduncle; C—Section of flower bud (after Mueller); D—Anthers (after Maiden); E—Young fruits (after Mueller); F—Fruits; G—Section of fruit; (A, F and G, Perry 3081).

38. **Eucalyptus latifolia** F. Muell.

Round-leaved Bloodwood

Round-leaved Bloodwood inhabits the sandstone valleys and basaltic undulating country between the Moran, King Edward and Carson rivers in North Kimberley. It is most frequently found on the light, sandy soils, with *E. miniata*. Both the popular and specific names refer to the broad leaves.

The species is a tree 8 to 16 m tall with a trunk up to 8 m long and up to 50 cm in diameter. The branches are spreading or drooping and the timber is pink, dense and rather hard.

The bark is yellowish-pink, rarely white, and spotted with small purple grey-flakes of tardily-shedding bark giving the trunk a mottled appearance.

The leaves are broad and somewhat obtuse, pale green or glaucous, on long stalks, the blade usually to 10 cm long.

The flowers are arranged in large terminal panicles, are white, and the obtuse operculum often remains hinged to the calyx when the flowers expand.

The ovoid-globular fruit is woody, about 12 mm long, and pale green with brown spots when ripe. The rim is rather thick and the valves enclosed.

The distribution range of Round-leaved Bloodwood extends into the Northern Territory to as far east as Birdum in the south and northward to Coburg Peninsula and to Bathurst and Melville Islands off the coast.

The timber is reported to be of fair quality and of some value for local use.

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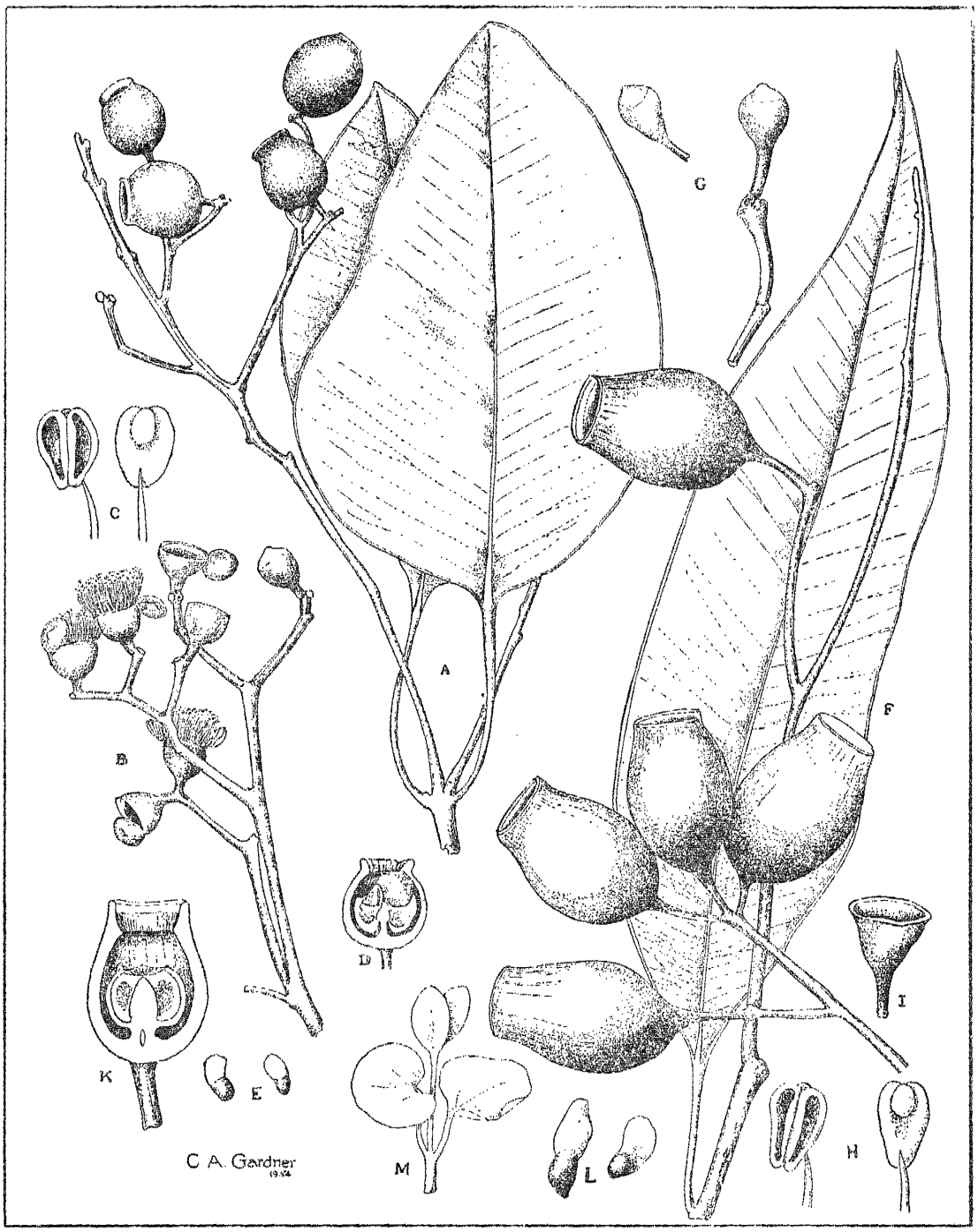

Fig. 30

Eucalyptus latifolia A—Branchlets with leaves and fruits; B—Portion of panicle showing flowers; C—Anthers; D—Section of fruit; E—Seeds. (Upper Moran River near Mount Hann, Gardner 1448, June 30, 1921).

Eucalyptus foelscheana F—Leaf and fruits; G—Flower buds; H—Anthers; I—Calyx after flowering; K—Section of fruit; L—Seeds; M—Cotyledons. (Admiralty Gulf, Gardner 1486, July 24, 1921).

39. **Eucalyptus foelscheana** F. Muell.

Smooth-barked Bloodwood

Smooth-barked Bloodwood was named after Paul Foelsch of Darwin who collected the first specimens of the tree. It differs from *E. latifolia* in its smaller size, much narrower leaves, and larger fruits.

The tree is common on the basalt or andesite country of North Kimberley around Admiralty Gulf, and the lower King Edward and Carson rivers. It rarely exceeds 10 m tall and is usually of lesser stature. The timber is red, hard and dense.

The bark of the tree is white or pale buff. It may be quite smooth, but sometimes carries patches of purplish, somewhat persistent bark, giving the trunk a mottled appearance.

The leaves, usually light green, are lustrous, narrow and vary from 10 to 20 cm long. As far as observed, they are pendulous. The sucker-leaves are remarkably large, sometimes as much as 37 cm long and 27 cm wide. The fruits are vase shaped, about 3 cm long with faint longitudinal striations. The capsule is deeply included, and the relatively large seeds are winged.

Smooth-barked Bloodwood is also found in the Northern Territory to as far east as Gove Peninsula.

40. **Eucalyptus lamprocalyx** Blakely

Meda Bloodwood

Editor's Note: *E. lamprocalyx* is regarded by L. D. Pryor and L. A. S. Johnson as being a hybrid of *E. collina* x *perfoliata.*

On April 29, 1905, W. V. Fitzgerald, who was attached to the Crossland Trigonometrical Survey of that year, travelled with the party from Native Well near Derby to a camp about 800 m from Meda Station homestead.

Fitzgerald collected 75 plant specimens including this species which he incorrectly named *Eucalyptus pyrophora* but concerning which he gave no definite locality or notes as to habit and general appearance. A few twigs with leaves, buds and detached flowers were collected, but no fruits.

The tree is apparently a small one with moderately thick, opposite or alternate leaves, which are a slightly darker green above than below. Branches are angular and the leaf-stalks very short and compressed.

The flower-buds are about 2 cm long, purplish and lustrous, the operculum being short with a small boss-like apex. The filaments are white.

The plate is prepared from the original material and shows the twigs and buds. The species has not been sighted since its discovery in 1905.

41. **Eucalyptus cliftoniana** W. V. Fitzg.

Desert Bloodwood

Desert Bloodwood grows at Mount Anderson among sandstone rocks; but the author of the species W. V. Fitzgerald also recorded it from Grant Range, Packhorse Range and from the summit of Bold Bluff in the King Leopold Range. What appears to be the same species, though not seen in fruit, occurs on the red sandy country between Margaret River and Bohemia Downs Stations. It has also been collected on Carlton Station near the Northern Territory boundary.

The tree is named after R. C. Clifton, a former Under-Secretary for Lands in Western Australia. It is a bloodwood attaining a height of about 10 m with rough, persistent bark throughout. The bark is scaly-fibrous, friable and somewhat tessellated and is reddish or grey.

The branches are mostly spreading or drooping and the leaves narrow, green and lustrous.

The flowers are white, in rather large, corymbose panicles, and the woody fruit is globular, often broader than its length, on a very short stalk. The thick rim slopes inward. The seeds are reddish-brown and winged.

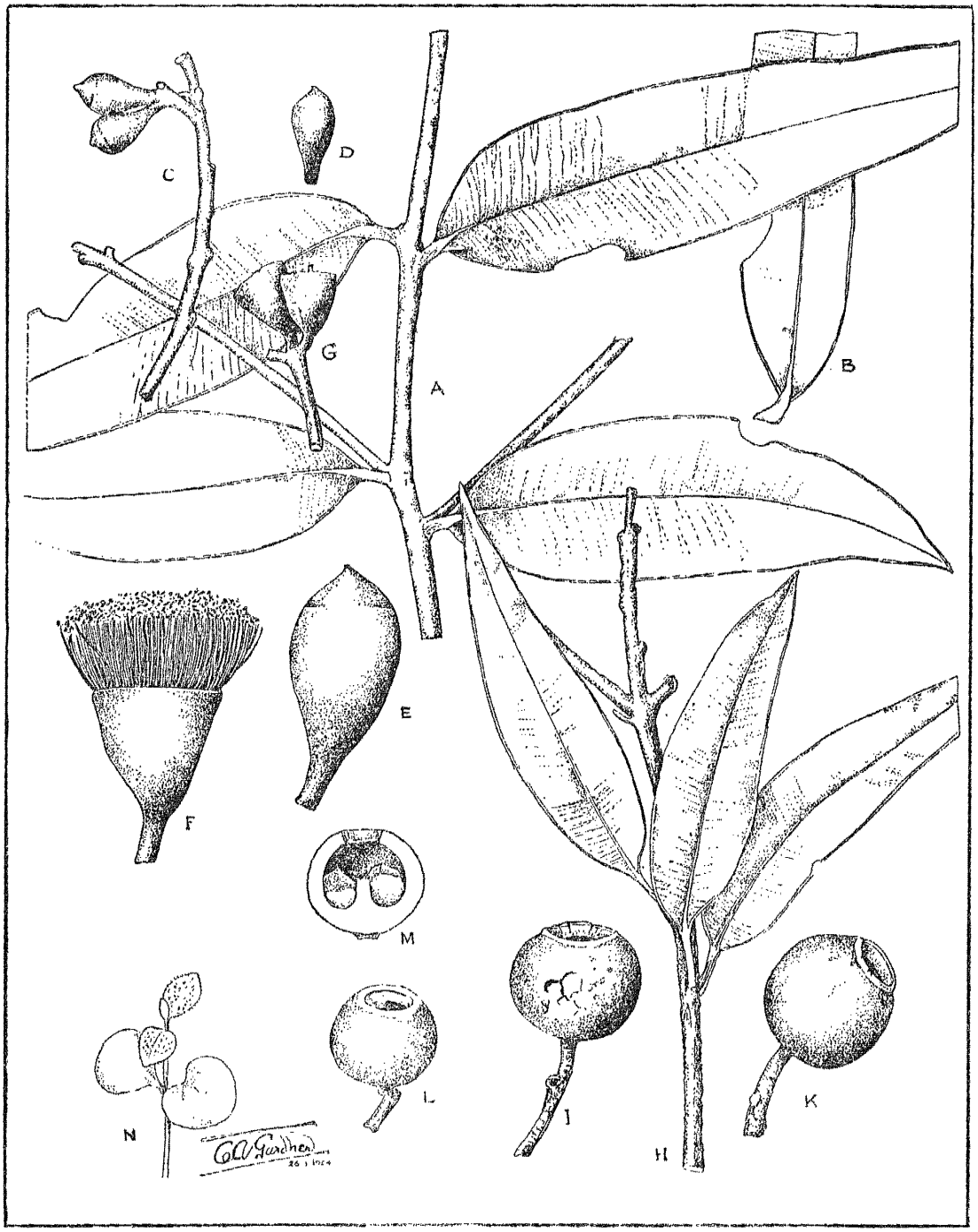

Fig. 31

Eucalyptus lamprocalyx A—Branchlet with leaves; B—Lower part of leaf showing distinctive leaf-stalk; C and D—Flower buds; E—Flower bud, slightly enlarged; F—Flower; G—Calyx after flowering. (Meda Station, Lennard River, W. V. Fitzgerald 416, April 1905).

Eucalyptus cliftoniana H—Branchlet with leaves; I, K and L—Fruits; M—Fruit in section; N—Cotyledons. (Mount Anderson, W. V. Fitzgerald).

42. **Eucalyptus megacornuta** C. A. Gardn.

Warted Yate

Warted Yate was originally discovered by the writer in 1927 in the Ravensthorpe Range, and to date has only been found occurring naturally in one other locality, namely the Fitzgerald River National Park about 64 km south-west of Ravensthorpe.

The tree, which attains a height of 8 m, resembles Gimlet in some respects, having smooth, rather thin, ashy-brown bark, a branching habit not unlike Gimlet, and hard, dark yellowish-brown timber. In other respects, however, there is no resemblance.

Warted Yate is remarkable for its large, green-filamented flowers, and its densely-warted operculum. This is long and horn-like except that it is obtuse at the tip. The base of the operculum shows a pronounced dilation with a dense row of closely-placed tubercles, those on the remainder of the cap being irregularly scattered.

Only two or three flowers occur at the end of the very thick peduncle which is dilated upwards, and the flowers are pendulous. These buds are more than 8 cm long, so that the flowers are relatively large. The green stamens are not incurved before the bud expands, but remain erect and wavy within the operculum. The fruit is hard and woody, somewhat bell-shaped and nearly 4 cm long. Broad processes of the disc overlie the valves.

Warted Yate is regarded by apiarists as one of the best nectar-producing species of *Eucalyptus* in Western Australia. Its planting on an extensive scale might serve a twofold purpose: it is a very desirable shade tree and one which is valuable for honey production. The leaves are very rich in oil, but this has not been chemically examined.

In the Ravensthorpe Range the tree grows in small, pure stands in gravelly declivities. It flowers in October and November. In cultivation it has proved hardy in the Banksia and Tuart sands of the Perth metropolitan area.

Warted Yate can be cultivated as a small ornamental tree and has been grown in eastern and western Australia as well as overseas, in California.

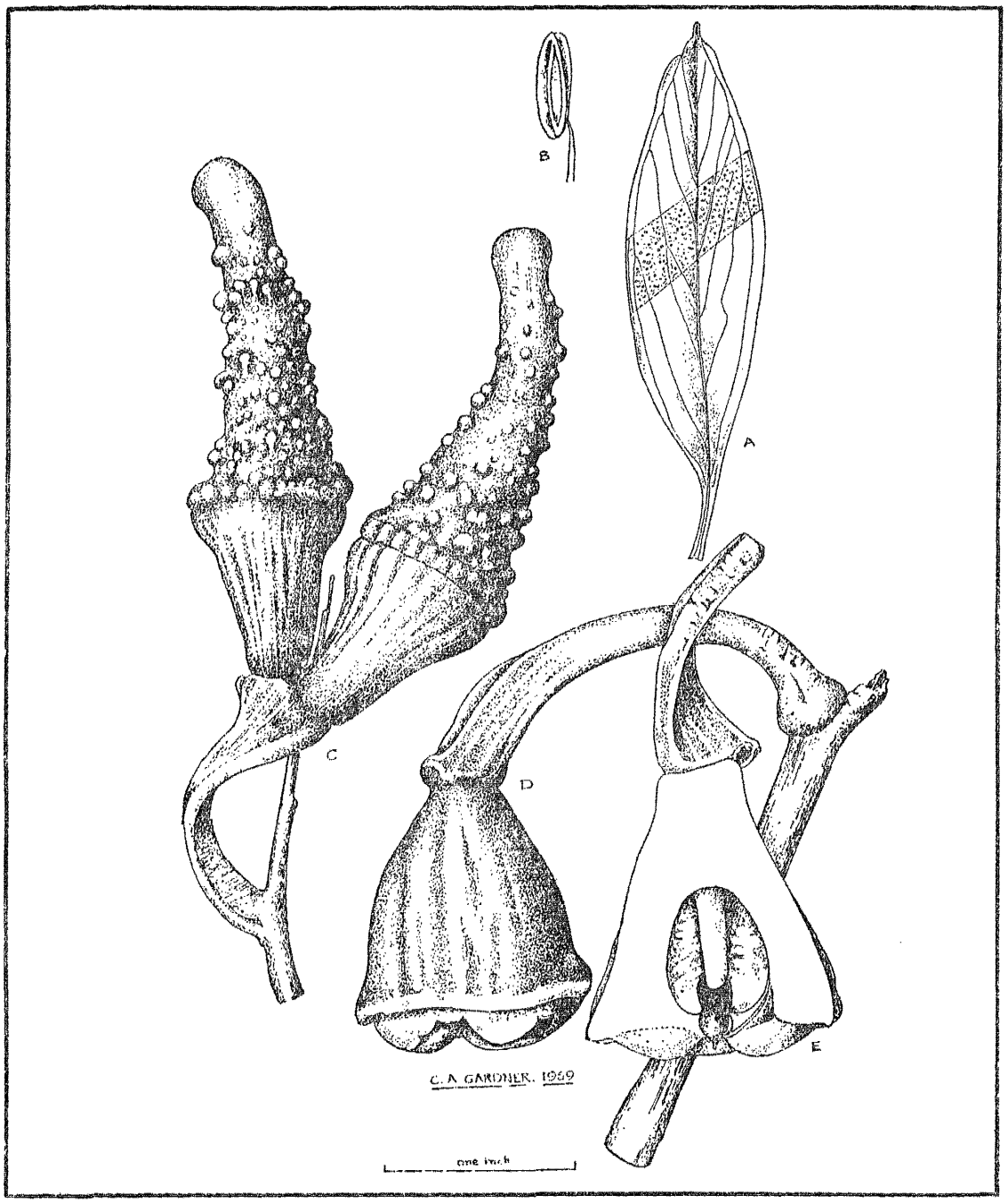

Fig. 32
Eucalyptus megacornuta A—Leaf; B—Anther; C—Flower buds; D—Fruit; E—Section of Fruit.

43. **Eucalyptus coronata** C. A. Gardn.

Crowned Mallee

Crowned Mallee is found in scattered spots on the hills of the south coast extending from and including Middle Mount Barren and East Mount Barren. Originally discovered on Middle Mount Barren in 1926, it has subsequently been found elsewhere, principally around East Mount Barren, growing among quartzite rocks and attaining a height of about 1.5 m, although usually less. In cultivation it grows somewhat taller, and has been widely cultivated in Victoria for windbreak purposes.

The principal features of the species are the remarkable ribbing of the buds and fruits, the curiously-shaped operculum, broadly and horizontally expanded at the base with the ribs expanded at the point where the cap joins the calyx, and the large globular tubercles which cover the valves of the fruit.

The fruit-valves, and correspondingly the tubercles, vary from four to six, and it is this crown of appendages which gives the mallee its common name. Another attractive feature of the quaintly-sculptured fruit is the broad wavy flower-stalk which is rigid, and takes on a variety of shapes. The filaments of the flowers are a pale yellow and expand to a diameter of nearly 4 cm.

The flowering season is in July and August.

Crowned Mallee has proved hardy in many types of soil, and would be suitable for planting anywhere where the annual rainfall exceeds 300 mm. It would be a desirable garden plant.

Crowned Mallee makes an attractive ornamental and may be suitable for coastal planting. It has been reported to be resistant to frost and drought.

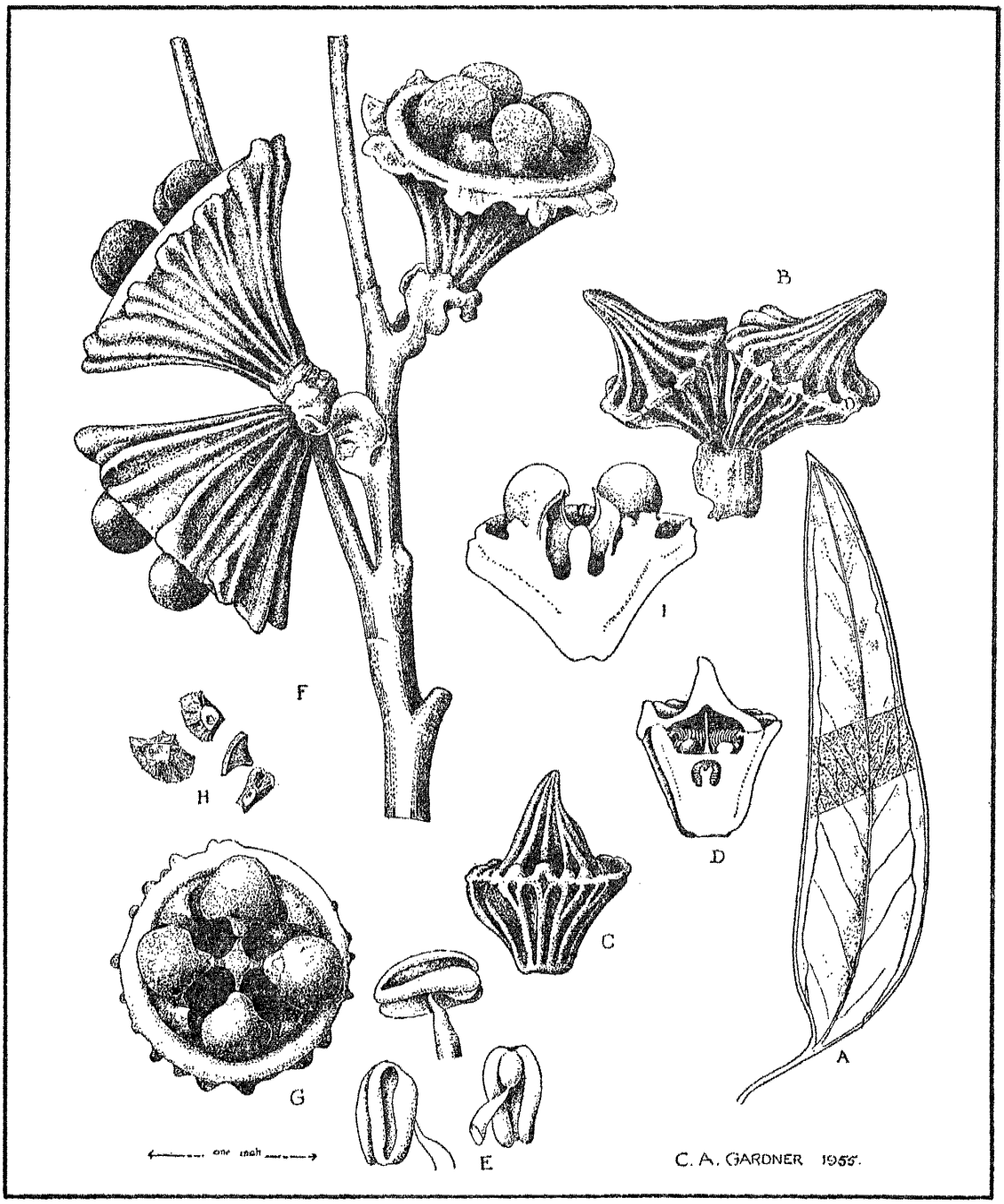

Fig. 33

Eucalyptus coronata A—Leaf; B—Flower buds; C—Single flower bud; D—Section of flower bud; E—Anthers; F—Branchlet showing fruits; G—View of fruit from above; H—Seeds; I—Section of fruit.

44. **Eucalyptus megacarpa** F. Muell.

Bullich

The name *megacarpa,* meaning large-fruited, is not particularly appropriate, for compared with other Western Australian species of *Eucalyptus,* the fruits of Bullich are not large. The species takes on two distinct forms. A tree form is found mostly in wet soils in the Karri and southern Jarrah forests extending from Jarrahdale on the Serpentine River to the vicinity of Albany, and also in the limestone soil of the valleys at Yallingup. A mallee form is found on the mountains of the Stirling Range, in shale and quartzite; this form is also found as far east as the Mount Barren Ranges. Both forms are attractive.

The tree form is not widely cultivated, but those who have seen specimens growing in the grounds of the University of Western Australia will have observed what must be regarded as one of the finest of our *Eucalyptus* species of the gum-tree type, with trunks of an alabaster whiteness with large patches of unshed violet-grey outer bark, and a very dense crown of dark green leaves. Unfortunately I do not regard this tree as suitable for general planting, but in places where its roots can reach the water-table it must be regarded as one of our best and most attractive shade-trees. The timber is very straight-grained, and pale.

The mallee form, found on the Stirling Range and adjacent quartzite hills, varies from 1.5 to 3 m tall and is a shrub with dark green leaves.

The main characteristics of the species are to be found in the fruit which is globular-hemispherical with a prominent rim, the disc continuous with the valves. The flowers are white, and the species flowers in October and November. The leaves yield 0.5 per cent. of oil.

Bullich is available in nurseries in eastern and western Australia.

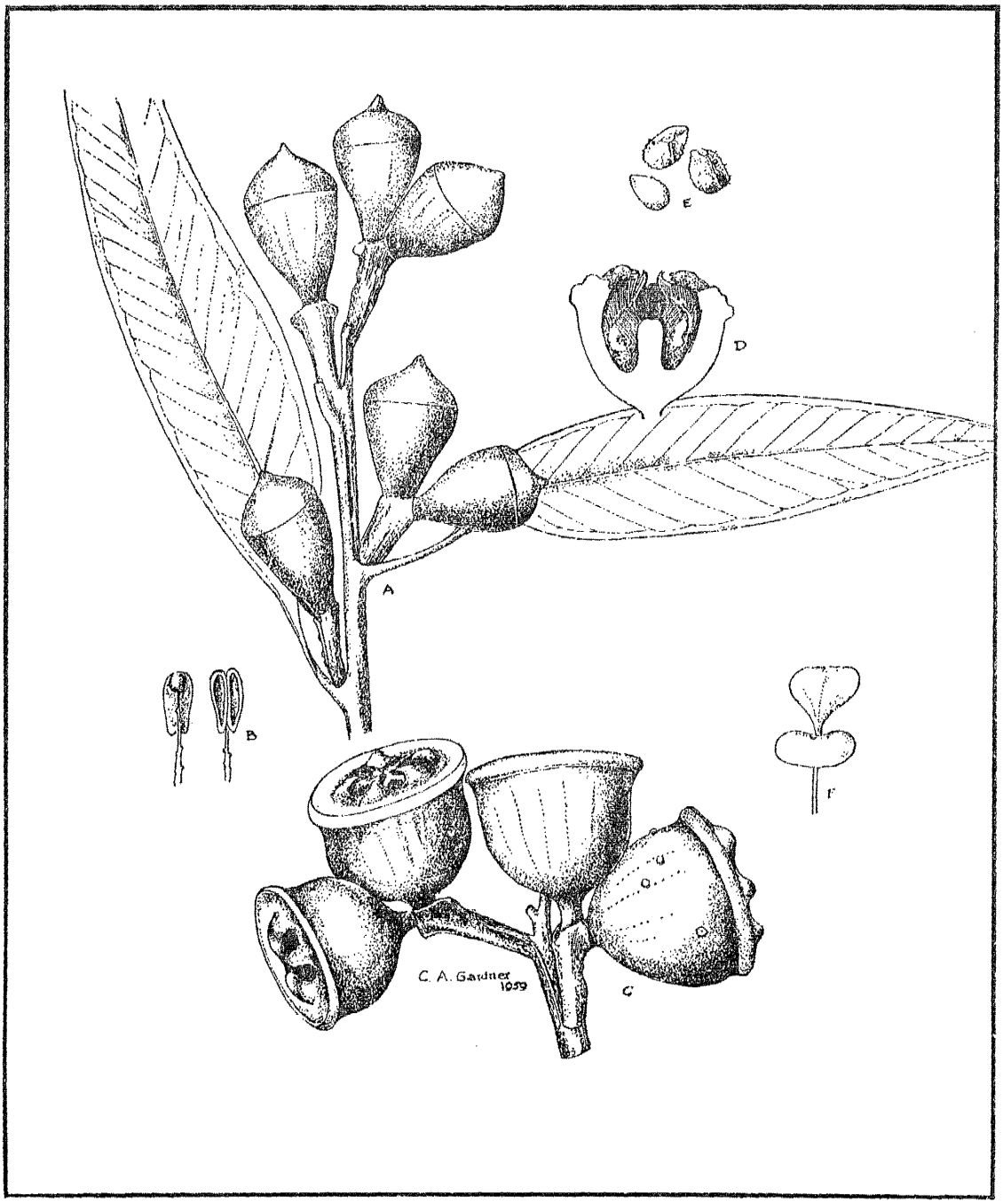

Fig 34

Eucalyptus megacarpa A—Branchlets with leaves and flower buds; B—Anthers; C—Fruits; D—Section of fruit; E—Seeds; F—Cotyledons.

45. **Eucalyptus preissiana** Schau.

Bell-fruited Mallee

Bell-fruited Mallee is one of the most attractive of our small shrubby species of *Eucalyptus*. It is found in the south coastal districts from the west end of the Stirling Range as far eastwards as Stoke's Inlet. Rarely exceeding 1.5 m tall, and of untidy, straggling habit, with stiff, blunt, grey-green leaves, its shortcomings in these respects are more than outweighed by its magnificent blossoms of rich yellow, and its attractive bell-shaped fruits. It grows in poor soils, such as stony sandstone country, usually on the open heath.

The name commemorates Ludwig Preiss, a botanist who visited the Swan River Colony in 1838 and resided there for four years. He often travelled with James Drummond, collecting specimens of plants and birds for the Hamburg Museum. Preiss penetrated as far inland as Wongan Hills, and took an overland journey to King George Sound far to the east of the present highway. He collected this species on the hills of Cape Riche, and described the plant as being 2.5 m tall.

Bell-fruited Mallee is well known in cultivation, but none of the specimens seen in the Perth metropolitan area compares with the forms seen in the native habitat, the flowers losing much in size and intensity of colour.

The species shows considerable variation in the shape of both the bud and the fruit. The operculum varies from merely convex to distinctly conical, and is usually red; the fruits normally have tubercles over the valves in the typical form but sometimes these are small and not at all conspicuous. A hybrid of *E. marginata* x *preissiana,* with small fruits and the disc tubercles almost non-existent, found on the Kalgan Plains, was formerly named *E. kalganensis.*

Bell-fruited Mallee is deserving of a place in gardens. It thrives in almost any type of soil, and would prove hardy in the wheat-growing areas of the South-West, especially when grown with other small shrubs such as *E. tetraptera* or *E. macrocarpa.* The flowering season extends from August to November.

Bell-fruited Mallee has been grown in eastern and western Australia as well as in some overseas countries. It has been reported to withstand (—4.4°C) frost in California.

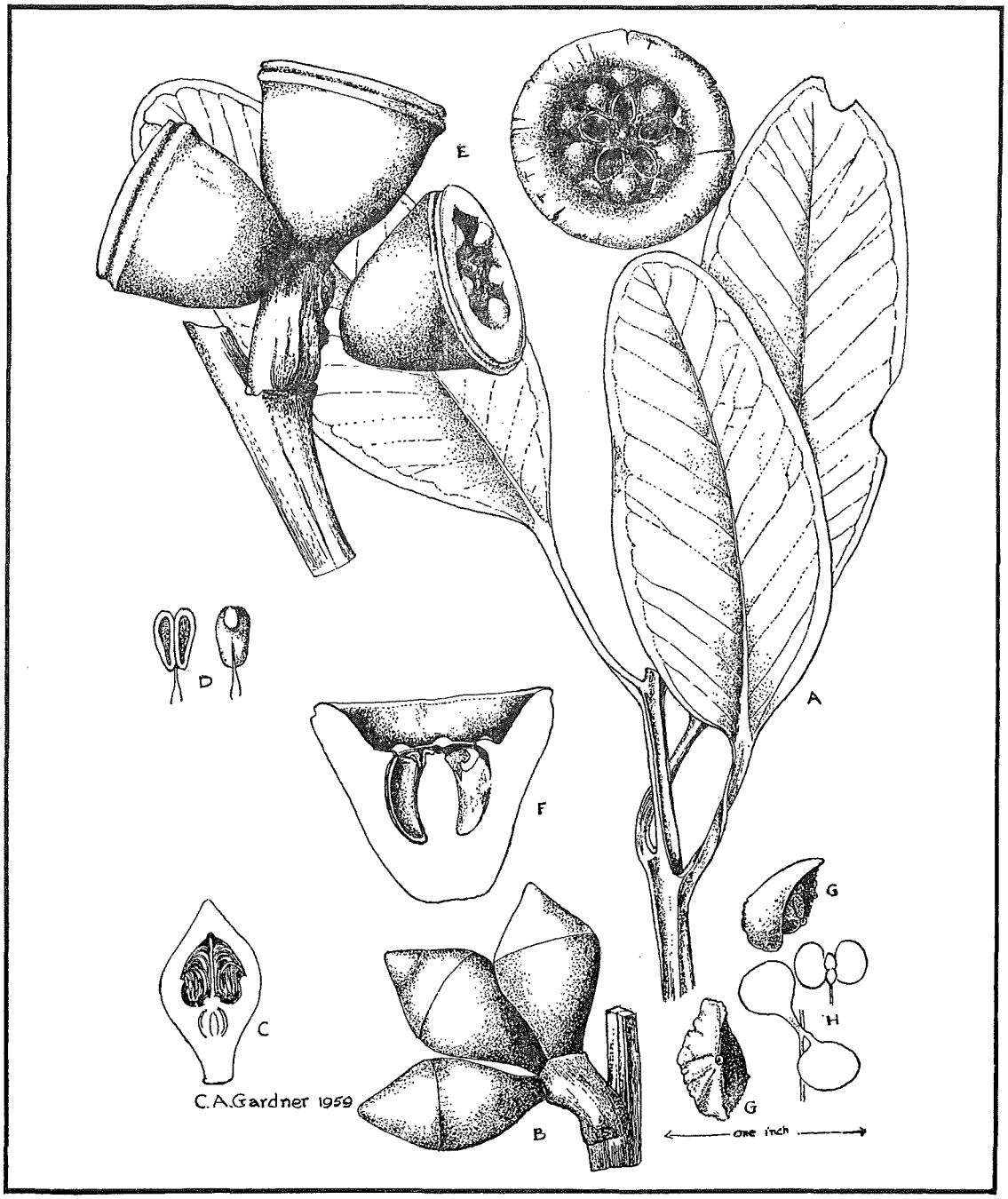

Fig 35

Eucalyptus preissiana A—Branchlet with leaves; B—Flower buds; C—Section through flower bud; D—Anthers; E—Fruits; F—Section of fruit; G—Seeds; H—Expanded cotyledons.

46. **Eucalyptus comitae-vallis** Maiden

Comet Vale Mallee

Editor's Note: Gardner included two taxa, *E. comitae-vallis* and *E. brachycorys,* Cowcowing Mallee, in his treatment of *E. comitae-vallis.* The taxon treated in this edition is *E. comitae-vallis,* which was illustrated by Gardner. *E. brachycorys* is found in the wheatbelt area from Mullewa southwards to Mount Holland. The two species are not known to overlap in distribution.

Comet Vale Mallee, formerly thought to be restricted to the Comet Vale district, is found from north of Laverton southward to Southern Cross and eastwards to near Balladonia.

It occurs as a mallee or tree up to 6 m tall, with rough flaky bark at the base and smooth, silvery-grey or greenish-brown bark above. The foliage is a lustrous green. The buds, up to seven in number, are borne on slightly flattened or angular pedicels.

The buds of *E. comitae-vallis* are not constricted, whereas the buds of *E. brachycorys* show a definite constriction at the join of the operculum.

E. comitae-vallis has a grey, deeply-pitted seed, while *E. brachycorys* has brown, shallowly-pitted seed.

Comet Vale Mallee flowers from June until September. It is worked by bees for nectar and pollen.

Comet Vale Mallee has been cultivated in eastern and western Australia. It could be useful for planting in mixed windbreaks.

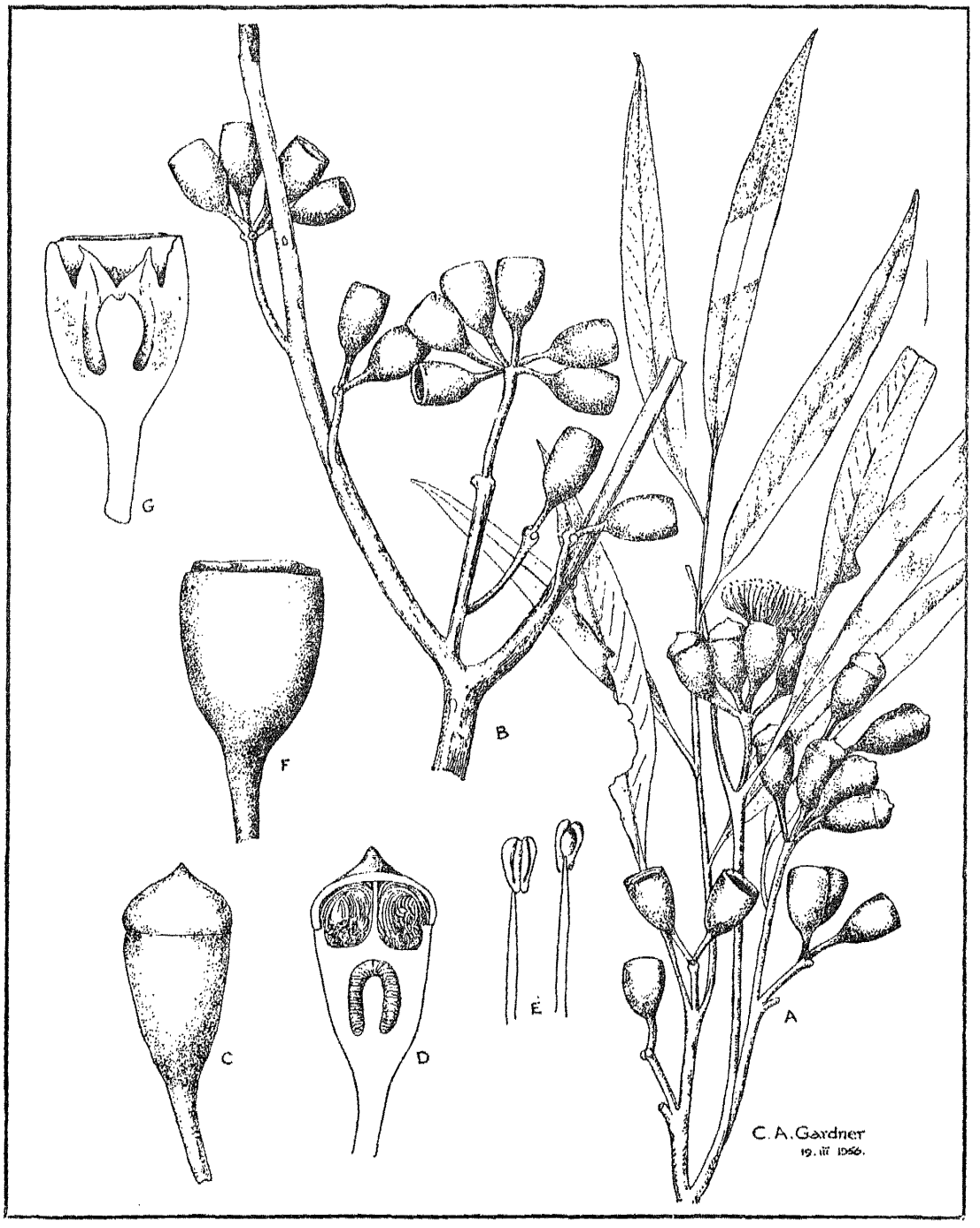

Fig. 36

Eucalyptus comitae-vallis A—Branchlets with buds, flowers and fruits; B—Branchlet with fruits; C—Flower bud; D—Section of flower bud; E—Stamens; F—Fruit; G—Section of fruit. (Comet Vale, Jutson).

47. **Eucalyptus cylindrocarpa** Blakely

Woodline Mallee

Specimens of Woodline Mallee were originally collected by J. B. Cleland, at Woodline, 100 km south of Coolgardie in September 1926. The locality reference was to the Kurrawang wood line, which supplied fuel and mining timbers to the goldfields, but apparently this was misread and, in a description published in 1934, the plant was referred to as the Woodbine Mallee.

This species has a wide range of distribution and is one of the commonest mallees to be found between Widgiemooltha and Kumarl, sometimes occurring as a tree not unlike the Salmon Gum, with which the mallee form is not uncommonly associated.

It extends eastward to Balladonia and northwards to Zanthus on the Trans-Australian Railway. The typical form is a mallee about 6 m tall with a rough bark on the lower parts of the stems and the bark of the upper portions varying from greenish red to light grey. The tree form has a perfectly smooth bark resembling that of the Salmon Gum, but the leaves are narrower and the branchlets tend to droop. The leaves are rich in oil. It flowers in December.

Woodline Malee, also found in the Holt Rock area, has alternate narrowly lanceolate to falcate leaves. The umbels have up to 13 pedicellate buds on a slender peduncle. The fruit is cylindrical or cup-shaped, the botanical name means cylindrical fruit, and the fruiting peduncle is sometimes curved so that the fruit hang downwards. The seeds are brown, elliptical, with a raised net-like pattern.

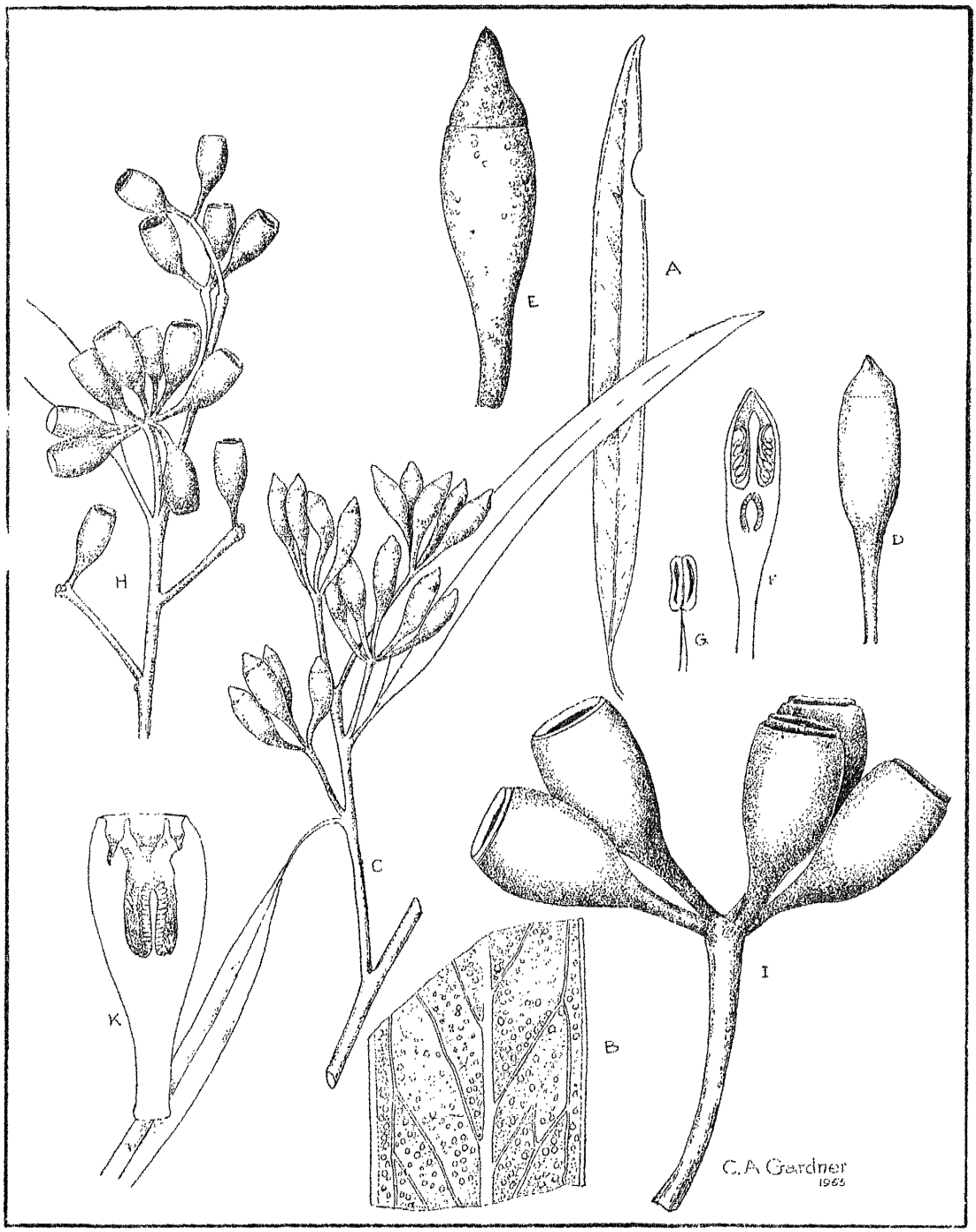

Fig. 37

Eucalyptus cylindrocarpa A—Leaf; B—Portion of leaf with epidermis removed showing oil cavities and veins; C—Branchlet with flower buds; D and E—Flower buds; F—Section of flower bud; G—Anther; H—Twig with fruits; K—Section of fruit.

48. **Eucalyptus sheathiana** Maiden

Ribbon-barked Mallee

In 1915, the late J. H. Maiden described a *Eucalyptus* from material received from J. Sheath, then Superintendent of King's Park, Perth, who stated that the seed was received from the Eastern Goldfields near the South Australian border.

In 1917, a further specimen collected from the Kununoppin district aroused much interest. It was not found to be common in the Kununoppin district and was in fact not rediscovered until 1957 when the writer connected the name with the common Ribbon-barked Mallee of the Yorkrakine area, growing in grey alluvial loamy soil associated with Wandoo. This mallee was particularly common from Hines Hill eastwards to Ghooli, and was also found commonly around Nembudding. Westwards it was found near Wyalkatchem.

The most peculiar feature of this species is the bark, which sheds in long ribbon-like flakes from the branches to the base of the stem, becoming free except at the top, and hanging for many weeks from February until August in this peculiar fashion. This ribbon-barked characteristic is not always reliable as a means of identification. The stocks and the stems are usually freely attacked by termites which eat out all the heartwood and so the older clumps usually have hollow and decaying stems surrounding the basal stock. The writer has not yet discovered a mature stem that was not so attacked. Although the bark is smooth in appearance, it is rather rough and prickly to the touch, and is a pale yellow-brown. The foliage is grey-green, and the blossoms are pale yellow. When in blossom, from March to August, this mallee is very attractive in its general appearance. It produces pollen and nectar.

Ribbon-barked Mallee has distinctive glaucous branchlets, buds and fruits. It has been cultivated and would be suitable as a specimen tree.

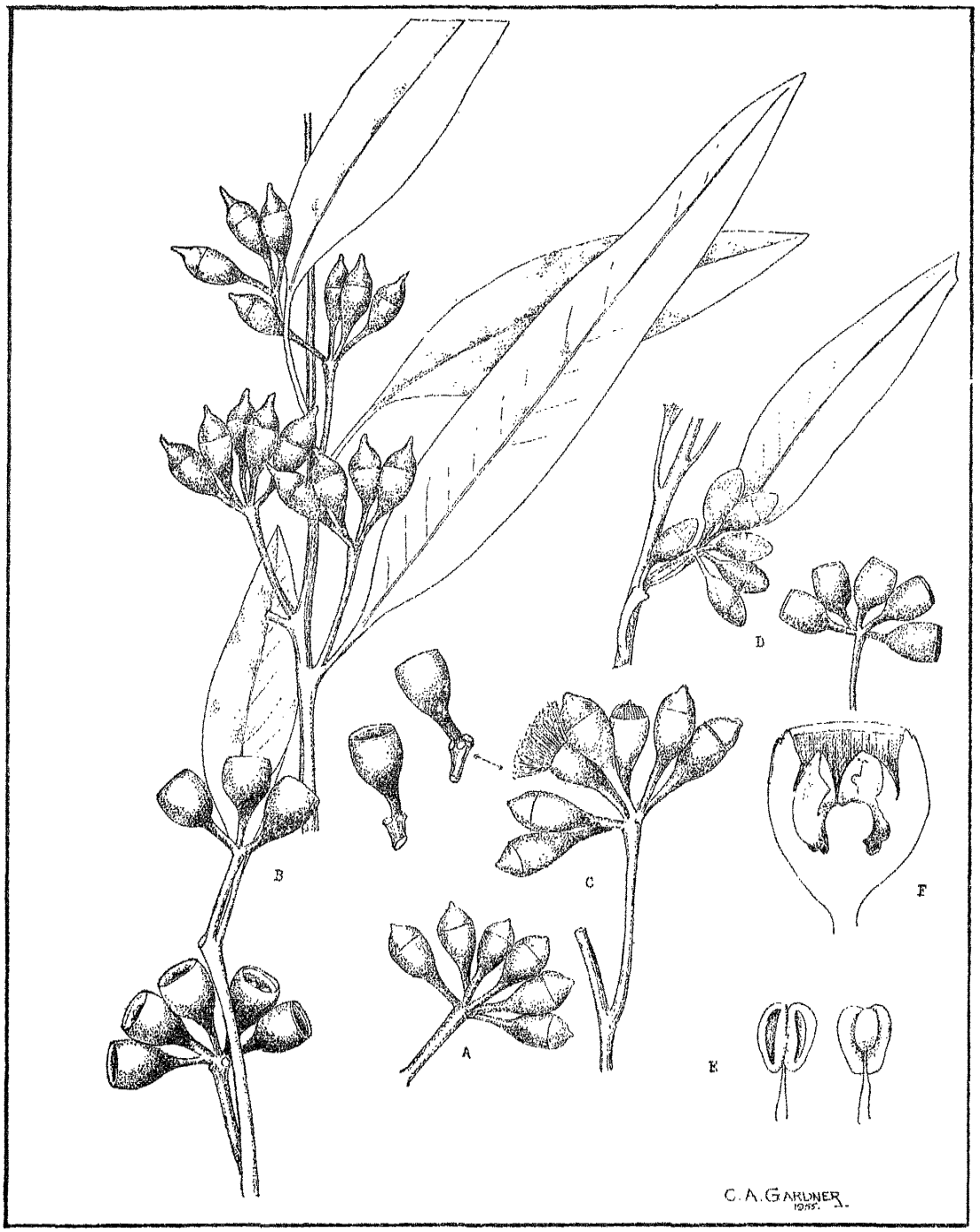

Fig. 38

Eucalyptus sheathiana A—Buds (King's Park, Perth-Sheath); B—Buds (near Nungarin-Brockway); C—Buds (Wyalkatchem—J. Reeves); D—Buds (Carrabin—Gardner 11828); E—Anthers from Sheath's specimens; F—Section of fruit (Gardner 11828).

49. **Eucalyptus burracoppinensis** Maiden et Blakely

Burracoppin Mallee

It is unfortunate that some authors should bestow place names on plants, especially when they are found in country which is botanically comparatively unexplored. We have, for example, *E. ebbanoensis* named after a water hole at Ebbano near Mingenew, but equally if not more common northwards from Kalgoorlie; *E. comitae-vallis* from Comet Vale is another which has a very extensive distribution, Comet Vale being near the western limit of its occurrence, while Burracoppin Mallee, *E. burracoppinensis,* which was originally thought to be restricted to Burracoppin, extends from Wyalkatchem and Bungulla eastwards to Karalee, northwards to Lake Brown and Campion, and southwards to near Kulin.

Of all the inland mallees which have a place in agricultural development as plants for windbreak purposes, Burracoppin Mallee should be of paramount importance in inland localities. Although in its natural state it may attain a height of nearly 6 m with erect, rigid branches when growing in thicket formations, its habit in the more open country, and especially along roadsides is entirely different. Here it seldom exceeds 3 m tall, is often even more in diameter, while the dense branches spreading down to the ground form a thick mass of branches and leaves rarely seen in other species if we except some of the species of the south coast.

The bark of the trunk is dark grey or almost black, that of the branches smooth and red or green, and the foliage characteristically yellow-green, sometimes almost a blue-green. The large flowers are creamy white, borne in clusters of three, and the species is eagerly sought by bees and other insects. It flowers from October to January.

Burracoppin Mallee has been cultivated in Western Australia and is also available in eastern Australia. Its large flowers makes this species a useful ornamental.

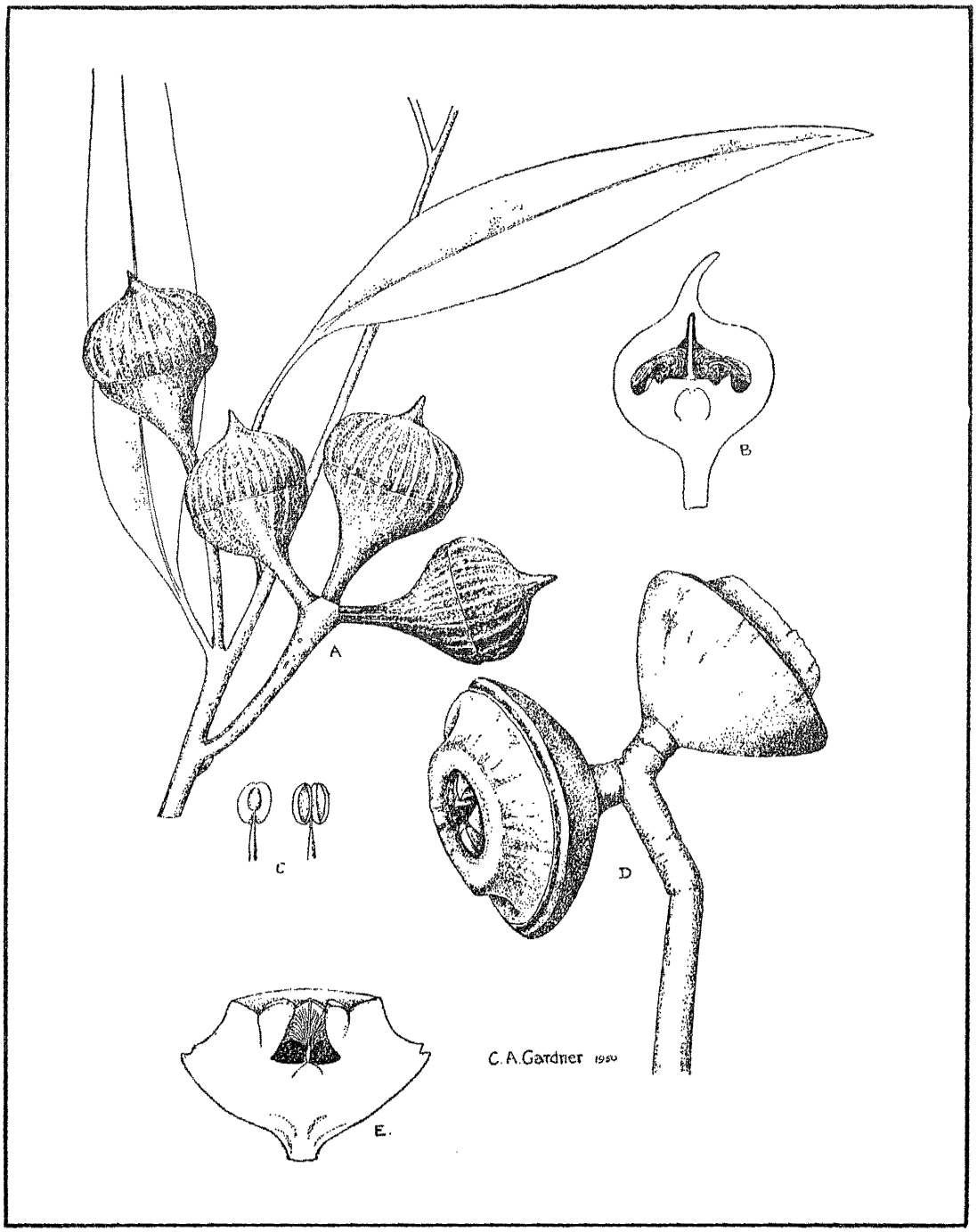

Fig. 39

Eucalyptus burracoppinensis A—Twig with leaves and flower buds; B—Flower bud in section; C—Anther (enlarged); D—Fruits; E—Section of fruit.

50. **Eucalyptus dielsii** C. A. Gardn.

Cap-fruited Mallee

Cap-fruited Mallee was first collected by W. T. Brown, a farmer of Salmon Gums in January, 1925, and the description published in 1926. It was regarded as rare until the writer in 1929 found it near Peak Charles, and again between Salmon Gums and Grass Patch, where it is a common mallee of the heavy clay crab-hole soils. It has subsequently been found westwards at least to the Rabbit-proof Fence near Ravensthorpe, always being indicative of the soil type mentioned.

The species is a mallee with erect stems from a small stock, and attains a height of 6 m, although usually less than 4 m tall, the slender stems covered with a thin green or reddish bark not unlike that of the gimlet. It is interesting to associate types of bark with different soil conditions, since there is a definite connection with many species, particularly those of the heavy clay soils and those restricted to granite outcrops, the latter frequently having a green inner bark overlaid by an outer crisped cinnamon-coloured bark.

Cap-fruited Mallee has erect, bright green, lustrous foliage like that of Gimlet, but the most notable feature is the disc of the fruit which is domed and much broader than the calyx. This is the result of the development of the outer disc which, at the time of flowering, lines the lower part of the operculum, a feature only to be found otherwise in *E. erythronema*, Red-flowered Mallee. The flowers of *E. dielsii* are always white and appear in the summer months.

The name *dielsii* commemorates Ludwig Diels, formerly of the Berlin Botanic Gardens, who visited Western Australia at the turn of the century.

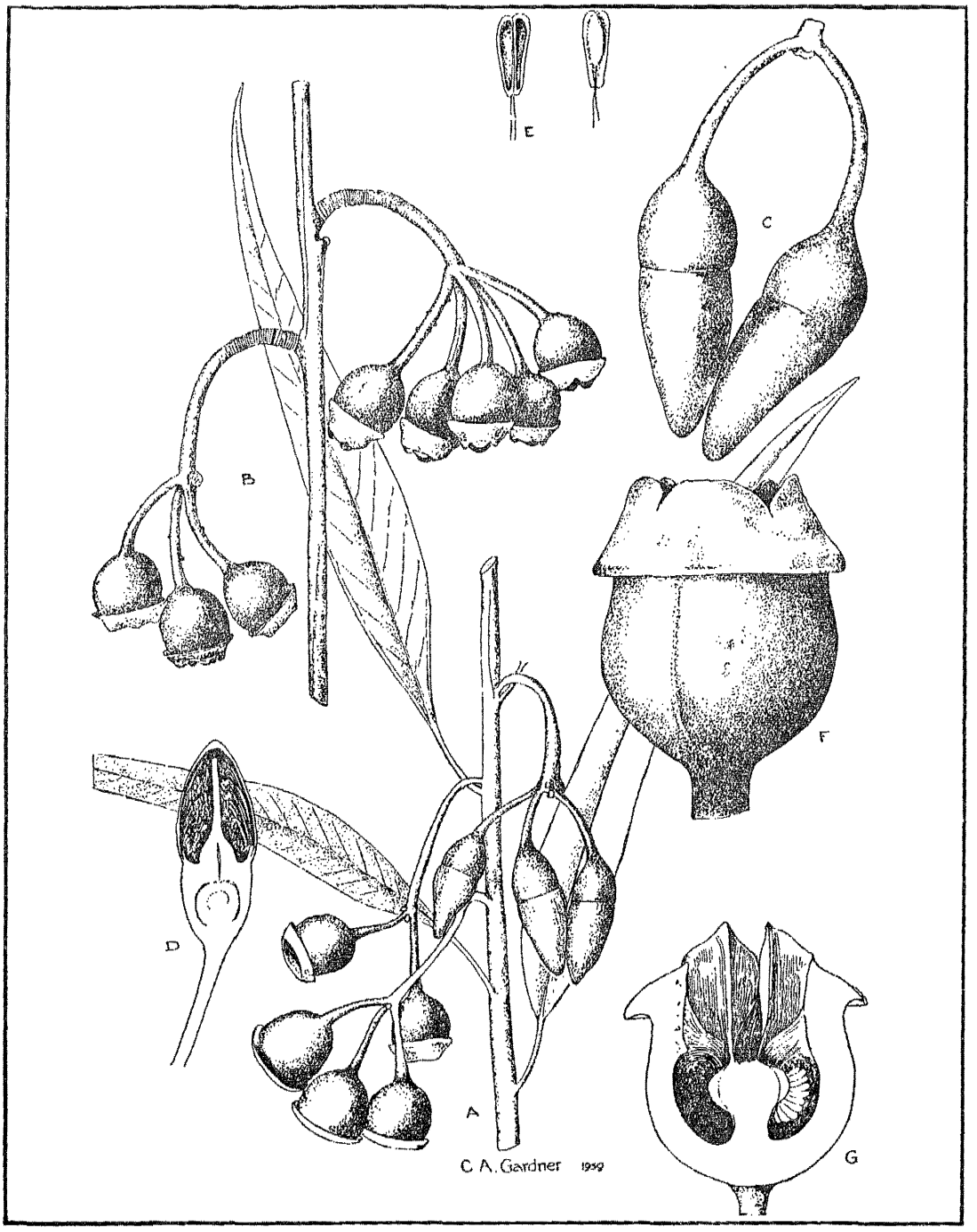

Fig. 40

Eucalyptus dielsii A and B—Branchlets with flower buds and fruits; C—Flower buds; D—Section of flower bud; E—Anthers; F—Fruit; G—Section of fruit. (C, D, E, F and G variously enlarged).

51. **Eucalyptus doratoxylon** F. Muell.

Spearwood Mallee

Spearwood Mallee is probably so-named because the unusually straight and slender stems were used for making spears by the early south coastal natives. It is always a mallee, seldom exceeding 5 m but more commonly 2 to 3 m tall, the bark is white and smooth, thin in texture, and shedding in small reddish-purple flakes.

The leaves are almost always opposite, erect or spreading, and lively green. The flowers and fruits are borne in umbrels with slender peduncles and pedicels, and are drooping. The operculum is sharply beaked, and yellowish-white which contrasts with the green calyx-tube. The filaments are white, and the flowers relatively small. It flowers in late spring. Altogether this species is both slender and very attractive.

E. doratoxylon is found mainly on the stony hills of the south coast from the Stirling and Porongurup Ranges as far eastward as Cape Arid and the Russell Range. It exhibits a preference for protected situations in rocky places, either in granite, sandstone or quartzite, and ascends the Stirling Range, to an altitude of 900 m and the summits of the Mount Barren Ranges to the east.

The name *doratoxylon*, meaning spearwood, refers to the use of the species in spear-making. Spearwood Mallee is available for cultivation in both eastern and western Australia.

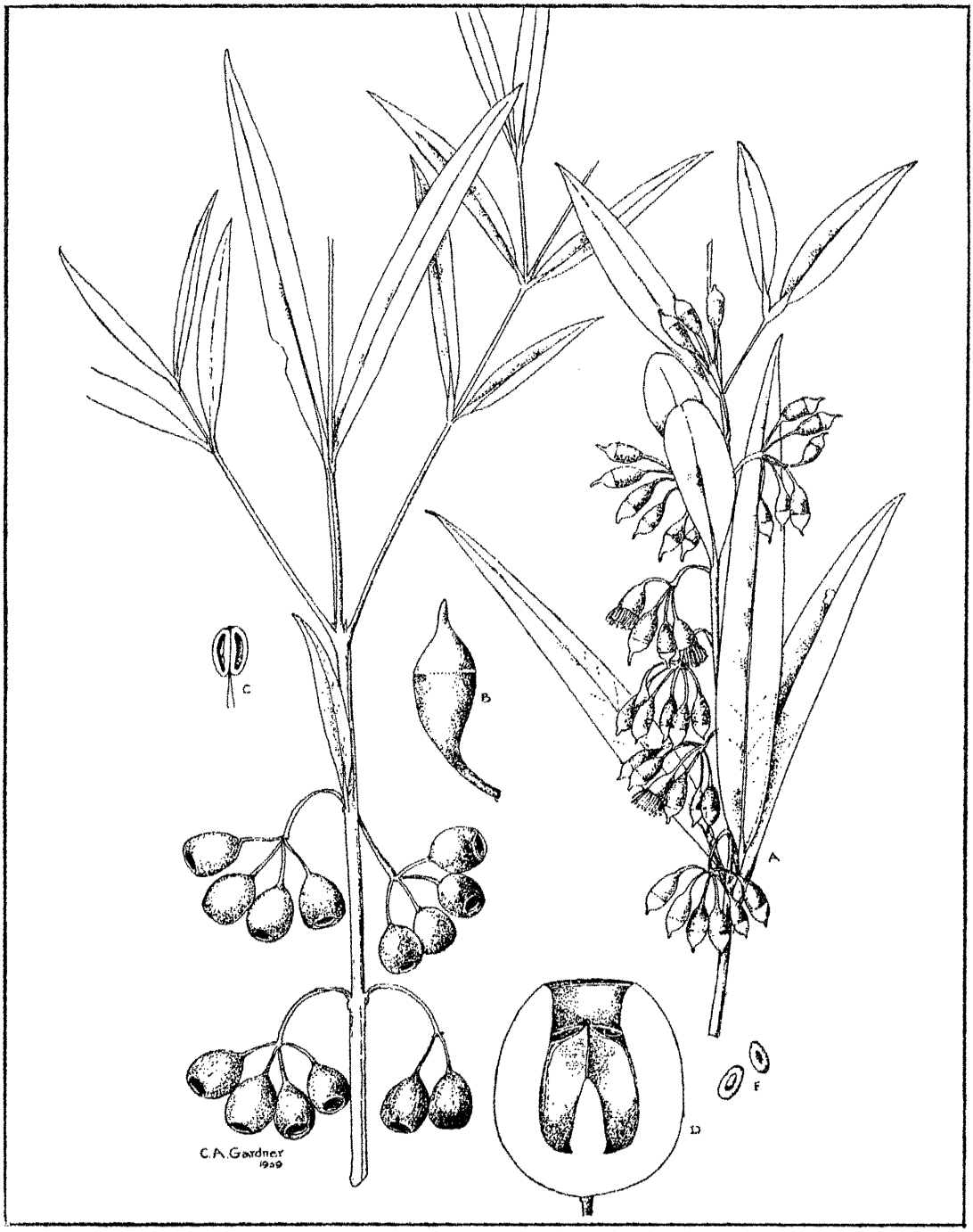

Fig. 41

Eucalyptus doratoxylon A—Branchlet with leaves and flower buds; B—Flower bud; C—Anther; D—Fruit in section; F—Seeds. (Toolbrunup, Gardner).

52. **Eucalyptus buprestium** F. Muell.

Apple Mallee

About the year 1862, G. Maxwell, who was collecting for Ferdinand von Mueller, collected the Apple Mallee on the Kalgan Plains between Ellens Peak and the Pallinup River. He noted that the flowers attracted large numbers of jewel beetles (*Buprestidae*) and thus Mueller gave the species the name *buprestium*.

Apparently it was not at the time known that most of our summer-flowering mallees commonly attract many species of *Stigmodera* in large numbers so that the name given to this plant is not very appropriate. On the other hand, the fact that this *Eucalyptus* has a remarkable characteristic in that the small globular apple-like fruits remain soft until the seeds are ripe, suggests the common name given above.

E. buprestium has a somewhat restricted range, in the south, being found around the Stirling Range, on both the north and south sides, but more commonly to the south, as far east as Bremer Bay. It is found in sandy places, and may reach a height of 5 m, but is commonly much smaller, being 2 to 3 m tall, with thin erect stems and a pale yellow smooth bark, although the branchlets are purplish. The small leaves are thin, bright green, and prominently and openly veined.

The small flowers are white and the globular fruits have a deeply immersed capsule. It is related to *E. todtiana,* Pricklybark, but is never a tree just as the latter is never a mallee. Pricklybark has a characteristically rough prickly bark and thicker pale leaves.

Apple Mallee is available for cultivation in eastern Australia.

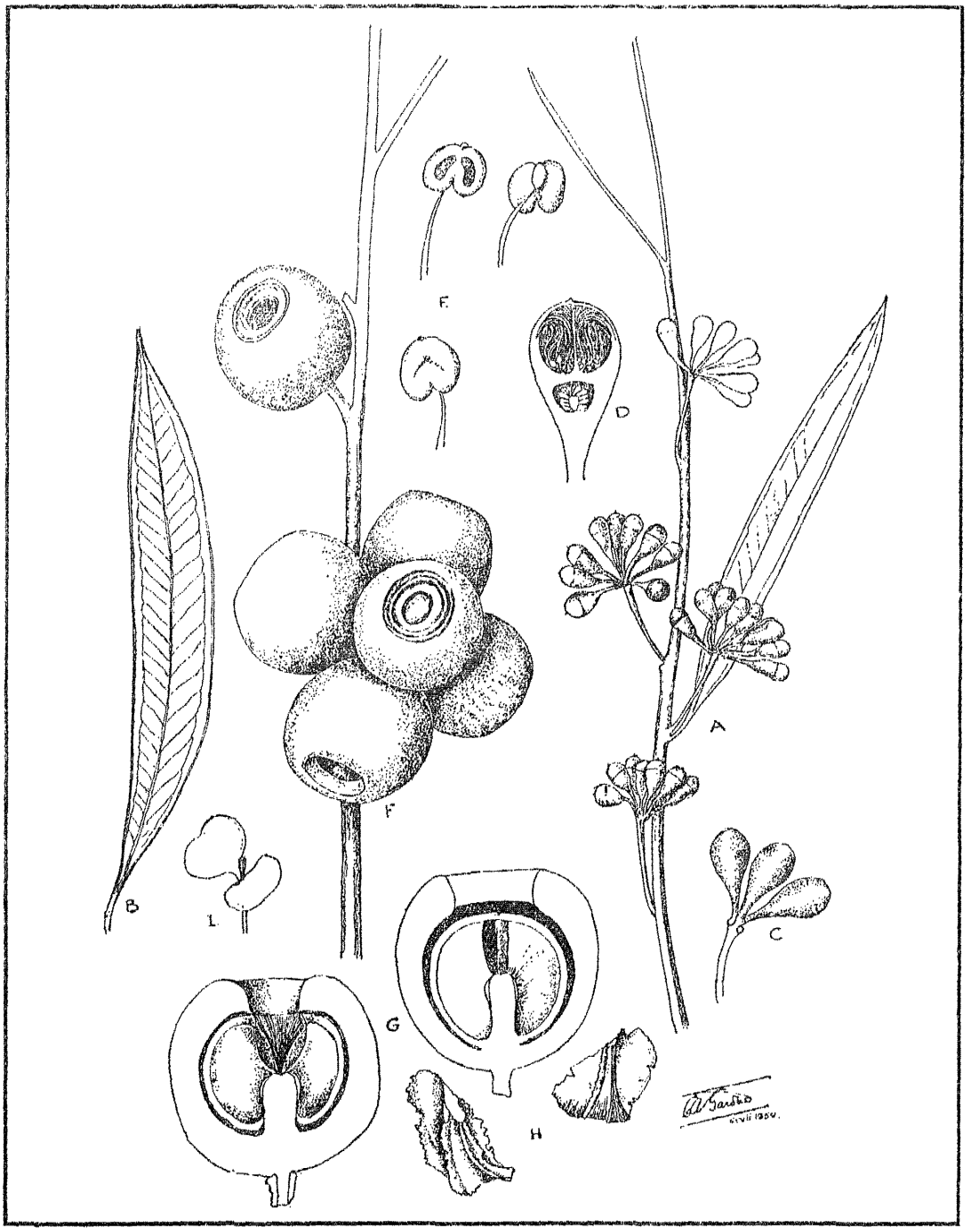

Fig. 42

Eucalyptus buprestium A—Branchlets with leaf and flower buds; B—Leaf; C—Flower buds taken from an umbel; D—Section of flower bud; E—Anthers; F—Fruits; G—Fruits in section (note the free capsule); H—Seeds; I—Seedling. (C, D, E, G and H variously enlarged).

53. **Eucalyptus merrickiae** Maiden et Blakely

Goblet Mallee

(Syn. **E. dumosa** A. Cunn. var. **scyphocalyx** F. Muell. ex Benth.

E. scyphocalyx (F. Muell. ex Benth.) Maiden et Blakely)

Editor's Note: Gardner called this species *E. scyphocalyx,* but under the International Rules of Botanical Nomenclature the correct name is *E. merrickiae,* a correction of the orthographic error *E. merrickae.*

The development and opening up of our agricultural areas, while in some cases leading to the unfortunate extermination of certain rare species, has, on the other hand, rendered accessible certain areas for botanical exploration which were previously unknown. Goblet Mallee has long been regarded as a very imperfectly-known and rare plant which was originally discovered in about 1850 at Eyre's Relief Camp, on the Great Australian Bight. It was probably discovered by George Maxwell, who unfortunately made no notes on its habit or distribution. Maiden and Blakely named it *E. scyphocalyx* in 1933.

In May 1924, the writer discovered a mallee on the shores of a small salt lake near Grass Patch, which was named *E. merrickiae* by Maiden and Blakely in 1925. This plant and the Eyre's Relief Camp plant are considered to be forms of the one species.

The Grass Patch form of *E. merrickiae* is found in the Circle Valley, Grass Patch and East Dowak area. A variety of the species extends westward as far as Newdegate and South Kumminin. Eastwards Goblet Mallee occurs past Zanthus. The Circle Valley and Grass Patch plants are densely-branched, widely-spreading mallees up to 3 m tall, with narrow leaves of a pale greyish or yellowish green, and a rough grey bark, which gives them a distinctive appearance. Apparently the plant is highly salt-tolerant. The broader-leaved variety is smooth-barked in the upper parts, and is sometimes a small tree. It flowers in September.

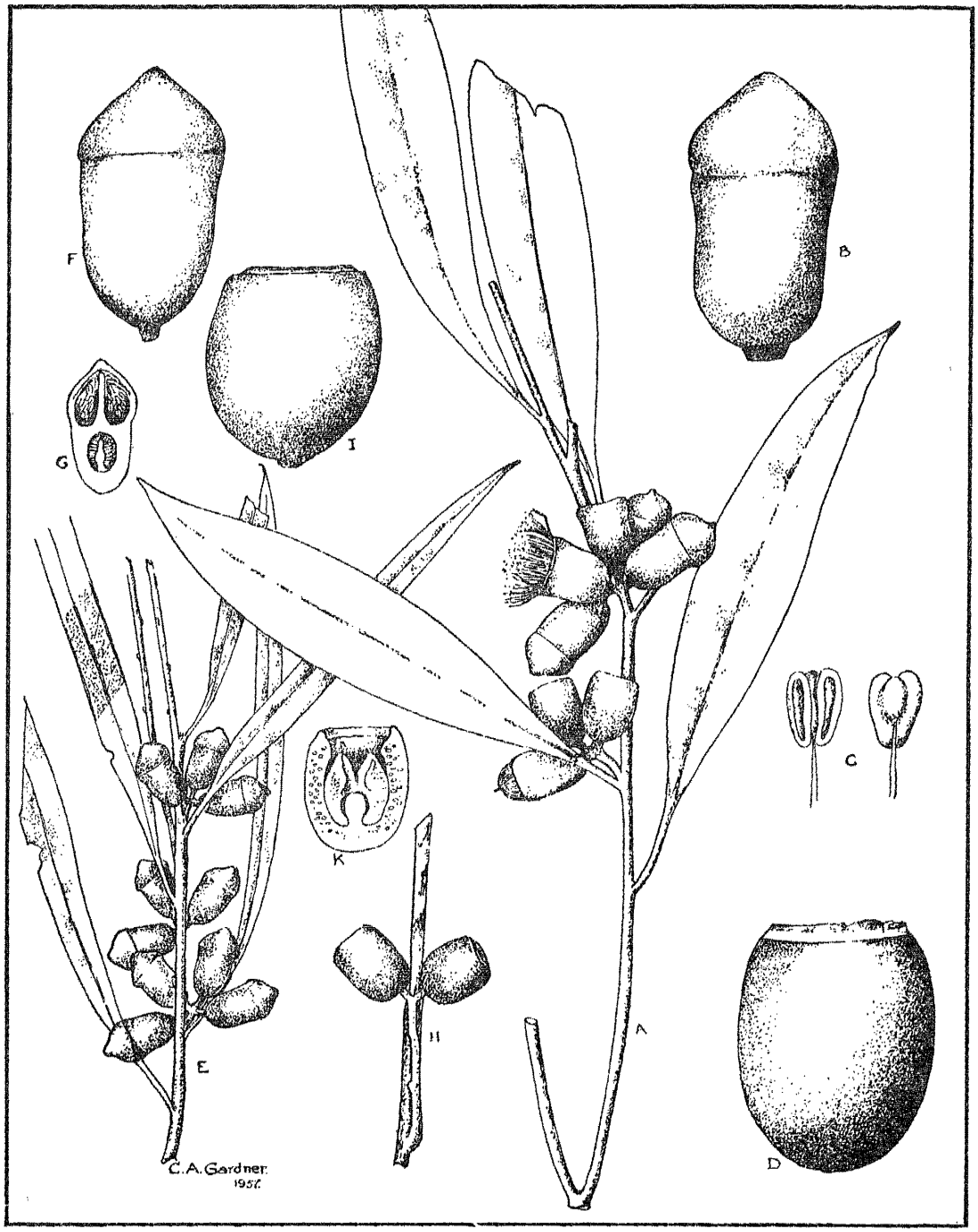

Fig. 43

Eucalyptus merrickiae A—Branchlet with buds and flowers; B—Flower bud; C—Anthers (after Flockton); D—Fruit; E—Branchlet with buds; F—Flower bud; G—Flower bud in section; H—Fruit; K—Section of fruit. (B, D, E, F, G and I variously enlarged). (A-D Eyre's Relief, Maxwell). (E-K Grasspatch, Gardner).

54. **Eucalyptus polycarpa** F. Muell.

Small-flowered Bloodwood

Small-flowered Bloodwood, which grows to about 10 to 12 m tall is one of the common rough-barked trees of the open woodlands of the Kimberley region, where the soil is sandy, and it is often associated with *E. miniata,* Melaleuca Gum.

The bark is usually dark grey and the species is sometimes called by the local inhabitants Ironbark, a name that should be reserved for *E. jensenii*. Unlike a true Ironbark which has a hard, black or dark-grey bark, this bloodwood has a friable bark which is brown in fracture, and the timber is red and rather soft. The bark is also somewhat tessellated, while that of the true ironbark is deeply longitudinally fissured.

The tree has a wide range from southern New Guinea to the northern parts of Australia. In Western Australia it occurs from Broome and Derby, where it grows in red sand, to the high plateau country to the north of the King Leopold Range, where it occurs commonly in the *E. tetrodonta,* Darwin Stringybark, woodland, being very common on the low sandy flats, especially between the Edkins Range and Karunjie.

Small-flowered Bloodwood, the leaves of which are markedly discolorous, has a wide distribution in the northern half of Australia. It also is found in eastern Papua.

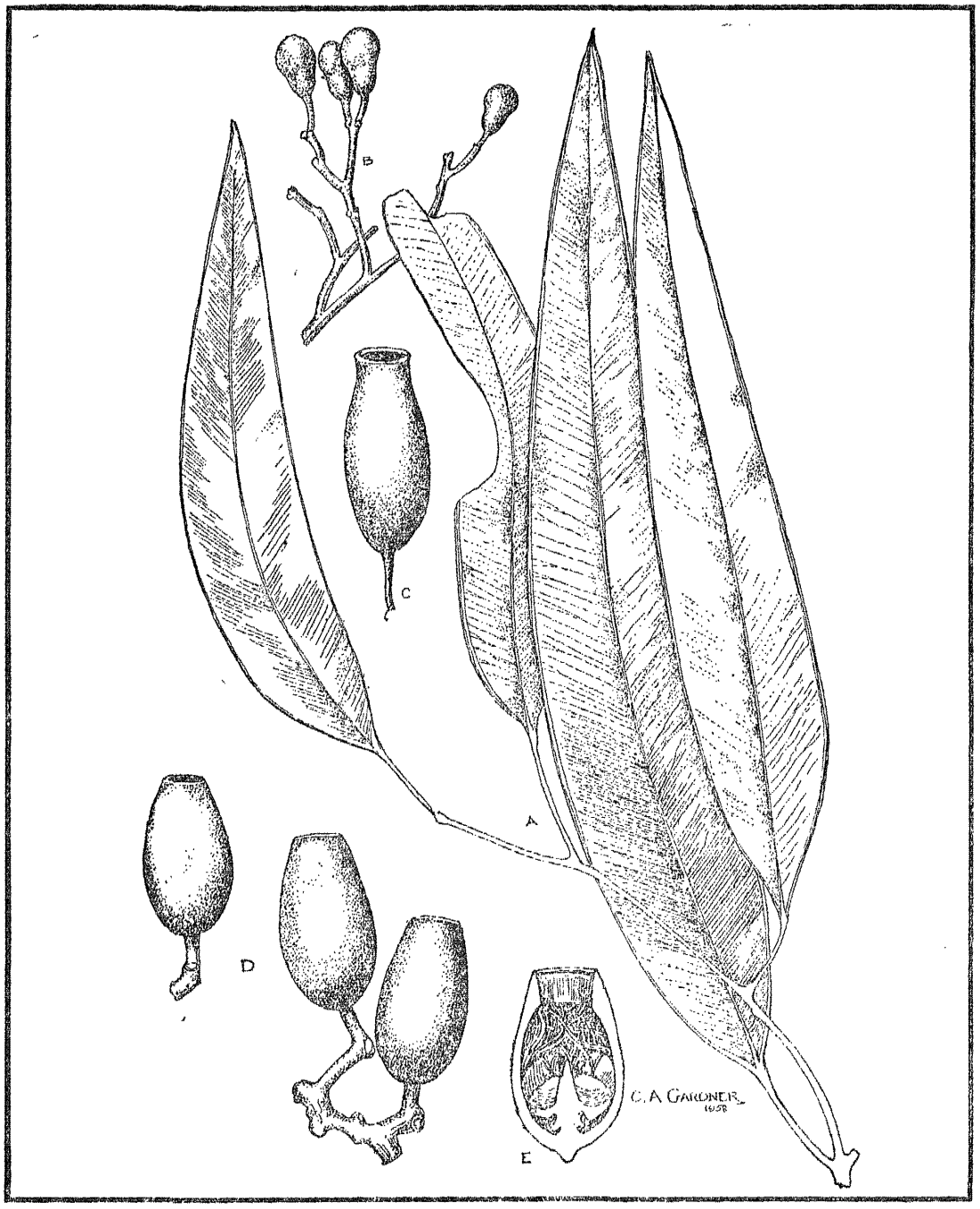

Fig. 44
Eucalyptus polycarpa A—Leaves; B—Flower buds; C and D—Fruits; E—Section of fruit.

55. **Eucalyptus terminalis** F. Muell.

Inland Bloodwood

Inland Bloodwood has been found in the Kimberley region southwards, through the Pilbara region, to near Wiluna. First collected on the summit of Bold Bluff in 1904 by W. V. Fitzgerald, it has subsequently been found at Gibb River, on high stony hills near Karunjie and in many other localities. The accompanying plate was made from material collected at Gibb River in 1952.

The tree has a smooth white bark which sheds in thin plates, is persistent, scaly and mottled with reddish patches near the ground. The leaves are dull green and rather thick, while the buds and fruits are on long stalks, the buds in particular being covered with small scurf-like scales. A feature of some of the trees is that they tend to produce on their smaller branches thin grey hairy leaves resembling sucker leaves. This may not be sufficient to entitle such trees to a distinctive specific name. The bloodwoods of tropical Australia are difficult to determine because many are only known from inadequate fragments, some in bud only, others consisting of fruits.

The timber of *E. terminalis* is red and the tree secretes an appreciable quantity of kino from its bark. The kino is deep red and not unlike that of the common Marri of the South-West.

Inland Bloodwood, the leaves of which are concolorous, is widely distributed in the central and northern parts of the arid and semi-arid zones of Australia.

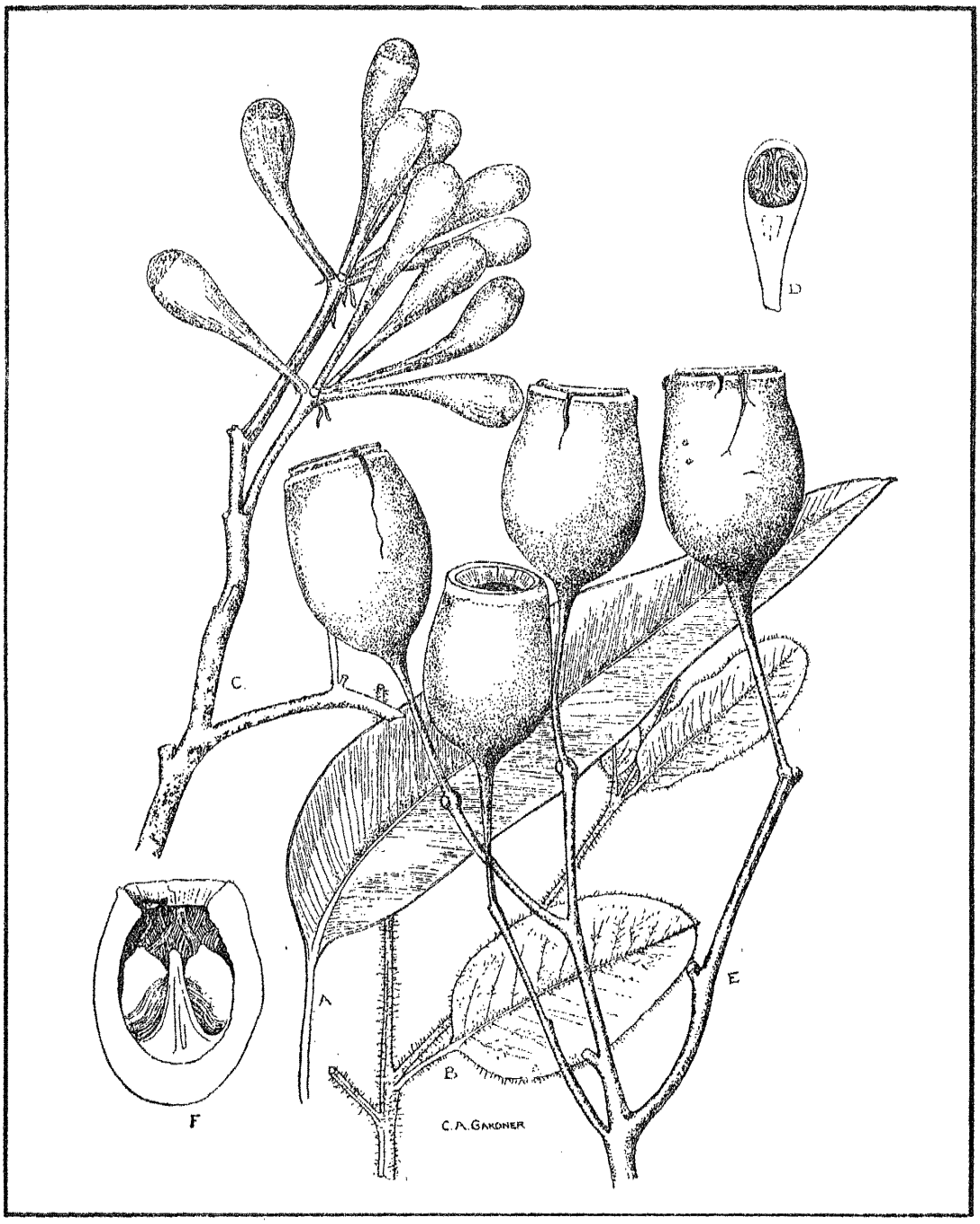

Fig. 45

Eucalyptus terminalis A—Leaf; B—Abnormal leaves; C—Flower buds; D—Section through flower bud; E—Fruits; F—Section through fruit. (Gibb River, Gardner 9923).

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56. **Eucalyptus argillacea** W. V. Fitzg.

Northern Grey Box

Northern Grey Box was first collected by W. V. Fitzgerald in 1905 on the clay shale flats which extend from Mount House to Mount Clifton between the Adcock and Throssell Rivers. It is a small tree, seldom exceeding 10 m tall, with widely-spreading branches, a light grey, rough, typically box bark, and a dense reddish-brown timber.

The name *argillacea* refers to the grey clay which supplies the necessary soil for its existence. It is curious that in the Mount House area this tree should be so completely restricted to this environment. The species has been recorded from near Derby, eastwards to Moola Bulla Station and the upper Ord River area in Western Australia. Its range extends further east, through the Northern Territory, into north-western Queensland. It is found in clay shales, heavy alluvials, red laterites, yellow sands and in broken limestones with very little soil.

Northern Grey Box, with leaves which may be glaucous or nearly green, has small glaucous buds and fruit which are glaucous to a varying degree. This species has an extensive distribution in northern Australia to the base of Cape York Peninsula.

Fig. 46

Eucalyptus argillacea A—Leaves and flower buds; B—Flower bud enlarged; C—Anthers; D—Fruits. (Mount House, Gardner 10051, 1952).

57. **Eucalyptus lirata** W. V. Fitzg. ex Maiden

Kimberley Yellowjacket

In May, 1905, W. V. Fitzgerald, a member of Crossland's trigonometrical survey party, climbed Bold Bluff in the King Leopold Range, and collected on the summit the first specimens of *E. lirata,* which he named from its occurrence on ridges of soil between rocks, from a Latin word meaning ridges between furrows.

The small original specimens of Kimberley Yellowjacket were in fruit only, and the only fragment collected came into the hands of the National Herbarium in Sydney. Nothing further was known of this species until the writer, on May 25, 1952, made an attempt to climb Bold Bluff. The condition of the track and other factors made it impossible to get within about 12 or 15 km of the objective, and another mountain was climbed, Mount Felix, where close to the summit this strange tree was found growing on ledges of soil alternating with quartzite rocks: a tree with a yellow fibrous bark not unlike a Paperbark Teatree, but of more open texture.

The original specimens were in fruit only, but the new locality yielded a fallen twig with dead buds attached. The species is thus adequately illustrated on the accompanying plate. Notable features are the twisted filaments, and the cylindrical, thin-rimmed fruits with pale yellow triangular concave valves protruding beyond the rim. The tree is about 6 m tall with slender branches and a relatively short trunk covered with remarkable bark which consists of thin, flaky, easily-separable layers of a delicate texture interspaced with longitudinal fibres. The leaves are pale green. This species is restricted to quartzite ridges from the King Leopold Range northwards to the Gibb River.

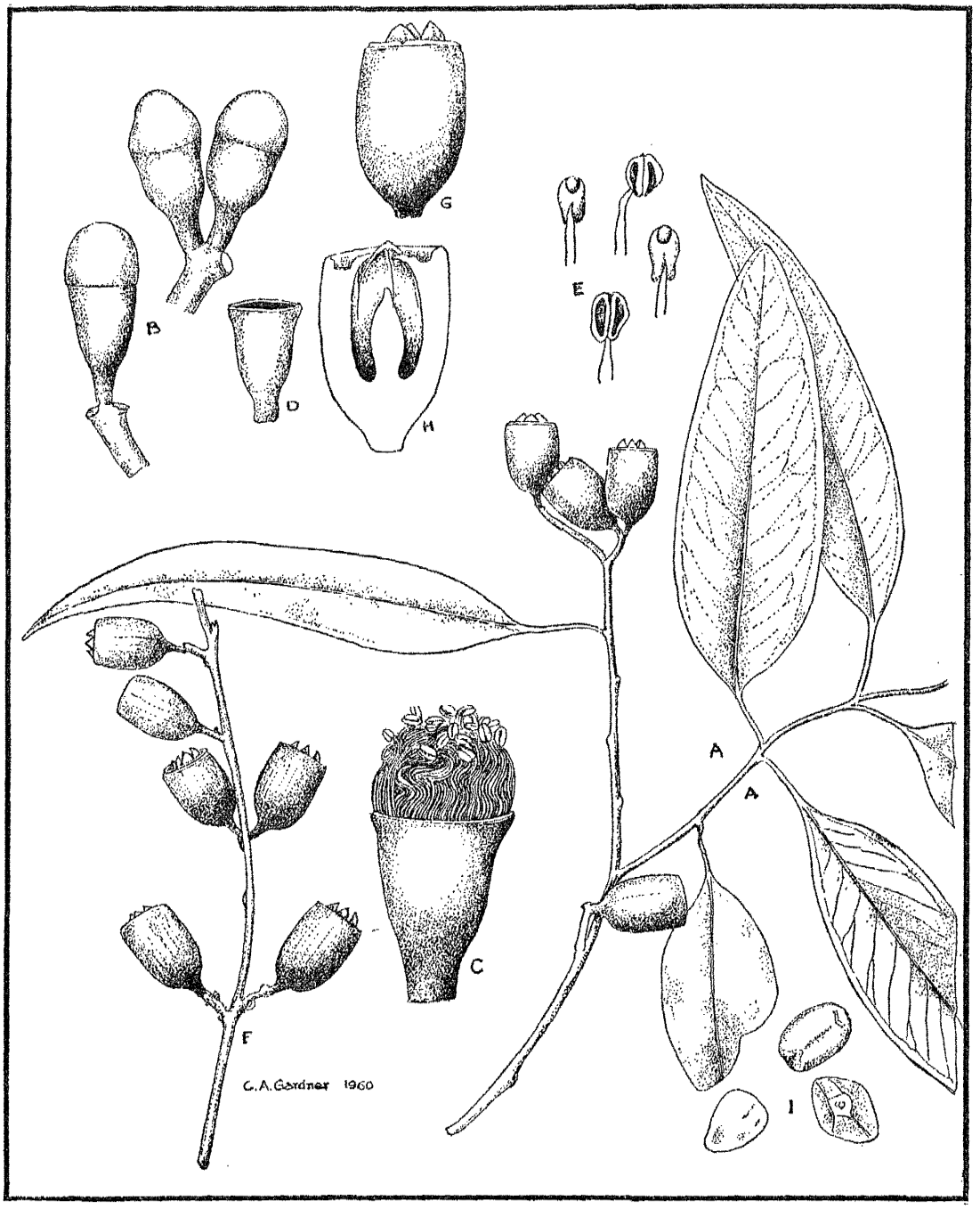

Fig. 47

Eucalyptus lirata A—Branchlet with fruits; B—Flower buds; C—Flower (enlarged); D—Calyx tube after flowering; E—Anthers; F—Branchlet with fruits; G—Fruit (enlarged); H—Section of fruit; I—Seeds. (Mount Felix, Gardner 11827).

58. **Eucalyptus mooreana** W. V. Fitzg. ex Maiden

Moore's Gum

Moore's Gum, discovered in 1905, is a small crooked tree less than 10 m tall, with a short trunk, both the trunk and branches having white, smooth bark, and a tough, moderately hard reddish timber. It is named after Newton J. Moore, a former Minister for Lands, subsequently Premier and Agent-General in London for Western Australia.

The leaves are always opposite and stalkless, with those of each pair often joined together at the base, pale grey-green, and up to 15 cm long and 10 cm wide; thick, rigid and conspicuously veined. The flowers are white. Little is known of this tree which was collected in the King Leopold Range in a few elevated spots; the summit of Mount Rason, not far from Mount Hart; the summit of Mount Broome which is 927 m high; Bold Bluff 841 m; and Mount Leake 685 m. It is thus a tree confined to relatively high altitudes and of very restricted occurrence, growing among quartzite rocks. It does not appear to have any close relatives.

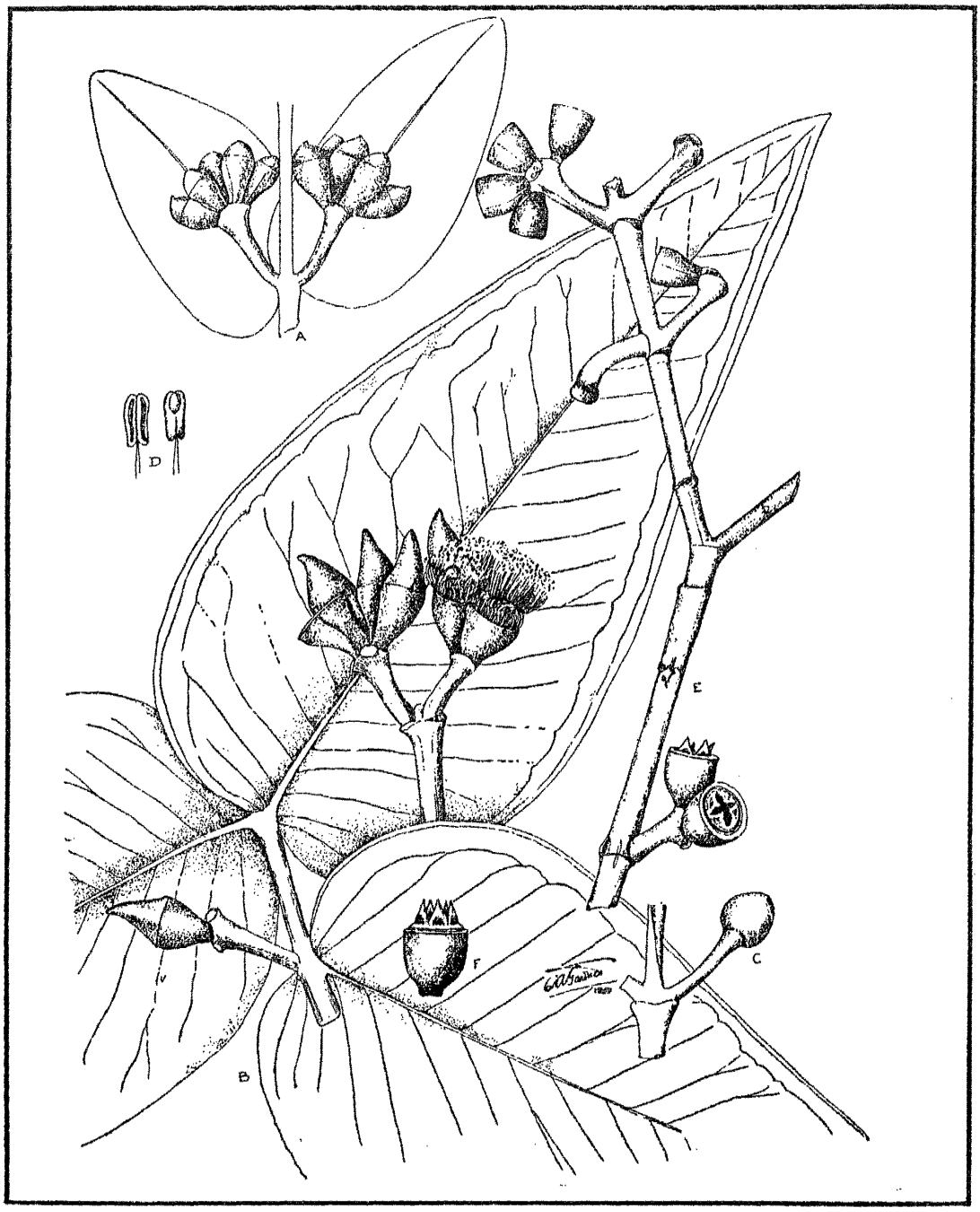

Fig. 48

Eucalyptus mooreana A—Pair of leaves and two umbels of flower buds; B—Mature leaves and flowers; C—United bracts which protect the young flower buds—the cluster being inside this globular organ; D—Anthers; E—Fruits; F—Single fruit in profile.

59. **Eucalyptus oligantha** Schau.

Broad-leaved Box

Broad-leaved Box was first collected by Alan Cunningham in 1819, when attached to the Admiralty explorations of the north and north-west coasts under Captain King. It was not rediscovered until August, 1905, when W. V. Fitzgerald collected specimens between Tabletop Mountain and the Artesian Range. It was collected again by the writer in the Artesian Range in October, 1921.

The tree grows to about 12 m tall with a short trunk up to 30 cm in diameter, the bark being thick, but with the outer layers shedding in thin papery flakes. The timber is red. It grows on gentle slopes in shallow red loams and grey podsols.

The accompanying plate was taken from an illustration of the original specimens collected by Cunningham at Copeland Island in the Northern Territory. The specific name is from the Greek, meaning few flowered.

Broad-leaved Box is also found in the Northern Territory from Darwin to Pine Creek and on Melville and Bathurst Islands. The mature leaves are always long-stalked, broadly ovate to orbicular and large, up to 20 cm long.

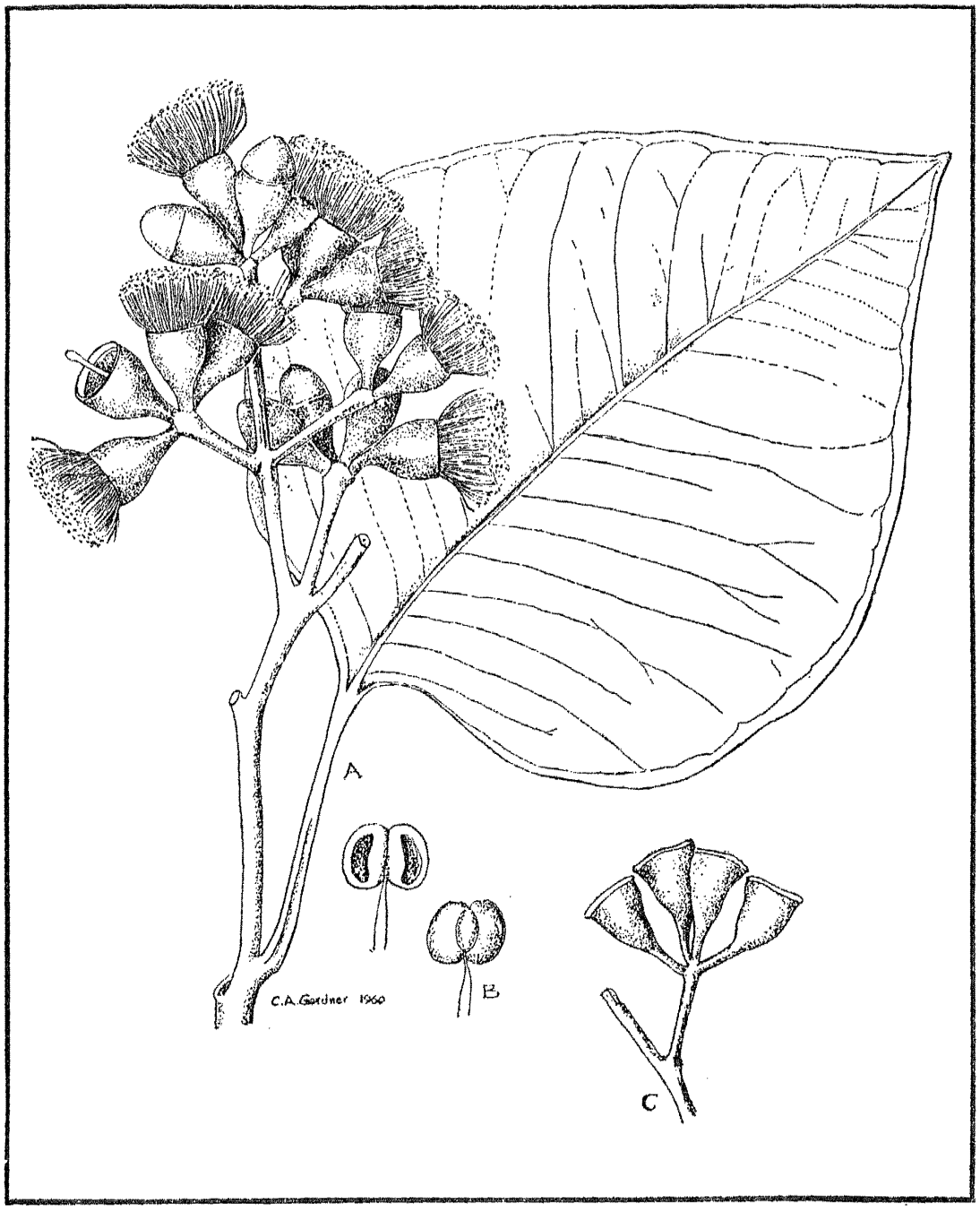

Fig. 49

Eucalyptus oligantha A—Specimen collected by A. Cunningham at Copeland Island; B—Anthers; C—Fruits.

60. **Eucalyptus brachyandra** F. Muell.

Tropical Red Box

Tropical Red Box is a species which, in Western Australia is not found further south than the Charnley River in the Kimberley region, although very common between the Charnley and Prince Regent River to the north, and eastward to the King Edward River.

The largest trees to be seen are probably those which occur between the Glenelg and Prince Regent Rivers, where the highest rainfall in tropical Western Australia occurs. Here, as a crooked tortuously-branched tree, it is found growing, often in scanty soil among rocks, sometimes in almost inaccessible spots.

The largest trees would not exceed 10 m in height, but the trunk is commonly 50 cm or more in diameter. The trunk and branches are covered with a rough, fissured, reddish-grey, fibrous bark throughout. The timber is deep, very hard and tough.

The most interesting features of this species are the very small flowers, the relatively small, broad and obtuse leaves and its habit of becoming completely leafless during the dry winter months. The specific name refers to the short anthers.

Tropical Red Box is also found in the Victoria River area in the Northern Territory. The leaves of this species are strongly discolorous and small, to 8 cm long and 5 cm across.

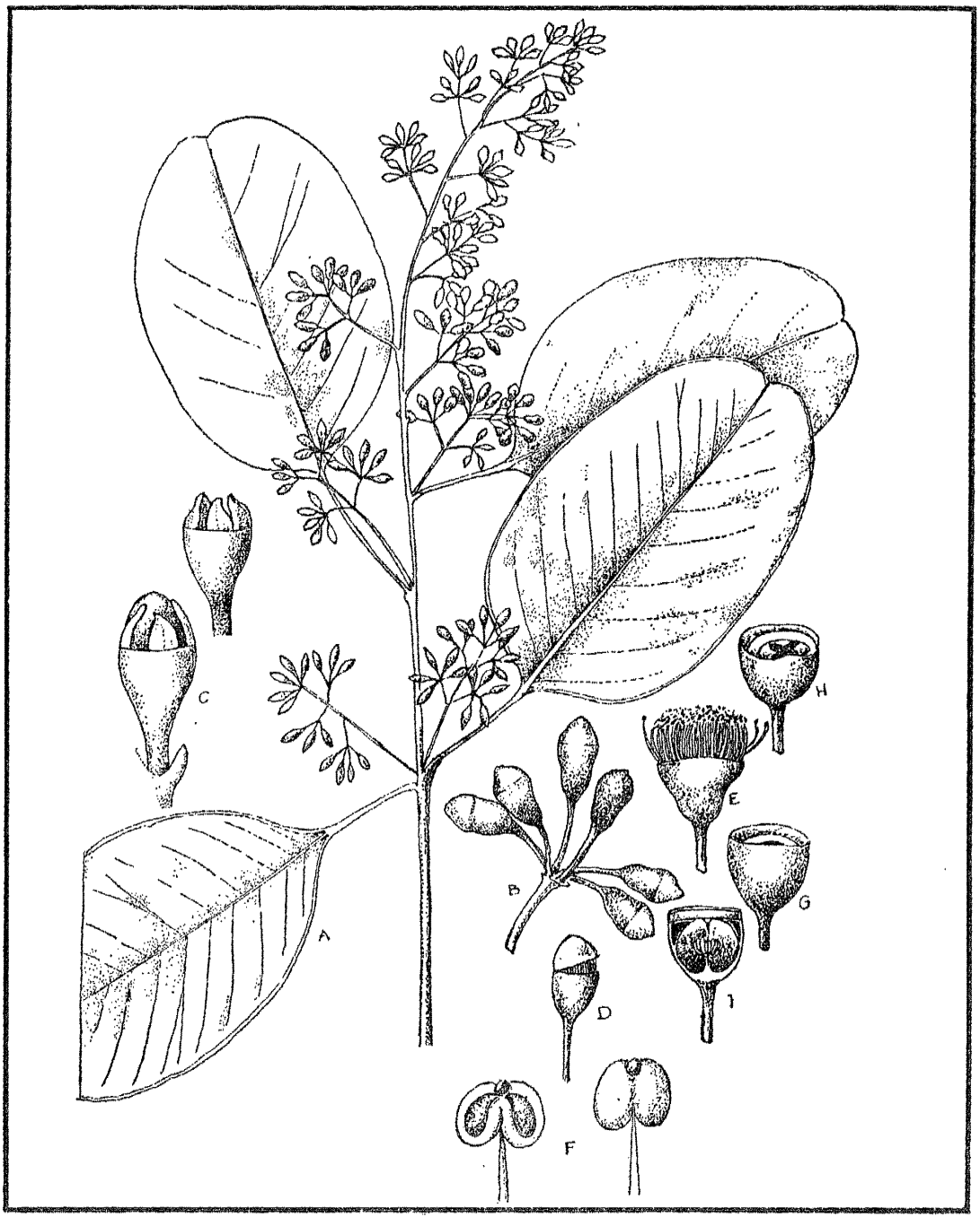

Fig. 50

Eucalyptus brachyandra A—Branchlet with leaves and panicles of flower buds; B—Flower buds (enlarged); C—Two buds showing the deciduous calyx teeth; D—Flower bud about to open; E—Flower; F—Anthers; G and H—Fruits; I—Section of fruit. (Artesian Range, Gardner 1621).

61. **Eucalyptus dichromophloia** F. Muell.

Variable-barked Bloodwood

The common Variable-barked Bloodwood grows along the Fitzroy, Lennard, Margaret and Ord Rivers as a robust tree with pale pink or white bark marked with reddish-brown flakes on the trunk, and a reddish-brown timber.

It is particularly abundant on the low-lying country around Fitzroy Crossing and Gogo Station. A second form with a persistent rough bark may be seen on the high stony country along the King Edward River, and as far south as the Ashburton River, while a third smooth-barked form with very narrow leaves extends southwards to the Murchison River. The shape of the fruit is fairly constant, although some forms are much more contracted at the orifice of the fruit than those depicted, while in length they vary from about 0.5 to 3 cm. The name *dichromophloia* refers to the variable colour of the bark.

Variable-barked Bloodwood is widely distributed in northern Australia north of 25°S latitude. The leaves are slightly discolorous.

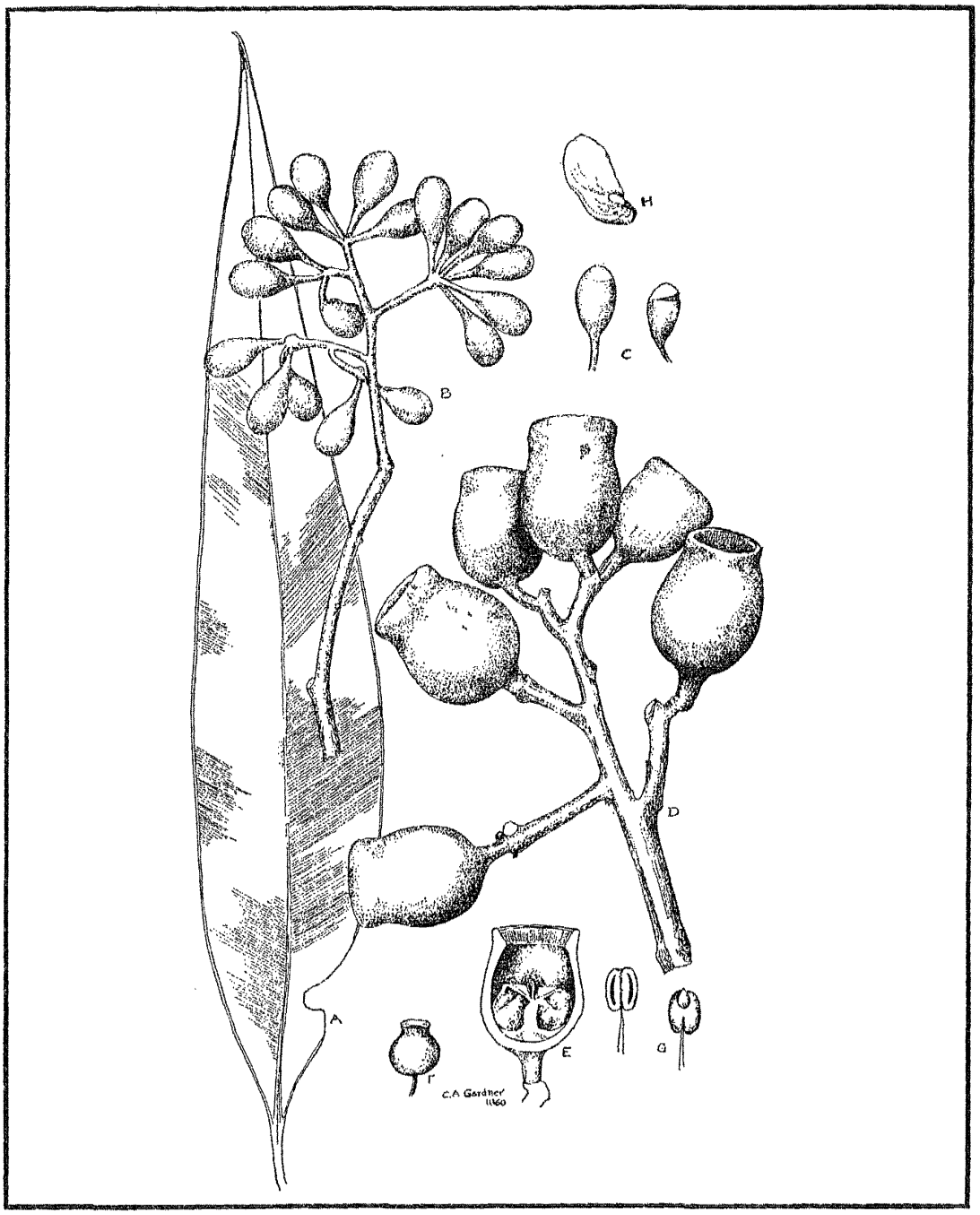

Fig. 51

Eucalyptus dichromophloia A—Leaf; B—Flower buds; C—the same; D—Fruits; E—Longitudinal section of fruit; F—Small fruited form; G—Anthers; H—Seed. (A-C Gardner 10067). (D-E-G. H Gardner 9727, Gogo, October, 1950, Fossil Downs Gardner 10067, April, 1951). (F 24 km N.W. from Kalumburu, N.H. Speck 4909).

62. **Eucalyptus clavigera** A. Cunn. ex Schau.

Apple Gum

Apple Gum is one of the common trees of the Kimberley region, inhabiting the sandy soils of the sandstone ranges, but is found less frequently on the sandy flat country. It is most common in northern Kimberley region extending as far south as the King Leopold Range, and is less frequently encountered on the plains of the Ord and Fitzroy Rivers. The species is an erect tree 6 to 10 m tall with widely spreading densely-foliaged branches and horizontally-expanded leaves. The trunk is about 6 m long with a diameter of about 50 cm.

The bark of the lower parts, and occasionally over almost the whole of the trunk, is tessellated, flaky and thick, persistent and dark grey; the bark of the upper part of the trunk is smooth and white, decorticating in large grey plates leaving the young inner bark at first greyish-pink. The timber is red.

A characteristic of the tree is the rough surface of the leaves which are commonly broad and blunt at both ends, stalkless or stalked and frequently cordate at the base. The leaves are pale green. The white flowers are borne on long stalks and arranged in condensed panicles along the branchlets, and the long-stalked fruits are conspicuously veined and fragile. They do not persist after the seeds have shed and are rarely found on the trees later than the middle of May.

The range of distribution of Apple Gum extends to as far east as Gove Peninsula in the Northern Territory.

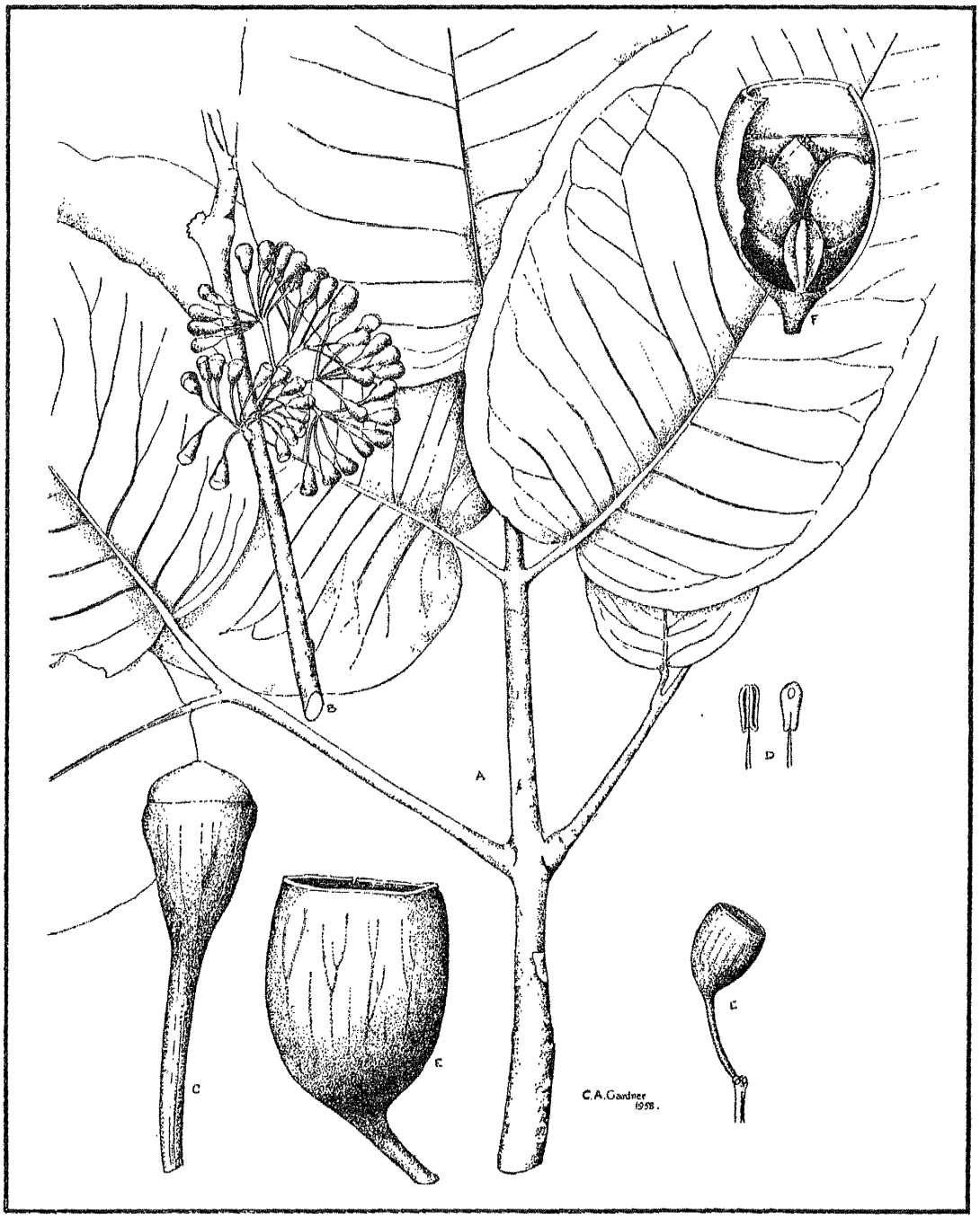

Fig. 52

Eucalyptus clavigera A—Branchlet with stalked leaves; B—inflorescence with flower buds; C—Flower bud; D—Anthers; E—Fruits; F—Fruit in section. (Walcott Inlet, Gardner 1588).

63. **Eucalyptus grandifolia** R. Br. ex Benth.

Large-leaved Cabbage Gum

Large-leaved Cabbage Gum is closely related to Apple Gum but is of taller growth and the branches are more erect. The bark is usually quite smooth throughout, although a collar of tessellated bark sometimes occurs close to the ground, the leaves are thicker, devoid of any excrescences, and lustrous.

The fruits are also frequently larger than those of Apple Gum but are of the same texture and are soon shed. The tree is less common in the Kimberley region than Apple Gum and occurs in sandstone country among rocks from the Artesian Range northward. It is found eastwards to the Ord River, extending into the Northern Territory. This species could be mistaken for *E. foelscheana* when only in leaf, but a reference to the illustrations of both shows at once the different venation, the veins of *E. foelscheana* being closer together and much finer than those of *E. grandifolia.*

Large-leaved Cabbage Gum is nearly deciduous in the dry season. Its distribution range extends eastwards to the southern end of the Gulf of Carpentaria in Queensland.

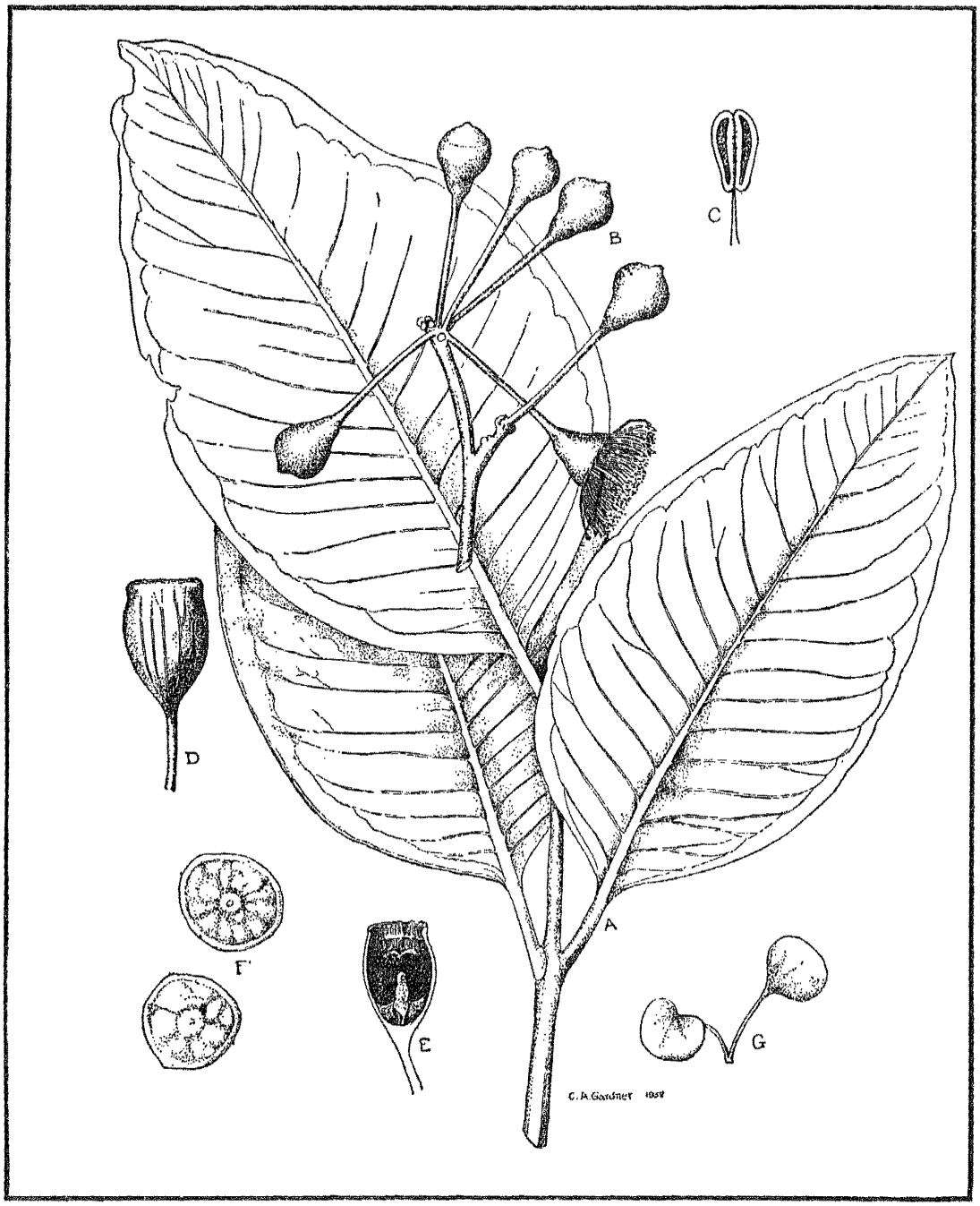

Fig. 53

Eucalyptus grandifolia A—Branchlet with three leaves; B—Flower buds; C--Anther; D--Fruit; E—Fruit in longitudinal section; F—Seeds; G—Cotyledons. (Cockatoo Sands, lower Ord River, Gardner 7324).

64. **Eucalyptus papuana** F. Muell.

Ghost Gum

The name Ghost Gum, although popular in literature, is rarely applied to this tropical tree by bushmen. In the Kimberley region, where the timber is used for structural work to some extent, it is commonly known as Carbeen, a name more properly given to *E. tessellaris* in eastern Australia.

It is found mainly on the alluvial river flats subject to periodic inundation, but it is also fairly common around Derby. This tree attains a height of 15 to 20 m with a trunk up to 6 m long and 60 cm in diameter. The bark is smooth and white with a satin-like lustre, and this latter characteristic renders the trees very prominent against green foliage, or in moonlight.

The timber is pale red, dense and rather hard, but is subject to the ravages of termites. The branches are widely-spreading the branchlets droop or are quite pendulous, and the leaves are a deep lustrous green, adding to the attractive appearance of the tree.

The flowers and fruits are much like those of the two preceding species, being of the same shape and thin texture, equally shortlived, but smaller, and on somewhat shorter stalks. A broad-leaved form is found near the Rawlinson Range, while at Vansittart Bay in the northern Kimberley region there is a smaller tree with more mottled bark, and sometimes a short collar of tessellated bark at the base. This form grows in sandstone ranges close to the sea. In the Kimberley region *E. papuana* is found along most rivers including the Ord, the Barker, Lennard and Fitzroy rivers, and around Cygnet Bay, Careening Bay, King Sound and Broome.

The distribution range of Ghost Gum extends over most of Australia north of the Tropic of Capricorn. It is also found in open woodland country around Port Moresby in Papua.

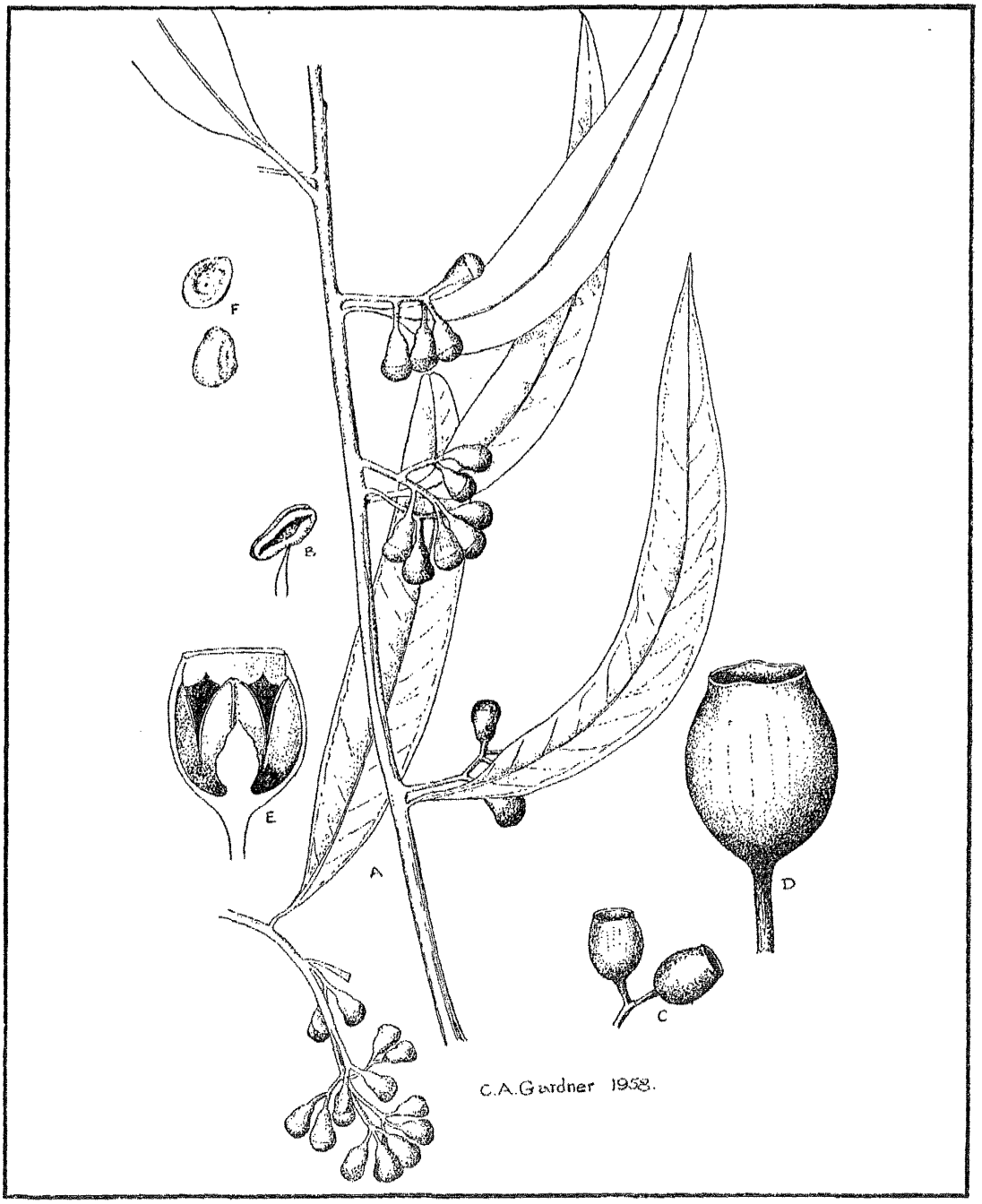

Fig. 54

Eucalyptus papuana A—Branchlet with leaves and flower buds; B—Anther; C—Fruits; D—Fruit (enlarged); E—Fruit in longitudinal section; F—Seeds. (Derby, Gardner 1629).

65. **Eucalyptus aspera** F. Muell.

Brittle Range Gum

Brittle Range Gum is usually a small crooked tree rarely more than 8 m tall, and often less, growing in dry stony places on tablelands or the sides of hills. It favours arid localities. Originally described from the sandstone country of the upper Victoria River, in the Northern Territory, it has a fairly extensive range in Western Australia, from Mount Barrett on Moola Bulla Station southwards to the Nullagine district and Jiggalong.

The largest trees, those seen on the eastern slopes of Mount Barrett, attain a height of over 6 m, whereas those further south are frequently less than 4 m tall. The bark is white or sometimes rough and tessellated on the lower part with the smooth bark often assuming a pink colour. The leaves are rough and more grey than green; when young they may bear coarse hairs on the stalks, midrib and principal nerves, or even the whole leaf may be hairy, but in the adult stage they are usually rough only, a character to which the species owes the name *aspera*.

There is considerable variation in the shape of the leaves. While the northern forms have oblong or ovate, opposite and almost stalkless leaves, in some of the Nullagine forms the leaves of the upper branches may be alternate or opposite, and taper to a rather acute apex. This variability in leaf form is found in all four of the species so far described in this issue, and thus is of limited value in determining the species. It can, however, be readily distinguished from *E. clavigera*, to which it is most closely allied, by the inflorescence which consists of axillary simple umbels on stalks about as long as the buds and fruits. The fruit shape and texture of all four are similar, and the same as that of *E. tectifica*, Darwin Box.

Brittle Range Gum is found as far east as Mount Isa in Queensland. In Western Australia the species occurs in the east Kimberley region. There is an unnamed eucalypt, found in the region, from Port Hedland to Meekatharra, which is closely related to *E. aspera*. This has been referred to *E. aspera* by Gardner.

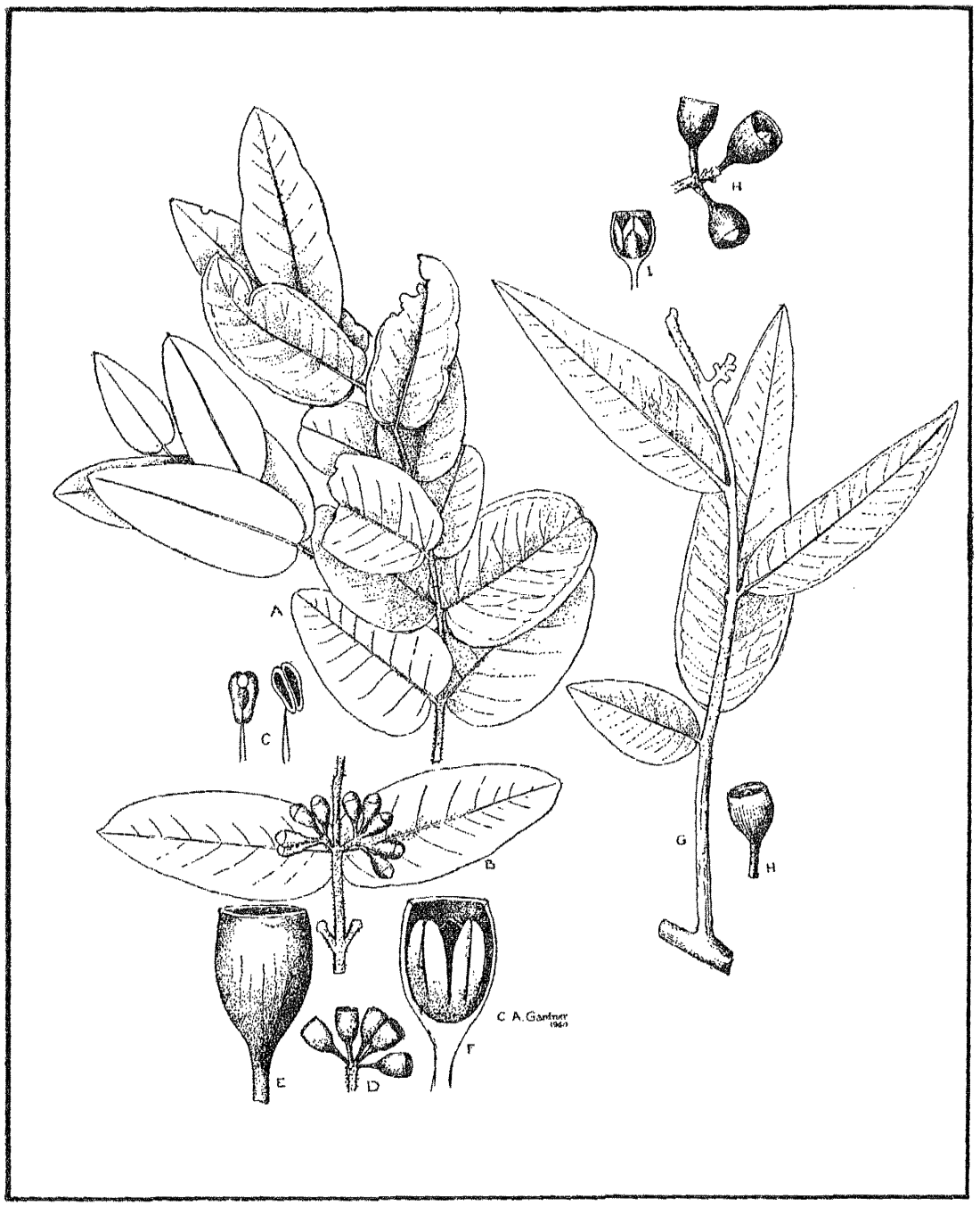

Fig. 55

Eucalyptus aspera A—Leafy branchlet showing opposite subsessile hairy leaves; B—Axillary inflorescence; C—Anthers; D—Umbel of fruits; E—Fruit enlarged; F—Fruit in longitudinal section; G—Branchlet with alternate narrow pointed leaves; H—Fruits; I—Fruit in section. (A, E, and F Mount Barrett Gardner 10200). (B, C, and D from Flockton, Maiden's Critical Revision of the genus *Eucalyptus*). (G, H, and I, Five Mile Creek, Nullagine, G. E. Brockway).

66. **Eucalyptus patellaris** F. Muell.

Weeping Box

Weeping Box is a rough barked box tree up to 20 m tall, with the grey fibrous bark extending to the ultimate twigs. The foliage is grey-green and the timber brown. The fruits are of woody texture with the valves usually shortly protruding.

Weeping Box has been collected from near North West Cape, on Barrow Island, in the Pilbara region and in the upper reaches of the Ord River in the Kimberley region, from where its range extends into the Northern Territory.

Weeping Box is distinctive amongst the box group because of its long peduncles, relatively large buds and subcylindrical fruit with their well-developed disc and usually prominent valves.

The name *patellaris* is in reference to the operculum which Ferdinand von Mueller described as "patellar umbonate". His description was based on a diseased bud. Typically the buds are conical. The operculum illustrated in figure 56 is not typical.

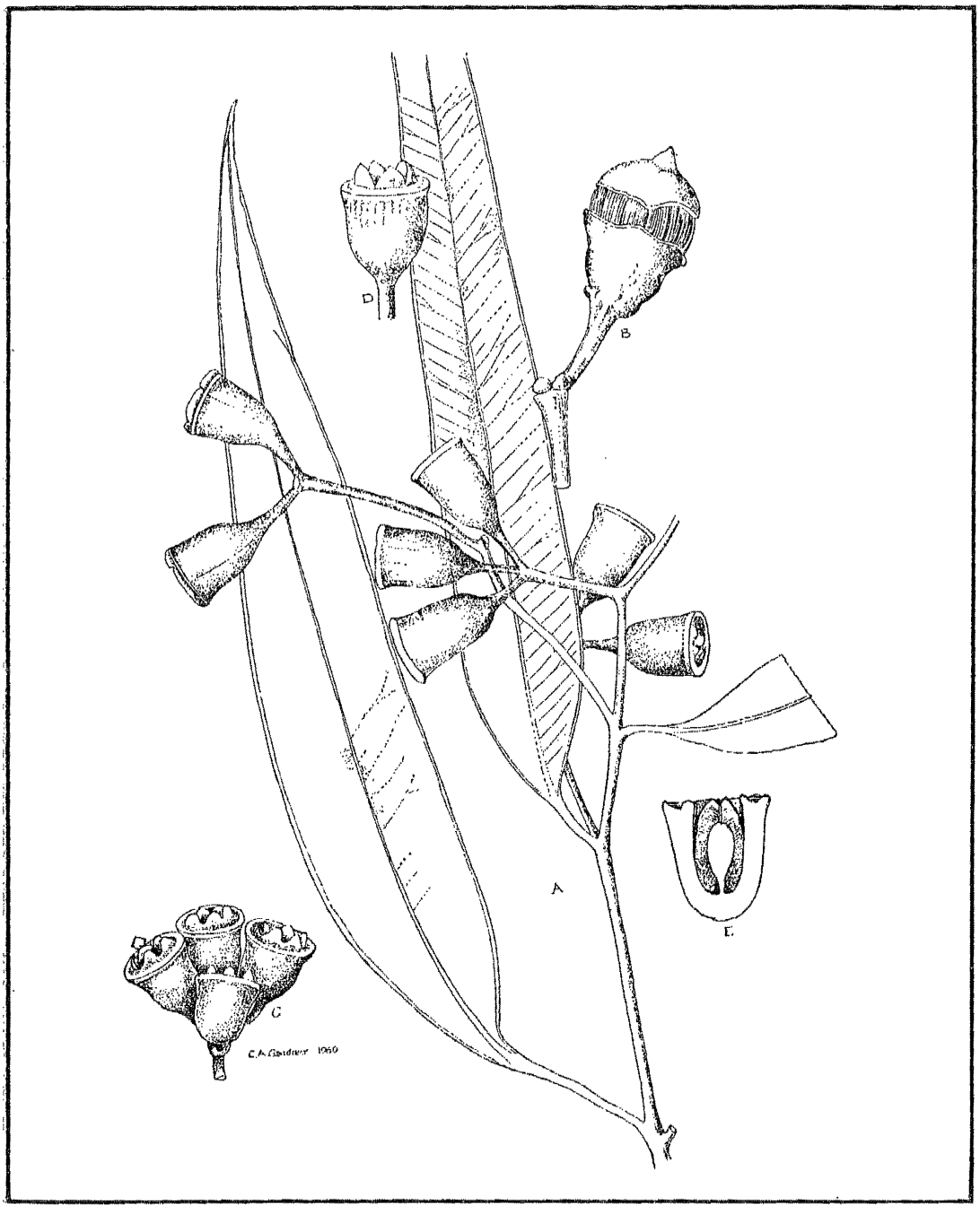

Fig. 56

Eucalyptus patellaris A—Branchlet with leaves and fruits; B—Flower bud; C—Cluster of fruits; D—Fruit; E—Section of fruit. (Near Turner River, Perry 3200, except B, which is copied from a drawing of a bud from the type specimen, upper Roper River, Mueller July, 1856).

67. **Eucalyptus pruinosa** Schau.

Silver Box

Silver Box is a small straggling tree rarely exceeding 6 m tall, with a rough grey fibrous bark persistent on the trunk and branches, and a dark red timber. The branches are spreading and somewhat straggling, and the branchlets, leaves and flower buds are white as if frosted. It is sometimes known as Apple Box on the Ord River. The specific name from the Latin *pruina,* hoar-frost, refers to this frosted appearance of the foliage.

The species is one of those which bear their flowers in umbels arranged in panicles. The foliage is stalkless and indented or stem-clasping at the base. The leaves are always opposite, and the branchlets usually four-angled. The flowers are white, and the fruits, which are hard and somewhat woody, vary from goblet-shaped to almost cylindrical, and the broad valves do not protrude.

This remarkable tree is found in various localities on the lower stretches of the Ord River, usually where limestone is present in the soil. It is also common along the Fitzroy River, especially around Bohemia Downs Station where it grows in red sand.

Silver Box is found over most of northern Australia between 14° and 20°S latitude. The type material was collected by Robert Brown and Ferdinand Bauer during the early years of the nineteenth century and described in 1843.

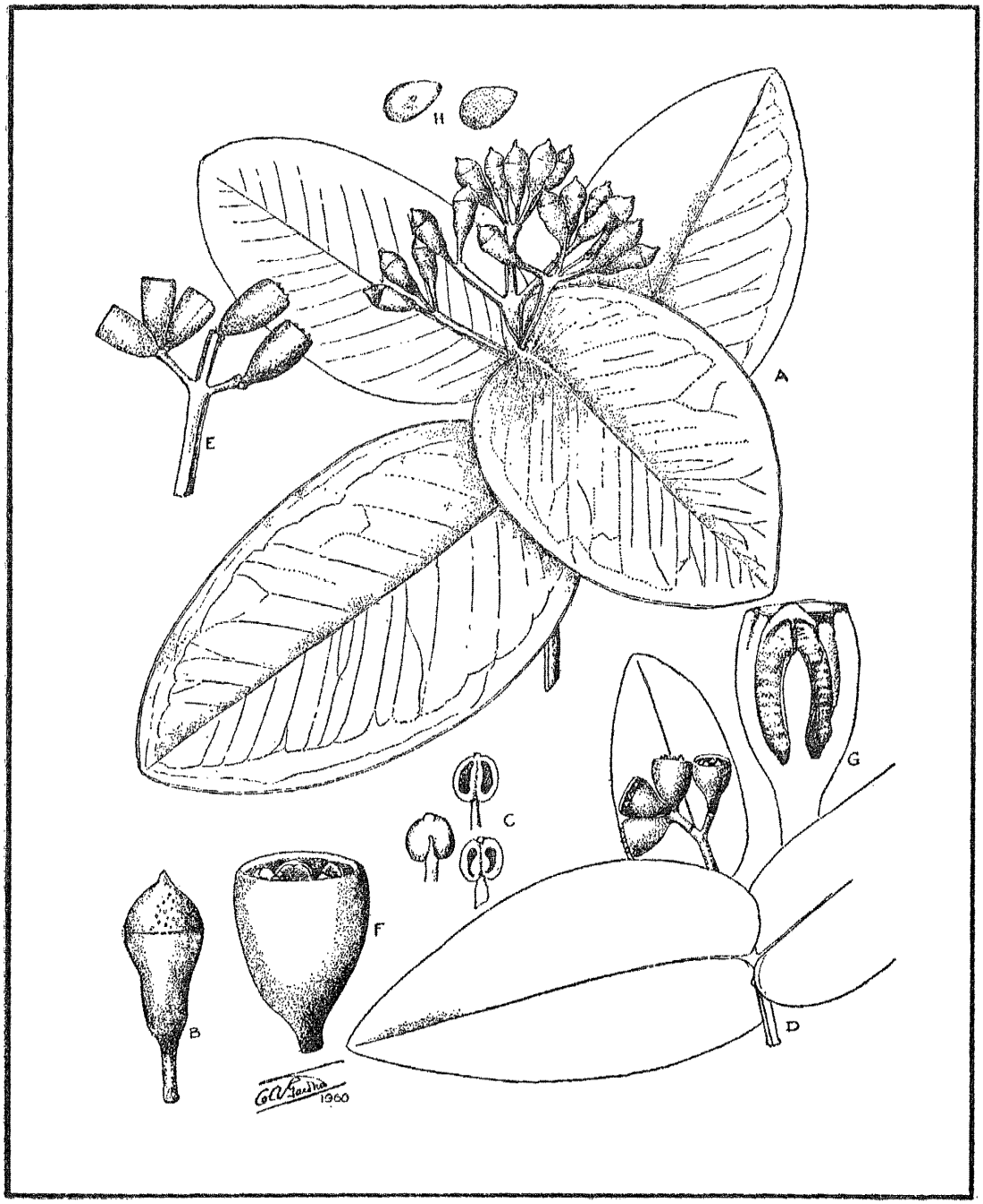

Fig. 57

Eucalyptus pruinosa A—Branchlet with leaves and a terminal panicle of flower buds; B—Flower bud; C—Anthers; D—Branchlet with fruits; E—Fruits; F—Fruit (enlarged); G—Section of fruit; H—Seeds. (All from Bohemia Downs, Gardner 7124, except E, from Kimberley Boundary Survey in latitude 19°S, S. J. Stokes.)

68. **Eucalyptus houseana** W. V. Fitzg. ex Maiden

Kimberley White Gum

The common tree found along the river flats of the Drysdale, King Edward, Mitchell, Moran, Carson and Glenelg Rivers is Kimberley White Gum, which grows to 20 m tall with erect or spreading branches. The bark is clean throughout and white, smooth and the outer layers shed in large thin plates. The trunk is up to 10 m long and 80 cm in diameter, and often swollen at the base as in the Wandoo of the South-West. The timber is pink to red. The tree appears to be restricted to the sandstone and quartzite formations.

Like a number of tropical Kimberley trees there is considerable variation in the shape of the leaves. The type specimen from the Isdell River near Mount Barnett homestead has practically stalkless, sub-opposite broad leaves; the form from the Artesian Range collected by W. V. Fitzgerald and the Charnley River form collected by C. A. Gardner, have narrow-stalked leaves, the leaf-base tapering into the stalk; while the form from the Couchman Range and the Prince Regent River has shortly-stalked, blunt leaves which at the base are broad and quite obtuse or subcordate.

The buds and flowers of all forms are similar. The fruit is hemispherical to obconic, about 4 to 5 mm across, with a narrow disc and slightly exserted deltoid valves.

E. apodophylla, also from the Kimberley region, is closely related to this species.

Kimberley White Gum is not found outside the State. The name *houseana* honours Dr. Frederick House, naturalist to the F. S. Brockman exploring party of 1901.

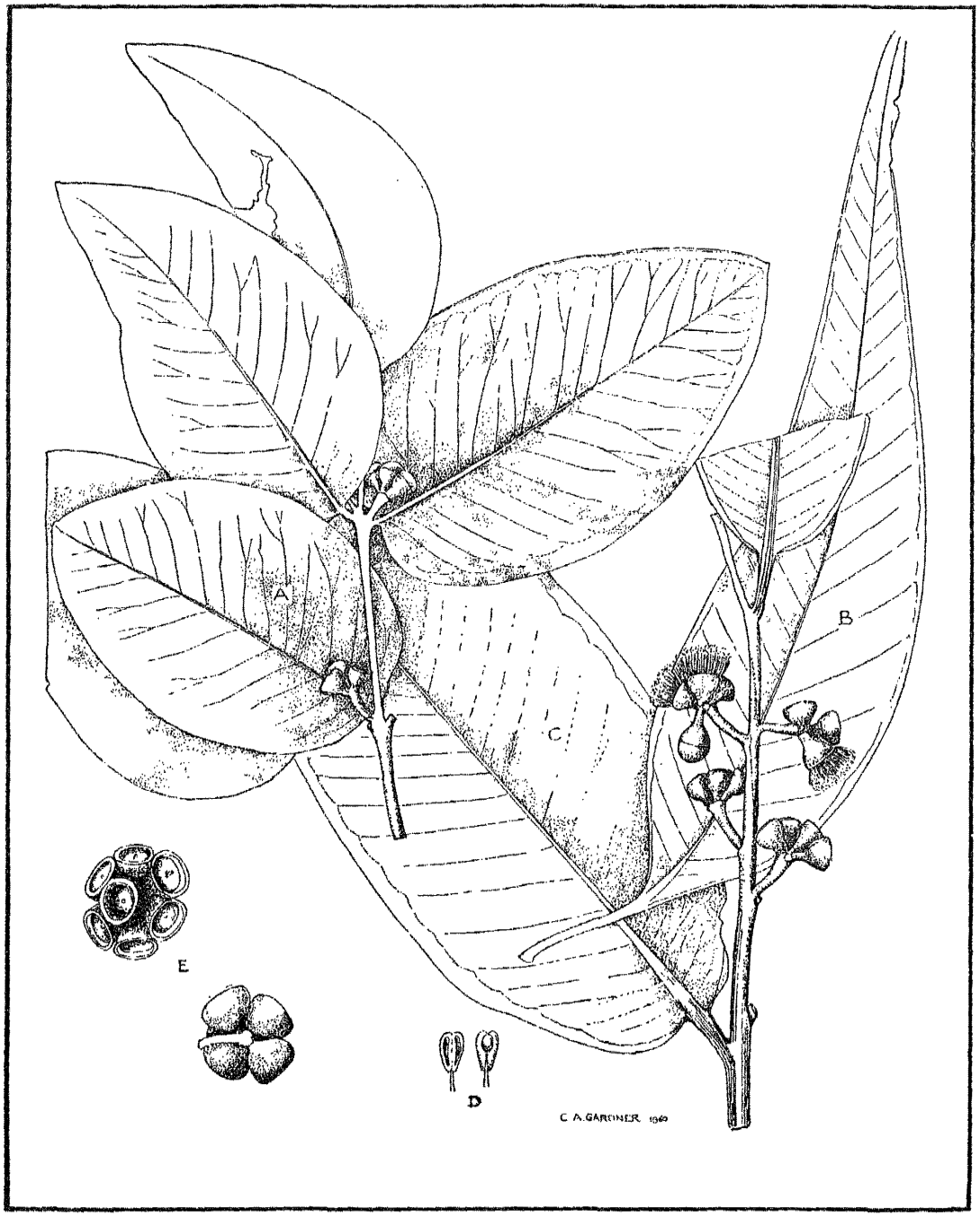

Fig. 58

Eucalyptus houseana A—Leaves, flower buds and immature fruits (Isdell River near Mount Barnett homestead, W. V. Fitzgerald 1014); B—Leaf (Artesian Range, Fitzgerald 1357); C—Branchlet (watercourses in Couchman Range, Gardner); D—Anthers; E—Clusters of immature fruits (Couchman Range).

69. **Eucalyptus bigalerita** F. Muell.

Northern Salmon Gum

(Syn. **E. pastoralis** S. Moore)

Northern Salmon Gum is found in various parts of the Kimberley region and in the Northern Territory, but as far as the writer has observed in Western Australia it is usually found on alluvial soils which are subject to inundation in summer or for a considerable part of the year. It is usually found in clay soils, but sometimes also in moist sandy loam, as for example near Mount Agnes, and on the upper Drysdale River near Mount Hann. Its range in Western Australia extends from the lower Ord River to the Barker and Lennard Rivers and their tributaries, but it has not been seen on the flats of the Fitzroy River.

The tree attains a height of 10 m, with a widely-branched crown. The stout trunk is up to 8 m long and 40 cm or more in diameter, and the timber is pink or light red. The bark is smooth throughout, varying according to the season from yellow to pink to pure white; the outer layers decorticate in large thin planes. The tree is frequently completely deciduous under natural conditions, and another somewhat peculiar feature is that the branches of the same or adjacent trees when coming in contact frequently fuse.

The leaves are almost triangular and bright yellowish-green, reminding one somewhat of large thick poplar leaves. This fact should be particularly noted with reference to the habitat, for the closely related *E. alba,* Timor White Gum, has leaves which do not possess this distinctive colouring, and are more rounded at the base. *E. alba,* which has somewhat dull foliage and narrow leaves, is usually found on higher land, while *E. bigalerita* which grows in moister low-lying situations has broader lustrous leaves. Since these are the principal differences, excepting for trivialities in the buds and fruits which are much less than the variations seen in some other species discussed in this edition, some botanists may prefer to regard these as two forms of a single species which would then be called by the earlier name *E. alba.*

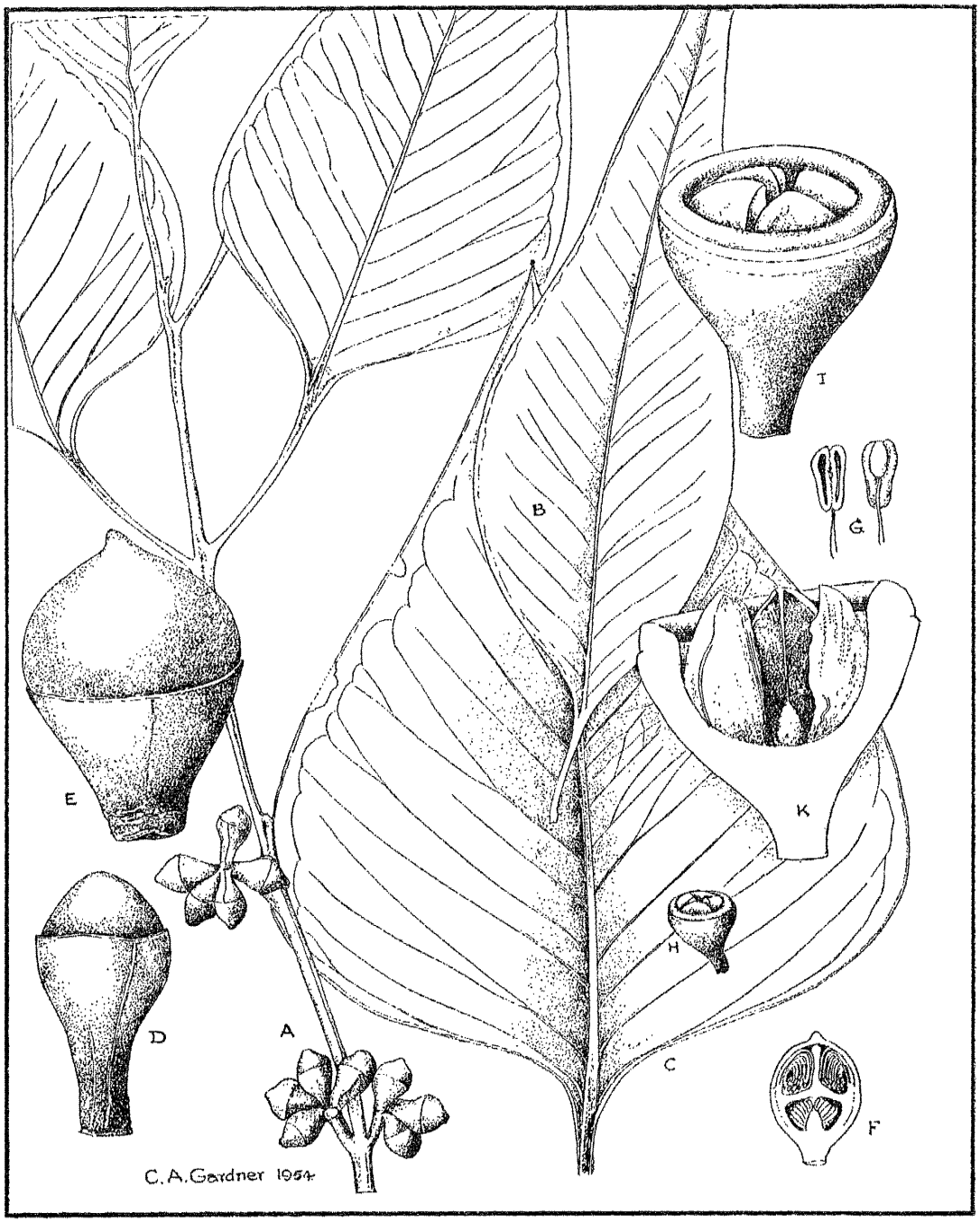

Fig. 59

Eucalyptus bigalerita A—Branchlet with leaves and buds; B—Narrow leaf; C—Broad leaf; D—Flower bud; E—Flower bud (much enlarged), F—Flower bud in section; G—Anthers; H—Fruit (natural size); I—Fruit (much enlarged); K—Fruit in longitudinal section. (Lennard River, Gardner.)

70. **Eucalyptus guilfoylei** Maiden

Yellow Tingle

Yellow Tingle is one of the large forest trees of the lower South-West, and although it possesses many good qualities, its limited range renders it of less importance than its associates, the Jarrah and Karri. Its area of distribution extends from the Denmark River in the east, to the Deep River in the west, in which area it is usually found fringing the Karri forest, mainly in low-lying situations.

Attaining a height of 45 m, although usually about 35 m tall with a trunk up to 2 m in diameter, the trunk is relatively short, usually about 15 m long, and the branches are widely spreading. The bark is dark grey, rough throughout, fibrous, not unlike that of Yarri, but less friable, and resembling that of Red Tingle, with which it is sometimes confused, although the two are very dissimilar in the flowers and fruits.

The timber is yellow, exceptionally hard and durable. It withstands long submersion in water. Experiments made by the Forests Department with this timber for sleeper purposes in 1937, have proved that the timber is very suitable for this purpose, and is termite resistant. The tree prefers low-lying situations, being fairly common along the watercourses in the area mentioned above.

Botanically the tree possesses two unusual characteristics. The inflorescence is made up of umbels arranged in terminal panicles, a feature common in many tropical species of the genus and *E. calophylla*. The second feature is in the shape of the anther, which instead of opening in vertical slits or pores, opens laterally, and when seen from below resembles a pair of spectacles. This character is peculiar to this species.

In the foliage and fruits the tree is not unlike Karri. The leaves, spread horizontally, are deep green above and paler underneath like those of Karri.

Yellow Tingle flowers in January and February. It yields pollen and nectar.

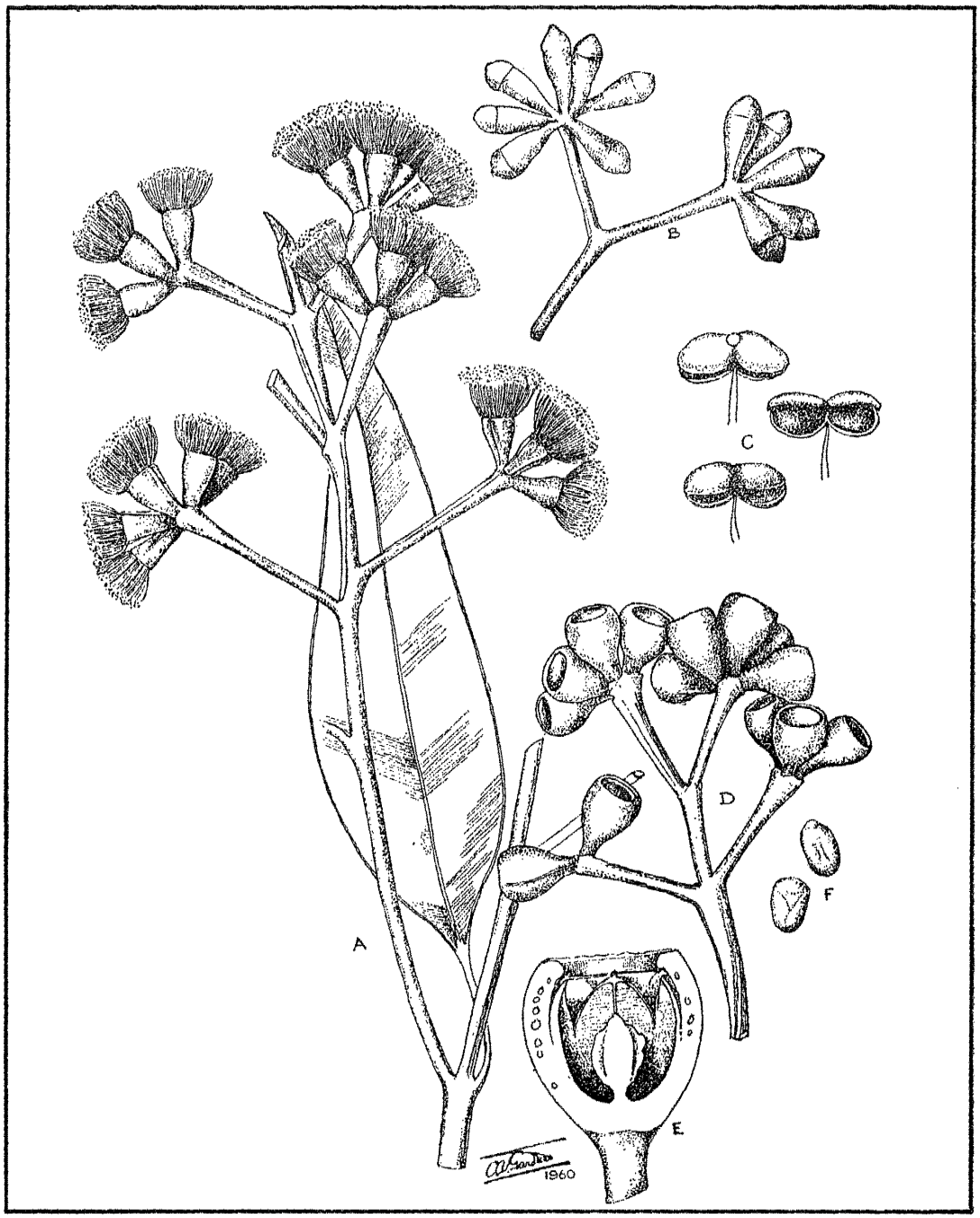

Fig. 60

Eucalyptus guilfoylei A—Branchlet with leaf and panicle of flowers; B—Flower buds; C—Anthers; D—Fruits; E—Section of fruit; F—Seeds. (Frankland River, Gardner.)

71. **Eucalyptus sepulcralis** F. Muell.

Weeping Gum

In naming and describing this species, Ferdinand von Mueller stated that "it was chosen because it will be destined to add another emblem of sadness to the tree-vegetation of cemeteries in climes similar to ours." Those who have seen the Weeping Gum will, I think, rather regard it as one of our most attractive and graceful species and worthy of a place in any scheme of cultivation.

Attaining a height of up to 8 m, the trunk rarely exceeds 5 cm in diameter, so that it is one of the most slender of trees, its powder-white bark, pendulous branches and olive-green leaves rendering it a singularly elegant plant.

First collected on the Thomas River eastward from Esperance by Campbell Taylor, who compares it to a weeping willow, the species is now known from the hills near East Mount Barren and the Eyre Range, occurring in sandy soil among quartzite rocks. The leaves, flowers and fruits are all pendulous, the leaves tapering at both ends, rather thick and very narrow. The flowers are on long stalks on still longer peduncles, the filaments a pale yellow.

The fruits are urn-shaped, olive-green, turning to a leaden grey when mature, not unlike those of Marri, but relatively longer. The anthers exhibit some degree of variation. Described as opening in slits which are confluent at their apices, among a number examined this was not found to be the case except in a very few old anthers. The closest relative of *E. sepulcralis* is *E. pendens.**

The seeds of Weeping Gum germinate freely. The first leaves are broad and blue-green, and the typical foliage is not produced until several of the broad leaves have been formed. It grows readily in the sand around Perth and although very rarely seen in cultivation it has a definite place in the gardens of the future, but should be protected from strong winds. It flowers in January and February.

* Editor's Note: *E. pendens,* Badgingarra Mallee, was described by M. I. H. Brooker in 1972. It differs from *E. sepulcralis* in fruit and bud morphology.

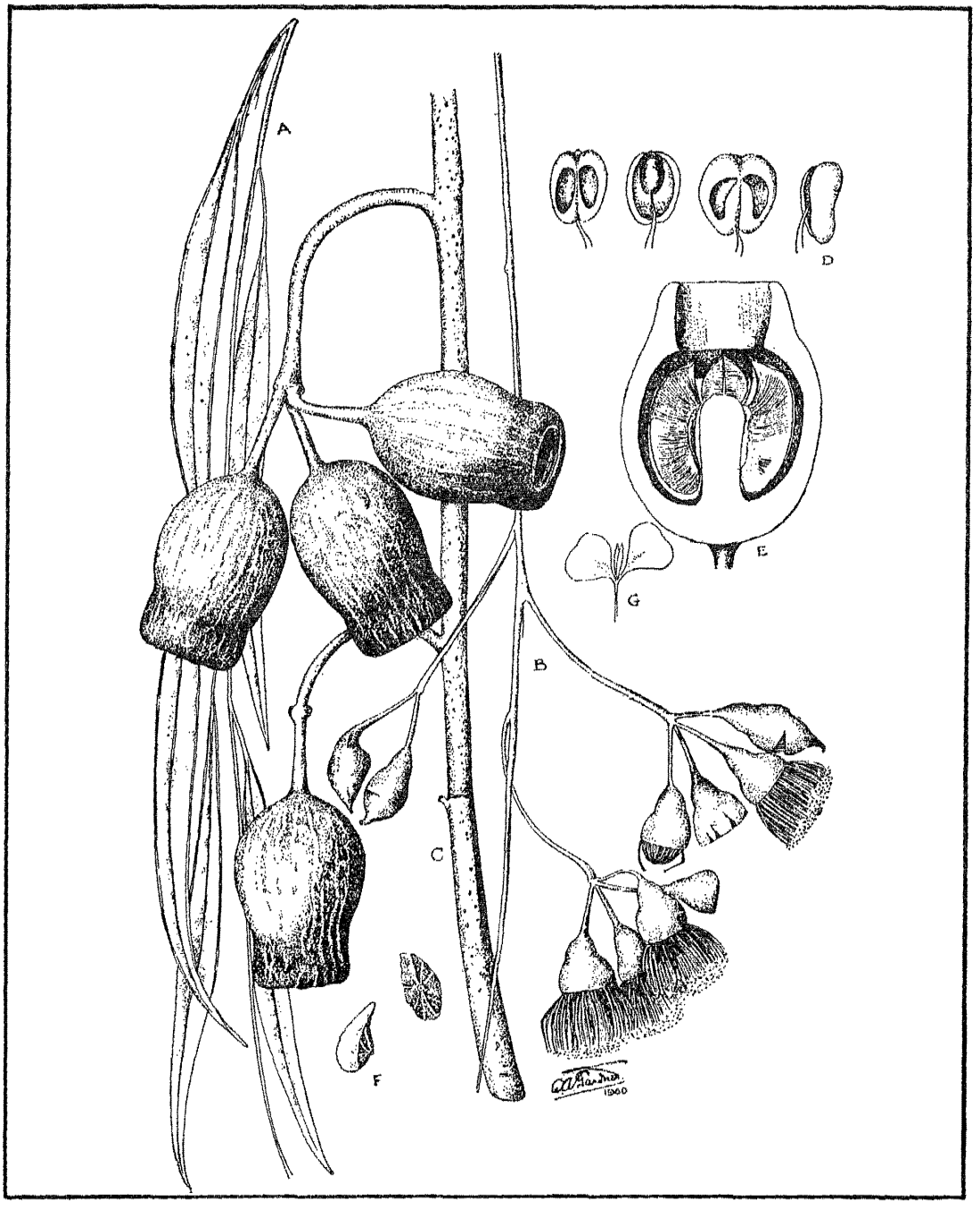

Fig. 61

Eucalyptus sepulcralis A—Branchlet with leaves; B—Flowering branchlet; C—Branchlets with fruits; D—Anthers; E—Fruit in section; F—Seeds; G—Cotyledons. (Near East Mount Barren, Gardner 12088.)

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72. **Eucalyptus kingsmillii** Maiden et Blakely

Kingsmill's Mallee

Kingsmill's Mallee is one of the most attractive of all our mallees. Attaining a height of about 5 m it is more commonly 2 to 3 m tall, and in cultivation is a widely spreading shrub. The bark of the main stems is rough and grey in the lower parts, that of the smaller branchlets greenish brown, and the branchlets usually red. It commonly spreads to a diameter of 2.5 to 3 m.

It is of open texture, in that the branches are not dense, so that the buds, fruits and flowers are the more conspicuous. It inhabits the red sand of the dry interior mainly between Sandstone, Nallan Station and Meekatharra, southward to Lawlers and eastwards to Carnegie Station, and the writer found it on the summit of Mount Bruce in the Hamersley Range in 1932. It has also been recorded from near Mundiwindi. The leaves are relatively small, a dull green or almost grey, and the lateral veins are scarcely conspicous.

The flowers are in umbels of three, on distinct stalks. The buds, flowers and fruits are distinctly ribbed with eight more or less equally-spaced ribs. The operculum varies from hemispherical to almost conical and is always beaked, with the same number of ribs as the calyx. The buds and young fruits are red, but the fruits gradually turn grey-brown when the seeds are ripe.

The rather long filaments of the anthers are either red or pale yellow, as in *E. pyriformis*, to which it is very closely related. The short anthers open in longitudinal parallel slits, and the shrub flowers from May to August.

Little known in cultivation, this plant proves very hardy under coastal sandy conditions, but is more spreading and bushy than in the field. It is more attractive than *E. pyriformis* and I would regard it as among the most attractive of the shrubby species for local cultivation in gardens.

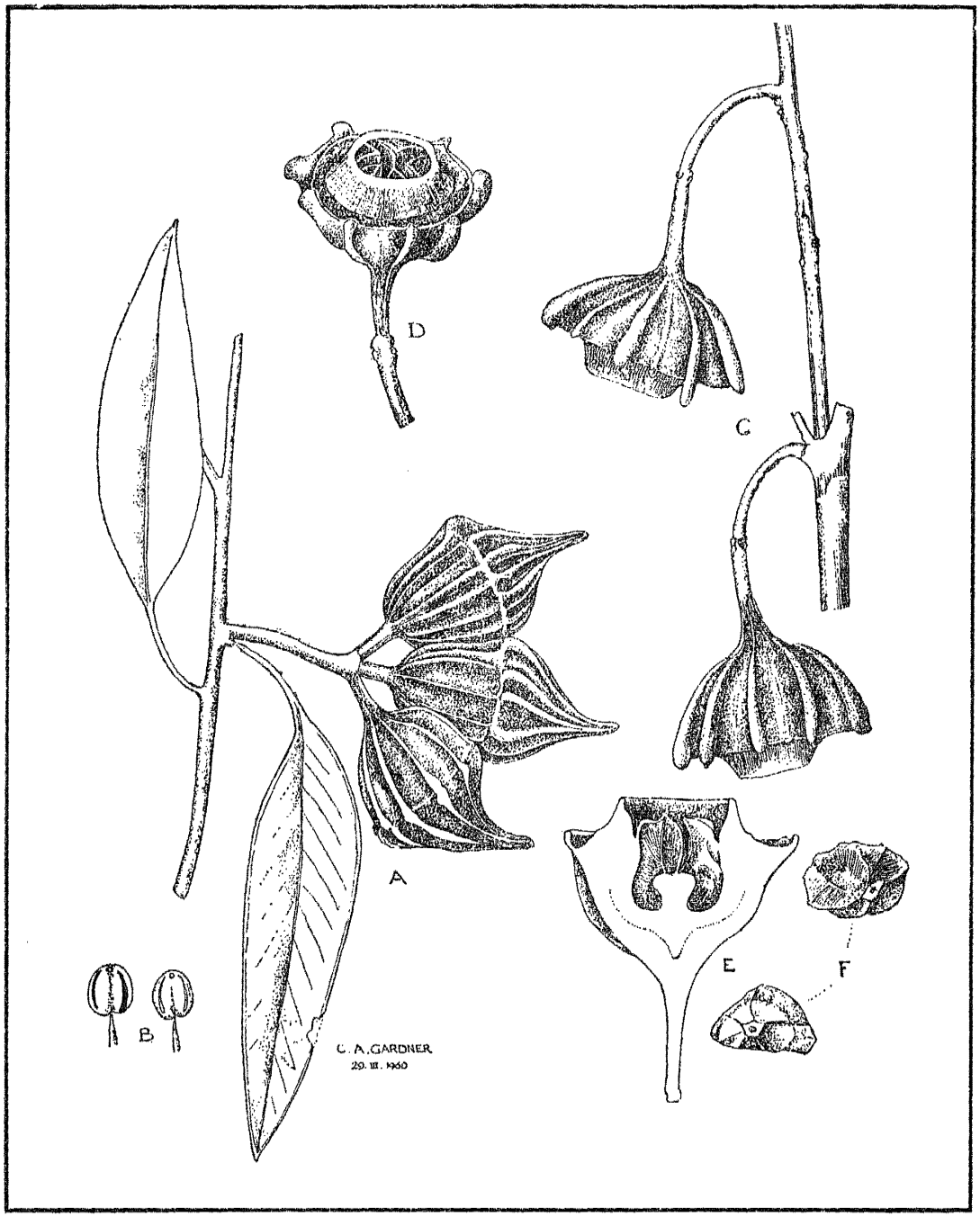

Fig. 62

Eucalyptus kingsmillii A—Branchlet with leaves and umbel of flower buds; B—Anthers; C and D—Fruits; E—Fruit in longitudinal section; F—Seeds.

73. **Eucalyptus leptocalyx** Blakely

Hopetoun Mallee

Hopetoun Mallee is a densely-branched shrub 3 to 4 m tall, with a rough grey bark on the lower parts, becoming smooth on the younger branches. The branchlets are acutely angled. The thick erect leaves are lustrous with the midrib impressed on the upper surface, the lateral veins scarcely conspicuous. The leaves are copiously oil-dotted.

The flowers are in umbels, the stalks of which are much thickened or flattened upwards, arising from immediately above the insertion of the leaves. Commonly there are ten flowers in each umbel, but frequently this number is reduced to seven or eight. The filaments of the anthers are yellowish-white and the species flowers in January in the Ravensthorpe-Hopetoun district.

Just how common this mallee is we do not know. The specimen illustrated is the one from which the species was named, but, exhibiting certain differences, the species extends eastwards to Israelite Bay, and northwards to Shark Lake and Salmon Gums, while it is very common along the Jerdacuttup River and around Kundip on the stony rising ground. In general the operculum of the Kundip shrubs is blunt, while in the eastern areas towards Salmon Gums, it becomes more pointed.

Hopetoun Mallee does not appear to be in cultivation. It could be useful in windbreak planting in sandy, coastal areas.

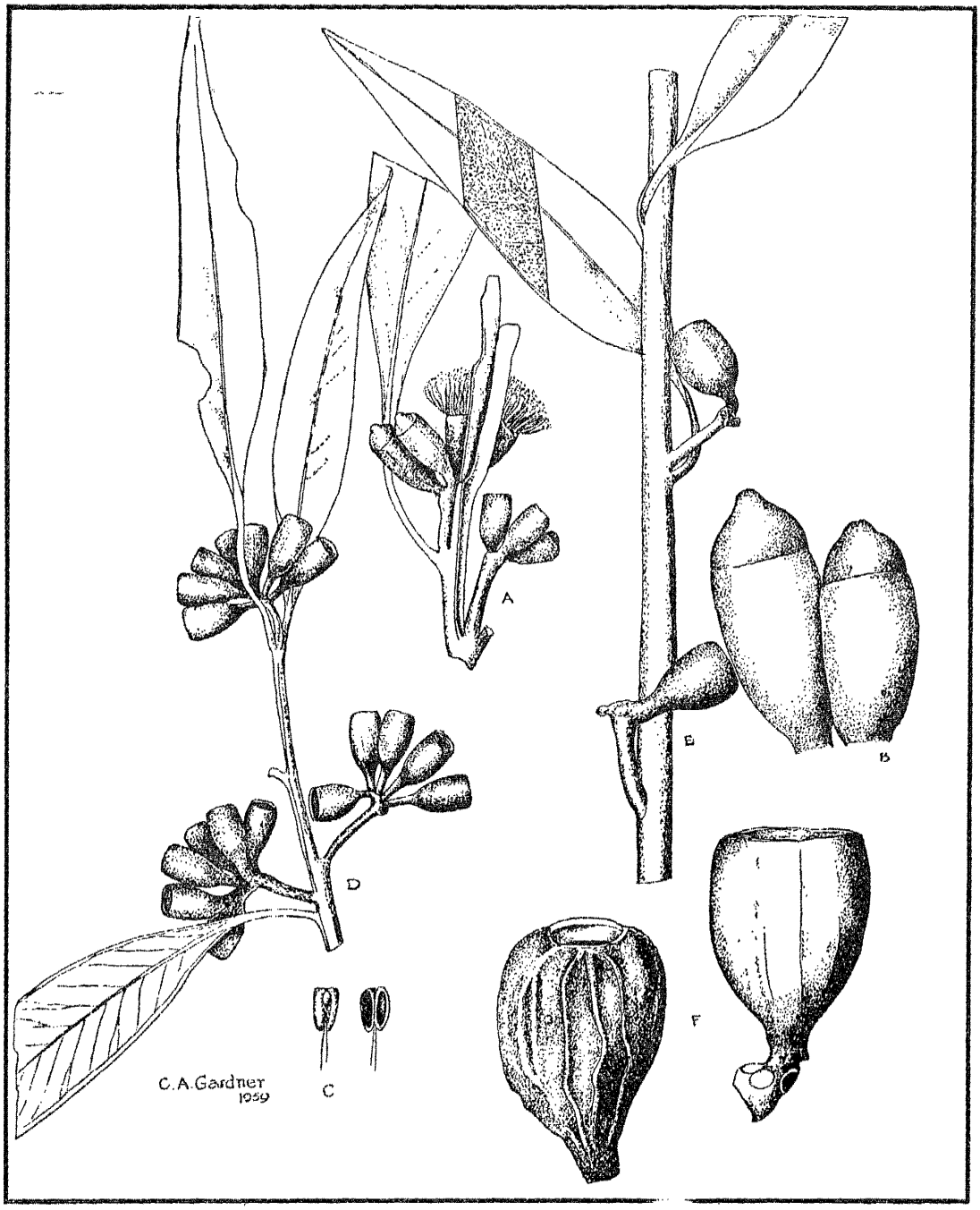

Fig. 63

Eucalyptus leptocalyx A—Flower buds and flowers; B—Flower buds (enlarged); C—Anthers; D and E—Fruits; F—Fruits (enlarged). (Nine Mile Tank northward from Hopetoun, J. H. Maiden, November, 1909).

74. **Eucalyptus pileata** Blakely

Capped Mallee

The specific name comes from the Latin, *pileus,* a cap fitting close to the head and worn by the Romans at feasts, especially the Saturnalia. It is not a particularly appropriate name, however, since a number of species of *Eucalyptus* have opercula which are even more cap-like.

Capped Mallee grows to 4 m tall, with a smooth, silver-grey bark and erect, lustrous, rather thick leaves which are narrow and taper into acute points, with an impressed midrib on the upper surface, and inconspicuous lateral veins. It occurs in a number of forms, being common in the clay soils around Ravensthorpe. The type specimen came from this district. It is found as far east as Israelite Bay, northward to Salmon Gums, and still further north, around Boorabbin and Karalee, we again find this plant, but with the operculum much more narrowly and sharply ribbed. The specimens from Salmon Gums appear to be from larger mallees and here again the ribbing of both operculum and calyx-tube are more defined than in the Ravensthorpe specimens. Furthermore, the Ravensthorpe plants flower in December, while those from Salmon Gums flower in April.

In general this plant can be distinguished from its closest relatives by the following characters: it is never a tree but always a mallee; the operculum is broader than the calyx-tube, much shorter, corrugated or ribbed, while the fruit is never deeply ribbed or corrugated.

Capped Mallee has been cultivated in eastern and western Australia and overseas, in California. It can be useful as an ornamental shrub or as a dense windbreak species, either inland or near the coast.

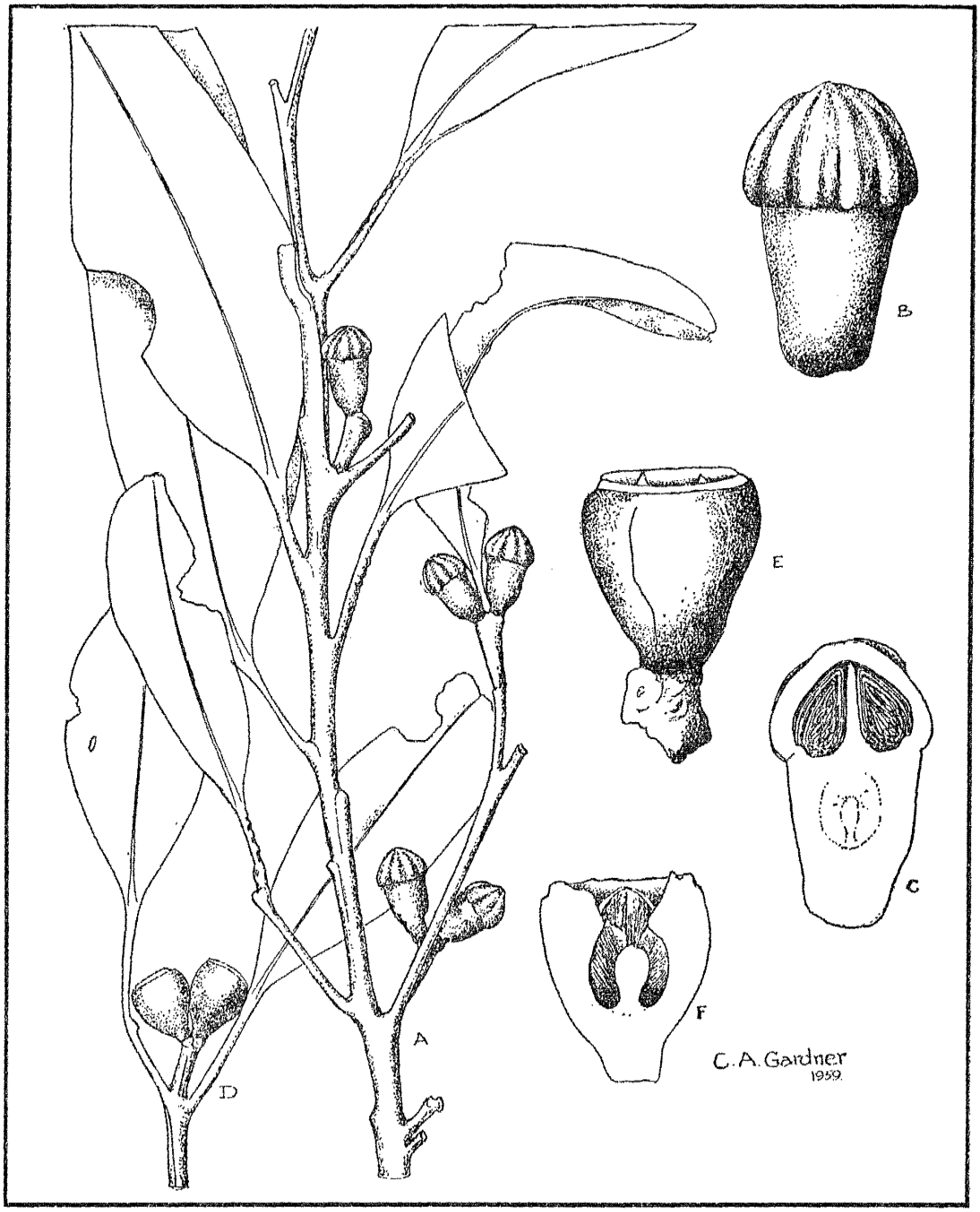

Fig. 64

Eucalyptus pileata A—Branchlet with leaves and flower buds; B—Flower bud (enlarged); C—Flower bud in section; D—Fruit; E—Fruit (enlarged); F—Fruit in longitudinal section. (Desmond near Ravensthorpe, J. H. Maiden, November 1909).

75. **Eucalyptus carnabyi** Blakely et Steedman

Editor's Note: Pryor and Johnson regard this species as a hybrid of *E. drummondii* x *macrocarpa.*

Eucalyptus carnabyi is imperfectly known. The original specimens came from the Victoria Plains district where it was collected by Carnaby and Steedman in March, 1937. Later Steedman stated that only one bush had been seen, at Barberton, growing on the edge of an area of *E. macrocarpa.*

In 1958 I received a small fragment from near Piawaning, and another plant growing on the roadside north of Bolgart appears to be this plant also, but the flowers are about the size of those of *E. macrocarpa.* The plant is very closely related to *E. macrocarpa,* differing essentially in the pointed stalked leaves, and in the number of flowers in the umbel.

It was described as a mallee up to 3 m tall, with several slender stems from the rootstock, covered with a brownish bark for 1 to 2 m from the ground, otherwise smooth and powdery. The filaments are stated to be white or yellowish, but it is probable that red flowers also occur.

There is some evidence to show that this plant is no more than a variety of *E. macrocarpa,* a species exhibiting much variation in leaf shape, presence or absence of leaf-stalk and the same of the flower-stalk, the essential difference being that in *E. carnabyi* the flowers are much smaller, and several, the original description states three, in the umbel.

E. carnabyi commemorates Isaac Carnaby, an entomologist and naturalist. This species is not known in cultivation.

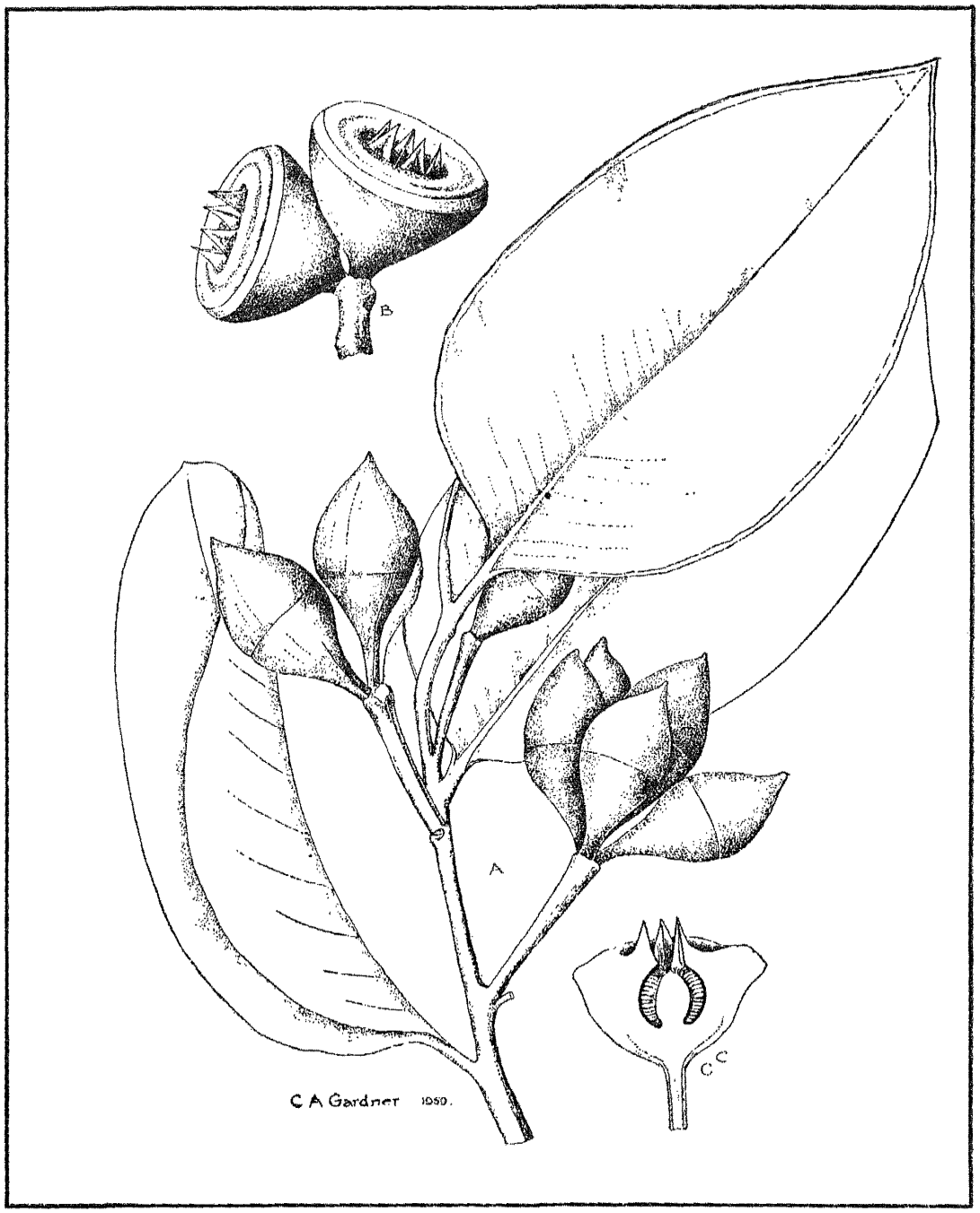

Fig. 65
Eucalyptus carnabyi A—Branchlet with flower buds; B—Fruits; C—Fruit in longitudinal section. (Near Piawaning, Curtis, 1959).

76. **Eucalyptus tetragona** (R. Br.) F. Muell.

Tallerack

Tallerack is indicative of poor white sandy soil, usually with a gravelly subsoil. It extends on the light soil types from Sukey's Peak just outside Cranbrook, eastward to at least as far as Cape Arid, not far from Israelite Bay. It extends inland as far as Gnowangerup and Borden to the north of the Stirling Range, thence to the Newdegate and Grass Patch districts. Another area of distribution, occurring under the same soil conditions occurs in the lower Hill River area, and from there northwards to Lake Logue.

The plant is usually a mallee 2 to 3 m tall, but specimens of 6 to 8 m have been recorded on the south coast. The bark is grey and flaky in the lower parts, shedding in rather thick plates; upward it is yellowish-brown and smooth, but the branchlets are covered with a white powdery exudation, which extends to the foliage and flower buds. The leaves are stalked with a thick stalk, seldom more than 8 cm long and often almost as broad, prominently veined, and rich in oil, but the oil is of low quality and contains but little cineol.

The flowers are borne in clusters of three on flat stalks, the buds are four ribbed and the calyx four toothed. The operculum is usually hemispherical, white and smooth; when shed there may be seen inside four small tooth-like projections which may represent the vestiges of the incurved tips of the four petals which have become fused to form the operculum. The stamens are pure white, in four tufts or bundles alternating with the four teeth of the calyx-tube. The fruits are almost globular in the south coastal forms but often more urn-shaped in the plants from the west coast.

The name *tetragona* refers to the four angles of the flower buds.

Tallerack has been cultivated in California and in eastern and western Australia.

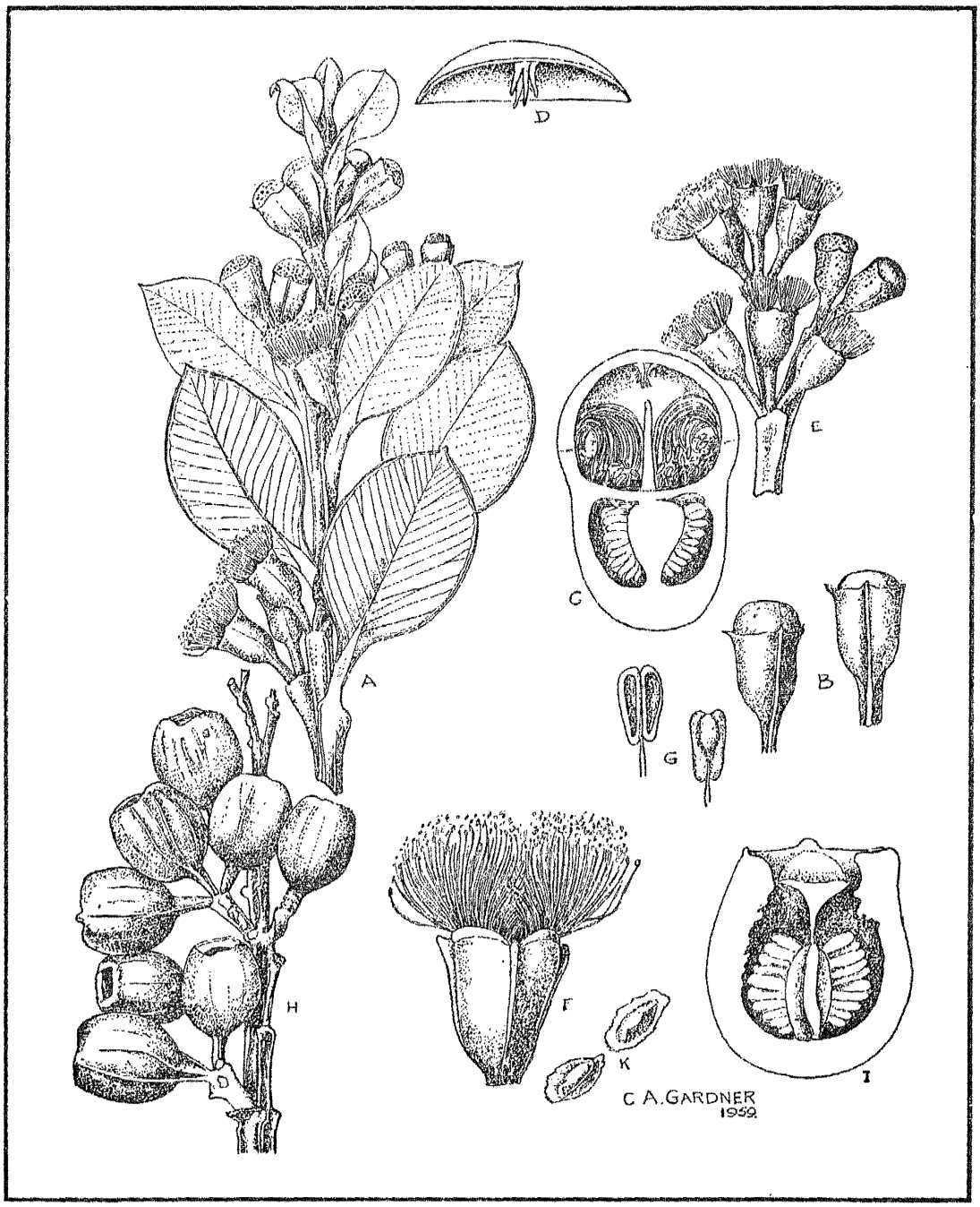

Fig. 66

Eucalyptus tetragona A—Branchlet with flowers; B—Flower buds; C—Flower bud in longitudinal section; D—Operculum seen from below and showing the four small processes in the middle; E—Flowers; F—Flower (much enlarged); G—Anthers; H—Fruit; I—Section of fruit; K—Seeds. (Dalyup near Esperance, Gardner).

77. **Eucalyptus micranthera** F. Muell. ex. Benth.

Alexander River Mallee

The specific name *micranthera* refers to the small anthers of the flowers. Alexander River Mallee was first collected by George Maxwell about 1850 on a white sandpatch 3 km westward from Eyre's Relief. This latter place, today known as Eyre, lies about half way between Cape Arid and Eucla on the coast roughly southward from Burnabbie Station.

Maxwell described the plant as a mallee 2 to 3 m tall. The material was in bud and flower only, no fruits being obtained. Many years later, H. P. Turnbull on the Alexander River collected further material which was sent to Maiden at the Botanic Gardens Sydney and figured in his "Critical Revision of the Genus Eucalyptus".

E. micranthera is found in coastal areas from near the Gairdner River eastward to Israelite Bay. A point of interest is that the species is very closely related to *E. cneorifolia,* Kangaroo Island Mallee, the well known source of eucalyptus oil of high quality. Another point of interest is to be found in the flowers which possess two types of stamens, long and short, and with these a certain difference in the size of the anthers. It has been reported as a good bee plant.

Alexander River Mallee is not known in cultivation. It should be suitable for windbreaks in coastal areas of southern Australia. Its midwinter flowering may be a useful feature in garden shrubberies.

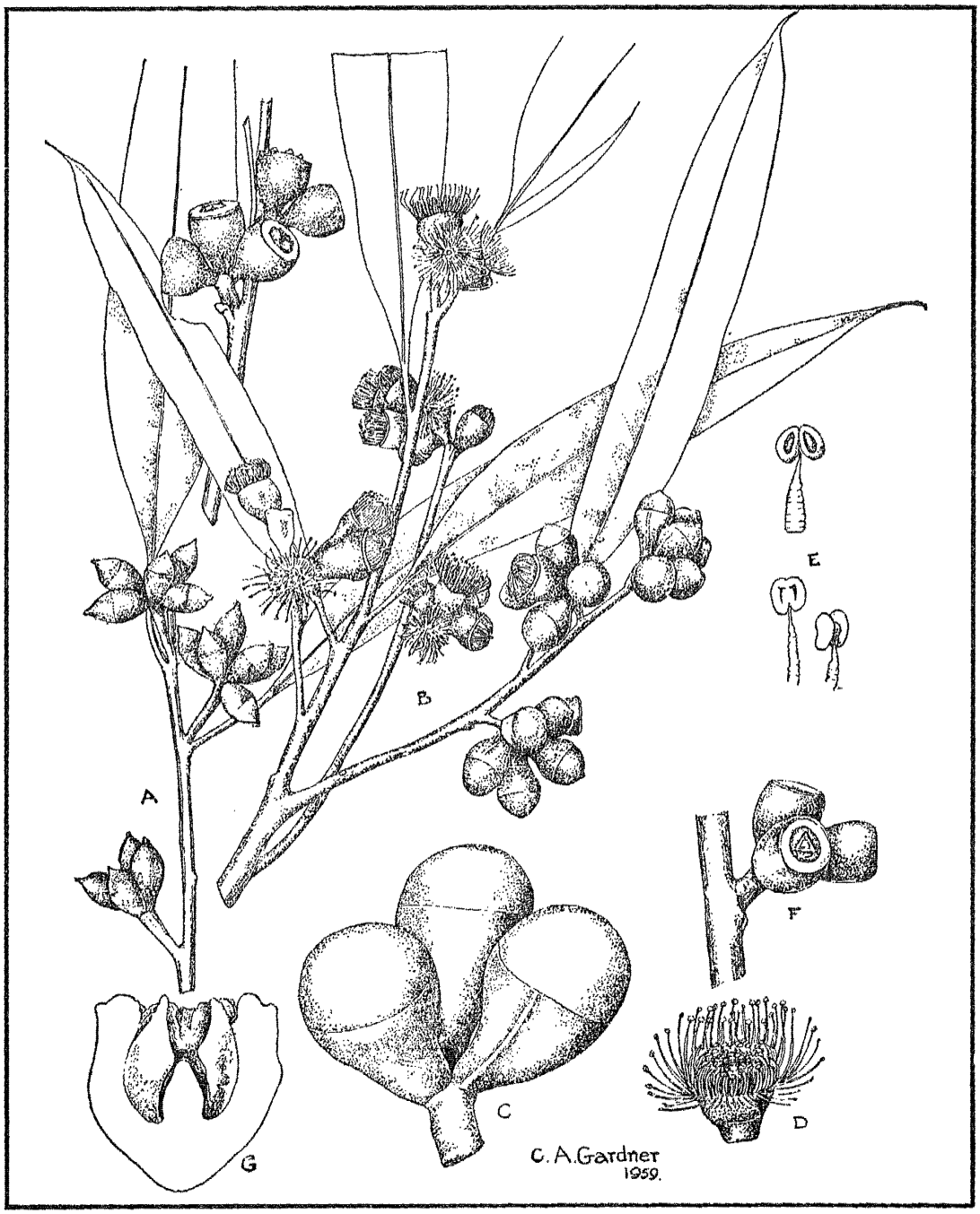

Fig. 67

Eucalyptus micranthera A and B—Branchlets showing leaves, buds, flowers and fruits; C—Buds (enlarged); D—Flower; E—Anthers; F—Fruits; G—Section of fruit. (About 16 km northward from Esperance, A. R. Main, 1959).

78. **Eucalyptus grossa** F. Muell. ex Benth.

Coarse-leaved Mallee

Coarse-leaved Mallee is unmistakable by reason of its peculiar habit and thick rough-barked stem and branches, both of which have longitudinally fissured persistent bark right up to the distinctly reddish branchlets. The leaves are broad and thick, a bright shining green, with the midribs usually a purplish-red. The heads of flowers are on thick, red cylindrical peduncles which hang almost vertically, and the reddish bud-cap conceals the ultimately free, bright yellow filaments. The widely-spreading thick branches, and in general the rough stout appearance of the shrub inspired the specific name from the Latin, *grossus,* meaning thick.

Originally described from specimens collected by George Maxwell in the vicinity of the Phillips River, the main centre of distribution lies to the north-east, from Newdegate to south and east of Norseman. Near Salmon Gums it is associated with thickets of Teatree in yellow clay or loamy soils. The plant seldom exceeds 2 to 3 m tall. It is not infrequently associated with such soils in proximity to granite rocks.

This remarkable species has no close relationship with other species of *Eucalyptus,* nor has the plant any known economic value, apart from the part it could play in horticulture. Being hardy, it would thrive in most localities in the South-West, and could be a distinct ornament in any garden or shrubbery. It would, however, require space for its ultimate development, since although not of any appreciable stature, it can occupy a lateral diameter of 3 m.

Coarse-leaved Mallee has been cultivated in California and in eastern and western Australia. It is adaptable to a variety of soils and is tolerant to saline conditions.

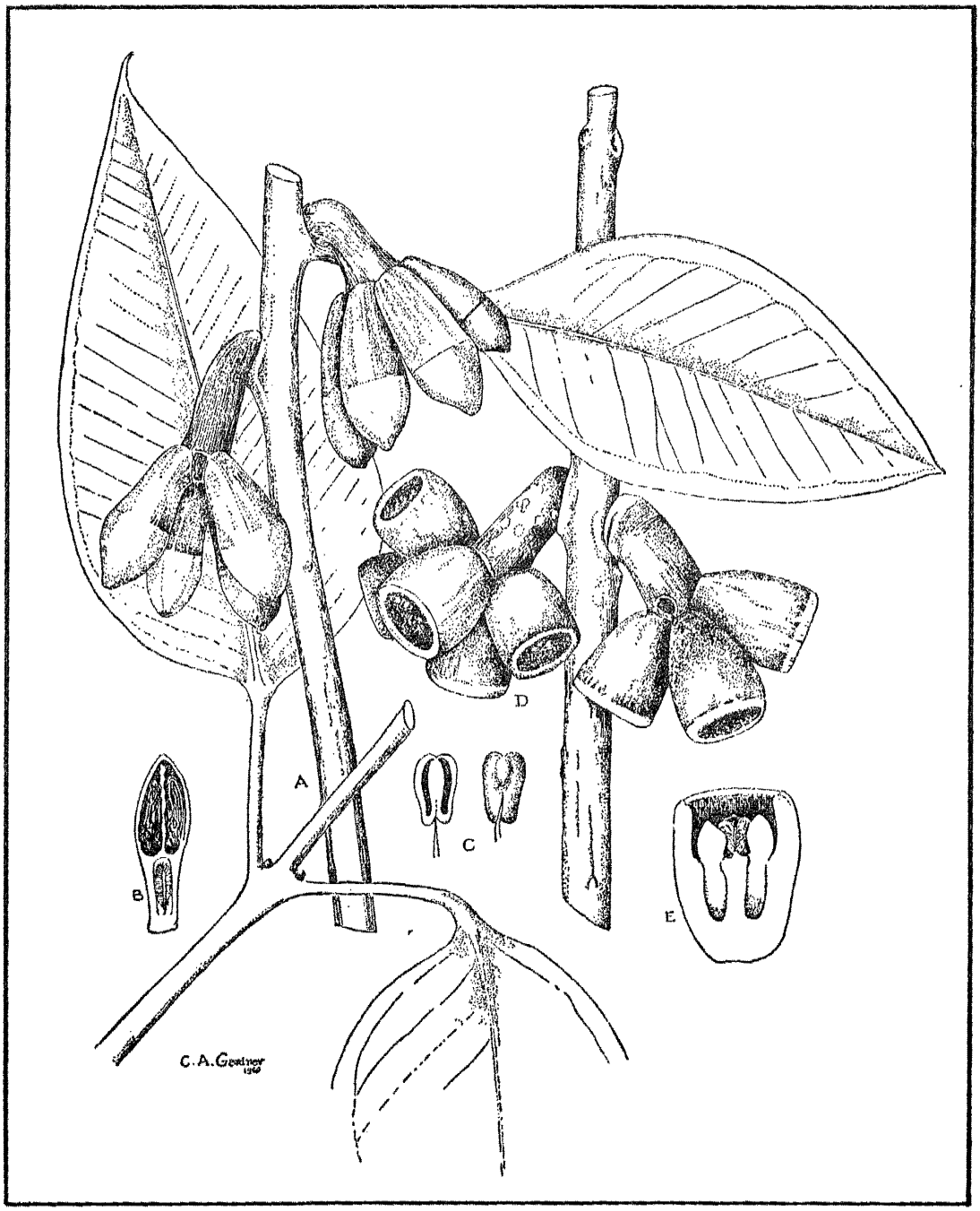

Fig. 68

Eucalyptus grossa A—Flower buds; B—Section of flower bud; C—Anthers; D—Fruits; E—Section of fruit. (Near Salmon Gums, Gardner 2228).

79. **Eucalyptus desmondensis** Maiden et Blakely

Desmond Mallee

The Desmond Mallee has a somewhat restricted range in the Ravensthorpe district, but is by no means confined to Mount Desmond, where the writer collected the type specimen in May, 1924. It is distributed over a fairly large area of the Ravensthorpe Range, and extends some distance to the east of this. It is one of our more attractive mallees, a shrub up to 5 m tall, with slender stems up to 10 cm in diameter, the bark rough and flaky at the base, but the stems soon smooth and almost white with a powdery bark.

The branches are flexuose and often drooping. The leaves are comparatively broad, blue-grey and rather thick without any evident veins, but these can be seen under a lens. The flowers are individually almost without stalks, and borne on broad stalks under the umbel, and the buds are chestnut-brown. The operculum varies from narrow and acute to somewhat broad and almost blunt. Both forms are depicted on the accompanying plate. The fruits are on very short stalks, and are somewhat bell-shaped, the valves never projecting beyond the rim of the fruit. The filaments are pale yellow when fresh but dry to a yellowish-brown.

On Mount Desmond the shrub grows in stony soil on the lower slopes of the hill, but in some places it may be found in clay. It flowers in winter and spring, from May to November.

This species is singularly attractive, and could be trained to grow for street-planting purposes.

Desmond Mallee has been cultivated in eastern and western Australia and in California. The name *desmondensis* is in reference to Mount Desmond, where the type specimen was collected.

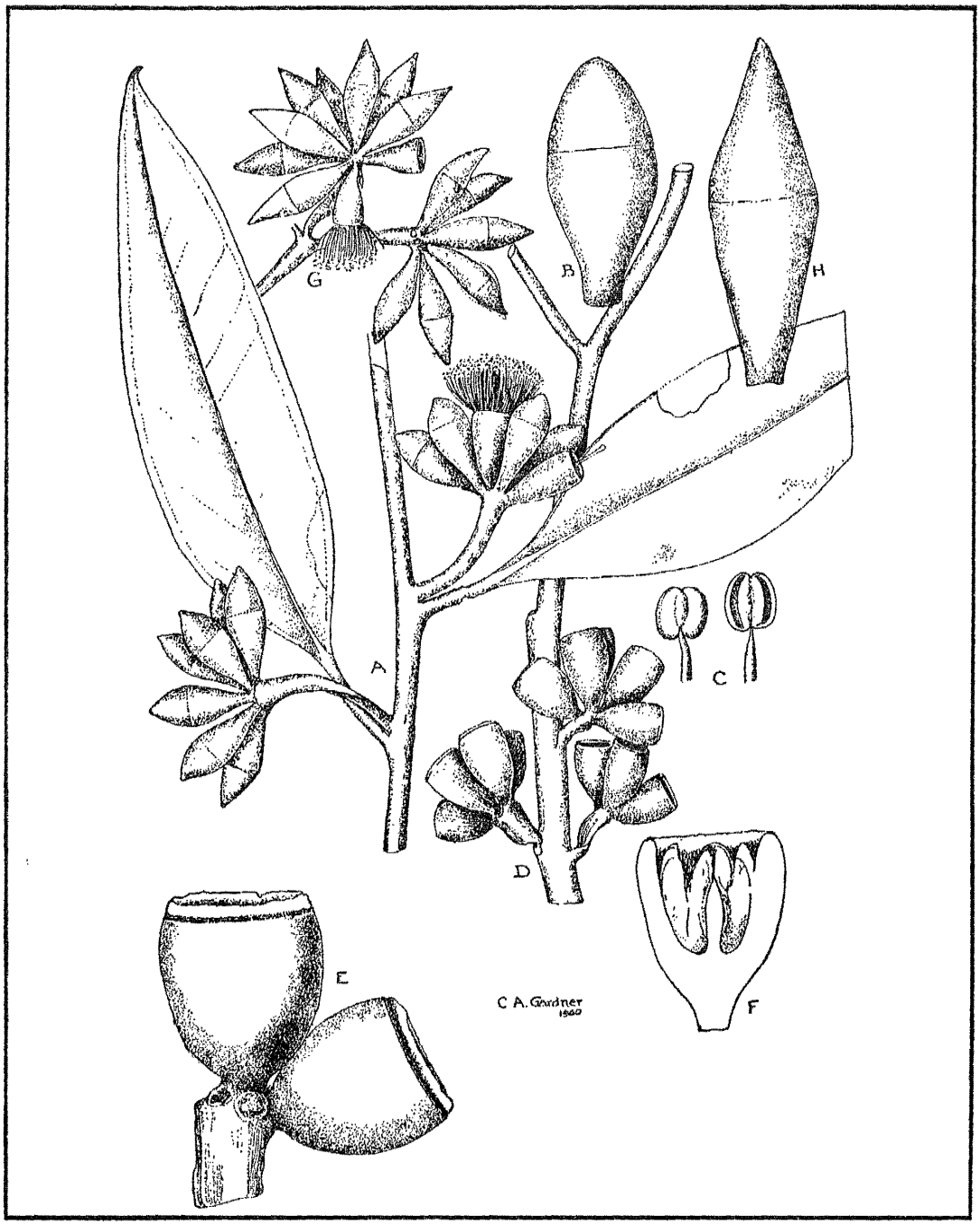

Fig. 69

Eucalyptus desmondensis A—Branchlet with buds and flowers; B—Flower bud; C—Anthers; D—Fruits; E—Single fruit (enlarged); F—Section of same (Mount Desmond, Gardner May 1924). G—Flower-buds; H—The same enlarged (Ravensthorpe district, Gardner 2935, November 1931).

80. **Eucalyptus falcata** Turcz.

Silver Mallet

Silver Mallet occurs as a mallee, or as a tree with a smooth pale bark. It is known as White Mallet in the Narrogin and Wagin districts. As a mallee it has an extensive area of distribution, extending from the Helena River in the Mundaring Catchment Area, southward to the south coast between the Stirling Range and Esperance. In both tree and mallee forms we find a smooth or longitudinally-furrowed fruit, but this character is unimportant, since considerable variation occurs between the two.

The first specimens were collected by James Drummond, probably in the districts to the east of the middle parts of the Great Southern district. In this area the species maintains a distinctive form, with slender stalks, long and acutely-pointed buds, a usually faintly ribbed fruit, and green, shining narrow leaves.

In the south, especially in the regions of the south coast eastward from the Pallinup River, it undergoes some changes, the buds and fruits being entirely smooth in some cases, and the operculum sometimes short and broad. These latter forms are sometimes easily mistaken for *Eucalyptus decipiens,* but always there is a definite stalk to the buds and fruits.

At Hatters Hill a robust form is found which shows a tendency towards *E. goniantha,* but always there is a more or less slender stalk to the buds and fruits, sometimes thickened upwards. Farther east, in sand near the coast towards Esperance, the buds become smaller and are borne on shorter, thicker stalks. It is here that the species most closely approaches *E. decipiens,* but does not have the stalkless buds and fruits of the latter.

The bark of the tree form is not high in tannin but is sometimes added to brown mallet bark as an adulterant.

Silver Mallet has been cultivated in eastern and western Australia. The name *falcata* refers to the falcate or sickle-shaped leaves, which is not a marked feature of this species.

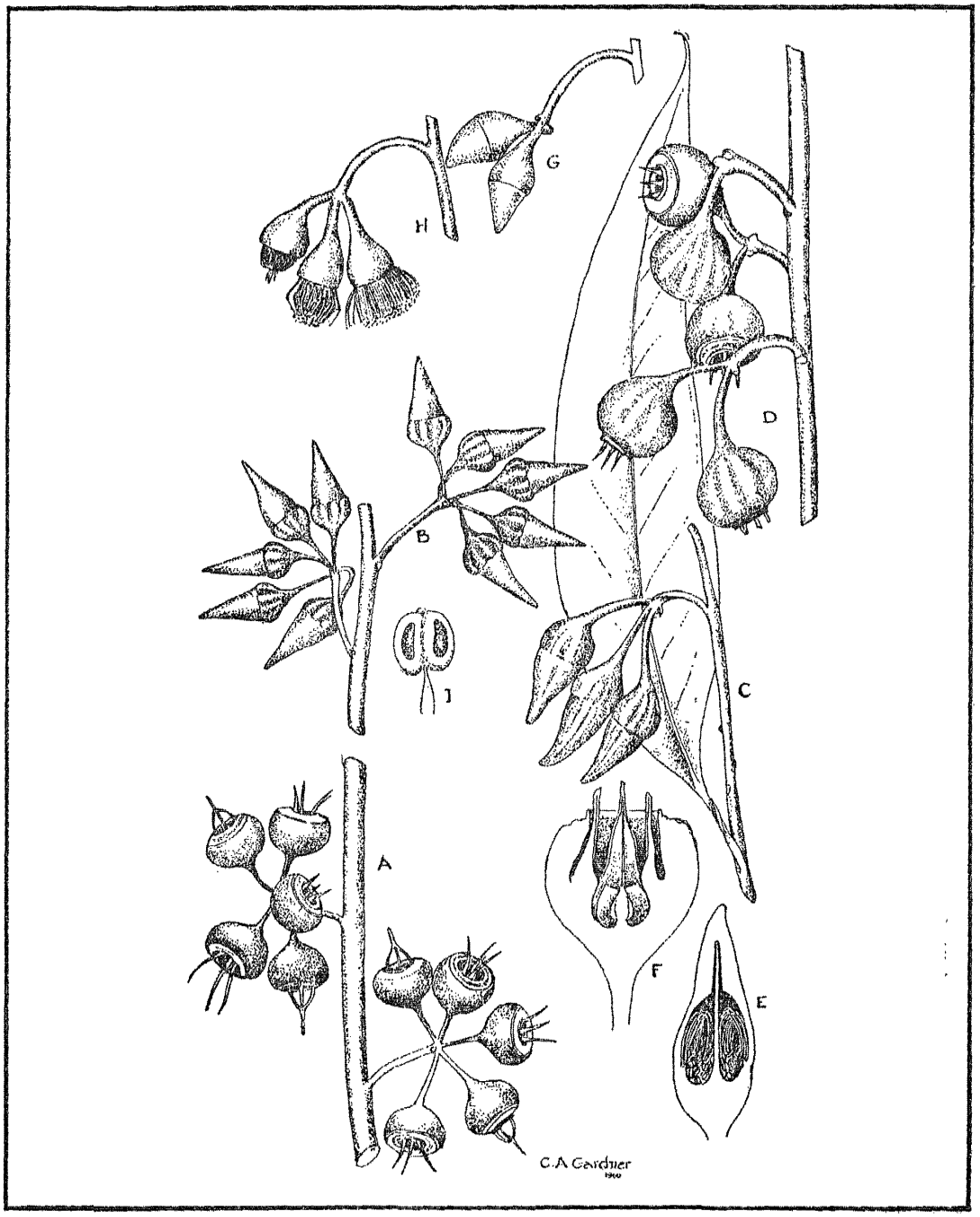

Fig. 70

Eucalyptus falcata A—Fruits; B—Flower buds (Mundaring catchment area, D. H. Perry). C—Flower buds; D—Fruits; E—Section of flower bud; F—Section of fruit; I—Anther (Hatter's Hill, Gardner). G—Flower buds; H—Flowers (56 km westwards from Esperance, G. H. Burvill).

81. **Eucalyptus goniantha** Turcz.

Jerdacuttup Mallee

Eucalyptus goniantha was, unfortunately, described without fruits, but we possess fragments of the leaves and flower-buds of the original specimens collected by James Drummond in his Third Collection. A specimen, in fruit only, of Jerdacuttup Mallee, or something very closely resembling it, was collected by George Maxwell from "Franklin River". It was also collected by Collie and Baxter from the east of King George Sound.

It is unfortunate that material from so many sources, all of it incomplete, became described under the one name, but I believe that even so, all of the earlier collections, or at least those of Drummond and Maxwell, and one other, are referable to the one species.

"Franklin River" as a locality does not exist in Western Australia, but it seems certain that the spot at which Maxwell collected his specimen lies somewhere between the Pallinup River and Cape Arid.

Between the Jerdacuttup River and the Dalyup River we find a robust mallee with rather thick, dark green, rather finely-veined leaves, somewhat massive buds with pale, almost conical streaked or ribbed caps, and a deeply ribbed fruit. It occurs in stony clay soil, often on the sides of hills and on breakaways.

The original specimens of Drummond's which I have seen are more longitudinally-wrinkled in the bud than those which have been subsequently collected, but this may be the result of immaturity, as can be demonstrated in other species. The operculum varies from smooth to longitudinally-ribbed. In south coastal areas the species is a thick-leaved mallee with buds in clusters of four to eight, the fruits more or less pear-shaped.

To the north of Esperance Jerdacuttup Mallee assumes a more spreading habit, rarely exceeding 1 to 2 m tall. The flowers appear to be constantly in groups of three and the fruit more coarsely ribbed. Farther north, in heavier soil, the plant becomes larger, and near Circle Valley it assumes a tree form, up to 13 m tall, with a rough persistent bark.

Farther north still, in clay soil we find *E. goniantha,* as far as Salmon Gums, as a rather tall mallee in yellow, loamy stony soil. This mallee was described as *E. kessellii,* but from an examination of the whole range of forms it must be regarded as merely a form of *E. goniantha.* We have here an excellent example of variation according to soil and climatic conditions.

The subspecies *globosa,* with rounded opercula and sub-globular fruit, is found on granite hills between Mount Le Grand and Frenchman Peak. There is the distinct possibility that intergrading forms between this subspecies and the subspecies *goniantha* may be found at some later date.

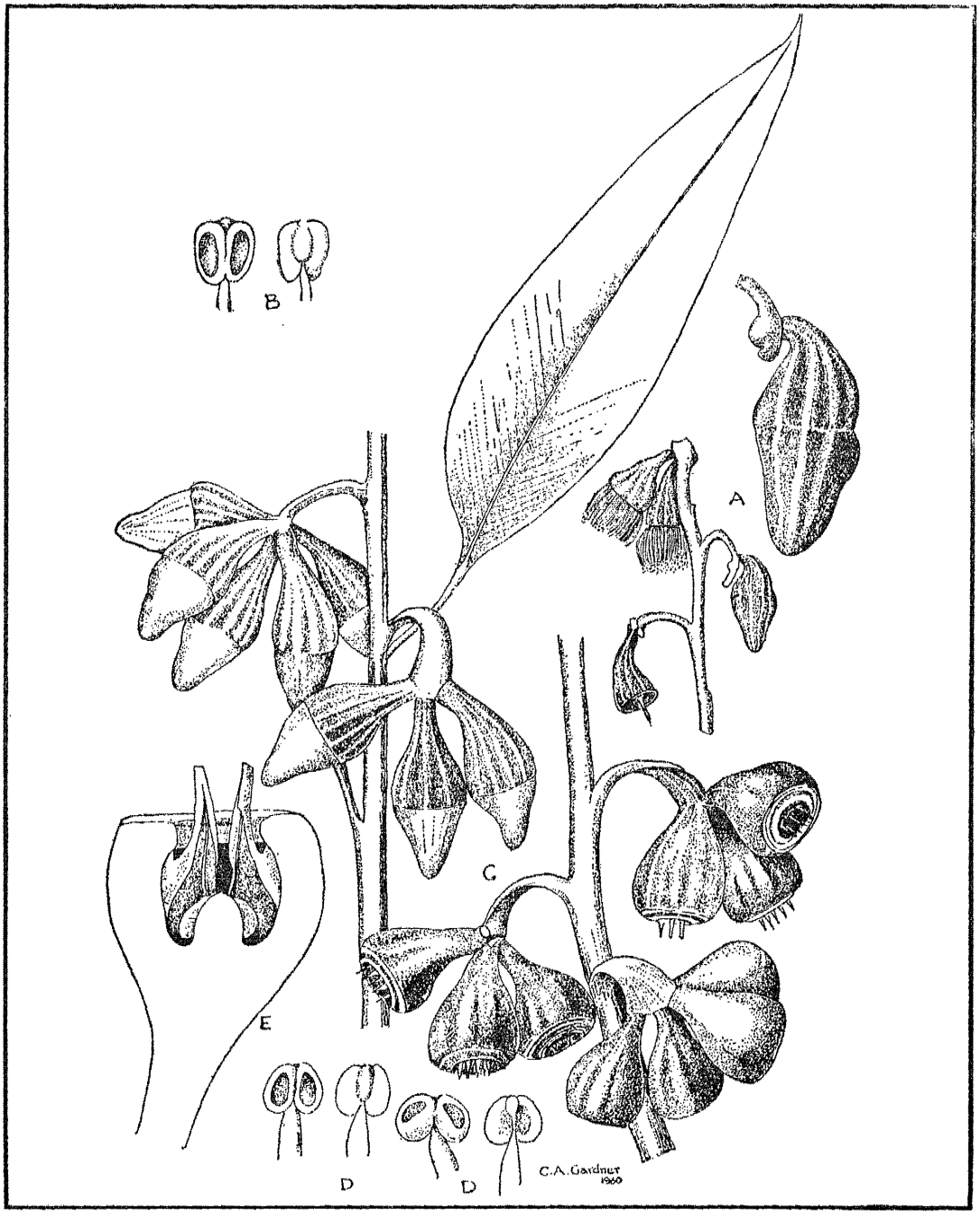

Fig. 71

Eucalyptus goniantha A—Flowers and buds; B—Anthers, Drummond (type collection); C—Buds and fruits; D—Anthers; E—Section of fruit. (Jerdacuttup River, Gardner, December 1940.)

82. **Eucalyptus decipiens** Endl.

Redheart

Redheart grows to about 13 m tall in limestone soils, but in sandy depressions it is a much smaller tree, sometimes having a mallee form. The more robust specimens are found in the limestone tract which extends from near the coast at the Moore River southward to the vicinity of Rockingham, where it is a tree with a rough, light grey bark which could easily be mistaken for Tuart, but of more spreading habit and somewhat untidy. Unlike Tuart the timber is red, and the trunk attains a diameter of over 1 m in well-grown specimens.

The other area of distribution is found under totally different conditions in the south, where from Katanning to Denmark, and again towards the Stirling Range and eastwards to the Fitzgerald River the tree is found growing in poor sand subject to very wet conditions in winter. The tree rarely exceeds 7 to 8 m tall, and has usually a gnarled or twisted trunk and widely-spreading, untidy branches. It is not a handsome tree. The bark of Redheart is darker in the trees from the limestone area farther north, but the timber is the same deep red. In the latter habitat, it inhabits sandy depressions.

A mallee form is found around the Stirling Range and the low-level plains to the east. This mallee form is at times difficult to distinguish from *E. falcata,* but always the buds and fruits are to all purposes stalkless, whereas those of *E. falcata* are distinctly stalked.

The anthers of *E. decipiens* exhibit some diversity in size and form: they have been described as opening in pores, and this is sometimes true of the immature anthers, but in the fully mature state they are found to open in parallel slits as illustrated in the accompanying plate.

Considerable importance has been given to the shape of anthers and their dehiscence, but detailed examination has shown that not too much reliance can be placed on this character: for example, when the plate of *E. sepulcralis* was being prepared, at least four anthers had to be examined before one was found in which the slits were joined at the apex. Similarly, in *E. desmondensis* we found a similar state of affairs.

The anthers of *E. decipiens* are not unlike those of a number of tropical species which have been described as opening in pores, but the important thing is that the filament is attached above the base of the anther, whereas those Western Australian species which have anthers opening in what might be called small pores, open nearly at the top, and the filament broadens at the apex into the anther.

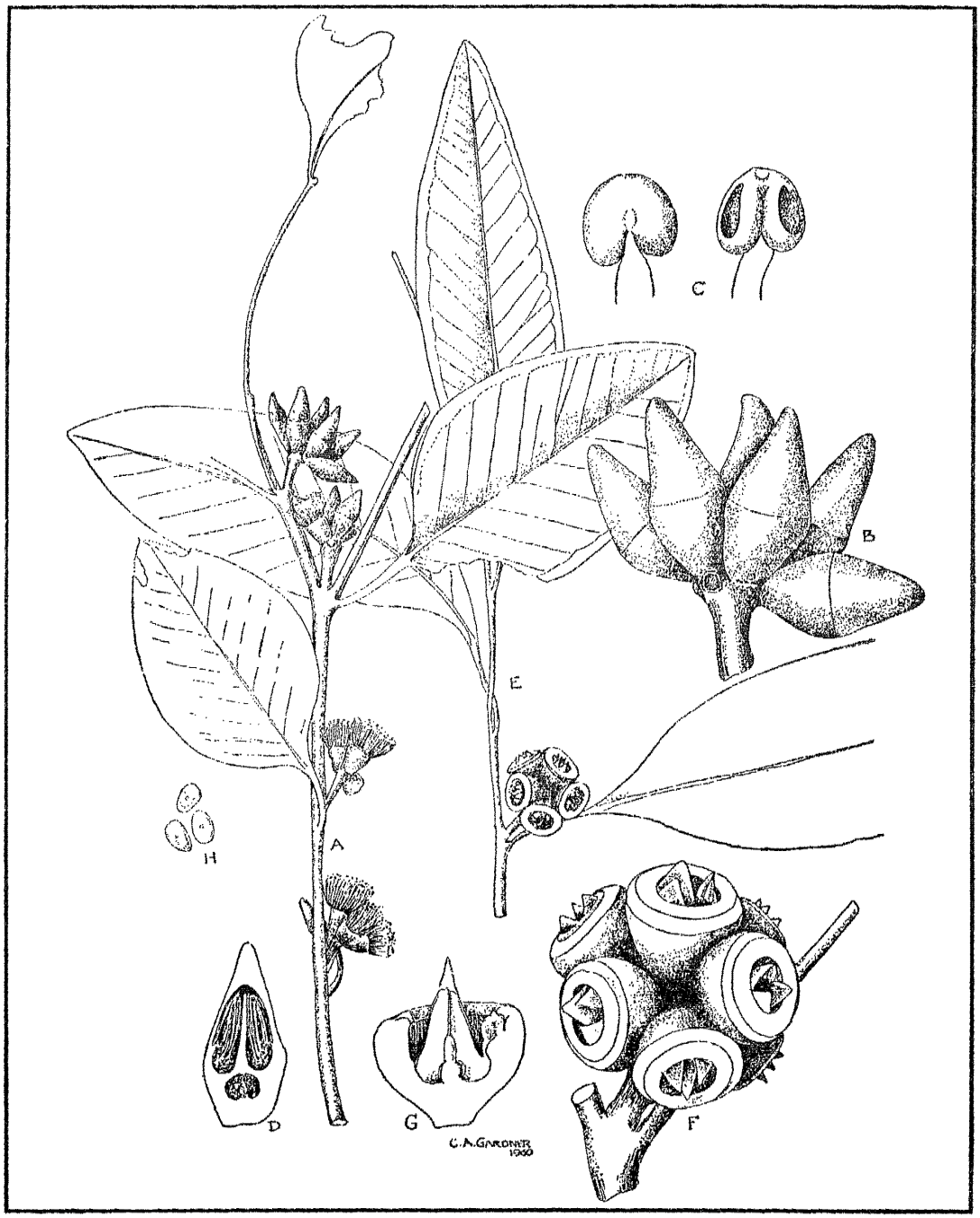

Fig. 72

Eucalyptus decipiens A—Branchlet with flowers and buds; B—Flower buds (enlarged); C—Anthers; D—Flower bud in section; E—Branchlet with fruits; F—Cluster of fruits (enlarged); G—Fruit in section; H—Seeds. (Toll's Pass, Stirling Range, Gardner 1931).

83. **Eucalyptus corrugata** Luehm.

Rough-fruited Mallee

Rough-fruited Mallee varies from a fairly large mallee to a tree about 10 to 12 m tall, with either a quite smooth bark, the outer layers of which shed in long plate-like pieces, or the lower part of the trunk covered with persistent outer layers of bark which give it a rough, dark, blackbutt appearance.

The bark, although appearing smooth, is slightly rough to the touch. It is a yellowish-brown when the outer bark has newly shed, but later becomes creamy-white. The timber is a pale brown, hard and straight-grained, and the leaves are bright shining green. The flowers are borne in umbels of from three to seven on short pedicels; the peduncle of the umbel is about 2 cm long. The buds and fruits are prominently ribbed. The operculum is normally broad and blunt, almost hemispherical and even more prominently ribbed than the calyx.

E. corrugata grows in stony soil, usually on rising ground, and its range extends from Westonia northwards to Mount Jackson and eastwards to near Coolgardie and some distance southward. The typical form has the obtuse, almost hemispherical, prominently ribbed or almost winged bud-cap, and the leaves are a shining green. It is never a large tree.

Rough-fruited Mallee has been cultivated in eastern and western Australia. The corrugated buds and fruit, from which the name *corrugata* is derived, are used in ornaments such as necklaces.

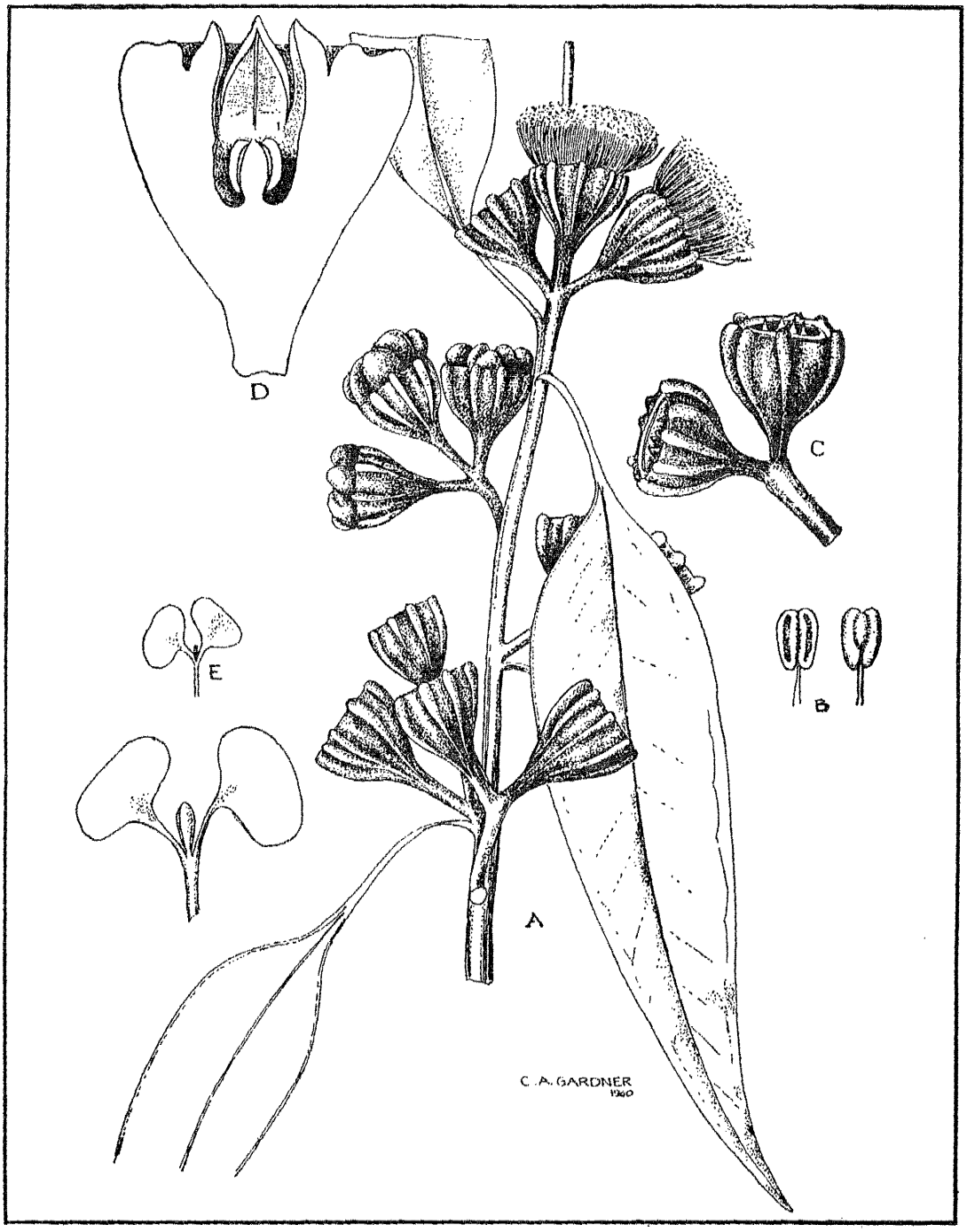

Fig. 73

Eucalyptus corrugata A—Branchlet with buds, flowers and fruits; B—Anthers; C—Fruits; D—Section of fruit; E—Cotyledons. (Westonia, Gardner 1095).

84. **Eucalyptus lesouefii** Maiden

Goldfields Blackbutt

Goldfields Blackbutt, common in the Kalgoorlie-Norseman district but also occurring as far north as Menzies and as far east as Cundeelee and Fraser Range, is found mainly on alluvial flats and shows a certain tolerance to salt. It attains a height of 14 m when well grown. The bark is flaky and persistent in the lower part of the trunk, from 30 or 60 cm to 2 to 3 m above the ground level. Above this it is smooth and light silvery-brown.

The branchlets are reddish and the leaves dull greyish-green in the common form, although forms with shining leaves have been observed. The dull, narrow leaves, the more pointed opercula, and usually the more pronounced black butt at the base of the trunk are the principal features which separate this tree from *E. corrugata,* but none of these characters is constant.

Specimens from Goddard Creek near Zanthus have many of the characteristics of *E. corrugata,* but the buds have the beaked operculа characteristic of *E. lesouefii.* Still another form from the Norseman district has lustrous leaves and remarkably long, pointed opercula. Perhaps all three should be grouped as a single species.

The range of the typical form of *E. lesouefii* extends from Kalgoorlie to Norseman and westward to Coolgardie. *E. lesouefii* flowers from October to December. Its honey potential is unknown.

The name *lesouefii* honours Ernest Le Souef, a former Director of the Zoological Gardens, Perth.

Goldfields Blackbutt has been cultivated in eastern and western Australia.

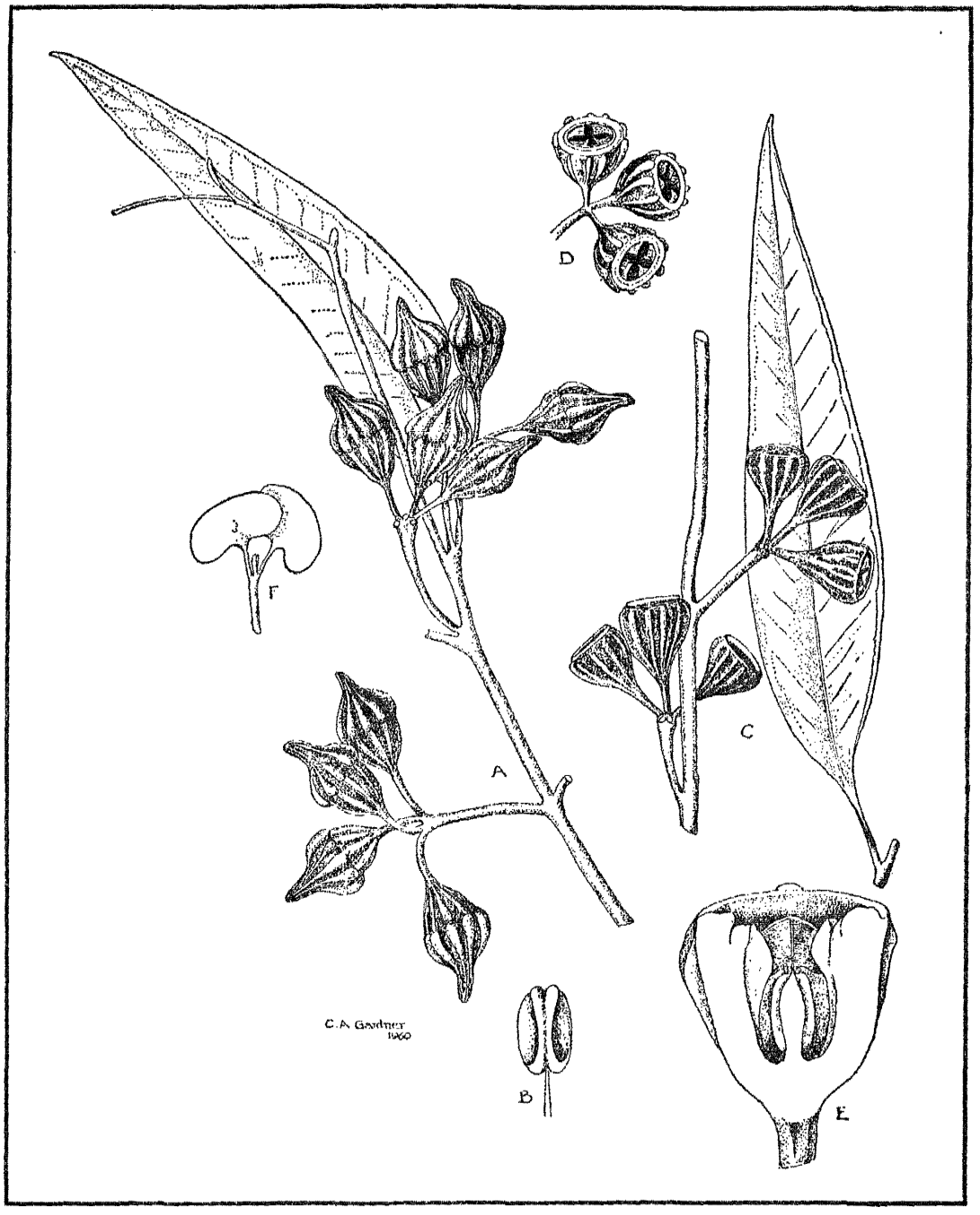

Fig. 74

Eucalyptus lesouefii A—Branchlet with buds; B—Anther; C—Branchlet with leaf and fruits; D—Fruits; E—Fruit in section; F—Cotyledons. (Higginsville, Gardner 9535).

85. **Eucalyptus stricklandii** Maiden

Strickland Gum

Few trees are more attractive than *Eucalyptus stricklandii* which grows on the stony hills between Coolgardie and Norseman, and eastward to the Fraser Range. Its heavy pale green foliage, attractive cinnamon-coloured bark above the rough black base and its masses of large lemon-yellow flowers make it an outstanding tree. Although its natural habitat is confined to stony, usually schistose hills in the eastern Goldfields, it is equally at home in the poor white sand of the coastal regions, or in the sandy or clay soils of the wheat districts.

Its specific name commemorates a former Governor of Western Australia who was subsequently Governor of New South Wales, and of Malta.

The Strickland Gum is not a tall tree. Rarely does one see it more than 7 to 8 m tall, but it has a short massive trunk up to 1 m in diameter, and widely-spreading branches. The bark of the trunk, or at least the lower part of the trunk, is covered with a persistent, dark grey or almost black curly-flaky bark which terminates abruptly and is succeeded by a smooth reddish-grey or cinnamon-coloured bark. The ultimate branches and branchlets and the flower-buds are covered with a white powder. The whole tree, in fact, has a singularly lucid appearance. It flowers from late November to January and may produce a honey flow when enough trees are available.

Strickland Gum is quite distinctive, with no close relationships within the genus except *E. carnei* which grows in the Sandstone district. Points which should be observed in *E. stricklandii* are the stout, flattened, common flower-stalks, the stalkless individual flowers, the shape of the fruit and the cylindrical-ovoid operculum which is yellow when the bud is ready to burst.

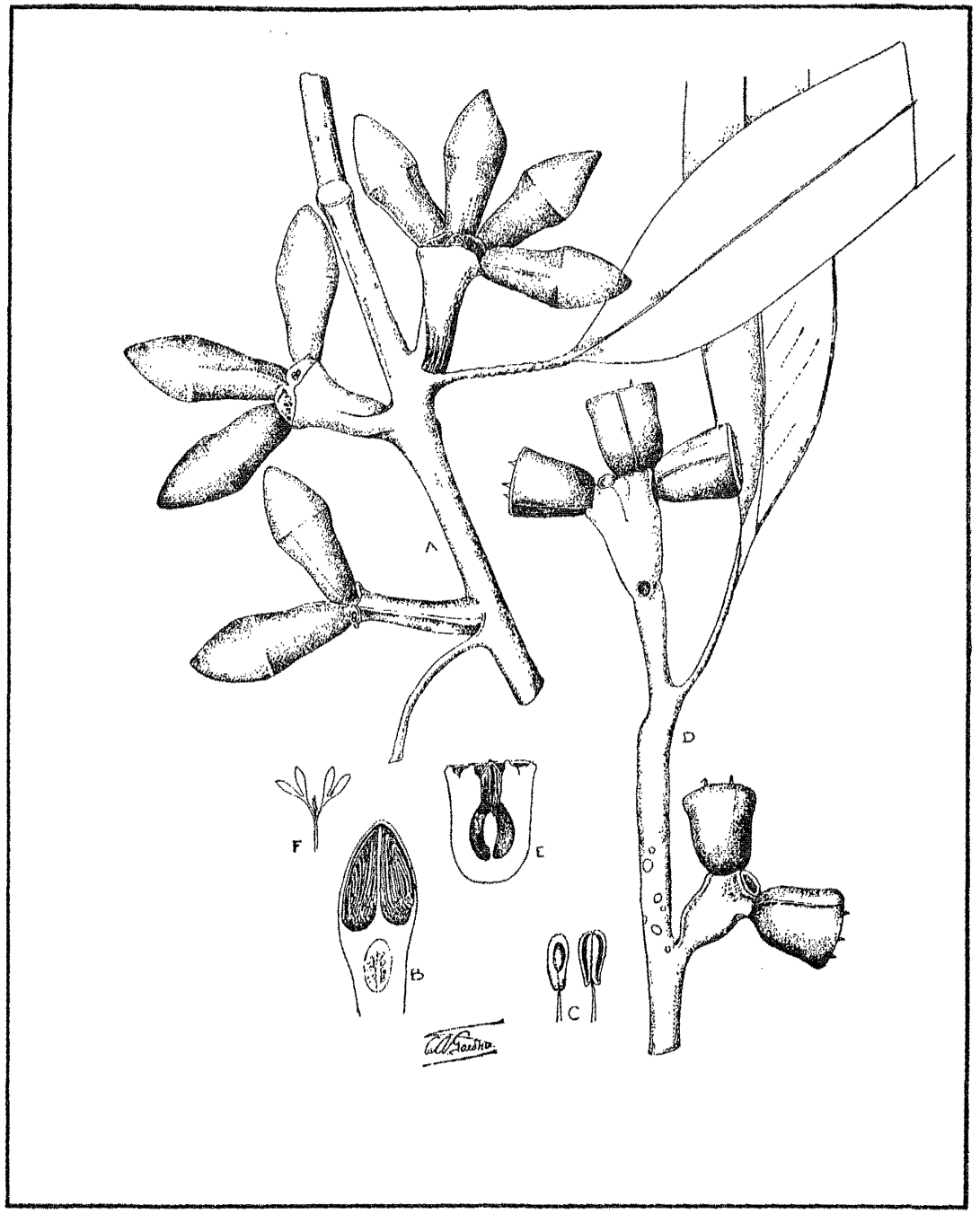

Fig. 75

Eucalyptus stricklandii A—Branchlet with flower buds; B—Flower bud in section; C—Anthers; D—Branchlet with fruits; E—Section of fruit; F—Cotyledons. (Widgiemooltha, Gardner 1050).

86. **Eucalyptus foecunda** Schau.

Narrow-leaved Red Mallee

Narrow-leaved Red Mallee has an average height of 2 to 5 m, several erect twiggy branches, the bark smooth except at the very base where unshed patches of a dark greyish-brown adhere to the stems; otherwise it sheds in small plates, leaving a smooth grey-brown bark.

The leaves are erect, green and shining on both surfaces, rather narrow, and terminate in usually long fine points; the leaf-stalks are slender and the leaf-blade gradually narrows into these stalks. The midrib of the leaf alone is prominent, the lateral veins scarcely or not visible to the naked eye, diverging from the midrib at a rather wide angle. The whole leaf is copiously oil-dotted, the average length of the leaf and its stalk being 8 to 10 cm.

The flowers are borne in umbels in the axils of the leaves, the common stalk rarely exceeding 2 cm long. The flowers number six to ten in the umbel, their individual stalks rarely exceeding 3 mm long. The calyx-tube is narrow in the bud, but becomes almost pear-shaped at the time of flowering; the operculum is conical, about the same length as the calyx-tube, and usually slightly narrowed in the upper half in dried specimens. The numerous filaments are white, the small anthers are club-shaped and continuous with the filament, that is they are not swivelled as in most species, and open towards the obtuse summit in small oblique pores.

The fruit is pear-shaped, smooth and rounded at the top with a short thick rim, and the remarkable white disc descends obliquely into the fruit orifice; the three fruit valves are at first surmounted by the split base of the style, but these soon break off leaving the persistent portion well included within the fruit itself.

This species was originally collected by Ludwig Preiss on the slopes of limestone hills not far from Fremantle, and it is still to be seen at Spearwood and towards Sorrento. *E. foecunda* has been confused with *E. oraria** from the coastal districts between the Murchison River and Dongara, as well as Dirk Hartog Island and the Abrolhos, but this latter species has very different anthers. The species is identical with what was named *E. leptophylla* by Ferdinand von Mueller from south-eastern Australia. This common species, now regarded as a synonym of *E. foecunda,* varies from a large tree to a small mallee. It is widely dispersed in various parts of the interior of southern Western Australia.

E. foecunda flowers from December to March, yielding pollen and nectar.

* Editor's Note: *E. oraria* was described by L. A. S. Johnson in 1962. It is not related to *E. foecunda* but has affinities with *E. loxophleba,* York Gum.

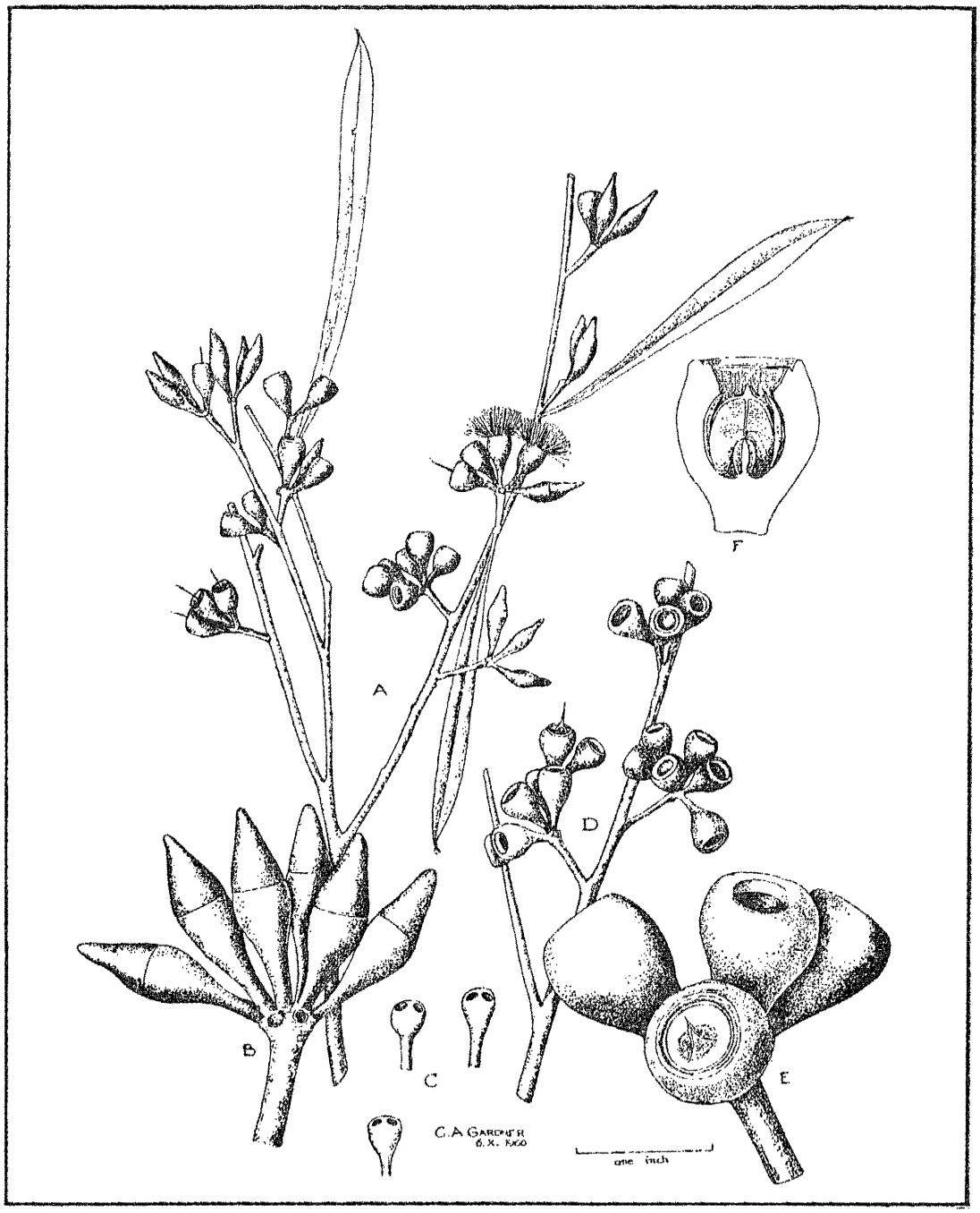

Fig. 76

Eucalyptus foecunda A—Branchlet with flower buds and fruits; B—Umbel of flower buds (much enlarged); C—Anthers (much enlarged); D—Fruits; E—Section of fruit (enlarged). (Spearwood, R. D. Royce 6326).

87. **Eucalyptus stowardii** Maiden

Fluted Horn Mallee

Fluted Horn Mallee varies from a tall mallee to a small tree. The bark of the stems is a yellowish-pink or grey, and the outer layers shed in rather thick plates about March, leaving the new bark yellow or orange. A few of the lower plates remain adherent, giving the mallee a rough bark at the base.

Fluted Horn Mallee has a wide range, extending from Mount Gibson in the north southwards to Tammin and Kellerberrin, and is always associated with soils containing decomposing granite. It is particularly common at Pithara and Wyalkatchem.

The leaves of *E. stowardii* are rather large and highly lustrous, deep green, up to 12 cm long and normally tapering into a short narrow point. The midrib is prominent, the easily distinguishable lateral veins diverging from the midrib at a wide angle, the intramarginal vein being at some distance from the leaf-margin. The whole leaf is copiously oil-dotted.

The flowers are borne in umbels in the axils of the leaves, the common stalk curving downwards and usually about 2 cm long. The number of flowers in each umbel varies from five to seven, the pedicels being less than the length of the calyx-tube which tapers at the base into these stalks, and is itself fluted or ribbed, the number of ribs being usually 10 to 12, but sometimes some of these are suppressed and the prominent ribs may number only four. The operculum is at least half as long again as the calyx-tube, slightly curved and prominently fluted or ribbed. The filaments are erect in the bud, pale yellow, angular and sometimes slightly glandular, the somewhat narrow anthers being attached on the back and opening in long slits.

The fruit is pear-shaped but truncated at the summit with a cushion-shaped disc which extends downwards internally into the fruit, the deltoid valves have at first long slender points derived from the split base of the style but their protruding tips soon break off, leaving the deltoid points slightly protruding from the orifice of the fruit.

The name *stowardii* commemorates Dr. Frederick Stoward, a former Government Botanist and Plant Pathologist in Western Australia. The species has been cultivated in eastern and western Australia.

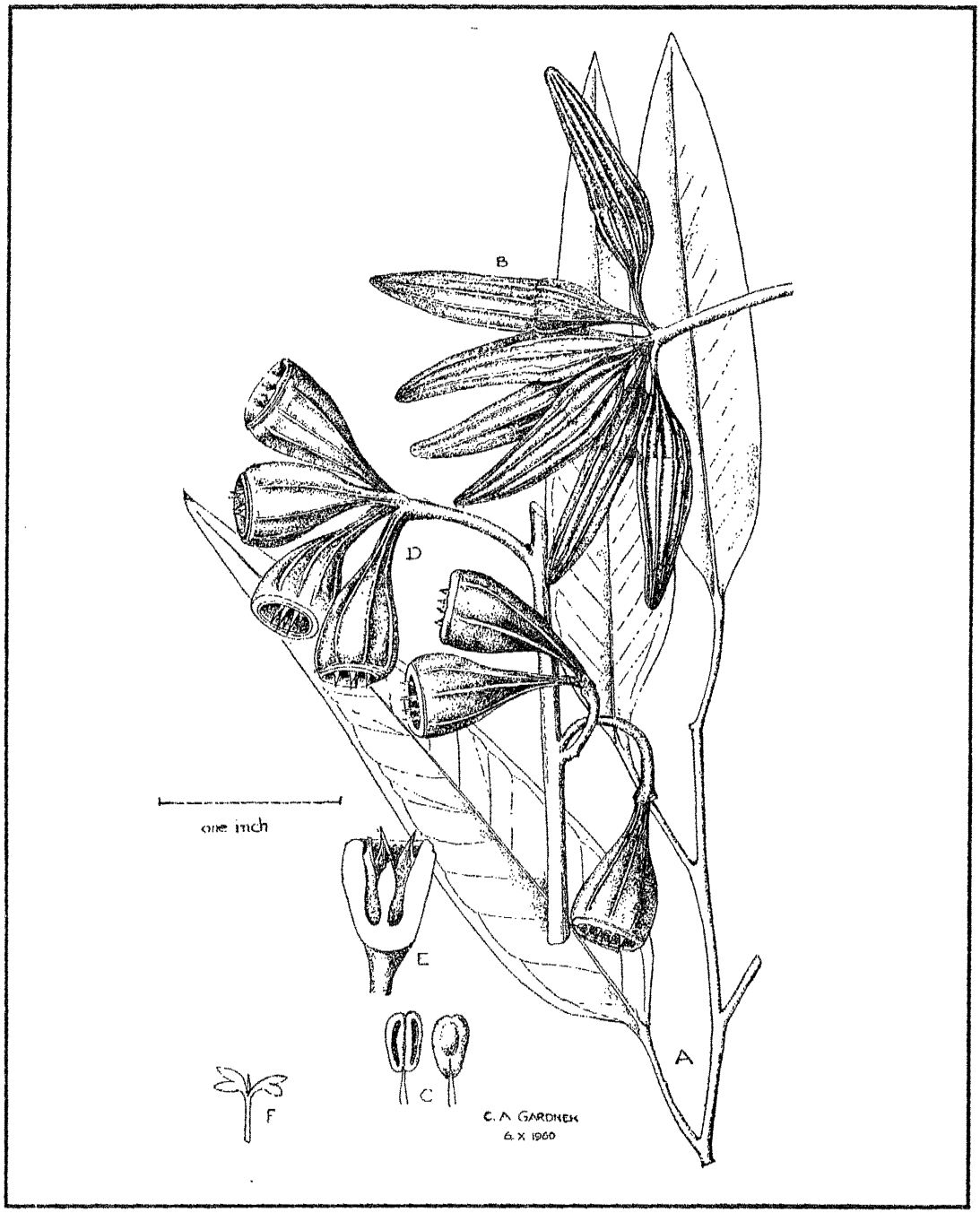

Fig. 77

Eucalyptus stowardii A—Branchlet with leaves; B—Flower buds; C—Anthers; D—Fruits; E—Section of fruit; F—Cotyledons. (Near Mt. Gibson, Gardner 10203).

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88. **Eucalyptus eremophila** (Diels) Maiden

Tall Sand Mallee

Tall Sand Mallee is always a mallee. It enjoys a very wide area of distribution which extends from Cleary and Beacon in the north to Pioneer and perhaps Gnowangerup in the south, westwards to Kellerberrin and Dalwallinu and eastwards at least as far as Kalgoorlie. The species exhibits some variation, especially in the flowers and fruits. The typical form is seen between Merredin and Coolgardie, while southwards from Widgiemooltha the plants are much larger, attaining a height of over 6 m. The latter form has longer and more flattened common flower stalks and usually longer, narrower and more pointed flower-buds. Intermediate forms also occur.

In general the mallee attains an average height of about 5 m with several stems from a stock-like base. The bark is a characteristic cinnamon brown, and quite smooth except during the late summer months when it sheds the outer bark in rather thick strips. The branches are erect and twiggy. The leaves are neither dull nor glossy, but have a nacreous appearance of an olivaceous grey-green. They are lance-shaped, commonly about 8 to 10 cm long and taper at the base into a somewhat flattened leaf-stalk.

The flowers like those of the preceding species are drooping on long, reflexed peduncles which are about 2 cm long, except in the southern forms where they are longer and distinctly slightly flattened. The umbels are three to seven flowered, each flower being on a thin stalk about the same length as the calyx-tube. The calyx-tube is somewhat pear-shaped when in bud, but varies from almost globular to shortly cylindrical. The operculum is distinctly narrower at its base than the diameter of the hypanthium, a somewhat distinctive characteristic of this species, and the whole flower-bud is glossy reddish-brown, shining and quite smooth. The operculum is curved, horn-shaped and about twice as long as the calyx-tube. The filaments are erect within the operculum, and vary from an intense crimson to pale yellow, the narrow anthers being attached on the back below the middle and swivelled on the thread-like apex of the filament, opening in parallel longitudinal slits.

The fruits are somewhat pear-shaped or shortly cylindrical, on distinct stalks, rounded or truncate at the top with a rather broad flat or rounded disc, and the capsule has short included deltoid valves.

E. eremophila inhabits loamy soil, frequently found on the margins of Salmon Gum forest and forming open thickets. It flowers from June to October, but sometimes until January, and produces an abundance of pollen and nectar.

The name *eremophila*, meaning desert loving, refers to the habitat of the species.

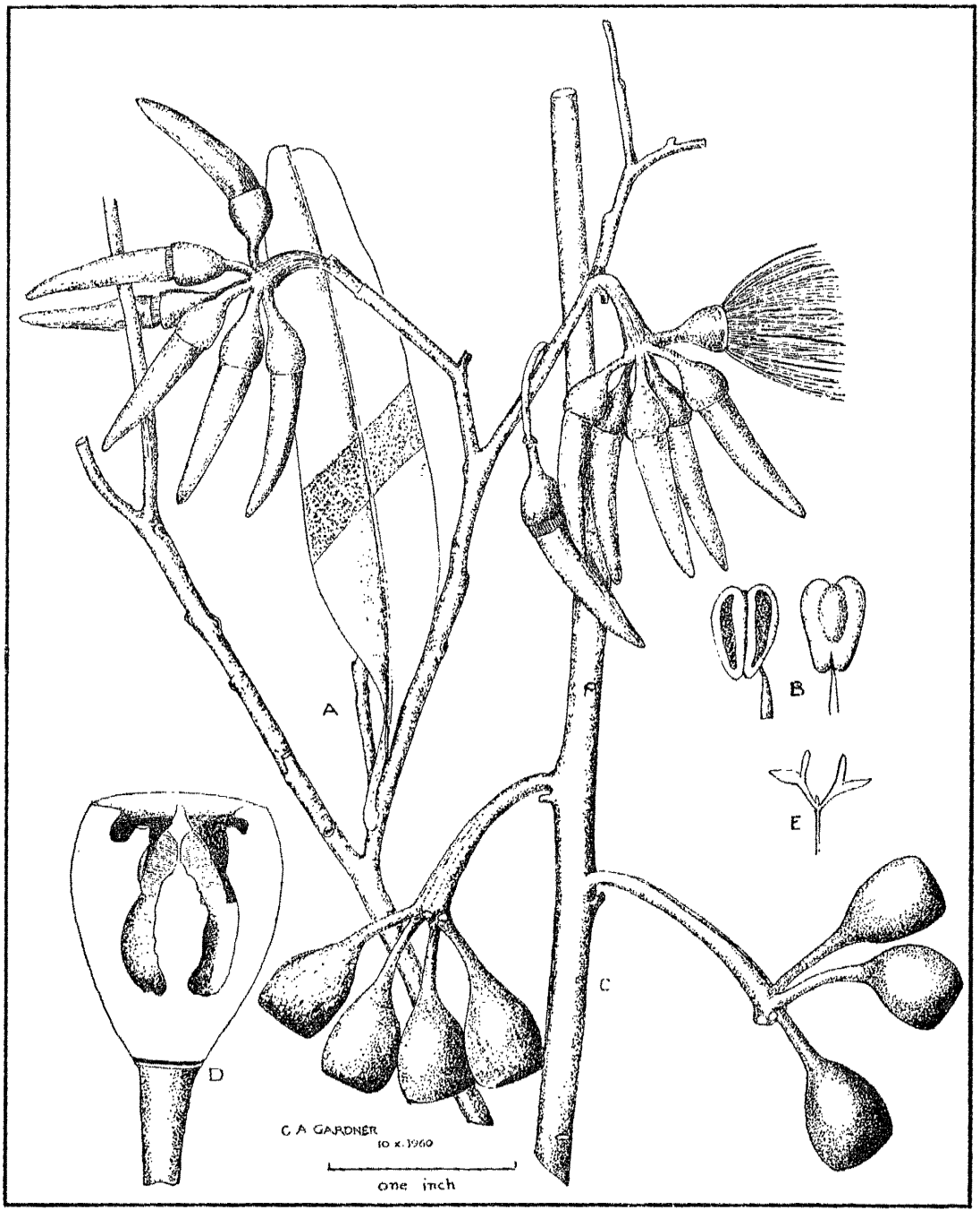

Fig. 78

Eucalyptus eremophila A—Branchlet with flower buds; B—Anthers; C—Branchlet with fruits; D—Section of fruit; E—Cotyledons. B and D much enlarged. (A and B between Yerbillon and Bodallin, Gardner sine no.). (C and D between Bullabulling and Coolgardie, Gardner sine no.).

89. **Eucalyptus oldfieldii** F. Muell.

Oldfield's Mallee

Oldfield's Mallee was described by Ferdinand von Mueller in 1860 from specimens collected by Augustus Oldfield in the vicinity of the Murchison River where it grows on the sand heaths as a small shrubby mallee. From there it extends through Binnu and Yuna to the Mingenew district, Mount Gibson and perhaps as far south as Cowcowing, as a larger mallee with spreading branches, up to about 4 m tall. It is found in a variety of habitats, usually on the open sand heath, in gravelly thickets, while on Mount Gibson a curious form occurs with fluted bud-caps, smaller than the typical form.

Oldfield's Mallee and *E. burracoppinensis* are very close in appearance. *E. oldfieldii* has smaller, practically stalkless buds and fruits with prominently exserted valves. *E. burracoppinensis*, on the other hand, has larger, distinctly stalked buds and fruits, a ribbed and usually distinctly beaked operculum and fruits with much less exserted valves.

Oldfield's Mallee has been cultivated in California and in eastern and western Australia. It is suitable for growing in shrubberies or windbreaks in many parts of southern Australia. The showy flowers make the species a suitable subject for horticulture.

Oldfield's Mallee is associated with mulga northwards from Menzies, extending towards Wiluna.

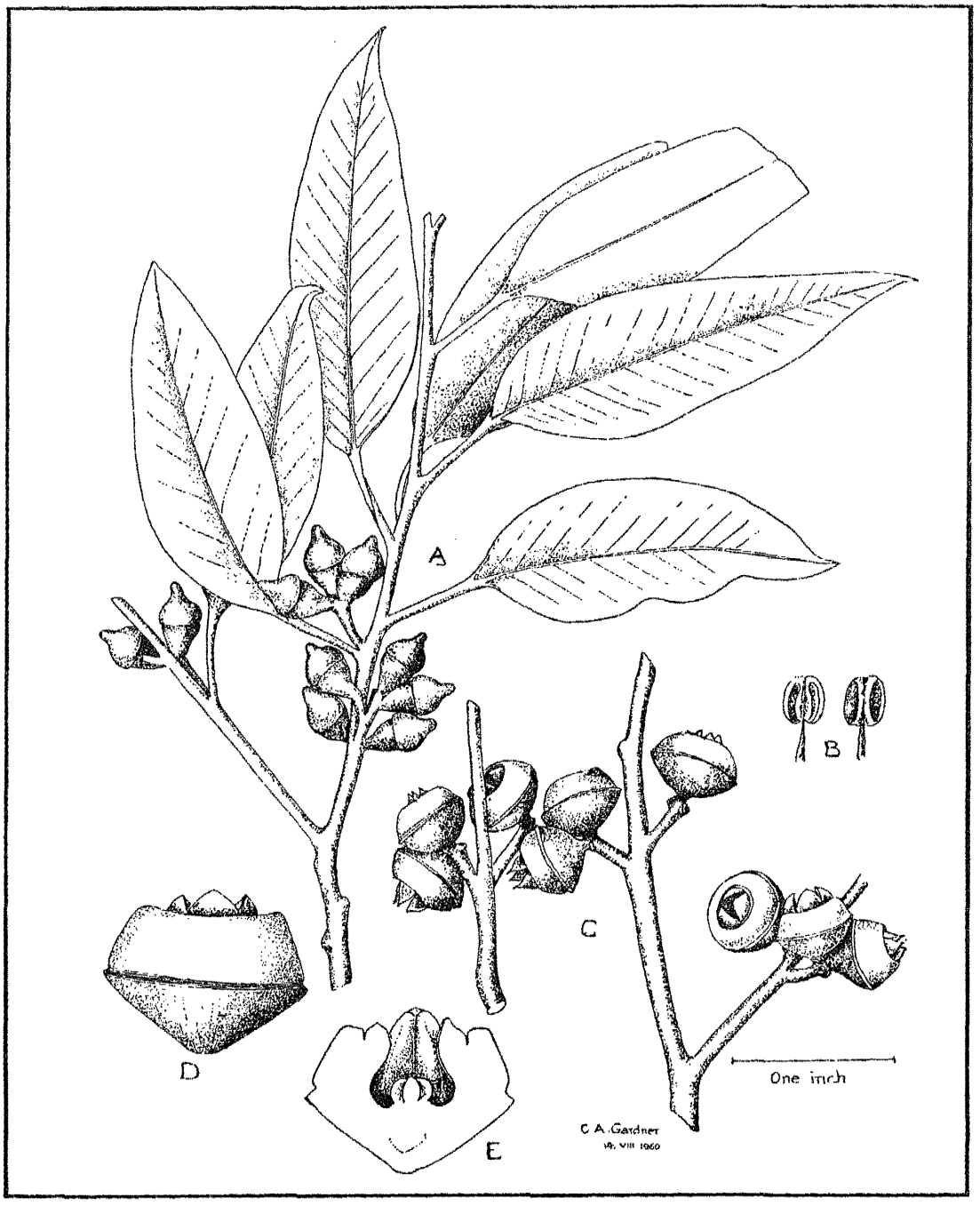

Fig. 79

Eucalyptus oldfieldii A—Branchlet with leaves and flower buds; B—Anthers; C—Fruits; D—Fruit (enlarged); E—Section of the same. (Near Binnu, Gardner sine no.).

90. **Eucalyptus cooperana** F. Muell.

Many-flowered Mallee

Many-flowered Mallee was described by Ferdinand von Mueller in February 1880, from a fragment having buds and flowers, but no fruit, collected by George Maxwell in South-Western Australia, without any locality. It remained imperfectly known until a specimen was collected, again without precise locality, somewhere between Esperance and Eyre, by Hammond. This specimen was in bud only. On October 21, 1960, the writer found a strange mallee near Boyatup Hill to the north of Cape Arid which proved to be this species, collected this time with both bud and fruit.

The plant is of striking appearance by reason of its white, smooth bark, densely branched habit, deep green, lustrous leaves, and purple, acutely angled branchlets. The dark purple-brown hypanthium is surmounted by a pale yellow short and obtuse operculum which at this stage is broader than the calyx-tube, and the buds are mainly eight to ten in the umbel. A characteristic is the broadening of the individual flower-stalk under the calyx-tube.

This mallee is found to be fairly common from the region of Boyatup to beyond Mount Baring, extending in a north-easterly direction to Point Dover. It is most common in the southern area of its range. Growing on open heath country, it possesses a striking appearance and is the largest shrub occurring there.

In the lower course of the Thomas River a related form, of striking appearance, is found growing in the low-lying country close to the river. This is a tall mallee or tree of up to 5 m tall with a pinkish or yellowish-white, smooth bark, erect and densely leafy branches, and with a profusion of pale, yellow flower-buds. It differs from the Boyatup specimens in having broader leaves, much larger flower buds and fruits, the buds with ribbed and obtusely pointed opercula, and the fruits larger and irregularly ribbed. The fruits are more than 1 cm long. The Thomas River form may prove to be a distinct variety. Both forms of *E. cooperana* have the characteristic purple angled branchlets, and seven or more flowers to the umbel. The species is unusually attractive, and interesting because of the variation in its buds and fruits.

When describing the species, Mueller compared it with *E. decurva* from the Stirling Range, but its closest affinity is undoubtedly *E. flocktoniae*, Merrit, a handsome tree of the Eastern Goldfields possessing a mallee form near the south coast.

Unlike *E. flocktoniae,* which belongs to a group of species remarkable for their oil yields, *E. cooperana* has no trace of oil cavities or dots in the leaves. Furthermore, *E. oleosa* and *E. flocktoniae* have long, slender, awl-like protruding points at the apices of their valves, while in *E. cooperana* the valves are deeply included without such points. The anthers of all are much alike, but the anastomising ribs of the fruits of *E. cooperana* are distinctive.

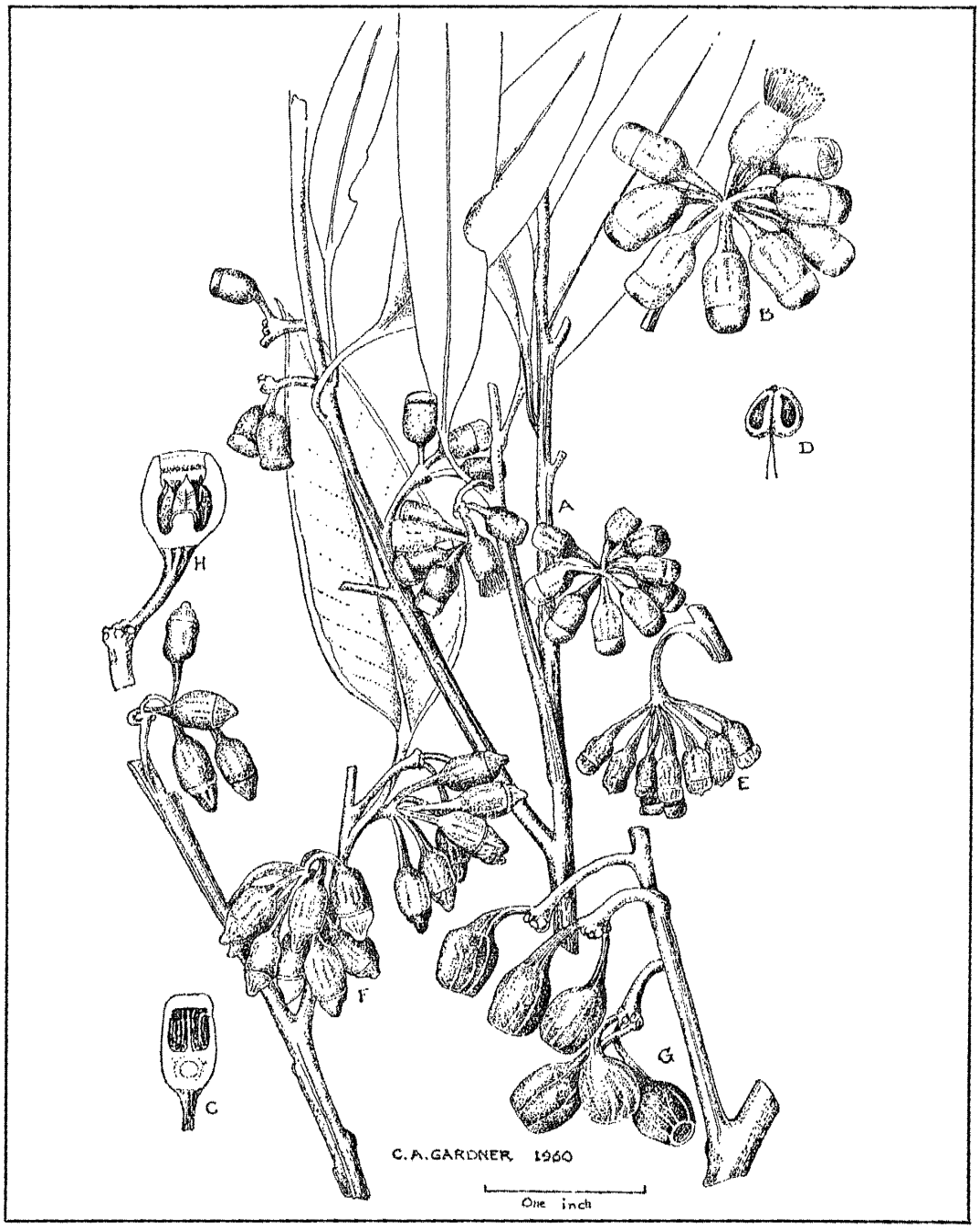

Fig. 80

Eucalyptus cooperana A—Branchlets with leaves and flower buds; B—Flower buds (enlarged); C—Flower bud in section (enlarged); D—Anther (much enlarged, between Esperance Bay and Eyre, Hammond); E—Flower buds (near Mount Boyatup, Gardner 12907); F—Flower buds; G—Fruits; H—Section of fruit (Thomas River, Gardner 12942).

Mueller in describing *E. cooperana* stated that he had not seen the fruit, but Blakely (Key to the Eucalypts) described what were apparently those of *E. oleosa,* and also gave King George Sound as the locality for the species. It is quite evident that Maxwell did not collect the type specimen in this area but on his journey from Cape Arid to the Great Australian Bight.

E. cooperana commemorates the name of Ellwood Cooper of Santa Barbara College, the author of "Forest Culture and Eucalyptus trees." He was a promoter of the cultivation of *Eucalyptus* in California. The species is worthy of cultivation being both attractive in appearance and suitable for shade purposes.

Many-flowered Mallee does not appear to be in cultivation. It should be a good species for planting in shrubberies, for windbreaks or as highway screen plant, particularly in coastal areas.

91. **Eucalyptus cornuta** Labill.

Yate

Yate, well known for the qualities of its timber, notably strength, elasticity and density, was formerly prized for coach work, being used for wheel spokes and the shafts of horse-drawn vehicles.

E. cornuta was first collected in King George Sound in 1791 by Archibald Menzies. It was collected a year later in the Recherche Archipelago by La Billardière who subsequently described and named it in 1799. The identity of La Billardière's landing on Observatory Island in the Recherche Archipelago was established in 1975 by S. G. M. Carr and D. J. Carr.

E. cornuta has the distinction of being the first Western Australian species of *Eucalyptus* to be described and named.

E. cornuta is the true Yate. The Flat-topped Yate, *E. occidentalis*, the Warted Yate, *E. megacornuta*, and the Salt River Gum, *E. sargentii*, are related to, but quite distinct from *E. cornuta*. Yate is endemic in South-Western Australia, extending from the Vasse River to the Dalyup and perhaps still further to the east. Inland it extends to the upper reaches of the Fitzgerald River and the Stirling Range. Almost always associated with granite rocks, it is found growing in the Stirling Range in soils of a different origin. The main centre of its distribution is between the Frankland River and Mount Barker, and southwards to King George's Sound.

The characteristics of Yate are its rough, dark-grey, somewhat shaggy bark on the trunk and main branches, pale yellowish-brown, extremely hard and tough timber, and its long operculum and yellow filaments. Still more characteristic is the fruit with its exserted domed disc and long valves formed from the base of the style.

E. cornuta derives its name from the horn-shaped operculum. The tree is both decorative and of rapid growth. It has been stated that it grows remarkably quickly in tropical countries, as for example in India it has been recorded as having grown 2 to 3 m in the first year. It flowers from November to February and is valued by the beekeeper for its production of pollen and nectar, the latter yielding an excellent honey.

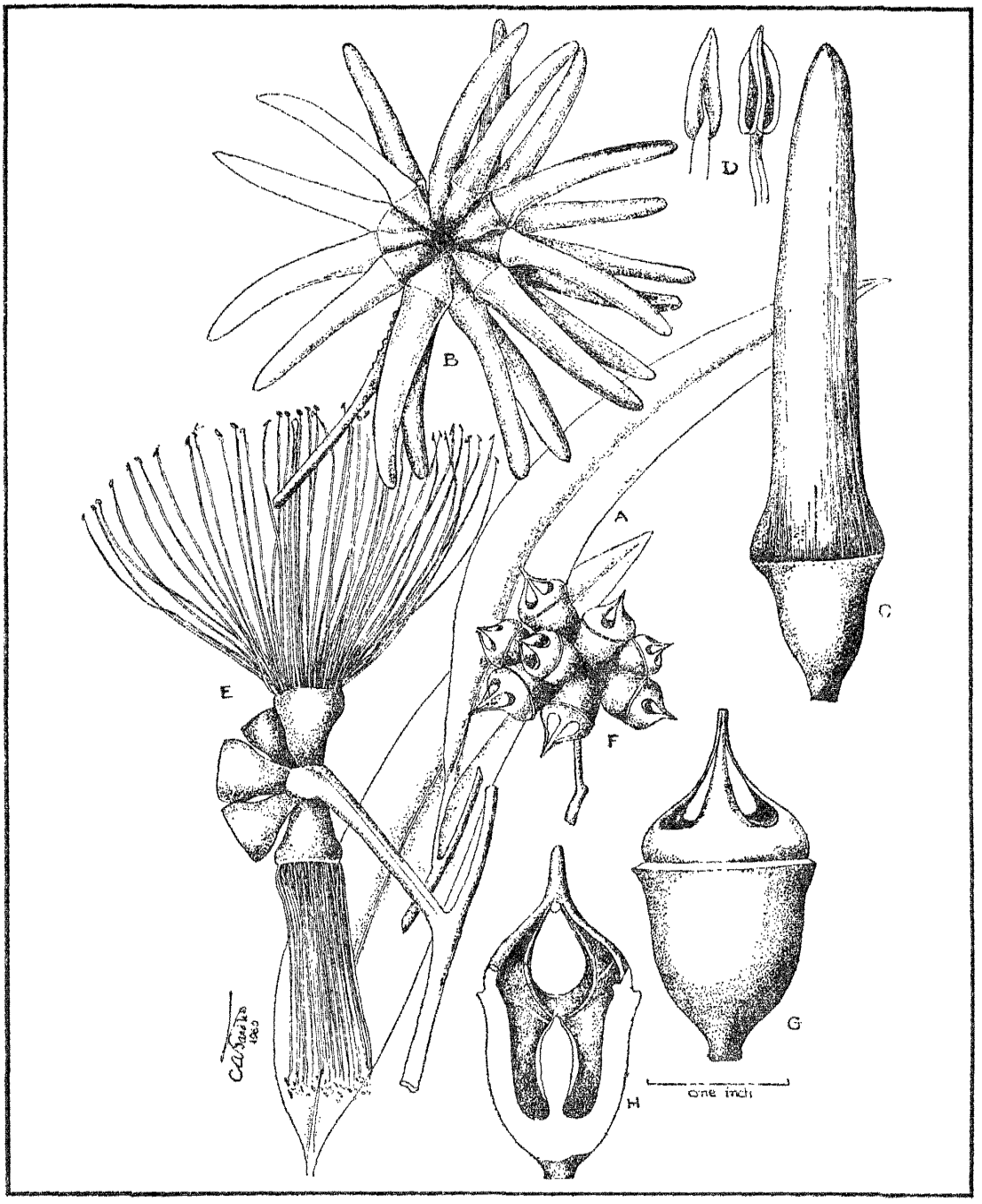

Fig. 81

Eucalyptus cornuta A—Leaves; B—Umbel of flower buds; C—Flower bud (enlarged); D—Anthers; E—Flowers; F—Cluster of fruits; G—Fruit (enlarged); H—Fruit in longitudinal section. (Ross Peak, Gardner sine no.).

92. **Eucalyptus griffithsii** Maiden

Griffith's Grey Gum

Although occurring as a tree, Griffith's Grey Gum is more typically a mallee up to 6 m tall with reddish bark in the upper parts, especially in the Coolgardie and Bullabulling area, where it is common. The tree form occurs more commonly in saline areas, and is relatively abundant on the shores of Lake Lefroy near Widgiemooltha. Here the tree has a rough, fibrous light-grey, persistent bark and smooth branches.

Griffith's Grey Gum grows 12 to 15 m tall, and the trunk to 25 to 30 cm in diameter. The timber is brown with an interlocking grain. The tree typically has a crooked trunk and is not very attractive, whilst the mallee form, with its handsome, glossy foliage, is worthy of cultivation in dry areas.

Characteristics of the species are the flowers which are always in umbels of three, the three flowers being in the one plane, long peduncles which are erect, and rather long pedicels which are dilated upwards into the calyx-tube. The calyx-tube is two-angled, and this condition is also to be observed in the fruiting stage, with often a few intermediate but less prominent angles. The operculum is depressed-hemispherical or cushion-shaped, with broad, obtuse ribs or corrugations. The filaments are white, inflected in the bud stage.

A comparison should be made with *E. lesouefii* and *E. corrugata.* The obvious differences are the umbels of three flowers of *E. griffithsii,* the absence of numerous ribs on the calyx-tube and the pedicel broadening upwards into the hypanthium.

E. griffithsii extends from Coolgardie and Bullabulling southwards to Norseman. The name commemorates J. M. Griffiths of Melbourne who collected the type specimen at Kalgoorlie.

E. griffithsii flowers from September to January. Its value to bees is unknown.

Griffith's Grey Gum has been cultivated in eastern and western Australia. It is quite tolerant of saline conditions.

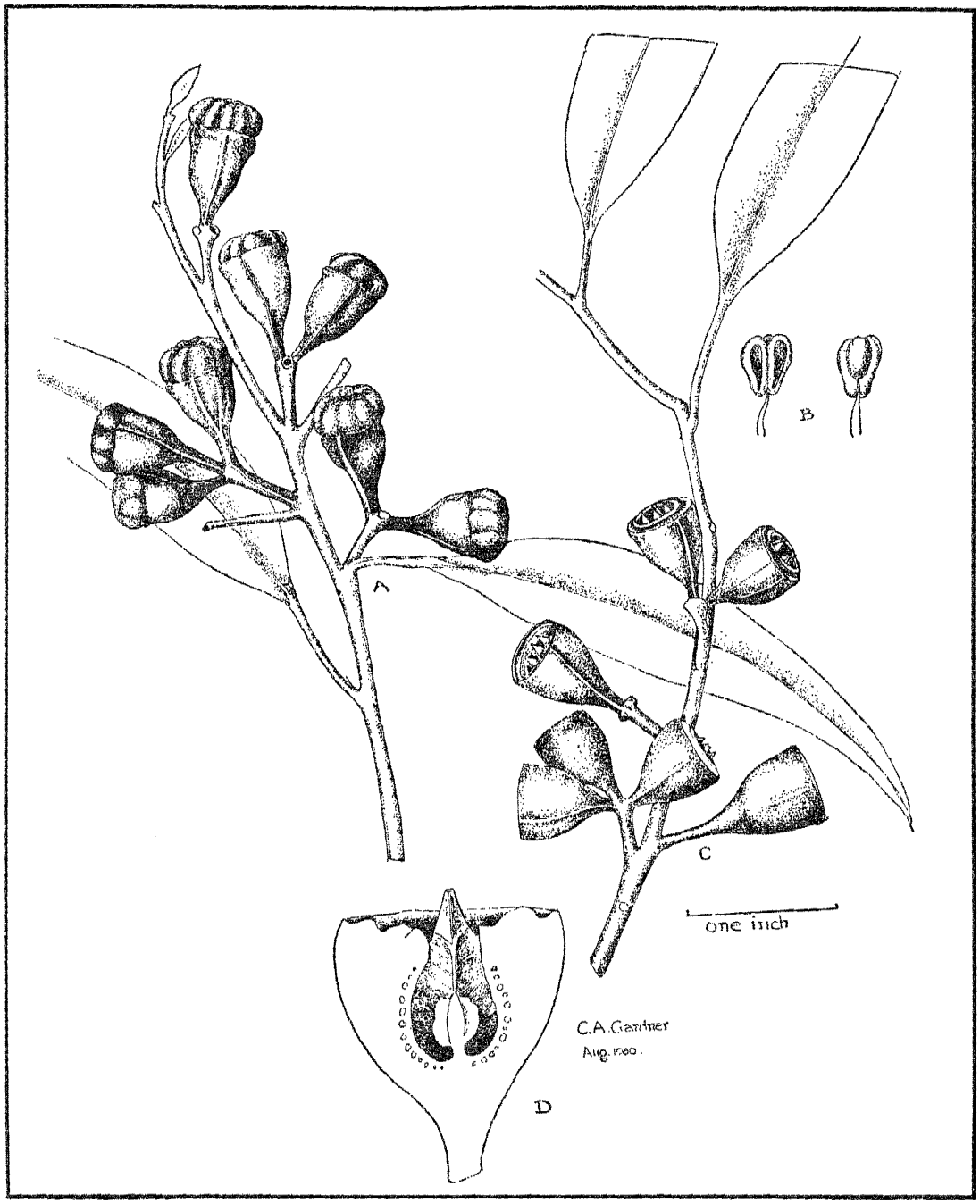

Fig. 82

Eucalyptus griffithsii A—Branchlets with leaves and flower buds; B—Anthers; C—Branchlet with fruits; D—Fruit in longitudinal section (much enlarged). (Bullabulling, Gardner 9269).

93. **Eucalyptus albida** Maiden et Blakely

White-leaved Mallee

White-leaved Mallee is always a mallee, rarely exceeding 5 m tall, it extends from the Tammin sand plain in the north to the gravelly-sandy sand heaths of the Dudinin and Harrismith districts. It is also found near Hyden and southwards to near the Hamersley River.

The type specimen was collected by the writer at Harrismith on March 6, 1924, the shrubs being 1 to 2 m tall and remarkable for the two types of foliage present, both of which are here illustrated: the narrow, deep-green lustrous leaves of the upper, older branches, and the broad, frosty-white, opposite leaves of the younger lower branches. These represent the juvenile leaves which are seen on a number of *Eucalyptus* species, especially *E. globulus,* Tasmanian Blue Gum, and the tropical bloodwoods.

E. albida is very closely related to *E. foecunda,* differing principally in the distinctly longer pedicels, the obtuse operculum, and the campanulate shape of the fruit. The anthers of the two species are identical.

White-leaved Mallee has been cultivated in eastern and western Australia. It should make a good ornamental shrub and windbreak species. The name *albida* refers to the markedly grey-white juvenile leaves.

Fig. 83

Eucalyptus albida A—Branchlet with leaves and flower buds; B—Anther; C—Branchlet with young fruits; D—Primary foliage. (A Harrismith, Gardner 2113). (C Dudinin, Gardner sine no.).

94. **Eucalyptus kruseana** F. Muell.

Bookleaf Mallee

Editor's note: Gardner provided an illustration of *E. brachyphylla* C. A. Gardn. which he regarded as being a form of *E. kruseana*. They are considered to be distinct species in this edition.

Bookleaf Mallee, a very decorative shrub, was described by Ferdinand von Mueller in the Australian Journal of Pharmacy in 1895 from specimens collected in the Fraser Range, which lies some distance eastwards from Norseman. It remained little-known until it was again collected by Henry Deane, consulting engineer for the Trans-Australian Railway in May 1909, from an occurrence between 80 and 250 km eastwards from Kalgoorlie. Deane's specimen was named *E. morrisonii* by Maiden, who was apparently unaware of Mueller's earlier description. Since then it has been collected 13 km north from Karonie, and from near Lake Cowan. The species appears, therefore, to be found in a few isolated spots eastwards from Kalgoorlie and Norseman.

The common name Bookleaf Mallee refers to the closeness of the leaves to one another on the stem.

The plant is described as a shrub 2 to 3 m tall, but under cultivation it attains a height of 4 to 5 m with usually a single stem and more or less horizontally spreading branches densely foliaged with circular grey-green or grey stalkless leaves which more or less embrace the branch at their bases, or are almost kidney-shaped. This type of leaf is not common in *Eucalyptus* and this feature, together with the small size of the leaves, renders the species at once distinctive.

The bark of the main stem is much like that of some other species of *Eucalyptus* which inhabit the stony outcrops of the arid interior, *E. crucis, E. orbifolia, E. ewartiana, E. websterana* and a form of *E. drummondii*. It is a peculiar bark in that the outer layers, reddish-brown or cinnamon coloured, separate from the pale green inner bark in long strips with rolled edges, thus exposing longitudinal rows of the pale green inner bark. It is curious that this type of bark should be characteristic of those species which inhabit granitic or lateritic outcrops.

The flowers are yellow, in umbels which exceed the leaves in length, and are quite attractive although not very large. Without any close affinities, this plant can at once be recognised by its small crowded grey leaves and unusual habit of growth.

In recent years the species has attained some popularity locally as a decorative shrub, growing well in the light sand of the west coastal regions, but it is equally at home in the clay soils of the interior, being suitable for garden planting in the agricultural districts.

The name *kruseana* honours John Kruse who was at one time Victorian Government Analyst and was involved in establishing the College of Pharmacy in Melbourne.

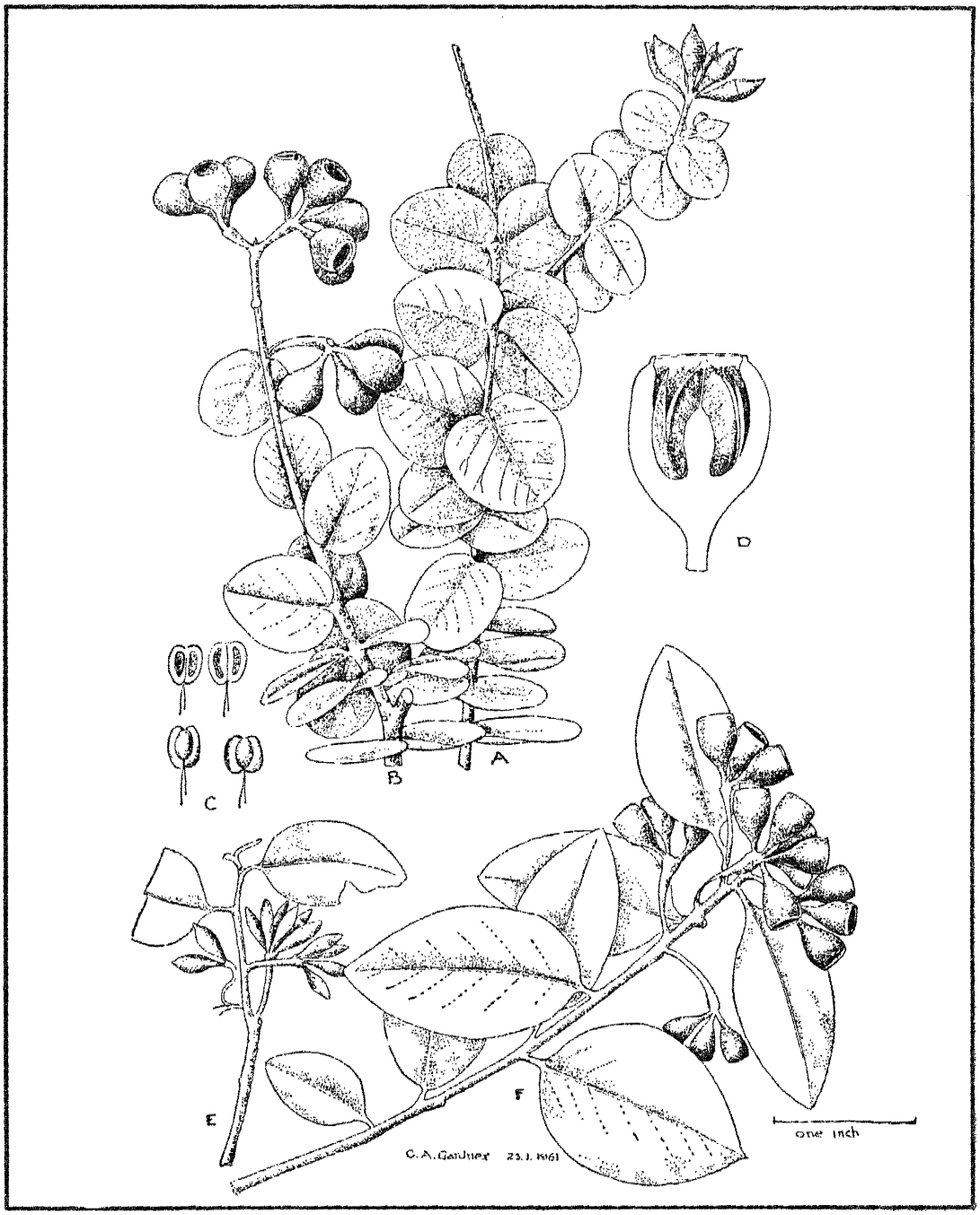

Fig. 84

Eucalyptus kruseana A—Branchlet with leaves and flower buds; B—Branchlet with leaves and fruits; C—Anthers; D—Fruit in longitudinal section (enlarged, 13 km north from Karonie, J. H. Frank).

E. brachyphylla E and F—Twig's with leaves, flower buds and fruits (near Lake Cowan, G. E. Brockway).

95. **Eucalyptus brachyphylla** C. A. Gardn.

A straggly mallee up to 3.5 m tall, *E. brachyphylla* has a smooth grey-brown bark which is deciduous in flakes or plates in late summer to reveal fresh, smooth, yellow-brown bark. The youngest branchlets are dark red with some grey, powder covering.

E. brachyphylla is found in granite soils, usually near rocky outcrops, from Binyarinyinna Rock, on the northern tip of Lake Cowan, north-east to near Karonie. It is usually associated with *E. kruseana*, Book-leaf Mallee.

The leaves of *E. brachyphylla* are alternate, sub-opposite or opposite, grey-green, broadly ovate to broadly elliptical and occasionally almost orbicular, 3 to 4 cm long, 2 to 3 cm across, with noticeable oil glands on the surface, and with a short petiole.

There are up to 7 flowers per umbel, which has a slightly flattened, glaucous peduncle. The operculum is conical and often glaucous. The calyx-tube is inverted conical, often glaucous and with noticeable oil glands.

The fruit is cylindrical or somewhat elliptical in outline, often glaucous, up to 6 mm long and 4-6 mm across, with a narrow rim and with the valves broadly triangular and enclosed below the orifice. The seeds are brown, oblong, crescent shaped and with a net-like pattern.

The name *brachyphylla* refers to the shortness of the leaves.

There is a specimen tree in Adelaide, otherwise this species appears not to be cultivated. It could be a useful small tree in dry areas.

96. **Eucalyptus macrandra** F. Muell. ex Benth.

Long-flowered Marlock

Long-flowered Marlock is of southern distribution, extending from the Stirling Range in the west, and eastwards as far as the Phillips River where it is found in sandy loamy soils, usually in depressions or on the banks of streams. It is most common along the Fitzgerald River and its tributaries.

Originally collected by George Maxwell in this general area of distribution, it was named by Ferdinand von Mueller but published in 1867 by Bentham in the *Flora Australiensis*. The name is derived from two Greek words *makros,* long, and *andra,* a man, in reference to the long stamens. It received the vernacular name of Long-flowered Marlock from Blakely, but the name is inappropriate, firstly because the flowers are no longer than in a number of other species, especially the Yate and its relatives, of which this is one, and secondly because it is not a marlock.

The term marlock has been proposed for those species of *Eucalyptus* which are shrubby but which do not possess woody stock-like bases from which a number of stems arise, these being mallees. As a matter of fact there is rarely such a distinction in the shrubby species of *Eucalyptus,* and the mallee form of growth is frequently, if not usually, the result of circumstances affecting the growth of the plant, amongst which fire is an important factor. The bushman would call *E. macranda* a Yate of some sort, and the name River Yate would not be inappropriate.

It does in fact belong to that group of species which includes the Yates, the Mallets and Moort, in which the stamens are erect and not incurved in the horn-like bud-cap.

The principal characteristics of this species are the long narrow horn-like bud-caps, the stalked buds and fruits, the flattened common peduncle and the numerous, up to 16, flowers in the umbel, together with the narrow-rimmed fruit with included obtuse valves. The leaves are relatively large, rather thick and lustrous, and particular notice should be paid to the shape of the fruit, together with the nature of the valves and their position. A comparison should also be made with *E. eremophila,* a mallee with olivaceous leaves, fruit with a different disc and valves and non-glandular filaments. *E. stowardii* has ribbed buds and the fruits have sharp exserted valves.

Although in its natural habitat it favours the banks of streams and depressions, it has proved hardy in cultivation in the drier districts. Edward Gardner raised the tree from seed in the Tammin district, where it attained a height of 5 m in less than five years and flowered very freely. The filaments are yellow. The plant should be of interest to the apiculturist, having many of the features of the Yate but of more rapid growth and free flowering. It flowers from January to March.

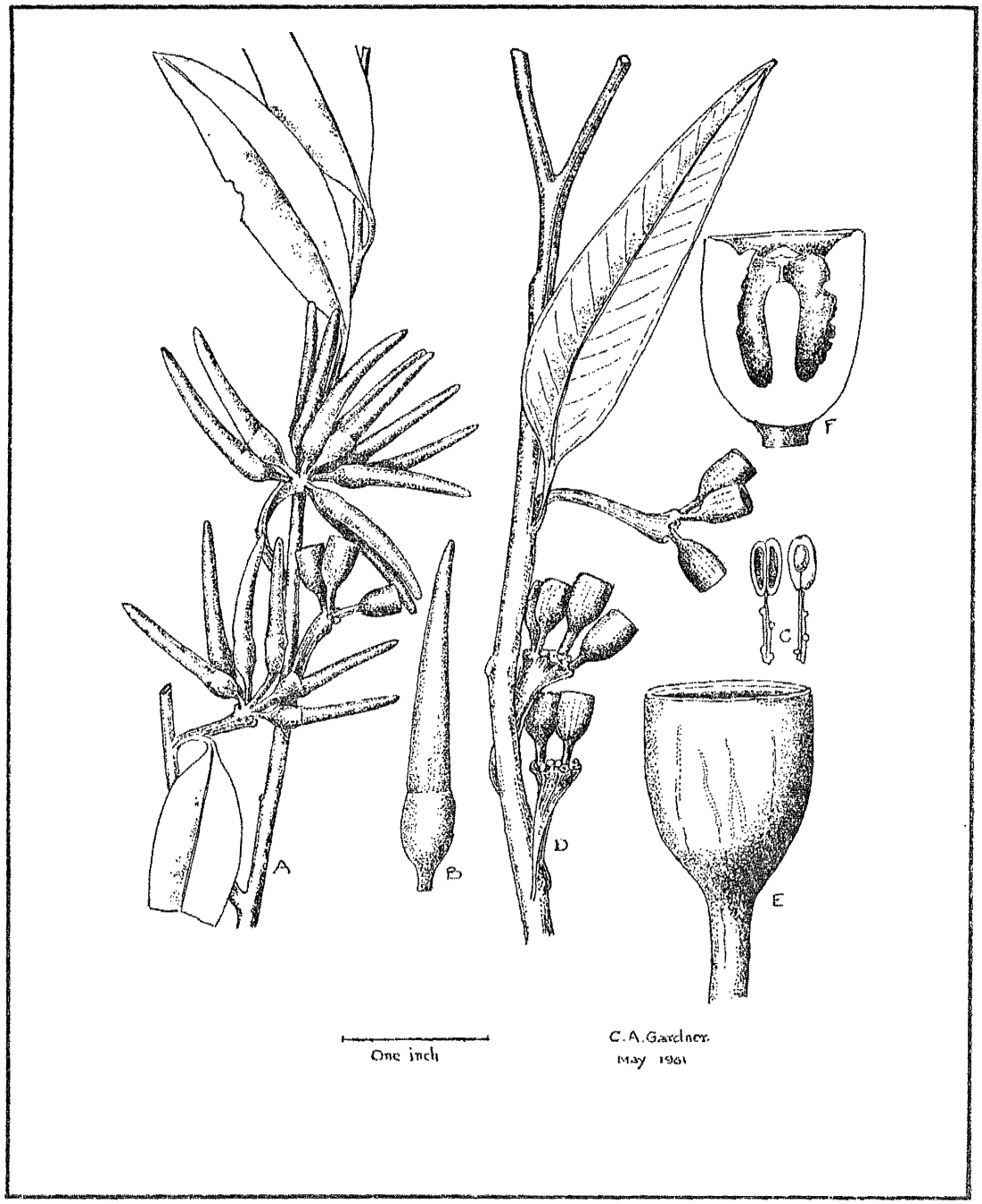

Fig. 85

Eucalyptus macrandra A—Branchlet with flower buds and leaves; B—Flower buds (enlarged); C—Anthers; D—Branchlet with fruits; E—Fruit (enlarged); F—The same in longitudinal section. (Hamersley River, Gardner, January, 1935).

97. **Eucalyptus eudesmioides** F. Muell.

Mallalie

The names Desert Gum or Desert Mallee sometimes given to this species are not appropriate, for Mallalie does not occur in the arid interior. The name Desert Gum should be reserved for *E. gongylocarpa* which is indeed a tree of the desert.

E. eudesmioides is a mallee, or very rarely attains the proportions and stature of a small tree. The first specimens to be named were collected by A. Oldfield and P. Walcott on the sandplains of the lower Murchison River and at Mount Curious which lies immediately north of this river. The range of the species extends from about half way between Northampton and Shark Bay in the north, to Walebing and Piawaning in the south, whilst to the east we find it as far inland as Perenjori and Eradu as a small bushy mallee with an average height of about 2 to 3 m and pale pink, or yellowish-pink bark, the outer bark shedding in dark grey plates.

The leaves of Mallalie are opposite, usually glaucous, thin and distinctly stalked, but in the northern extremity of its range we find mallees with deep green larger and quite lustrous leaves.

The flowers are always in umbels of three, on slender stalks collected on a common peduncle. The calyx-tube is campanulate, four toothed at the top, and the broad obtuse operculum is broader than the hypanthium. The filaments are white, arranged in four distinct groups or bundles with a clay-like base and the anthers are rather short and broad. The only other south western species with a similar staminal arrangement are *E. erythrocorys, E. tetragona* and *E. ebbanoensis.* This group of species is considered primitive in *Eucalyptus.*

E. eudesmioides is the Mallalie of the Murchison aborigines, according to Oldfield. Oldfield obtained the native names for most plant species and it is to be regretted that other collectors did not do the same.

The mallee grows in poor sandy or sometimes lateritic soils restricted to the area outlined above. It flowers from January to March, and is a hardy species in cultivation. I would recommend it for planting in exposed situations near the western seaboard.

In the north portion of its range the typical form has larger fruits and green leaves, while the common form of the intermediate region has thinner usually pale foliage and smaller fruits. In the Hill River district further south, we find a third form with fruits like those found in the north but more angular and thick, and with perhaps more glaucous leaves.

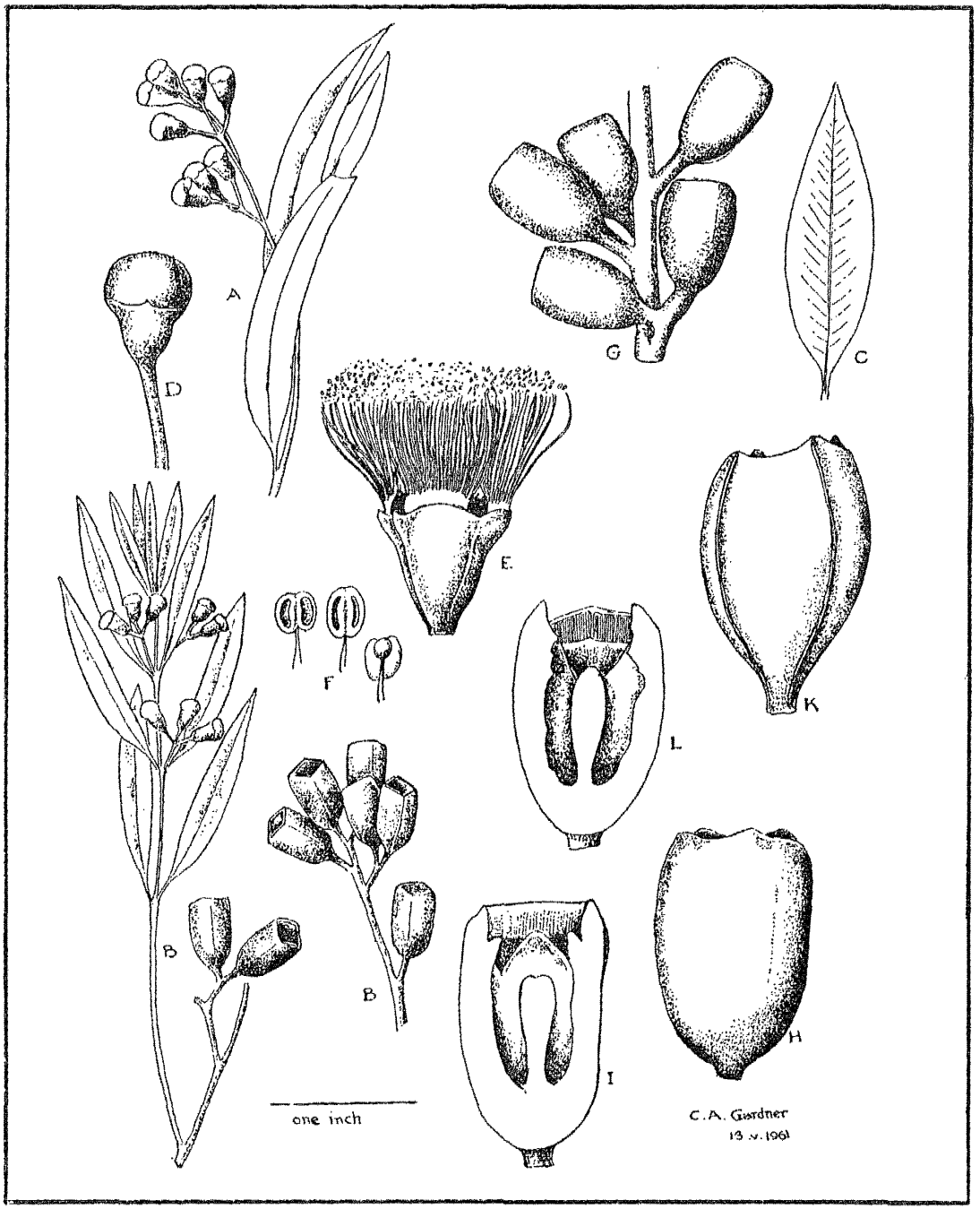

Fig. 86

Eucalyptus eudesmioides A—Branchlet with leaves and flower buds; B—Branchlet with leaves, flower buds and fruits; C—Leaf; D—Flower bud (enlarged); E—Flower (enlarged); F—Anthers (Mingenew, Gardner 690). G—Fruits; H—Fruit (enlarged); I—The same in longitudinal section Walebing, Gardner). K—Fruit (enlarged); L—The same in section (Hill River, T. N. Stoate 22).

98. **Eucalyptus rhodantha** Blakely et Steedman

Rose Mallee

Editor's Note: Pryor and Johnson regard this species as a hybrid of *E. macrocarpa* x *pyriformis*. Chippendale, on the other hand, regards the forms of *E. rhodantha* as belonging to one variable species.

Rose Mallee was formerly looked upon as a variety of *E. macrocarpa* but is distinguished primarily by its stalked flowers. This handsome species was named from material collected near Gunyidi by H. Steedman in December, 1934. I am including it as a species in this series.

E. macrocarpa has practically stalkless solitary flowers and stalkless leaves, but its operculum undergoes considerable variation in the area of its distribution. *E. rhodantha* has conspicuously stalked flowers in general, but here and there on many plants we find stalkless, or practically stalkless flowers, which are typically solitary, but again, here and there we find two flowers on the very short stalk.

The leaves of *E. rhodantha* vary from orbicular and stalkless to broadly ovate and stalked, or ovate-lanceolate, stalkless or stalked. The fruits are generally smaller than one finds in *E. macrocarpa,* and exhibit a greater degree of variation in the disc than is usual in the latter species. I have illustrated three types of fruits, all from the Watheroo district where hundreds of specimens were examined: the common form, with a large fruit and scarcely exserted valves, a second form with a smaller fruit and a much more prominent raised disc and exserted valves reminding one of *E. oldfieldii,* and a third form with drooping fruits of even smaller size and a very narrow disc. In addition, but not figured, practically stemless fruits occur which vary from one to two on an extremely short stalk.

If one remembers that *E. macrocarpa* sometimes has a rather long conical operculum, and compares the drawings of *E. rhodantha* and *E. carnabyi,* it will be apparent that there is little difference between the three, bearing in mind that a form of *E. rhodantha* has stalked leaves. All three have red, or yellowish-white filaments.

Notwithstanding this variation, I regard *E. rhodantha* as a distinct species. It is a plant that is almost unsurpassed for cultivation. Typically it is a shrub 1 to 2.5 m tall, of greater diameter, but frequently we see specimens over 6 m tall. The leaves are usually shorter and smaller than those of *E. macrocarpa,* and the plant does not appear to be affected by insect attacks as is so frequently the case with *E. macrocarpa.* Although two floral colours are to be seen, the commoner colour of the filaments is deep red. These smaller more richly coloured flowers are borne on stalks which enable them to protrude beyond the foliage and so give the plant a distinct advantage over *E. macrocarpa.*

E. rhodantha extends from north of the Hill River, where it is mixed with *E. macrocarpa,* to Gunyidi, east of Watheroo, and southwards to near New Norcia. Its range is thus much more restricted than *E. macrocarpa,* which extends from

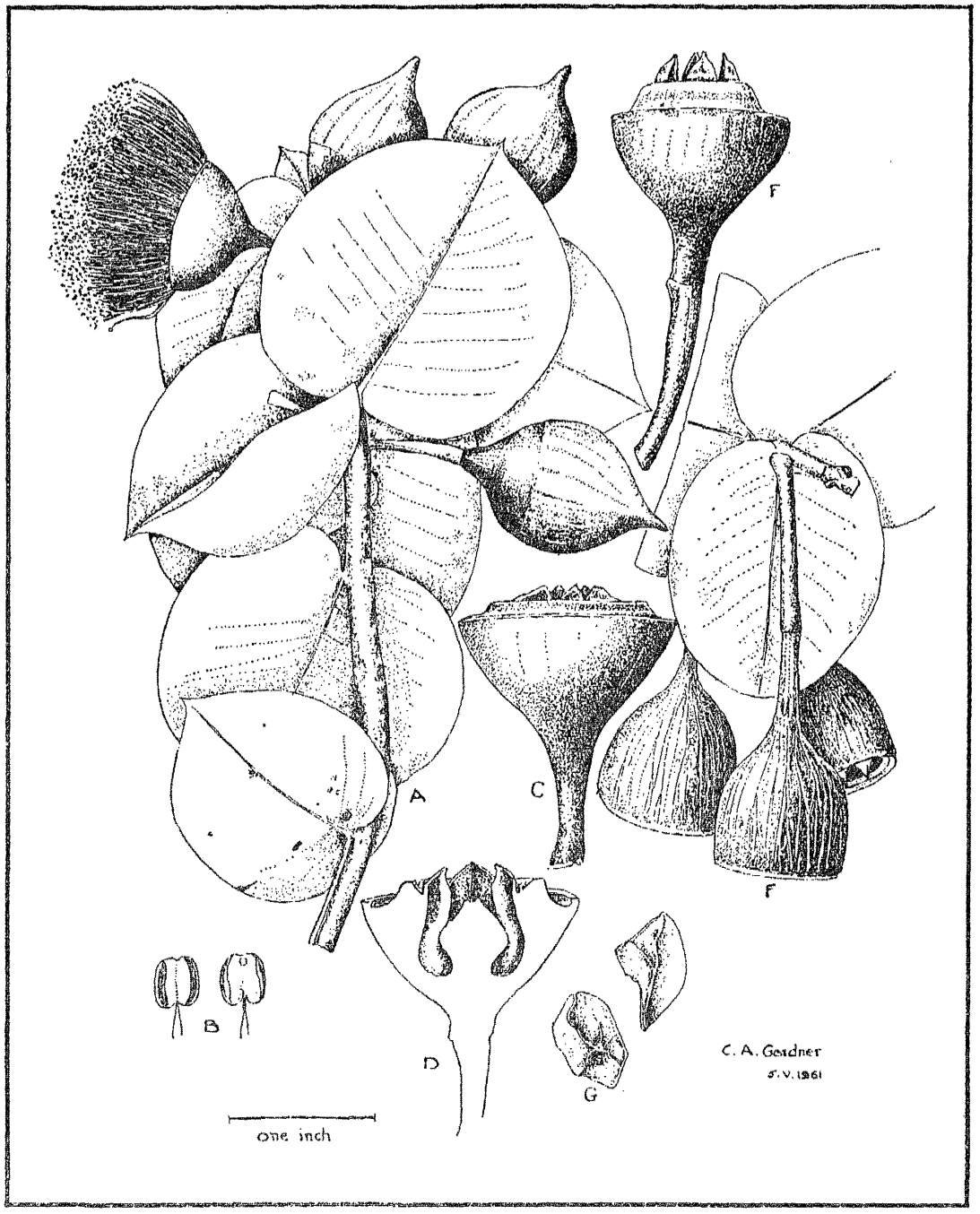

Fig. 87

Eucalyptus rhodantha A—Branchlet of the typical form with leaves, flowers buds and one flower; B—Anthers; C—Typical fruit; D—Section of same; E—Smaller fruit with much exserted valves; F—A form with smaller leaves and pendulous smaller fruits with narrow disc; G—Seeds. (Watheroo, Gardner 12780, February, 1961, except F, which was collected by A. J. Gray in the same area, 1960).

Geraldton to Kulin. It is worthy of note that *E. carnabyi* occurs with *E. macrocarpa* at Barberton and Piawaning, and a form intermediate between the two is found not far from Bolgart.

The species flowers almost throughout the year.

Rose Mallee has been cultivated in California and in eastern and western Australia. It is a most attractive ornamental shrub and its sprawling or spreading habit may be used to effect in sloping gardens.

The name *rhodantha*, derived from the Greek words *rhodon*, a rose, and *anthos*, a flower, refers to the brilliant red filaments of the flower.

99. **Eucalyptus accedens** W. V. Fitzg.

Powderbark Wandoo

Powderbark Wandoo was originally named by W. V. Fitzgerald from specimens which he obtained near Pingelly in November, 1909. The specific name is from the Latin *accedo,* to approach or come near, and is here used in reference to the supposed close approach of the tree to *E. wandoo,* the common Wandoo.

The two trees are, however, very dissimilar botanically, so any resemblance or close approach would refer to the habit of growth and the character of the bark, in which they are not dissimilar.

They can be easily distinguished in the field since the bark in Wandoo is white except in those forms which we find eastwards from Tammin; it is never powdery, and the timber is a pale yellow ochre in colour. In Powderbark Wandoo the bark has a talc-like powder always in evidence, at least on the protected or eastern side of the trunk; it is yellow in fracture, and the timber is more pink.

Furthermore, the two trees almost always occur in different soil types, Wandoo in clay, and the Powderbark Wandoo associated with laterite on high ground. Thus we find Powderbark Wandoo not infrequently in the Darling Range on high lateritic hills, often growing amongst boulders of laterite.

Almost all of our gum trees, those species of *Eucalyptus* with a smooth bark, shed the outer layers of their bark annually, usually between February and the early part of April. The newly exposed bark is as a rule much deeper in colour than it appears later in the year when it pales considerably. For example, Karri bark when first exposed is a deep orange, while Wandoo bark has a warmer tint in April than later in the year, when it often turns dead white. Powderbark Wandoo is never this pale or white, retaining something of its orange-red tint throughout the year. As it is often flecked with small patches of older persistent outer bark, it is not uncommonly known as Spotted Gum especially in the York and Pingelly districts.

Botanically, Powderbark Wandoo can be distinguished from Wandoo by its usually broader foliage, peduncles not distinctly flattened as in Wandoo, fewer flowers in the umbels and much shorter obtuse hemispherical to ovoid operculum. In Wandoo many of the filaments are erect when in the bud stage, but in Powderbark Wandoo they are all incurved. The fruits are also more pear-shaped and contracted at the top in Powderbark Wandoo.

The distribution range of Powderbark Wandoo extends from Arrino in the north to Pingelly and Dwarda in the south, and eastwards to Werribee, Coates Siding, York and Pingelly. It is also fairly common between Mogumber and Bindoon. It flowers in the early summer. The pollen is useful for building and maintaining bee colonies. Honey flow is limited.

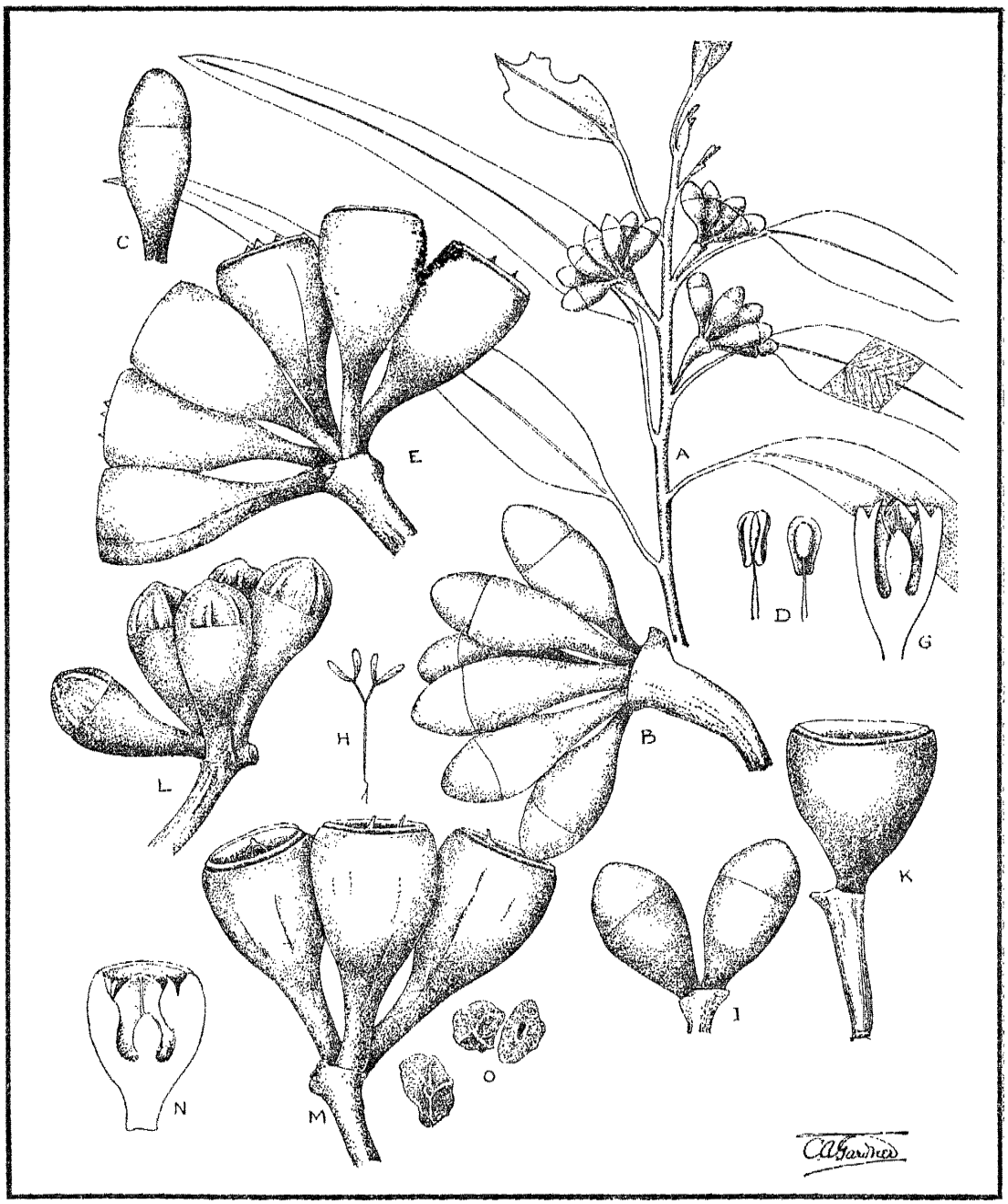

Fig. 88

Eucalyptus accedens A—Branchlet with flowers buds; B—Flower buds C—Flower bud; D—Anthers; E—Fruits; G—Section of fruit; H—Cotyledons; I—Flower buds; K—Fruit. (B—K enlarged). (A—H Wooroloo, F. M. Schoch). (I—K, Mount Peron, Gardner 9412).

Eucalyptus dongarraensis L—Flower buds; M—Fruits; N—Section of fruit; O—Seeds. (All enlarged). (Dongara, Gardner sine no.).

100. **Eucalyptus dongarraensis** Maiden et Blakely

Dongara Mallee

The originally described specimen of a species, known as the type specimen, is used where possible for comparison with material collected later. Sometimes, as in this case, the type specimen is far from typical of the species population especially when it comes from near the boundary of the known range of the species.

E. dongarraensis was described, as the name implies, from material which Maiden collected at Dongara, at one time spelt Dongarra. The species has been seen north of Carnarvon, eastwards at least as far as Yuna, and southwards to Walebing. It appears to be a variable species inhabiting a variety of soil types, usually a light loamy or gravelly soil, while the Dongara form grows in white sand.

Dongara Mallee varies from a mallee to a small tree with a ribbony bark in the lower part of the trunk, but white and smooth upwards, with reddish branchlets. The buds and fruits are much like those of *E. accedens* but the operculum is obtusely ribbed or wrinkled, at least in the dry state; it is also usually shorter. The fruits are smaller and more cupular in shape, approaching the Mount Peron form of *E. accedens*. In the tree form the timber is described as being dark.

The relationship between the two forms is receiving further attention.

Dongara Mallee has not been brought into cultivation. It may be useful as a windbreak species.

101. **Eucalyptus tetrodonta** F. Muell.

Darwin Stringybark

Darwin Stringybark is widely spread over the higher rainfall regions of Northern Australia. In the Kimberley region it is found fairly widely diffused over the sandstone and quartzite country to the north of the King Leopold Range, and eastwards on the Cockatoo Sands of the lower Ord River.

It is a common tree of the Edkins Range and the country between the Prince Regent and Glenelg rivers, the Phillips Range and eastwards to the Durack River, usually growing on the lighter soils in the valleys. The tree is more familiarly called Messmate by those early settlers who came over from Queensland in the last century.

It attains a height of 20 m with a trunk up to 60 cm in diameter. The bark is rough throughout, grey, and has a fibrous, stringy, persistent quality. The red timber is not unlike that of Jarrah, but less hard and dense and somewhat paler.

The leaves are a dull green, up to 20 cm long, very variable in width, with a strong midrib and faint lateral nerves, the intramarginal nerve being separate from the leaf-margin.

The white flowers are in umbels, each consisting of three almost stalkless flowers. The calyx-tube is bell-shaped, with four broad conspicuous lobes or teeth below the rim, and is smooth or ribbed. The operculum is hemispherical, either quite smooth, or four or eight ribbed. The stamens are not in bundles but in a continuous series or ring, while the versatile oblong anthers open in distinct longitudinal slits.

The fruits are bell-shaped, shortly stalked, smooth or four ribbed, with the persisting teeth of the flowering stage, the rim projecting beyond them. The three valves by which the fruits open are not extended beyond the rim of the fruit.

The tree flowers from March to June.

We have seven species of *Eucalyptus* which possess teeth on the calyx; of these, the four found in the south have the stamens in four clusters or bundles; the three tropical species have the stamens not in bundles, but in a continuous ring.

The timber of the Darwin Stringybark is used by pastoralists, but unlike Jarrah, which it resembles, is not immune to termite attacks.

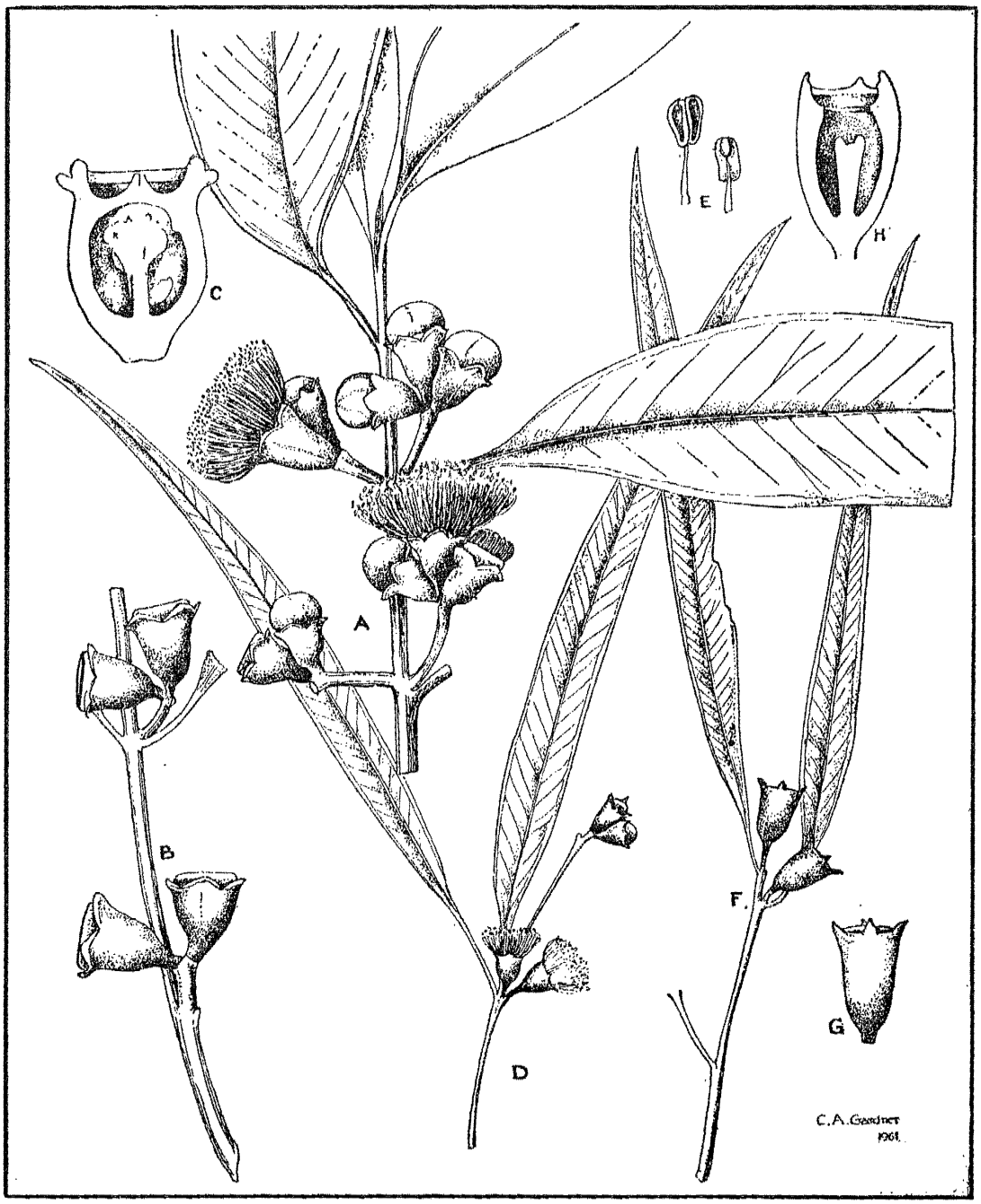

Fig. 89

Eucalyptus tetrodonta A—Branchlet with buds and flowers; B—Fruits; C—Section of fruit. (Mount Shadforth, Edkins Range, Gardner 1075).

Eucalyptus odontocarpa D—Branchlet with flower buds and flowers; E—Anthers; F—Branchlet with fruits; G—Fruit (enlarged); H—Fruit in section (enlarged). (Boundary Survey, between 18° and 19° Lat. S. S. J. Stokes).

102. **Eucalyptus odontocarpa** F. Muell.

Sturt Creek Mallee

The specific name of the Sturt Creek Mallee is derived from the Greek *odontos,* a tooth and *karpos,* fruit, in reference to the small tooth-like lobes of the hypanthium.

The Sturt Creek Mallee attains a height of 4 m but is usually of smaller stature. It grows on stony hills in an arid environment. The writer has seen it on the rough country of the upper reaches of the Ord River, where it has slender smooth-barked stems and narrow, pale leaves.

The flowers are small and white; the species can be readily recognised by its opposite leaves, narrow buds and fruits with four small acute but prominent teeth, somewhat spreading. The operculum is much like that of the Darwin Stringybark, to which *E. odontocarpa* is closely related, and the stamens are in a continuous ring as in that species. The flowers are in shortly stalked clusters of two, three or solitary, on short slender stalks.

The fruit is much narrower than in the Darwin Stringybark. Unlike the latter however, the operculum does not exceed the calyx-teeth, and is hemispherical to almost dish-shaped.

Sturt Creek Mallee is common in the Northern Territory on the cliffs of the Victoria River and in the dry spinifex country to the South. In Western Australia it occurs in dry spinifex country to the south and east of the upper Ord River and in the desert country of the upper Oakover River. Ferdinand von Mueller collected it in the desert area of Sturt Creek in 1856.

The distribution range of Sturt Creek Mallee extends into western Queensland to near Mount Isa. It grows under semi-arid to arid conditions.

103. **Eucalyptus carnei** C. A. Gardn.

Carne's Blackbutt

Named after Walter Mervyn Carne, a former economic botanist and plant pathologist of the Department of Agriculture in Western Australia, Carne's Blackbutt was discovered at Sandstone by the writer in July 1927, and subsequently collected in August 1961.

It is not uncommon on the ironstone and sandstone hills near Sandstone, occurring on the steep sides of the hills and breakaways in shallow soil. It is found from Menzies northwards to Meekatharra. It is a typical blackbutt with a rough, dark persistent more or less tessellated bark on the lower and greater part of the trunk, this being succeeded by a smooth, yellowish bark shedding in plates. The ashy-white branchlets spread widely or are even pendulous.

The timber is yellowish-brown, very dense, hard and straight-grained, but the trunk seldom exceeds 1 to 2 m long. The foliage is a blue green, but here and there trees with yellow-green foliage are also seen.

The tree rarely exceeds 4.5 to 5 m tall.

This variation in the colour of the foliage in the inland species of *Eucalyptus* is not an uncommon feature of some species, the most noteworthy being *E. lesouefii,* in which green foliage sometimes occurs, although typically the foliage of this species is a blue-green. The same thing occurs in *E. loxophleba,* York Gum, in the far eastern parts of its range.

The flowers of *E. carnei* have creamy-white filaments. Both *E. carnei* and *E. stricklandii* have the same general appearance in the field, but *E. carnei* differs in having smaller narrower leaves, smaller flowers, each with a shorter obtuse operculum always shorter than the calyx-tube and always without the compression of operculum which characterises *E. stricklandii.* The valves of the ripe fruits are exserted in both species.

E. carnei is a desirable species for planting in streets and in parks and gardens. It is not unlike *E. desmondensis* in general appearance, but is always a tree with a short stout trunk and spreading or pendulous branches. It is remarkably drought-resistant. It probably flowers in February and March.

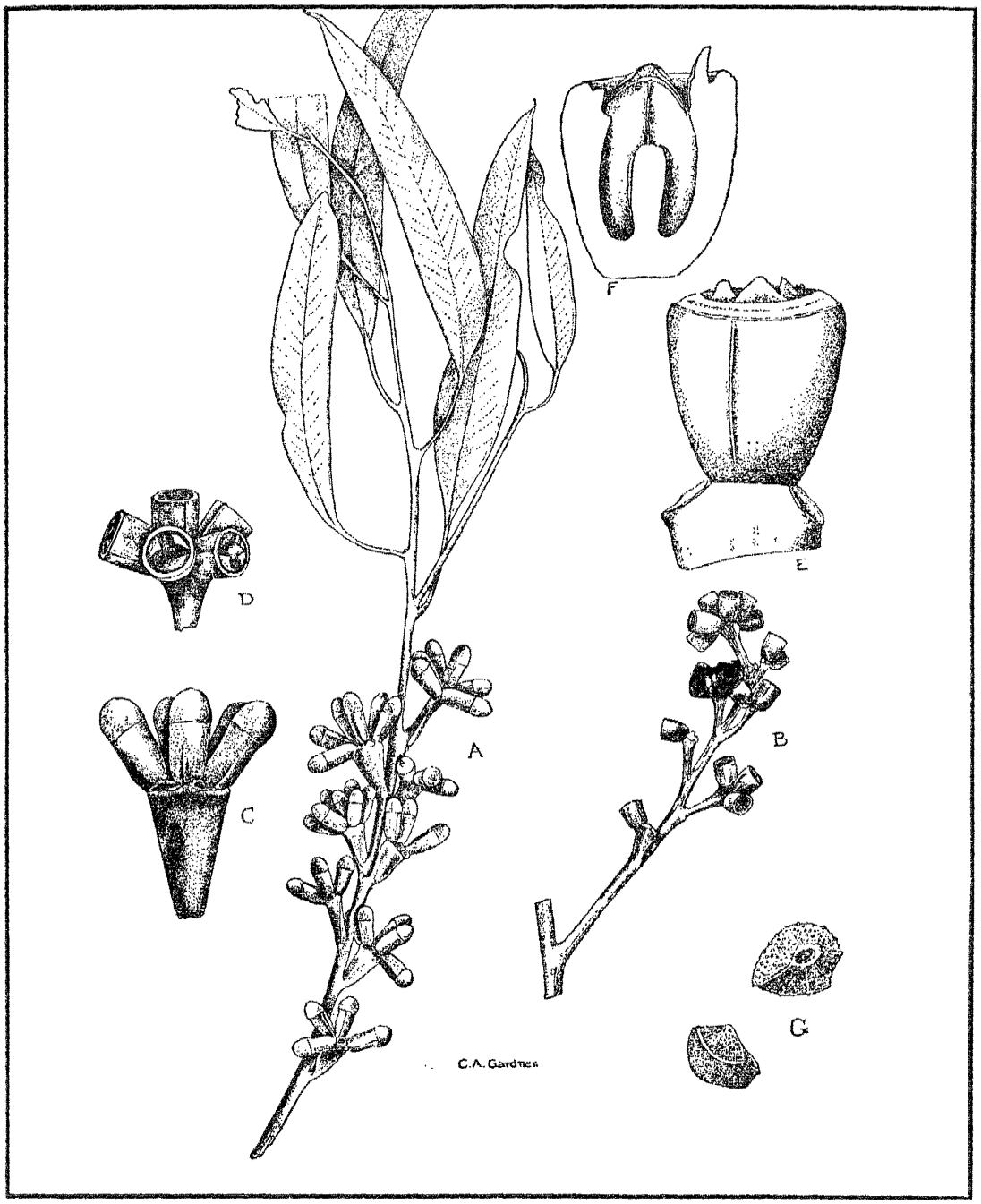

Fig. 90

Eucalyptus carnei A—Branchlet with leaves and flower buds; B—Branchlet with slightly immature fruits; C—Flower cluster (enlarged); D—Fruits (Sandstone, Gardner 2073). E—Fruit (enlarged); F—Section of enlarged fruit; G—Seeds. (Sandstone, Gardner 13430).

104. **Eucalyptus clelandii** (Maiden) Maiden

Cleland's Blackbutt

Cleland's Blackbutt commemorates J. B. Cleland, who made extensive botanical collections, especially of *Eucalyptus,* in the drier parts of Western Australia and in central Australia.

The tree is fairly widely distributed throughout the drier eastern areas of Western Australia. Extending from east of Merredin southwards to east of Hyden, it is fairly common in the Kalgoorlie and Coolgardie districts, especially the latter where it is common on schistose hills and red loamy flats. It is also found in the Ninghan district near Mount Gibson, near Minnie Creek and between Cue and Sandstone. It has not been recorded from any intermediate localities. In the Ninghan district it is not uncommonly an erect tree up to 10 m or more in height, but around Coolgardie it is usually much smaller, with a relatively short trunk, often only 2 m long and widely spreading branches.

The field characteristics of the tree are the short stout trunk covered with a dark grey or almost black bark throughout or over the greater part of the trunk, succeeded by a yellowish-brown or almost green smooth bark on the branches, and this in turn succeeded by powdery white smooth branchlets. The lanceolate leaves are blue-green. The timber is light or dark brown, very hard, dense and straight-grained.

Among the floral characteristics of the tree are the very shortly stalked buds and fruits, both of which are powdery-white. The calyx-tube is almost bell-shaped, the flowers five to seven in the umbel, the umbels being in the axils of the leaves. Although the calyx-tube is smooth, the operculum, shorter than the calyx-tube in the typical form, is rather prominently ribbed, and broader in diameter than the calyx-tube. The filaments are white.

E. clelandii is a most desirable species for planting because of the attractive appearance of its various types of bark, its short trunk and widely spreading, usually dense branches. The typical Coolgardie form found so abundantly on Montana Hill, rarely exceeds 6 m tall, and thus, as a street tree, would require little or no pruning. It is drought resistant, as indicated by the climate and soil of its habitat, and although happy in this arid environment, it responds well to cultivation in the light sand of the Perth Metropolitan Area.

It is of fairly rapid growth, and flowers abundantly from August to February. Its value to bees is not known.

The name *clelandii* also commemorates A. F. Cleland, an engineer formerly of Kurrawang, uncle to J. B. Cleland.

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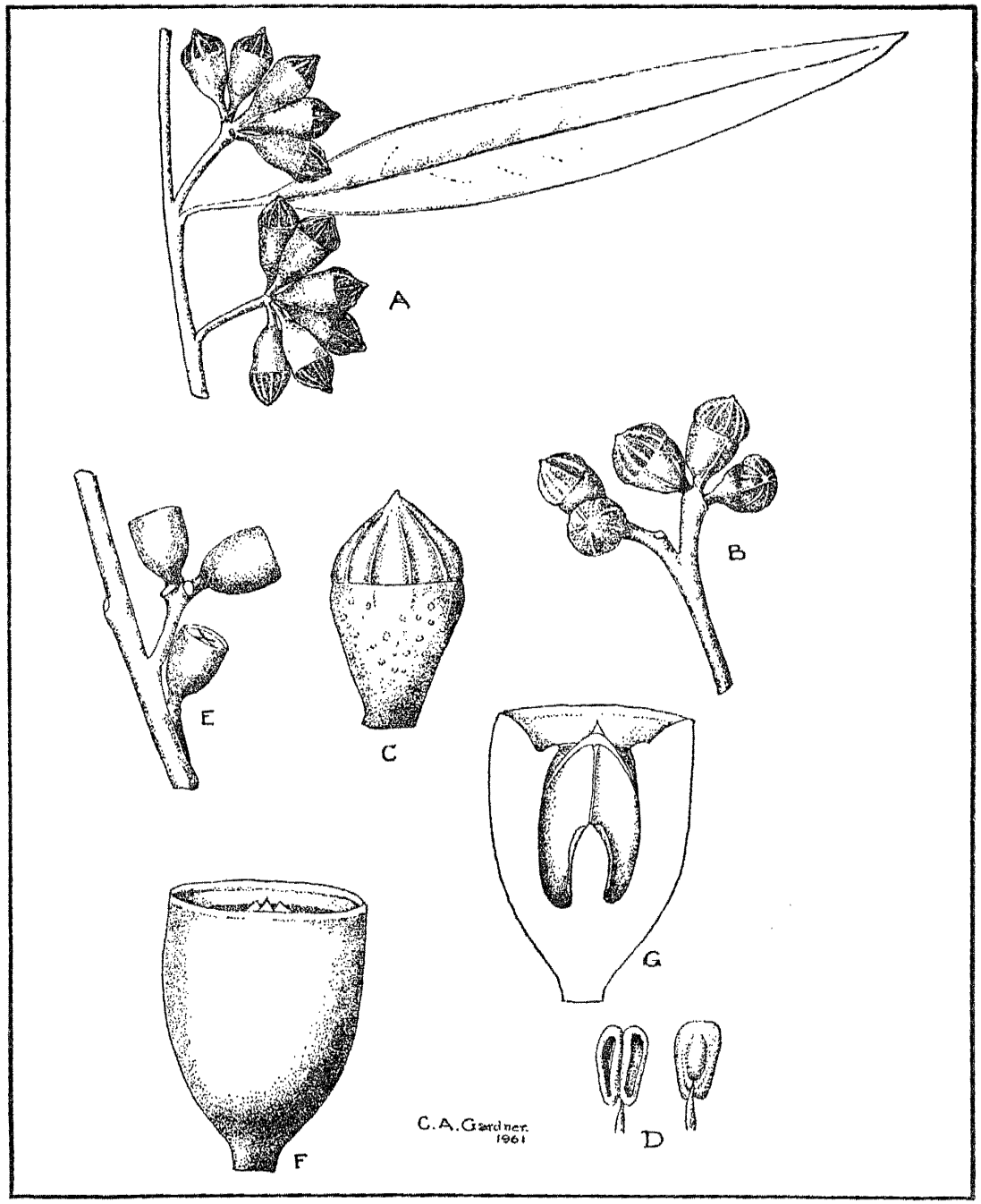

Fig. 91

Eucalyptus clelandii A—Leaf and flower buds; B—Flower bud (enlarged); D—Anthers; E—Fruits; F—Fruit (enlarged); G—Fruit in section). (Montana Hill, Coolgardie, Gardner 1277).

105. **Eucalyptus camaldulensis** Dehnh.

River Red Gum

River Red Gum has the widest distribution of all eucalypts. Its range extends from Queensland and the Northern Territory to the drier parts of Western Australia, South Australia, New South Wales and Victoria. In Western Australia it is confined more or less to the banks of watercourses within the summer rainfall zone, which brings its range of distribution from the Kimberley, in the north, southwards to Wiluna and Meekatharra and then westwards to the Bowes River not far to the north from Geraldton.

In these areas it is found as a smooth-barked gum tree, varying in its appearance from north to south and from west to east. For example, in Victoria and South Australia it occurs as a thick-stemmed gum tree with widely spreading branches rendered familiar by paintings; in the north it has quite a different appearance, being a comparatively slender stemmed tree up to 21 m tall with a trunk up to 11 to 12 m high, and comparatively slender erect or spreading branches, the bark always white and smooth.

The foliage varies from green to a blue-green and the leaves are frequently very long and narrow. The timber is a pale to deep red and being straight-grained, strong and durable is commonly used for structural purposes.

There is remarkable variation in the shape and comparative length of the flower-buds, the operculum varying from almost egg-shaped to conical and beaked. The latter forms are found mainly in eastern Australia and in the southern areas of its distribution in Western Australia. A number of varietal names have been given to the various forms, but in Western Australia we can recognise within the summer rainfall area only two: the one illustrated, and a form common in the Kimberley region in which the operculum is somewhat shorter and broader and terminates in a small short abrupt beak. A form much like this is also found in the Leonora district.

Southwards from the Bowes River, in the winter rainfall area, the tree undergoes a gradual change at first almost imperceptible. The bark remains smooth and white, but the fruits become somewhat broader and almost hemispherical. This smooth-barked form with the almost hemispherical domed fruits extends to the vicinity of the Moore River, occasional trees being found as far to the south as Northam.

In the vicinity of the Moore River we find a rough-barked tree with broader leaves, larger and broader flower buds and fruits with the disc scarcely or not at all domed. The timber is pale. This is *E. rudis,* Flooded Gum, which is found in virtually the same habitat as River Red Gum.

Although Flooded Gum is readily separable in its southern range from River Red Gum, it cannot be separated from this tree in the region extending from the Bowes to the Moore rivers. The difference in the two types of bark of Flooded Gum is considerable, being smooth and white in the north, and rough and fibrous-flaky in the south. Both trees are generally spring and summer flowering.

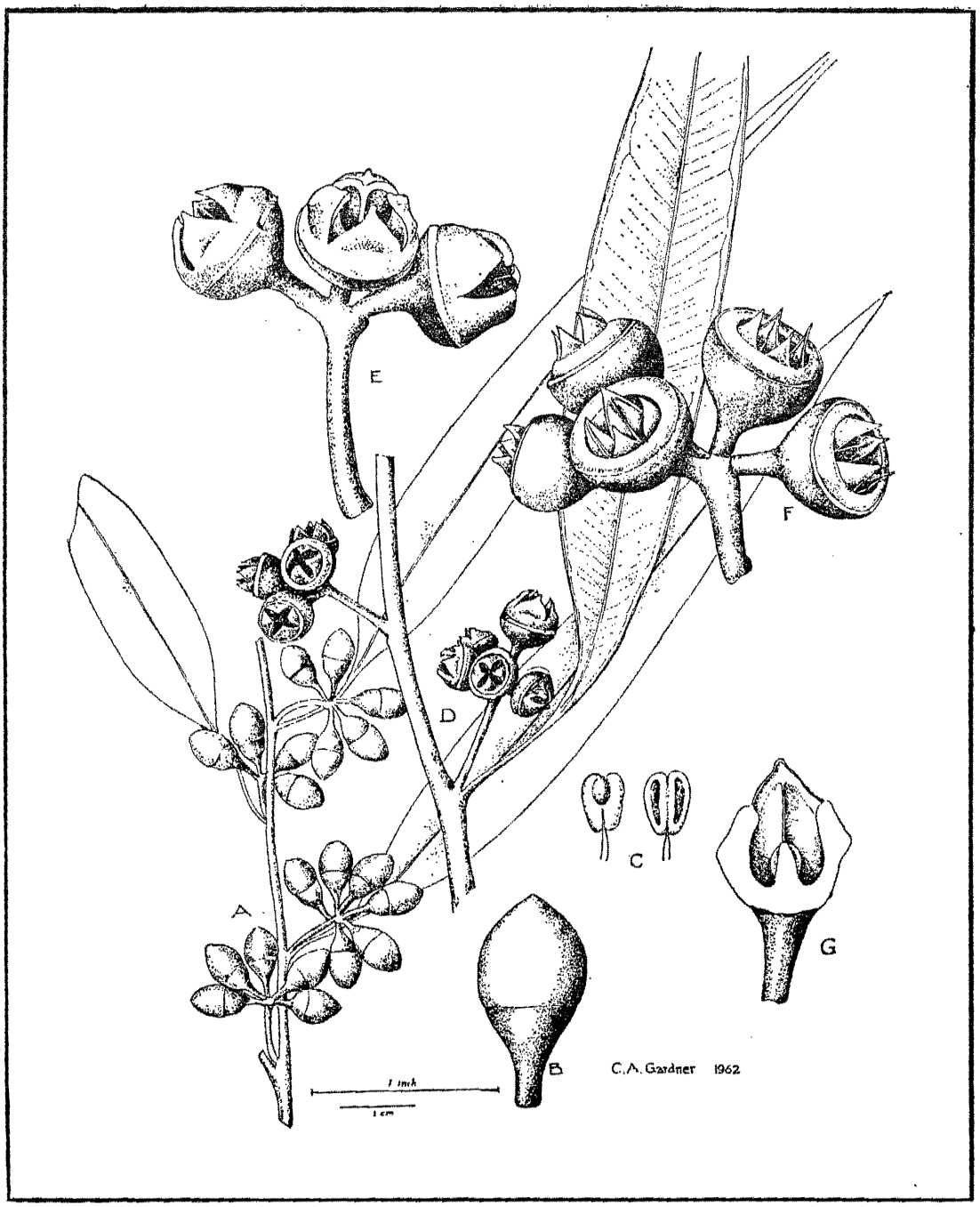

Fig. 92

Eucalyptus camaldulensis A—Branchlet with leaves and flower buds; B—Flower bud (enlarged); C—Anthers (enlarged); D, E, and F—Fruits (E and F enlarged); G—Fruit in longitudinal section.

One of the most interesting features of *E. camaldulensis* is that, although largely restricted to the vicinity of streams, it has proved hardy under cultivation in a variety of soils and climates. We see it growing in red sand on the coast at Onslow, while it has proved equally hardy in the sandplain country as well as in the red clay loam of our southern agricultural districts. One gains the impression that it can be grown almost anywhere in Western Australia.

River Red Gum is remarkably quick growing, and can be recommended for planting in the eastern agricultural areas as well as in the pastoral district.

It cannot generally be recommended for street planting or planting in suburban residential blocks because of its size.

River Red Gum is one of the most widely planted eucalypts overseas. The greatest success with this species has been in semi-arid areas bordering the Mediterranean, notable in Israel and North Africa. It is also an important source of sawn timber in Brasil.

E. camaldulensis hybridizes with *E. rudis* in Western Australia, with *E. tereticornis* in parts of Queensland and with *E. ovata* in Victoria. Otherwise over the greater part of its range this species is readily identifiable.

106. **Eucalyptus jutsonii** Maiden

Jutson's Mallee

Jutson's Mallee commemorates the name of J. T. Jutson, a field geologist of the Geological Survey of Western Australia from 1911 to 1918, well known as the author of "The Physiography of Western Australia". He collected both this species and *E. comitae-vallis* at Comet Vale.

The species is a very distinctive one, growing in red sand or sandy loam in the Comet Vale-Menzies area. It attains a height of eight metres, and may be a small tree or more commonly a mallee with close erect leafy branches. The stem is up to 15 cm in diameter, and covered with a light grey flaky and longitudinally fissured persistent bark which becomes stringy in the upper trunk, the branches and branchlets. Usually the upper part of the trunk has a smooth silver-reddish brown bark.

The leaves are remarkably narrow and very finely pointed, commonly 12 to 15 cm long, rarely more than 9 mm broad, a bright lustrous green on both surfaces and always erect.

The flowers are in axillary umbels of commonly four or five flowers on short pedicels, the operculum varying from narrow conical to broadly conical and longer than the calyx-tube. The white staminal filaments are inflected in the bud, bearing small anthers which open in small oblique slits, sometimes confluent at the apex.

The small fruit is hemispherical, about 6 mm in diameter, with a wide slightly domed disc and three broad deltoid valves. The style is relatively thick and slightly dilated in the upper part.

E. jutsonii flowers in December. It is most closely related to *E. angustissima* of the south coast around Israelite Bay.

Specimens of what appear to be a form of Jutson's Mallee have been collected near the Murchison River, north of Geraldton. These have wider leaves, to 2 cm broad, while the flower buds, seven or more to an umbel, have longer pedicels and peduncles.

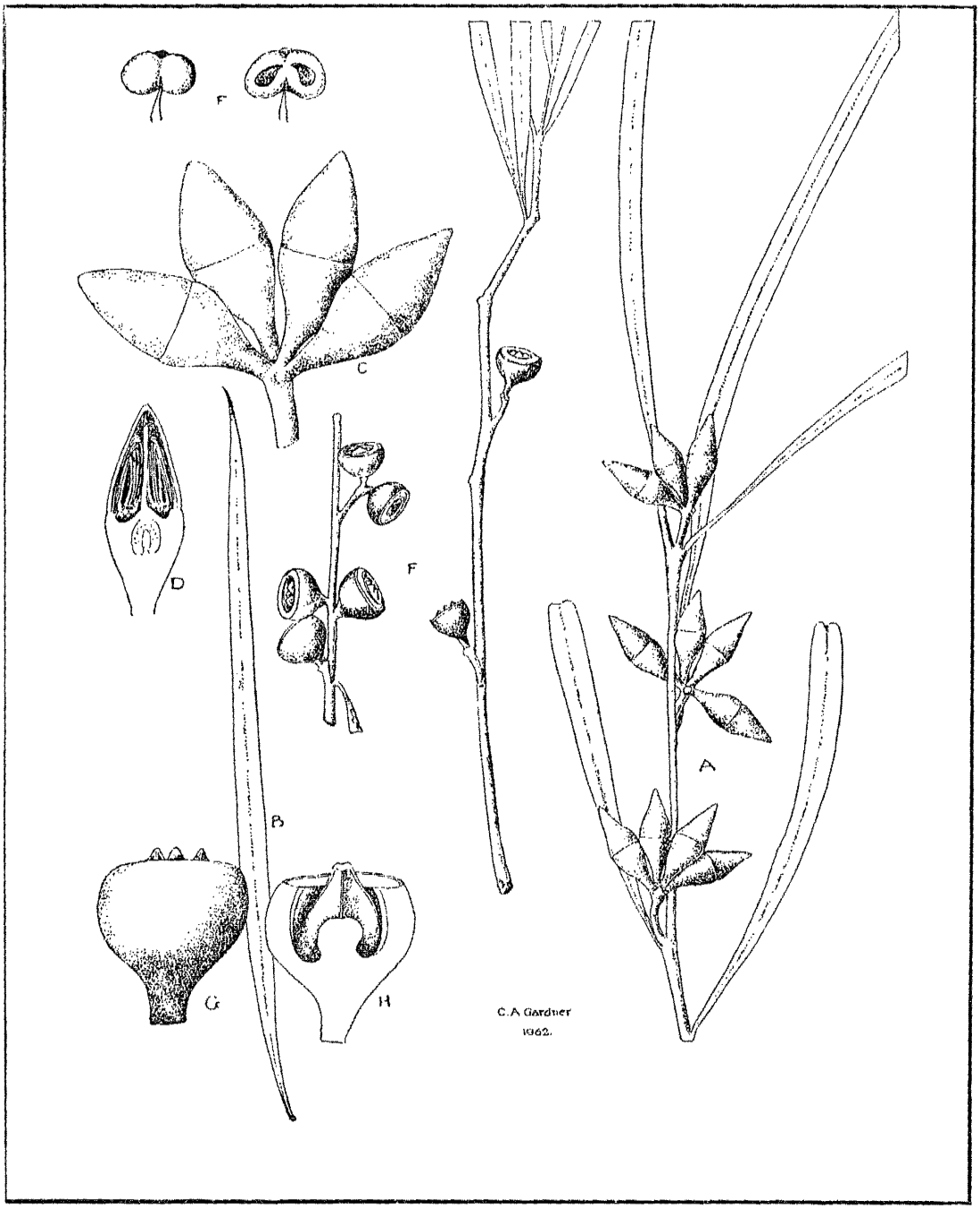

Fig. 93

Eucalyptus jutsonii A—Branchlet with leaves and flower buds; B—Leaf; C—Flower buds of the broader type (enlarged); D—Flower bud in longitudinal section; E—Anthers; F—Fruits; G—Fruit (enlarged); H—Fruit in longitudinal section.

107. **Eucalyptus macrocarpa** Hook.

Mottlecah

Editor's note: Gardner was not convinced that *E. macrocarpa* and *E. rhodantha* were separate species. In this edition they are treated as distinct entities.

Mottlecah, a shrub between 2 to 5 m tall, is the largest-flowered of all the species of *Eucalyptus*. The name is intended to indicate this fact, but unfortunately the Greek word *makros* means long and actually the fruit is remarkably short in comparison to its diameter, being in fact the broadest fruit within the genus. Fruits have been recorded as being about 9 cm across. *E. megacarpa,* Bullich, which is named from its large fruit, is small by comparison.

The range of *E. macrocarpa* extends in a relatively narrow zone of open sandheath from just north of Geraldton, via the Hill River, Piawaning, Meenaar, Tammin and Bruce Rock to Kulin, where it usually occurs in small patches.

Ornamentally it is not as attractive as *E. rhodantha,* which has smaller leaves and flowers, and it is unfortunately subjected to the ravages of a leaf-eating insect, which much affects its appearance. In cultivation, given immunity from the attacks of this pest, Mottlecah develops into a very attractive shrub with its blue-grey large spreading leaves and its large flowers with red, pink, or sometimes yellowish-white filaments.

The principal differences between *E. macrocarpa* and *E. rhodantha* are the very short peduncle of the former, and the quite distinct peduncle of *E. rhodantha.* The leaves of both exhibit considerable variation.

In the southern areas *E. rhodantha* is associated with *E. macrocarpa* and sometimes it is difficult to separate them. The anthers and seeds of the two are alike. A characteristic of *E. macrocarpa* is that, especially in the larger fruits, the valves at maturity split the cushion-like part of the disc, a characteristic I have not observed in any other species.

The species blossoms almost throughout the year, but the main period of flowering is from June to October.

Mottlecah has been cultivated in California and in eastern and western Australia. Pruning, while the plant is still young, should help develop a dense shrub which will be an outstanding ornamental.

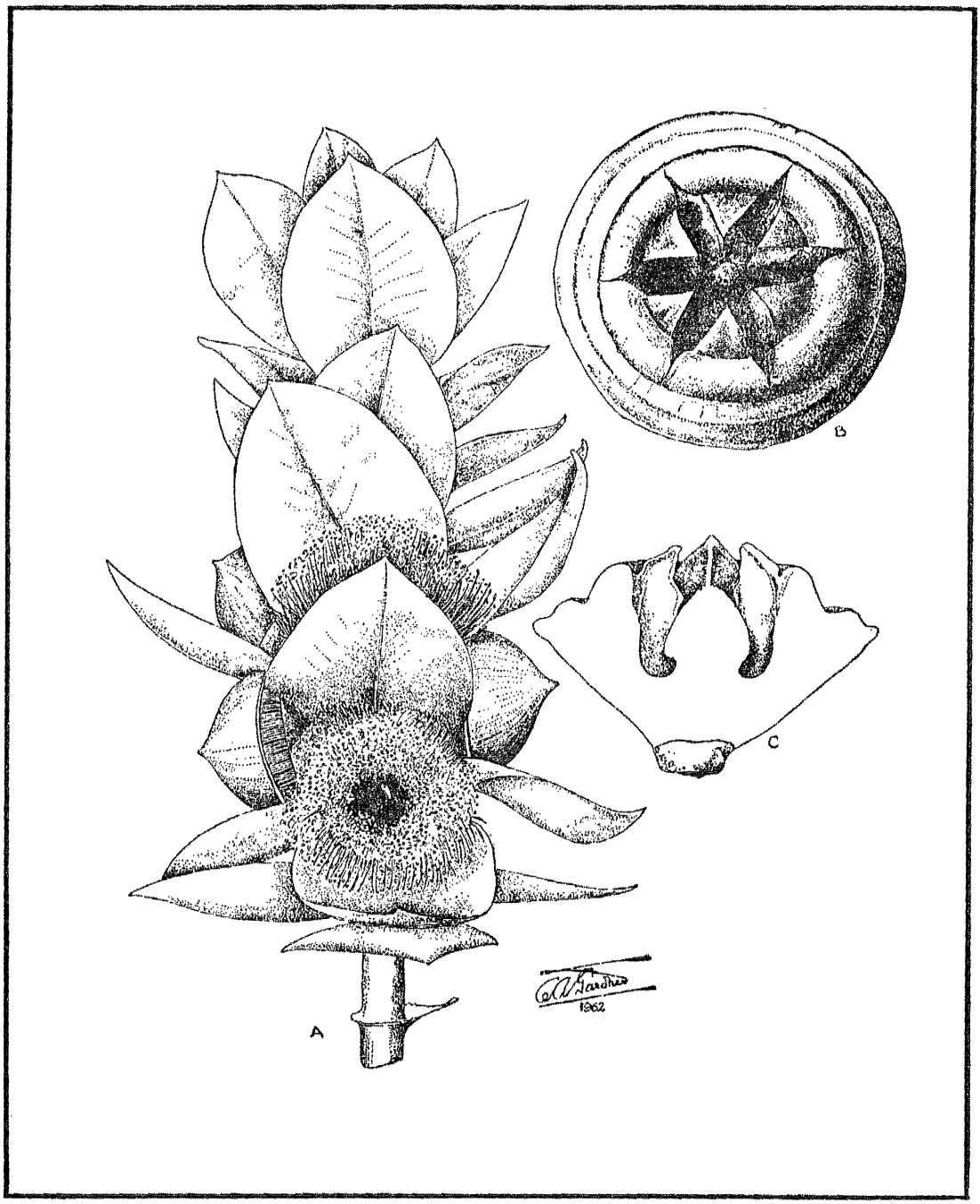

Fig. 94

Eucalyptus macrocarpa A—Branchlet with leaves and flowers and buds; B—Fruit; C—The fruit in vertical section. (Piawaning, Gardner, January, 1961).

108. **Eucalyptus lehmannii** (Schau.) Benth.

Bushy Yate

Bushy Yate, or the Bald Island Marlock as it is sometimes called, is a mallee or small bushy tree which attains a height of about 10 m, although usually it is smaller. As a mallee it ranges from 1.5 to 6 m tall, growing on granitic, lateritic or quartzite hills between King George Sound and Cape Arid. It is rarely found on the plains except in the vicinity of the Stirling Range and the Phillips and Hamersley Rivers. It occurs as far inland as Ongerup.

The original specimens were collected by Ludwig Preiss on the hill at Cape Riche in November, 1840. It was described and published under the name *Symphyomyrtus lehmannii* by Schauer. Bentham, in 1867, named it *Eucalyptus lehmannii.*

The form illustrated is the large-flowered and fruited form found on Bald Island. The tree form has a smooth greenish bark, tending to become rough in the lower parts with age, and widely spreading branches. It has usually a dense foliage, the leaves being usually small, rarely exceeding 8 to 10 cm long, and deep green.

The most characteristic feature of the species is the massing of the flower-buds, flowers and fruits into a concrete head, the calyx-tube usually almost immersed in the receptacular portion of the very broad peduncle. The individual flowers are closely sessile.

The operculum is horn-shaped, smooth or finely striate, sometimes conspicuously one-ribbed, varying from pale yellow to purple-red. The filaments are green and erect while within the operculum, later green or yellowish-green, and angular. The fruiting heads are normally up to 8 cm in diameter, but both flowers and fruits show remarkable variation in size.

Bushy Yate is most closely related to *E. cornuta*, differing essentially in the calyx-tubes being fused into a solid mass in bud and in fruit. All that remains free is the actual rim of the hypanthium in the fruiting stage. Some forms, particularly those growing on the quartzite hills of the Phillips River district usually have much smaller flowers with comparatively longer and more slender opercula than the form illustrated in the accompanying drawing.

This species is well known in cultivation. The tree is ideal for street planting, and for windbreaks. As a street tree it has advantages over most species in that it is shady, while its low stature makes lopping unnecessary. It possesses a broad dense crown, providing both shade and resistance to wind.

It flowers during winter and spring.

The name *lehmannii* honours J. C. Lehmann, a German botanist of the early and middle nineteenth century.

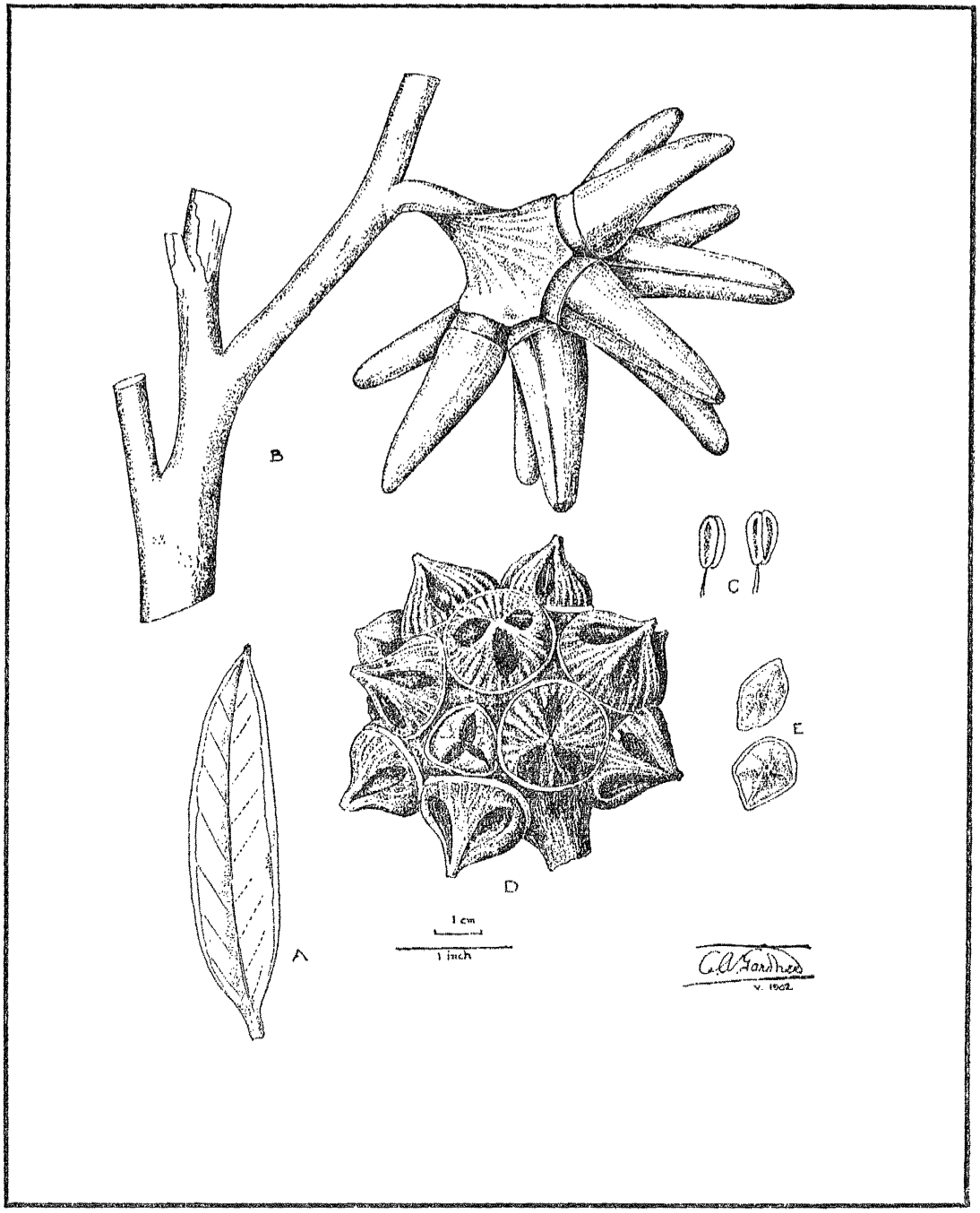

Fig. 95

Eucalyptus lehmannii A—Leaf; B—Branch with inflorescence in bud; C—Anthers; D—Head of fruits; E—Seeds. (South coast near Pallinup River).

109. **Eucalyptus sargentii** Maiden

Salt River Gum

With the increasing spread of salt in certain poorly-drained soils in Western Australia, any vegetative cover which tends to restrict salt encroachment is of considerable economic importance.

In the genus *Eucalyptus* there are a few which will withstand a certain degree of soil salinity, the principal one being *E. kondininensis,* Kondinin Blackbutt, first described from Kondinin where it was locally called Stocking-tree because of the black rough bark of the lower trunk which gives way somewhat abruptly to a thin, smooth bark. Kondinin Blackbutt is much more common further south, inhabiting the shores of the salt-pans, particularly at Pingrup, Lake Grace and other salt-pan country in the district. It may be found growing fairly close to the white surface salt, and is undoubtedly valuable under dry conditions in salt affected areas.

E. sargentii, Salt River Gum, was originally named from a specimen collected at Lake Mears between Dangin and Kweda on a salt river near where it enters the Avon. From there its distribution range can be traced as far as Hines Hill, while it is also not uncommon on the east branch of the Mortlock River between Cunderdin and Wyola.

Salt River Gum is closely related to *E. astringens,* Brown Mallet, but is a smaller, more widely branched tree averaging about 6 m tall, with a rough flaky bark on the lower part of the trunk. This bark is a dark grey or almost black and is succeeded upwards by a greenish-brown thin smooth bark. The bark is fairly rich in tannin and in the early days of settlement of the eastern districts it was used for tanning hides.

The heartwood is tough, dense, straight-grained and dark brown.

Salt River Gum is sometimes associated with a mallee form of *E. spathulata,* which is also to some extent salt-tolerant.

Although Salt River Gum is salt-tolerant to a marked degree, often growing under conditions in which the other vegetation dies from excessive salt in the soil, it also dies but is the last tree or shrub to do so. For example, formerly common at Hines Hill, much of the Salt River Gum has died. There are probably two factors involved: too much salt, and insolation through lack of soil protection.

Salt River Gum is being increasingly grown in many inland places in soils which are becoming saline. It is both hardy and rapidly-growing as far inland as Wanarra Station, east of Perenjori and may be found in cultivation in many parts of the eastern wheatbelt.

Planting should be undertaken not later than the end of June. The young trees should be planted some distance from any visible superficial evidence of salt on the surface.

Salt River Gum is a small tree, rarely exceeding 8 m tall, with a rather stout trunk, the greater part of this relatively short trunk covered by a thick persistent dark grey flaky bark, often

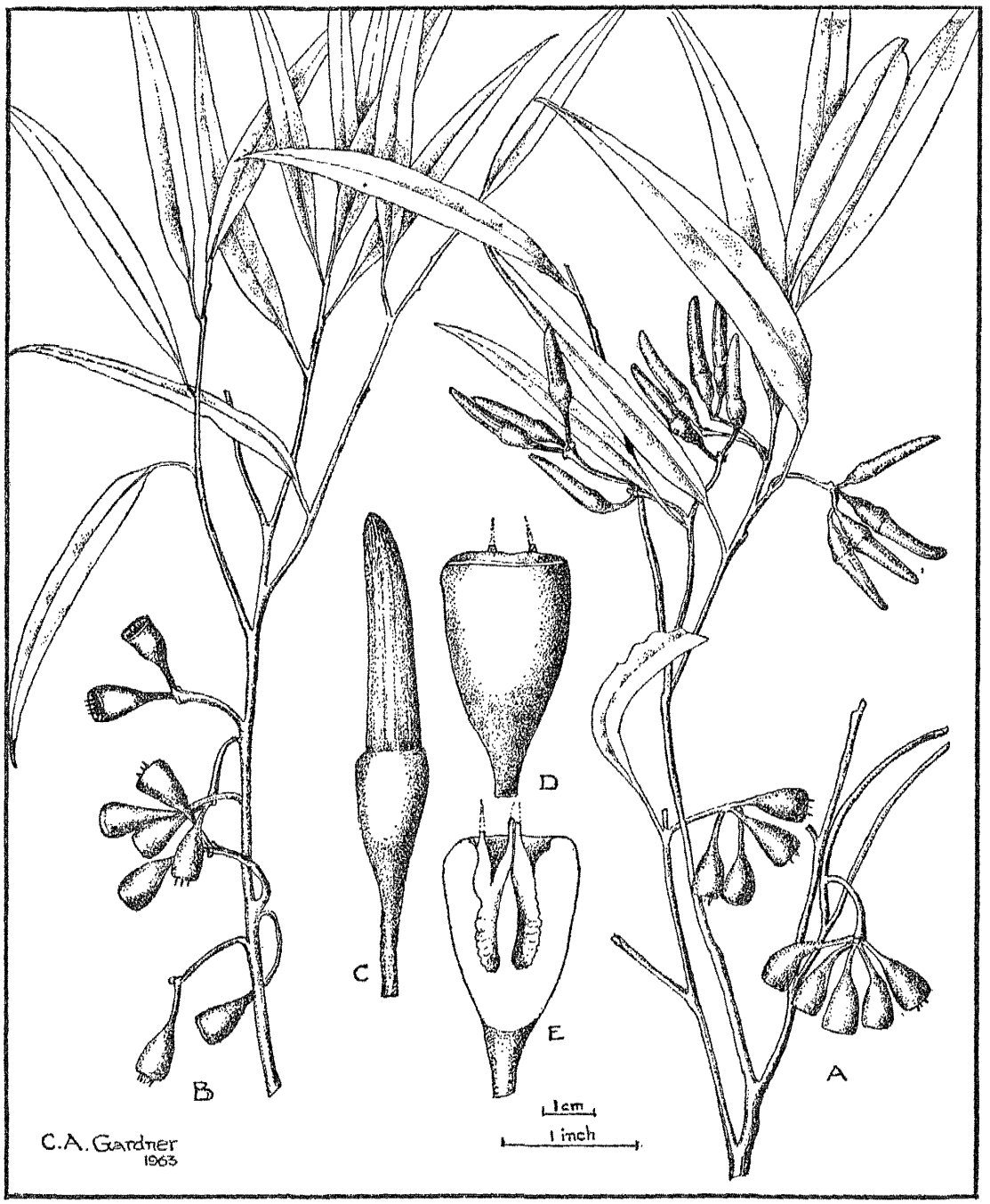

Fig. 96

Eucalyptus sargentii A—Branchlet with buds and fruits; B—Branchlet with somewhat immature fruits; C—Flower bud (enlarged); D—Fruit; E—Fruit in longitudinal section. (Wyola, Gardner 14388, January, 1963).

thick and ragged; the bark of the upper parts thin, smooth and greenish-brown. The branchlets are slender, often drooping, reddish. Timber pale brown, straight-grained, hard and tough.

The leaves are alternate, spreading or drooping, narrow, lustrous on both surfaces with copious oil cavities.

The flowers are in axillary or lateral three to seven flowered umbels on rather long slender recurved common stalks, the individual flower-stalks slender, about as long as the fruits. The calyx-tube is somewhat obconical or almost cylindrical, smooth and about half as long as the operculum. The filaments are yellowish-white and erect when in the unopened bud. The stamens are all perfect with narrow anthers opening longitudinally. The fruit is cylindrical-cupular, tapering into the stalk, less than 2 cm long, smooth, the disc narrow, the valves slender and needle-like. It flowers in the spring.

The specific name commemorates Oswald H. Sargent, a pharmacist, who collected botanical specimens in the York and Bruce Rock districts and was also the author of a number of species.

Salt River Gum has been grown successfully in eastern Australia. At Broken Hill it has been used on mine dumps. It is highly suitable for planting for shade, windbreaks or as a street tree, particularly in inland, salt-affected soils.

110. **Eucalyptus diptera** C. Andrews

Two-winged Gimlet

Two-winged Gimlet has the habit, colour and form of the common Gimlet, even to the characters of the fluted bark and often twisted trunk. It is much smaller, however, rarely exceeding 6 m tall, and it never attains the girth of the Gimlet.

Its relationship to Gimlet is obscure and it remains a very distinctive tree because of its flowers and fruit. These are without stalks; the flowers, solitary, in pairs or in threes, are closely attached to the branch or branchlet, usually some distance below the leafy twigs. The two-winged character of the flowers, which gives the species its name, is quite unmatched within the genus. Also, there are not many species which are devoid of both peduncle and pedicel. The filaments of the flowers are greenish-yellow. It flowers in May.

The branches are erect, the bark brownish-green, quite smooth, the hard straight-grained timber light brown and very tough. The leaves are lustrous on both surfaces, typically broader than those of Gimlet and well-provided with oil cavities.

The original material was collected and named in 1903 by C. Andrews, who found a tree in flower north of Esperance. It was without opercula, was not in fruit, and the species, as well as the locality in which it was found remained unknown until in May 1924 the writer rediscovered the tree near Salmon Gums, growing in clay.

Its range extends from the Circle Valley to near Norseman and eastwards to near Fraser Range. It was stated by Blakely that Two-winged Gimlet tolerates subsaline conditions where salt is not evident in the soil. Trees more than 6 m tall are rare and the species is occasionally found in thicket formation. The size of the flowers and fruits is variable; specimens with fruits over 2 cm in diameter are not uncommon.

Two-winged Gimlet has been collected from as far west as Frank Hann National Park and has been observed at Lake Cronin to the north. The specific name means two-winged.

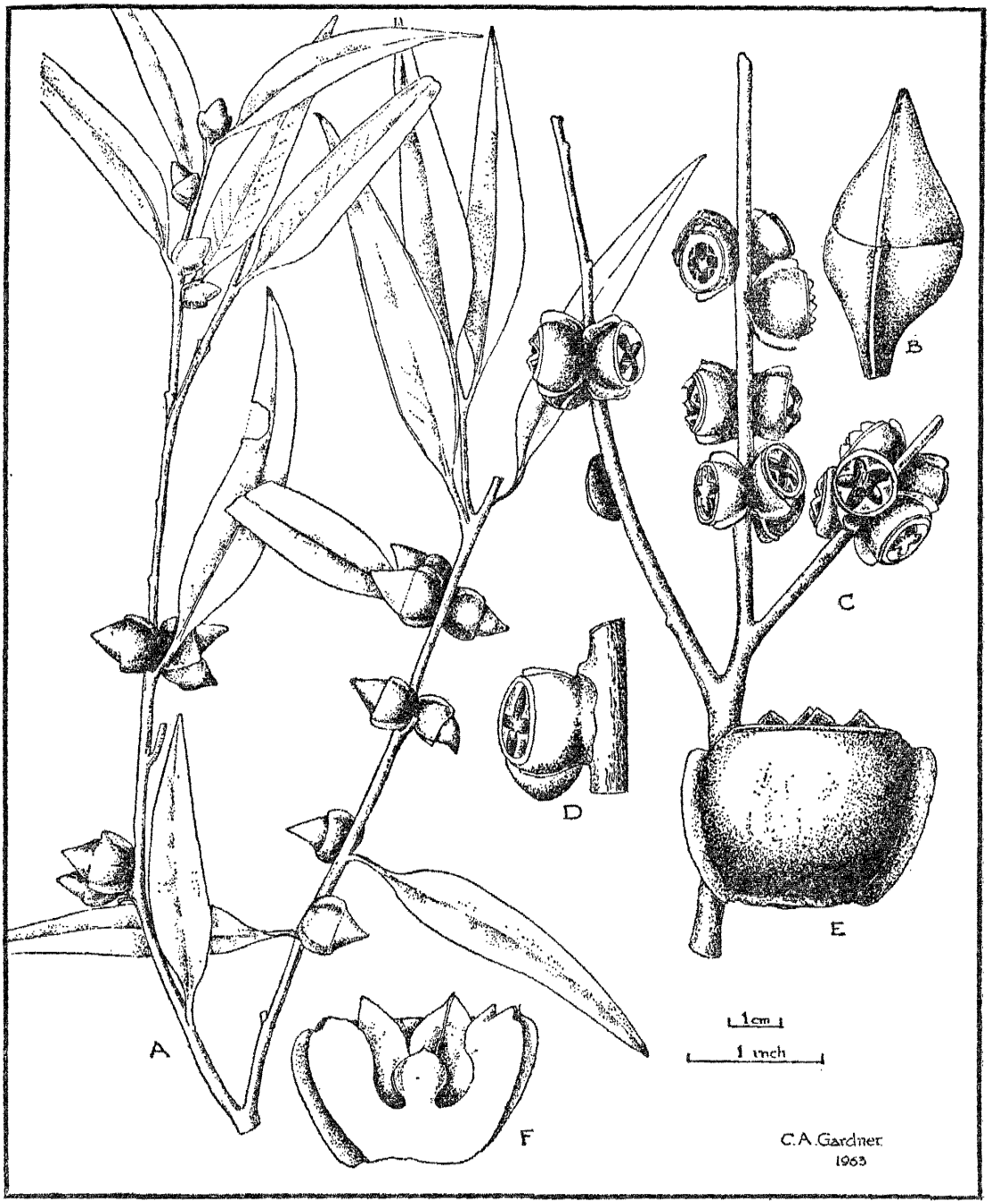

Fig. 97

Eucalyptus diptera A—Branchlet with leaves and flower buds; B—Flower bud; C—Branchlet with fruits; D—Fruit; E—Fruit (enlarged); F—Fruit in longitudinal section. (Salmon Gums, Gardner 14297, September, 1962).

111. **Eucalyptus burdettiana** Blakely et Steedman

Burdett Gum

Burdett Gum is a shrub or mallee, usually about 2 m tall, but which in rocky declivities may attain a height of 4 m or more.

The stems and erect branches are smooth-barked. The bark is greenish, becoming brown. The leaves are rather small, always tipped by a dark blunt apex like those of *E. stoatei,* green, lustrous and erect.

The flowers are in heads on thick deflexed peduncles, quite sessile, three to seven together in the head. The calyx is cylindrical-campanulate and smooth or slightly rough to the touch, while the elongated operculum is cylindrical, expanded at the base and very obtuse. It has a number of small, irregularly-placed warts which give it a distinctive appearance, and the blunt apex bears a dark pit-like depression. The filaments are yellow-green and erect within the bud, somewhat wrinkled throughout their length, and the elongated anthers are attached slightly above the base. It flowers in late summer.

The fruit is subglobular or globular-cup-shaped, smooth, or occasionally with a prominent single rib, and rounded at the top. The valves, three or four in number, arise from the domed summit of the ovary, becoming united at the tips, but these tips are relatively short.

The species name commemorates W. Burdett, a South Australian horticulturist who visited South Western Australia on several occasions and raised many plants in his garden at Basket Range near Adelaide.

Burdett Gum is confined to East Mount Barren and the quartzite spurs or ridges which radiate in a northerly direction from the mountain.

It bears a close relationship to *E. megacornuta,* the Warted Yate of the Ravensthorpe district, but *E. burdettiana* differs in having smaller flowers and fruit, differently shaped and less warted operculum, and in the shape of the fruit. *E. megacornuta* is a Gimlet-like tree, while *E. burdettiana* is always a shrub or mallee.

Burdett's Gum has been collected from as far west as Beaufort Inlet, at the mouth of the Pallinup River. This species has been cultivated in California and in eastern and western Australia.

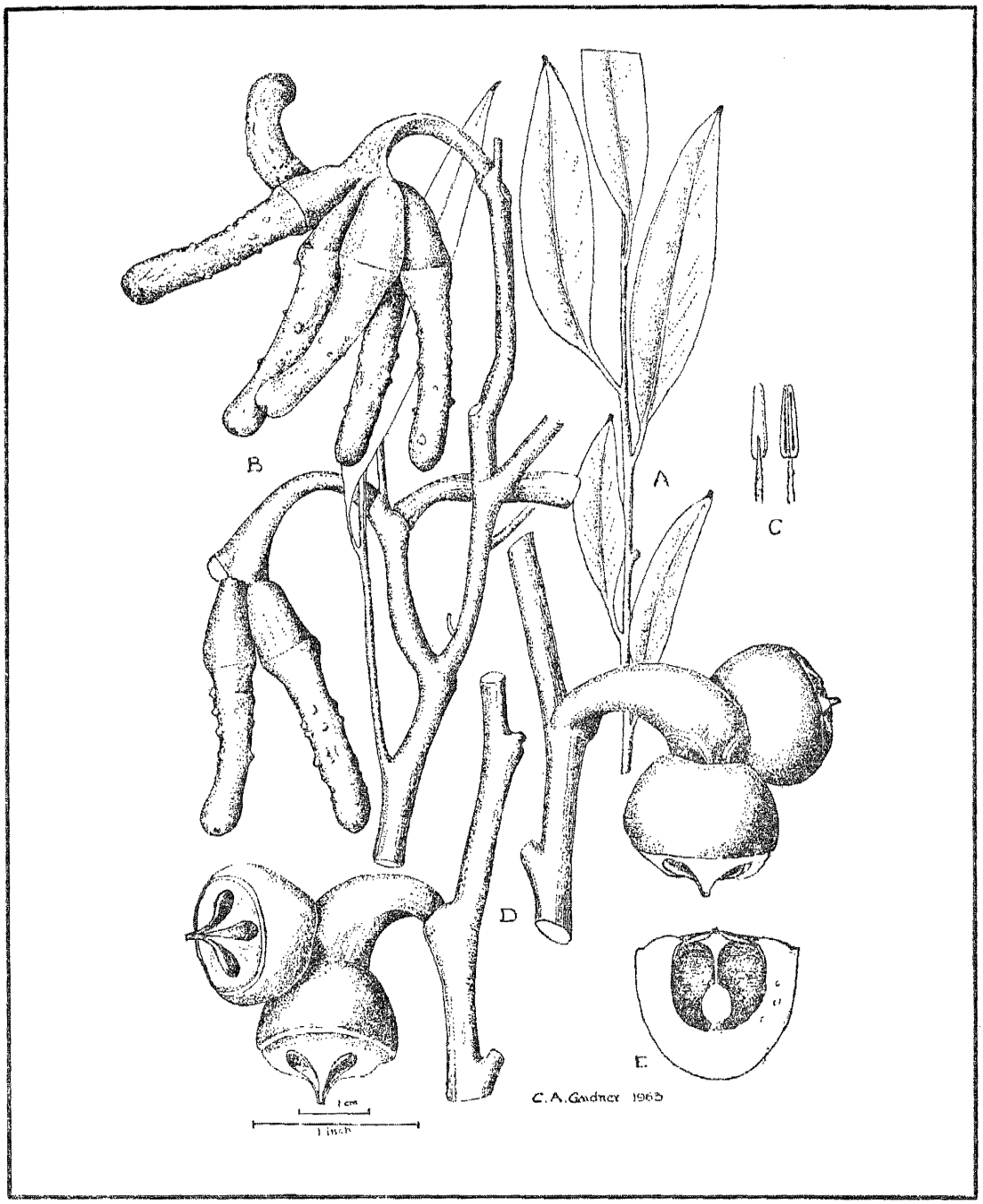

Fig. 98

Eucalyptus burdettiana A—Branchlet with leaves and flower buds; B—flower buds; C—Anthers (enlarged); D—Fruits (immature); E—Section of mature fruit. (East Mount Barren, Gardner 14351).

112. **Eucalyptus platypus** Hook.

Moort

Moort usually occurs as a small tree 3 to 6 m tall, with rather a stout trunk and spreading leafy branches. The bark is yellowish, smooth, or sometimes rough in the lower part. The pale timber is strong and straight-grained.

The typical form has roundish, very obtuse or notched leaves which are lustrous, but not a bright green, rather a dark oliveaceous green. The leaves are thick, obscurely veined, and often wavy-margined.

The relative lengths of the broadly flattened peduncle and the horn-shaped operculum exhibit considerable variation. The operculum varies from rather shortly conical to much elongated, the form illustrated being the one with long peduncles. In some specimens the operculum at the base is much narrower than the top of the calyx-tube, in others it is only slightly narrower.

The foliage also exhibits considerable variation, the leaves varying from almost round to obovate or shortly oblong, and in the variety *heterophylla,* mainly centred around the Kundip-Hamersley River district and the coast at Hopetoun, the leaf may be narrow-oblong or broadly lanceolate. There are some forms which appear to connect the two.

The filaments are either red or yellow, both forms being common. The red-filamented form is more attractive when the trees are in blossom. Flowering occurs from June to January, producing good honey-flow and pollen.

E. platypus occurs mainly in a heavy, grey, clay soil, and sometimes we find whole colonies of this species growing to the exclusion of practically everything else. It is the type of soil which is not readily permeable and requires a considerable amount of rain before it becomes wet. When this occurs it is found to be a clay of great tenacity. It is frequently associated with limestone.

The range of the species extends from Pingrup southwards to Gnowangerup, and from Albany eastwards to Esperance, but the main areas of its occurrence are in the Ravensthorpe district.

This species has much to recommend it as a shade tree. It is grown to some extent in the Perth metropolitan area but in sandy soils its habit is more lax, and it does not develop into the robust plant found in the heavy clay soils of its natural habitat.

Moort is cultivated in eastern and western Australia and also in California where it has shown moderate resistance to frost. It is a species capable of growing in salt-affected soils.

The name *platypus*, meaning flat or broad-footed, probably refers to the foot-like shape of the peduncle and buds.

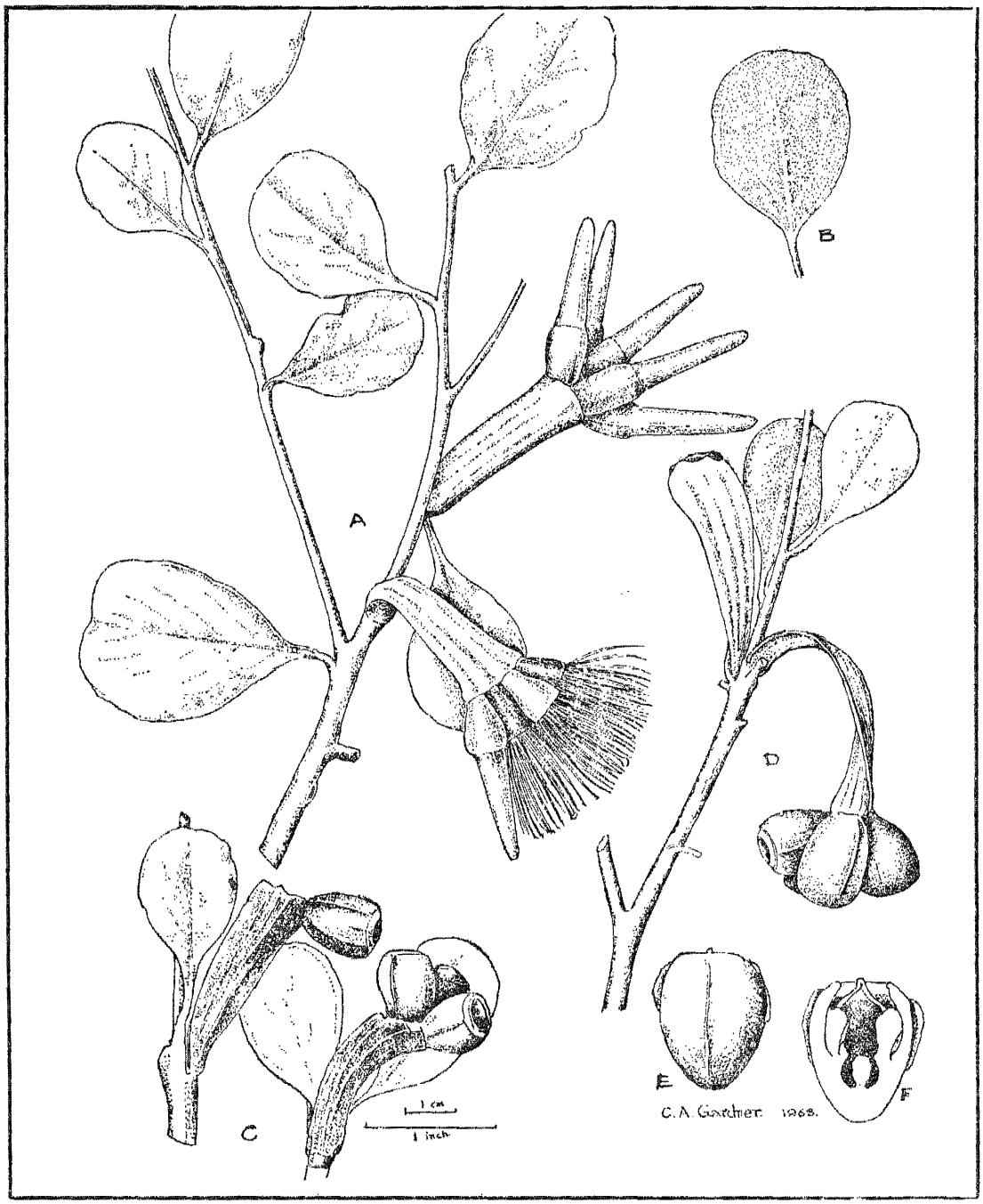

Fig. 99

Eucalyptus platypus A- -Branchlet with leaves and flower buds; B—Leaf of the typical form; C and D—Fruits; E—Fruit; F—the same in longitudinal section. (Gnowangerup, Gardner 1671).

113. **Eucalyptus kondininensis** Maiden et Blakely

Kondinin Blackbutt

Kondinin Blackbutt, originally found by the writer in July, 1923, was described in 1925. At the time it was known only from a small area immediately to the east of the Kondinin town in a shallow depression in the clay flat which more or less surrounds the townsite. Kondinin Blackbutt is seen from near Quairading southwards to Pingrup and Lake Grace on flats surrounding salt lakes.

These facts make the recognised vernacular name somewhat meaningless, for the tree enjoys a wide area of distribution. It is always associated with salt, and the fact that it is frequently found on the fringes of the salt lakes would indicate that it would be a most valuable tree for planting in moderately saline soils. In fact, although it shares this peculiarity with *E. sargentii, E. eremophila,* and *E. spathulata,* it does not, like these species, show any signs of dying as the salt increases with land clearing. I would regard Kondinin Blackbutt as the most salt tolerant Western Australian species of the genus *Eucalyptus,* but there are indications that it may be a slow-growing species.

The tree is much like the Red Morrel in general aspect, but the bark of the trunk is almost black and more deeply fissured, the crown usually more heavily branched, the leaves more lustrous, dark green and the branches, at least in their upper parts, darker and more or less green. When grown in places where there is room for lateral development, the tree is both attractive and widely umbrageous. It attains a height of 20 to 25 m, with a trunk diameter of nearly 60 cm. It is commonly found in a sandy loam with nodular limestone.

Although somewhat resembling Red Morrel, this tree is more closely related to a number of the eastern goldfields blackbutts, bearing some resemblance to *E. striaticalyx,* although it is very different in general appearance. Specific characteristics which serve for the recognition of the tree are the stalkless buds and fruits, the included valves of the fruiting capsule and the ovoid, shortly and broadly beaked operculum.

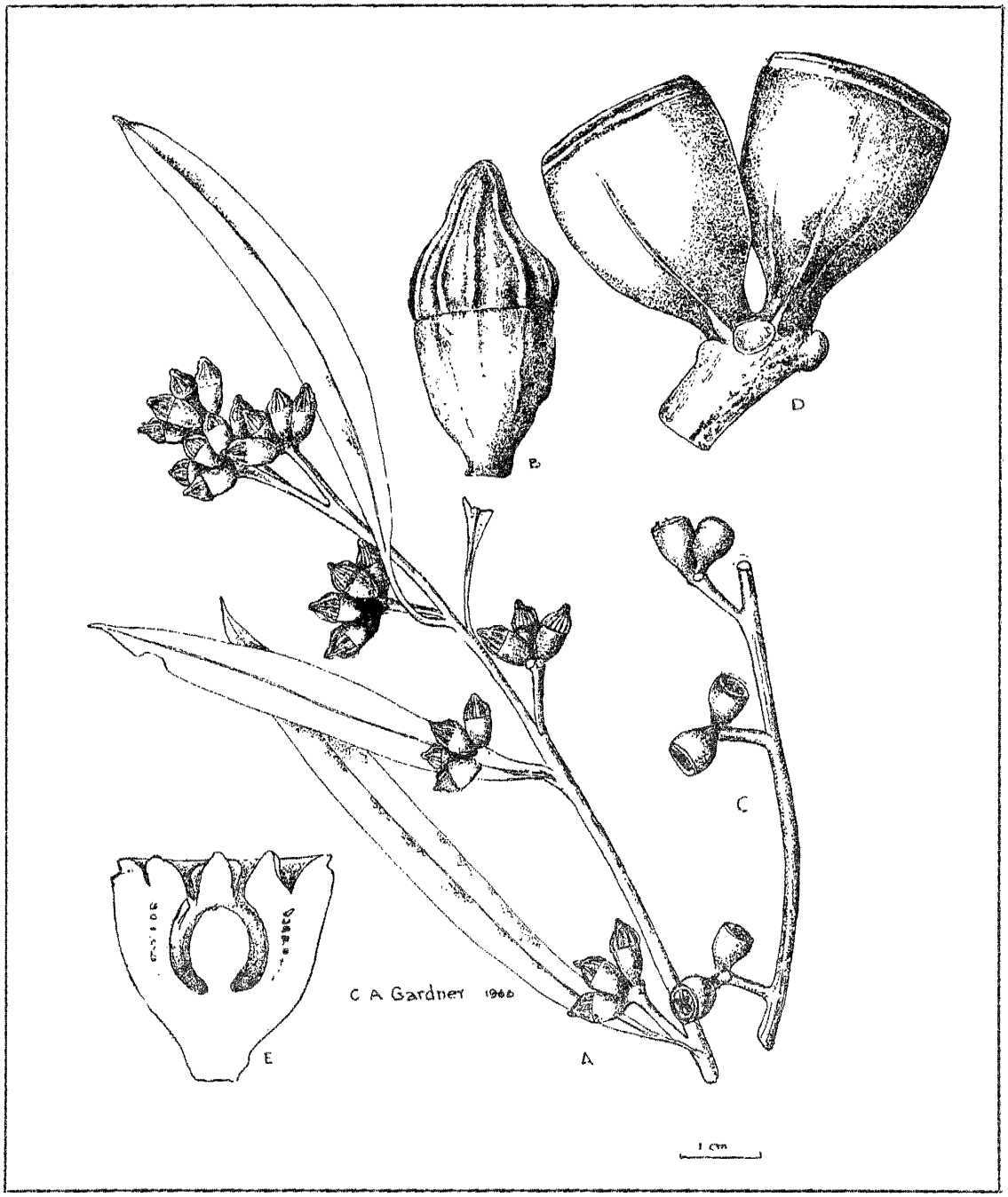

Fig. 100

Eucalyptus kondininensis A—Branchlet with leaves and flower buds; B—Flower bud; C—Fruits; D—Fruit; E—Longitudinal section of fruit. B, D, and E much enlarged. (Kondinin, Gardner 15002).

114. **Eucalyptus striaticalyx** W. V. Fitzg.

Kopi Gum

In September 1903, W. V. Fitzgerald collected and described a tree, known locally as York Gum, but to which it bears no affinity, growing at Milly's Soak in the Cue district. Milly's Soak is no longer known to the local inhabitants, but I visited the place in 1920, and remember it as a depression about 6 to 10 km westwards from the Cue townsite. The locality is not far removed from Big Bell, where the specimens illustrated were collected.

Kopi Gum makes its appearance again to the north, where it grows on the sand hills near Lake Annean near Nannine, but here the trees are more slender, and the bark smooth except for a short dark rough bark for a short distance above the ground. The species occurs once more on a watercourse northwards from, and close to Mount Magnet, growing in loamy soil of the banks of the creek. The three forms exhibit differences in stature and in the nature of the bark, but all have the same pendulous grey leaves.

The specific name is unfortunate, since the calyx is not, or only barely striate, but on the other hand the operculum is conspicuously striate or ribbed, the number of ribs varying from about 10 to 15.

Kopi Gum is rarely more than 10 m tall, and occurs often in fairly large numbers in certain areas, as for example at Nannine, and at Mount Magnet. Trees from other localities, now rarely seen since they have been mainly cut down for mining timber, have a stout trunk, up to 45 cm in diameter, covered totally or partially by a dark grey fibrous rough bark, whilst the branches are smooth with pale orange-yellow or yellowish-white bark, decorticating in long strips. The timber is hard, dark brown and has an interlocked grain.

A comparison with the illustration of this species and that of *E. kondininensis* will show many points of similarity, but in *E. striaticalyx* the flower-buds are larger, and distinctly stalked, and the leaves a dark lustrous green. The degree of ribbing and striation of flower-buds, and to a less extent in the fruits, is a characteristic which is dependent largely on the maturity of the organs, and the condition of the specimen when described. They are more conspicuously developed when the buds and fruits are dry. For example, Blakely places *E. striaticalyx* and *E. kondininensis* amongst those species in which the buds and fruits are striate, while *E. platycorys* is described as having coarsley striate, ribbed or corrugated buds and fruits. This distinction is not satisfactory as *E. platycorys* can be practically smooth.

E. striaticalyx is fairly salt tolerant, but not to the same extent as *E. kondininensis,* which is often found in highly salt affected soils.

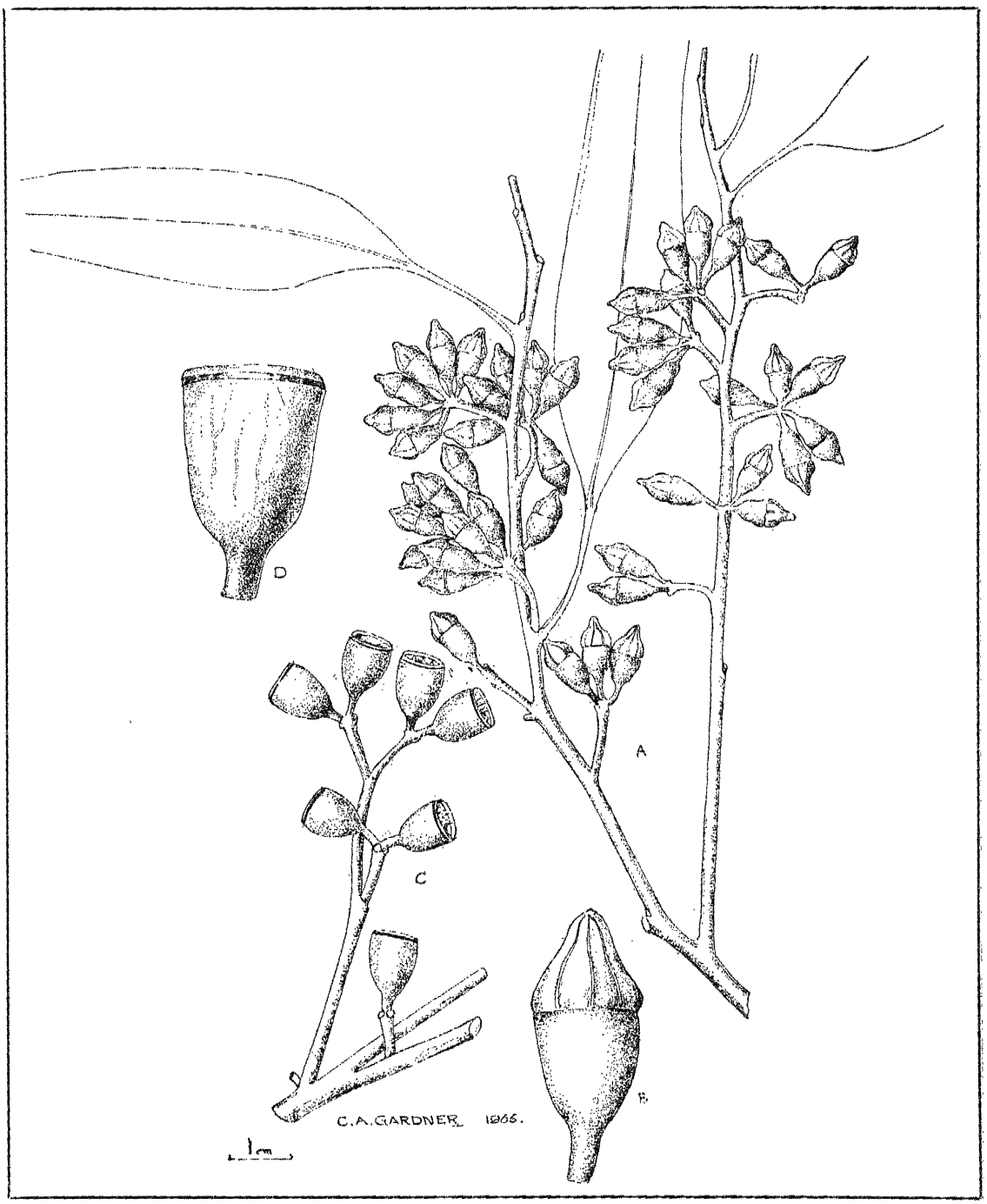

Fig. 101

Eucalyptus striaticalyx A—Branchlet with leaves and flower buds; B—Flower bud; C—Fruits; D—Fruit. B and D much enlarged. (Near Big Bell Mine, westwards from Cue, Gardner 13369).

115. **Eucalyptus platycorys** Maiden et Blakely

Boorabbin Mallee

Boorabbin Mallee was first collected by Alexander Morrison early in the century at Boorabbin, a few kilometres westwards from Coolgardie. It was named in 1929, from a fragment in the National Herbarium of New South Wales. A portion of Morrison's original collection is in the Western Australian Herbarium.

E. platycorys, as a small mallee, occurs rather commonly at Boorabbin, and southwards is seen through the vicinity of Victoria Rocks to just north of Ravensthorpe. It is found eastwards at Coolgardie, Norseman, where it occurs near Lake Cowan as a tree 8 m tall, and at Fraser Range. *E. platycorys,* like *E. kondininensis* and *E. striaticalyx,* is able to thrive in saline soils.

The Boorabbin plants rarely exceed 3 m tall, are densely branched, and well foliaged. The leaves are rather thick, a deep lustrous green and usually hooked at their extremities. The flowers are either solitary, in pairs, or more commonly in groups of three on short peduncles and pedicels, and the operculum is much broader than the calyx, smooth when fresh, becoming longitudinally wrinkled but not corrugated when dry. The specific epithet is derived from two Greek words, *platys,* flat, and *korys,* a helmet, in reference to the flat, or relatively flat, operculum.

Boorabbin Mallee could be a useful ornamental and windbreak species.

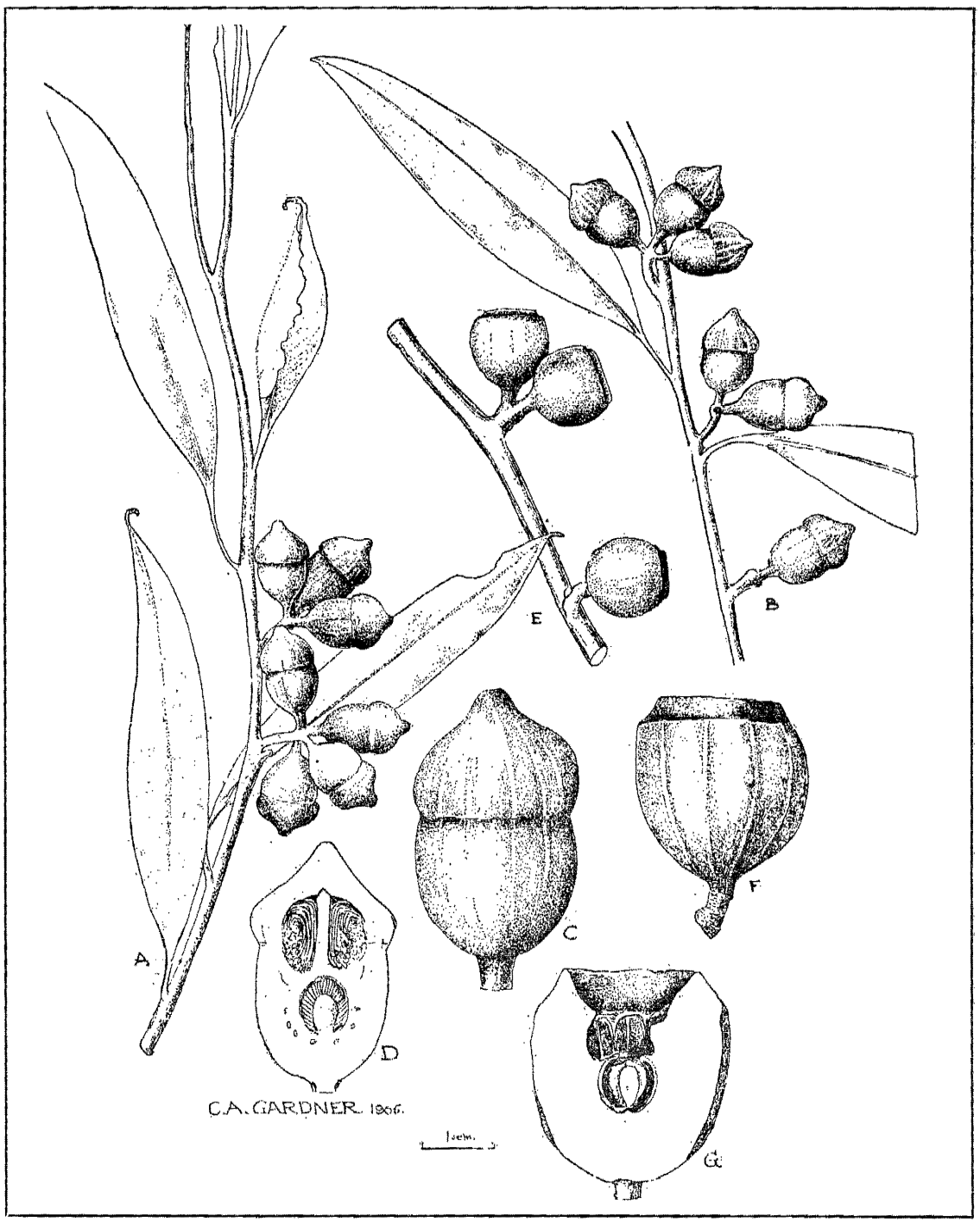

Fig. 102

Eucalyptus platycorys A—Branchlet with leaves and flowers buds; B—The same; C—Flower bud; D—Flower bud in longitudinal section; E—Fruits; F—The same (enlarged); G—Fruit in longitudinal section.

116. **Eucalyptus cupularis** C. A. Gardn.

Halls Creek White Gum

Halls Creek White Gum was first collected in 1951 close to Halls Creek, growing on the westward slopes of a schistose hill. It is a white-barked tree 8 to 10 m tall, the bark being smooth except near the base where it is somewhat furrowed.

The leaves are long and narrow, mostly about 15 cm long, rather thick, the same colour on both surfaces, somewhat lustrous, and tapering into an acute or long fine point. The flowers are in umbels of five to seven, on rather long rigid peduncles. The buds are whitish, the operculum at the base being somewhat narrower than the rim of the calyx-tube. The fruits are hemispherical-campanulate in outline, with a rather narrow raised disc and broadly protruding triangular erect acute valves.

The species is a handsome one, with somewhat drooping branchlets. It could be compared, as a subject for planting, with *E. camaldulensis* and being much smaller, would be a desirable tree for gardens and street planting.

Halls Creek White Gum has been collected further to the north of where it was originally collected and also to the east, towards Tanami in the Northern Territory. It is closely related to *E. herbertiana,* Kalumburu Gum, but the latter has smaller buds and fruit.

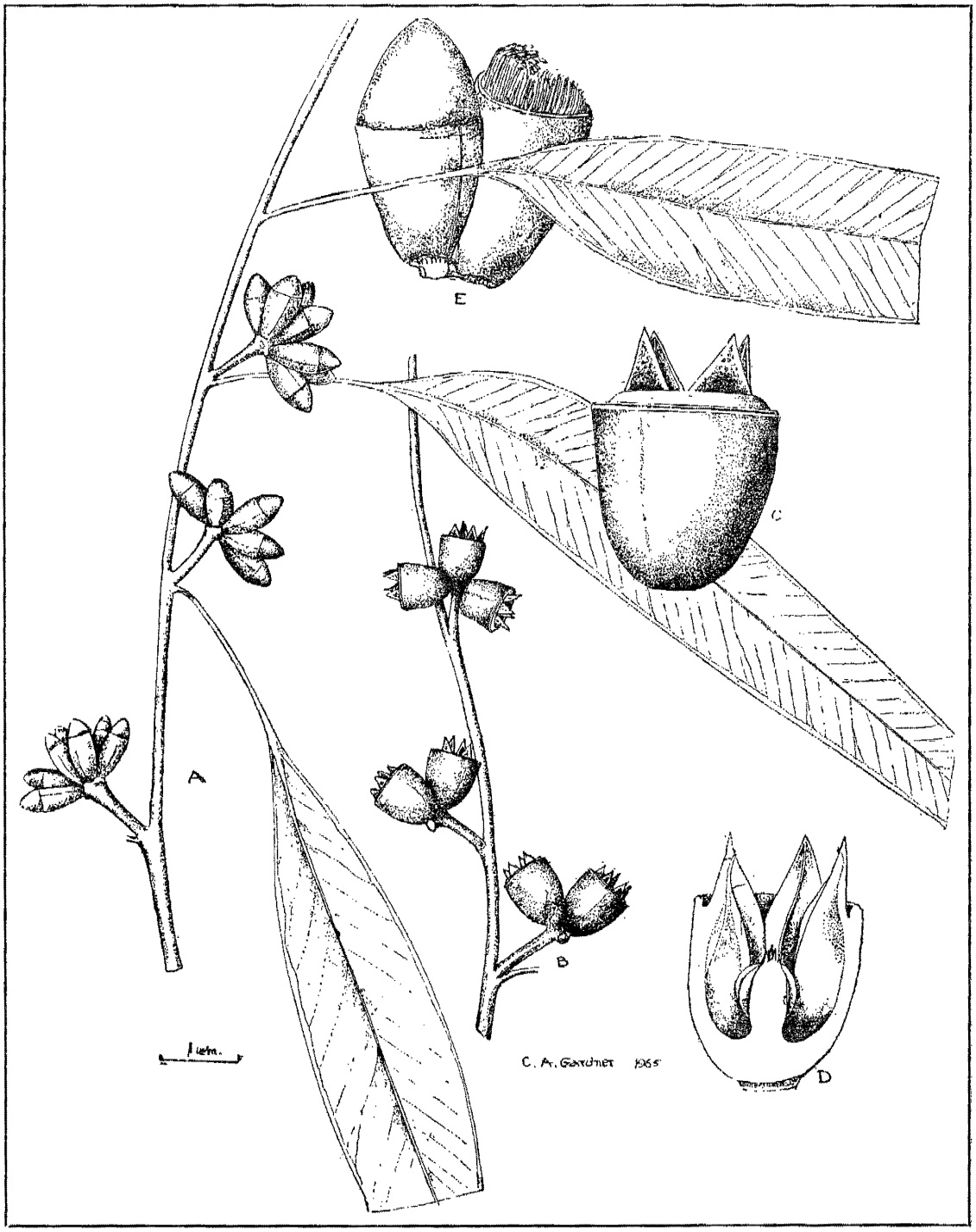

Fig. 103

Eucalyptus cupularis A—Branchlet with leaves and buds; B—Fruits; C—Fruit; D—Fruit in longitudinal section; E—Buds. (Near Halls Creek, Gardner 10217).

117. **Eucalyptus pachyphylla** F. Muell.

Thick-leaved Mallee

Thick-leaved Mallee is a mallee or shrub 1 to 3 m tall, forming low dense thickets, with apparently erect-spreading branches, broadly ovate or ovate-lanceolate leaves which are thick, glaucous, up to 13 cm long, rigid and with spreading rather conspicuous nerves.

The flowers may be in umbels of three, sometimes crowded into a head-like cluster, or irregularly arranged. The buds are conspicuously ribbed, especially the operculum, which is long-beaked and much longer than the calyx-tube. The filaments are yellowish-white, the anthers short and broad, opening in two longitudinal slits. The fruit is distinctly pedicellate, hemispherical, few-ribbed, the disc elevated and almost truncately conical; the fruit-valves are stout and exserted.

Ferdinand von Mueller collected this species in the sandy desert at Hooker Creek in the Northern Territory. It was collected for the first time in Western Australia by John Beard and Fred Lullfitz in the vicinity of Sturt Creek in dry sand with spinifex.

Thick-leaved Mallee is related to *E. pyriformis*, Pear-fruited Mallee, but the latter has larger buds and fruit. *E. sessilis*, Finke River Mallee, differs from *E. pachyphylla* mainly in its rudimentary peduncles, sessile buds and fruit and the three to seven-flowered umbels.

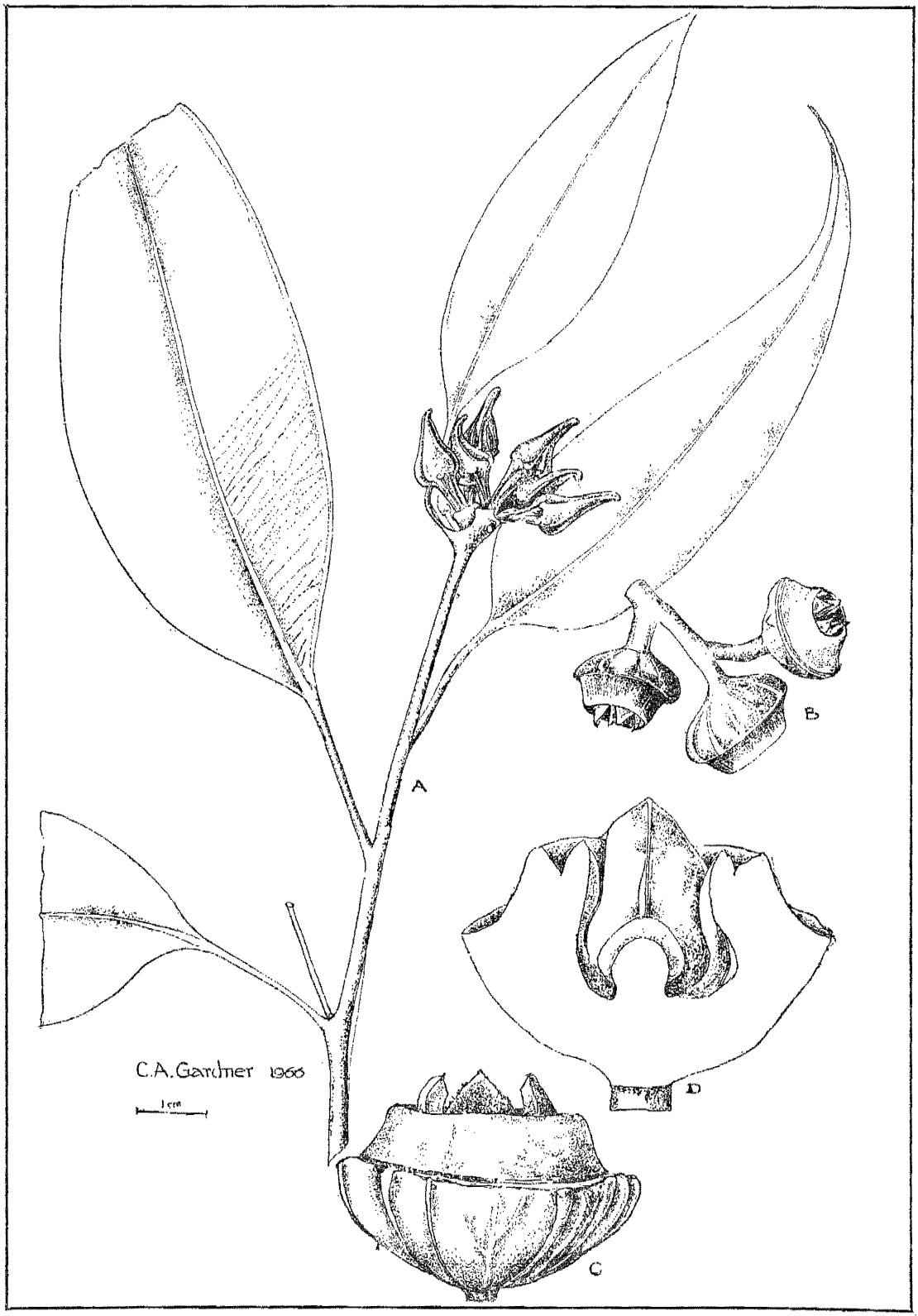

Fig. 104

Eucalyptus pachyphylla A—Branchlet with leaves and young flower buds; B—Fruits; C—Fruit; D—Fruit in longitudinal section. (C and D much enlarged). (Sturt Creek, at Billiluna, Beard and Lullfitz 4259, 29 May, 1965).

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