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Photography by Patricia Palmer

A Study of *Corybas dilatatus*

STATELY HELMET ORCHID

The flowers are on a short stalk above the leaf. The labellum is deeply notched.
Read of the other "Helmet Orchids" and how to grow them.

GROW AUSTRALIAN WILDFLOWERS

The Australian Lily-like Plants, A Tree Hibiscus, The Leatherwood Tree,
Woollisia, Epacris & Isopogon

CONTENTS OF THIS ISSUE

The principal subjects of the issue are the Australian natives (Lily-like plants) belonging to the plant family *Amaryllidaceae* and the terrestrial orchids *Corybas*. The articles have been compiled in the order of interest to the home gardener but it is appropriate to index them more systematically as follows:

- AMARYLLIDACEAE**, The Classification by A. M. Blombery—page 268—There has been considerable confusion and disagreement over which genera of plants are included in the family. The most recent classification that is now generally accepted is defined and the difference between the other three closely related families *Haemodoraceae*, *Agavaceae* and *Hypoxidaceae* fully described with clear sketches.
- AMARYLLIDACEAE**, The Australian Species by A. M. Blombery—page 259—A clear review of the three genera *Calostemma*, *Crinum* and *Euryclis* is given with excellent advice on their cultivation.
- CALOSTEMMA**—"The Garland Lily," by N. Lothian—page 256—These lovely plants are described first as a colour plate presents the coloured species in the family.
- EURYCLIS AMBOINENSIS**, "The Cardwell Lily" by K. Kennedy—page 258—Flowers are white but similar to *Calostemma*.
- CRINUM**—These Lily-like plants are introduced by L. S. Hannibal as the GENUS *CRINUM*—page 262—and the AUSTRALIAN *CRINUM*—page 263. All Australian species recorded are described with special sections on propagation. Two species *CRINUM ANGUSTIFOLIUM* (page 266) and *CRINUM PEDUNCULATUM* (page 267) are then described by K. Kennedy.
- LEATHERWOOD**—Species of the genus *Eucryphia* are described by A. M. Gray (Tasmanian species, page 253) and by J. H. Willis (Extra Tasmanian Species, page 255). Beautiful trees with "rose" like flowers.
- PYRAMID TREE OR NORFOLK ISLAND HIBISCUS**, *Lagunaria patersonii*, an excellent specimen tree for park, street or garden planting by H. Oakman (page 272) and L. J. Butt (page 273).
- WOOLLSIA** by B. R. Jackes—page 276—Second article in a series on *Epacris* like plants of the family *Epacridaceae*. The cultivation of these beautiful heath plants were the subject of our last issue.
- EPACRIS** by J. Simmons—page 274—The Tasmanian species are described.
- ISOPOGON CUNEATUS & I. LATIFOLIUS**—page 287—The third article in a series on the genera *Iso Pogon* and *Petrophile*.
- GARDENING TO ATTRACT BIRDS** by K. Stucker—page 274.
- FROST HARDY WILDFLOWERS**—Second report this time by M. Simmons—page 275.
- TERRESTRIAL ORCHIDS**—Each issue describes species of Australian orchids. In this issue it is: *CORYBAS*—"Helmet Orchids"—page 245—Leo Cady describes all Australian species—page 279. A. W. Dockrill describes those species found in the tropics; Page 243—M. J. Firth delights in his description of the Tasmanian species in the wild; Page 249—R. C. Nash describes the S.A. species with details on how to grow them. He defines some simple experiments on the following page. In defence of his proved methods of cultivation, he makes the following important points.

GROWING TERRESTRIAL ORCHIDS

Some people have tried my sand/sawdust mixtures and have complained that it is no good. Some I have investigated and find that the sand used is too fine, the coarser the sand the better. The best sized sand grain to use is one that will just pass through fly wire, even if it is too large to pass through it is still good sized.

With the sawdust, the coarser the better, buzzer chips are good, but should be lightly powdered in the hands.

Most of the failures with terrestrial orchids can be traced to too much water. Some tubers are lost in the dormant period from dehydration, this can be over come by always storing in a cool place.

GROWING WILDFLOWERS

The objective of this publication is to assist in the cultivation of Australian Wildflowers. To do this an understanding of their habit and certainly correct naming of the thousands of species is important. For those not interested in the simple botanical descriptions, please be patient as in most articles very clear and simple descriptions are given on their propagation and cultivation.

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AUSTRALIAN PLANTS—Volume 2 Price \$6.00 each plus 20c postage.
Volume 2 comprises issues 13-20. Bound in the same volume is the publication *Descriptive Catalogue of West Australian Plants*, see below, giving this volume its exceptional value.

These volumes are beautifully presented in gold lettered, hard covers and include *The Language of Botany*.

DESCRIPTIVE CATALOGUE OF WEST AUSTRALIAN PLANTS. Price \$1.20 plus 16c post & pack
This book lists all the wildflowers indigenous to Western Australia, giving for each species, kind of plant, general size, flower colour, flowering months, localities of occurrence and type of soil and/or vegetative type. Illustrated with many full colour photographs and supplemented by articles such as "Planning, Making and Growing A Native Garden", "Notes on Growing W.A. Plants", "Recommended Subjects for the Beginner", "Propagation", etc., it is fantastic value.

CORYBAS

ORCHIDS OF TASMANIA—Part III by M. J. Firth

Corybas are known as "Helmet Orchids," and what an appropriate name it is for these quaint little plants. They are tiny orchids seldom lifting their heads more than an inch or so above the ground. Looking down on these minute plants one feels like Gulliver peering down on Lilliputian soldiers.

Here are "Spurred Helmet Orchids," covered so closely by their pointed helmets that no part of the soldier can be seen.

There is the "Slaty Helmet Orchid" its colour blending with the surrounding vegetation. These are guerilla fighters waiting in ambush for the enemy. Their white faces are upturned looking for an approaching plane. Perhaps if a dragon fly goes over, they will hide their faces and dive into an underground shelter.

"Fringed Helmet Orchids" appear in the depths of winter. Crouched among the fallen leaves of trees their upturned faces give the impression of soldiers with unkempt beards jutting in frozen spikes. They are fierce little warriors. Beneath that casuarina they crouch in readiness, and the surrounding heath and bracken covers away from their hiding place leaving them alone amidst the fallen twigs.

The "Stately Helmet Orchid" stands proudly erect like a sentry. No fighting soldier this but rather a guard with decorated helmet prepared for a state ceremonial. They stand to attention undaunted by the fate of so many of their companions annihilated by the bulldozers of modern progress. The ploughs and harrows of this materialistic age hold no terrors for this gallant elfin soldier.

Last is the "Small Helmet Orchid." These are not martial figures, but rather a crowd of crash-helmeted motorists waiting to take part in some miniature Grand Prix.

Yes, the common name is most suitable. What a pity that Robert Brown's name *Corysanthes*, which means "Helmet Flower," was discarded in favour of Salisbury's *Corybas*. This name refers to one of the dancing priests of Phrygia. Salisbury published his description of the genus in 1805. Brown's description appeared in 1810. For nearly a century and a half Brown's name was used, because it was generally felt amongst scientists, that Salisbury had pirated Brown's work. Then came the realisation that, as a result of the 1905 International Congress, the name *Corybas* must be given priority. One can imagine a minor seismic disturbance occurring in a cemetery on far English ground when the decision was made.

We have five *Corybas*, but these are not usually found by fair-weather orchid hunters. They appear in winter and early spring when only the hardy persist in their field work. They usually occur in quite big colonies, often a hundred or more within a few square yards. The first to flower is *Corybas fimbriatus*, the "Fringed Helmet Orchid." They are usually to be found on moist sandy soil beneath bracken and small shrubs near the coast. The flower is dark red-purple in colour and is fringed with long hairs.

Closely following is *Corybas aconitiflorus* so named because of the fancied resemblance of the flower to that of Aconite. This is the "Spurred Helmet Orchid" referring to the two fleshy spurs on the stalk just below "Native Orchids of Tasmania" by M. J. Firth is available for \$3.25 from Mr. Firth, c/o Dept. of Agriculture, Wynyard, Tasmania. An excellent little 100 page book.



Photography by M. J. Firth.

CORYBAS DIEMENICUS — The "Slaty Helmet Orchid"

the flower. The helmet is long and pointed completely hiding the flower parts. In areas of high rainfall they are often found in open spaces between the trunks of eucalypts, pushing their way up through the coating of fallen leaves covering the soil. When rainfall is not so favourable, they are to be found sheltering beneath the shade of bracken and small shrubs.

Soon after this the "Small Helmet Orchid," *Corybas unguiculatus* flowers. These plants are relatively rare in Tasmania. They grow in heathy land in light forest near the sea, usually under somewhat drier conditions than those favoured by the two "Helmets" already mentioned. They differ greatly from other members of the genus. In profile their flowers resemble the head of a duck, the flower stalks being much longer than stalks of our other *Corybas*.

The "Slaty Helmet Orchid," *Corybas diemenicus*, may appear as early as June or as late as September. They are readily recognised by the white central mound of the minutely toothed labellum which has a slightly in-turned margin. They grow on rather dry sandy soil, beneath shrubs

and bracken. They are the most widely spread of our "Helmets," but do not flower as freely as other *Corybas*. This is a true Tasmanian since its specific name is derived from Van Diemen's Land, the old name of Tasmania.

The last of our "Helmets" to flower is *Corybas dilatatus*, the "Stately Helmet Orchid." It favours mossy areas in rocky crevices. It is readily distinguished from *Corybas diemenicus*, which may still be flowering, by its habit of sitting higher above the ground, by the absence of the white central mound on the labellum and by the much more deeply indented labellum margin.

All "Helmets" have heart-shaped leaves which are either reddish or frosted green beneath. Colonies can be located early in winter from the profusion of such leaves scattered beneath shrubs and ferns. But beware! The *Acianthus* have similar leaves. You may find that the patch of Helmets you have been watching so patiently may produce far different flowers from the ones you expected.

"HELMET" ORCHIDS

THE AUSTRALIAN SPECIES OF *CORYBAS* by Leo Cady, Kiama, N.S.W.

If you are an ardent bush walker or a person that likes to enjoy a bush picnic; to come across a colony of our unique "Helmet" orchids can make one only gaze in wonderment at these miniature gems. In N.S.W. these plants can be found in a number of habitats but mainly anywhere you can find semi-shade and a damp atmosphere, such as the edge of rain forest or in Eucalyptus forest under low growing shrubs, e.g. *Banksia spinulosa* or amongst Bracken or Soft Ground Ferns (*Pteridium esculentum* & *Culcita dubia*) and in some cases along creek banks. In all cases it grows in large tight or loose colonies with few flowers for the size of the colony as they are normally shy flowers. Usually the leaf is pressed closely to the leafmould or mossy soil. The flower, which in a number of species is fairly large, perches daintily but very closely (in most species) onto the leaf. It abruptly changes after the flower has been fertilized (this is done by insects) and the once very short stem elongates from .5 cm. to, in some cases, 20 cm. high. This is possibly an agent in the dispersal of the seed after the capsule dehises.

CULTURE

Foremost, one must have a cool damp shady sheltered corner. They do not like full sun at any time and burn badly if exposed at all. They can prove rather short lived in culture, as they damp off rather easily, but if a 50% grey sand, 40% peat moss or leafmould and 10% charcoal is used as a potting mixture and the plants sprayed with fungicide in a diluted (say half strength) form then you should be on the way to success.

DESCRIPTION OF SPECIES IN AUSTRALIA

Corybas is a fairly large genus upwards of 50 species being named. Its range is from the Himalaya foothills east to the Philippines thence through Malay Archipelago to New Guinea, Australia and New Zealand. It is also reported from Polynesia.

1. *Corybas abellianus* Dock.

A terrestrial plant with a cordate leaf, much veined with white. Stem up to 12 mm. above the leaf, this elongating up to 14 cm. with fertilisation. Flower medium size for the genus, reddish with white midlobe to the labellum. Dorsal sepal transparent for basal third, falcate, cucullate. Labellum 3 lobed with 2 basal auricles, the apex dilated and very obtuse.

District: North Queensland.

Flowers: April.

Remarks: A very rare plant only recently being described, it is closer to the New Guinea taxon than to the typical Australian ones.

2. *Corybas unguiculatus* (R.Br.) Reichb. f.

A smallish plant to 3 cm. high. Leaf almost cordate reddish beneath. Flower 1, very rarely 2, reddish purple. Dorsal sepal shorter than the labellum, dark, cucullate, suddenly contracting to a narrow basal claw. Lateral sepals linear 6 mm. long spreading beneath the labellum. Petals similar but shorter. Labellum inflated from a narrow base, the tube directed toward the lamina with numerous calli extending from the lower lip along the medium line to the base.

District: From Central Coast N.S.W. to Vic. and South Australia and Tasmania.

Flowers: 6 & 7 months.

Remarks: A most unusual species, the flower being on a longer stem, held more erect than in most of the other species.

3. *Corybas fordhamii* (Rupp.) Rupp.

This species is very similar to the foregoing plant, differing in the few following points. Dorsal sepal not unduly contracted at its base, its apex emarginate. Labellum conspicuously striate, with reddish purple bands. Lamina with no calli on the medium line.

District: N.S.W. & Queensland.

Flowers: 7 & 8 months.

Remarks: This species resembles very closely No. 2 and could even be only a marked variation of No. 2.

4. *Corybas undulatus* (Cunn.) Rupp. and Nich.

A very small species with a cordate leaf. Flower dark purplish red, with translucent patches, 10-15 mm. long. Dorsal sepal cucullate very conspicuously net veined. Lateral sepals and petals very minute. Labellum with two short spurs at its base, lamina expanding very widely thence extending to a mucronate tip, this conspicuous; the lamina with white boss in centre, the outer edges with minute calli to the minutely and irregularly serrulate margins.

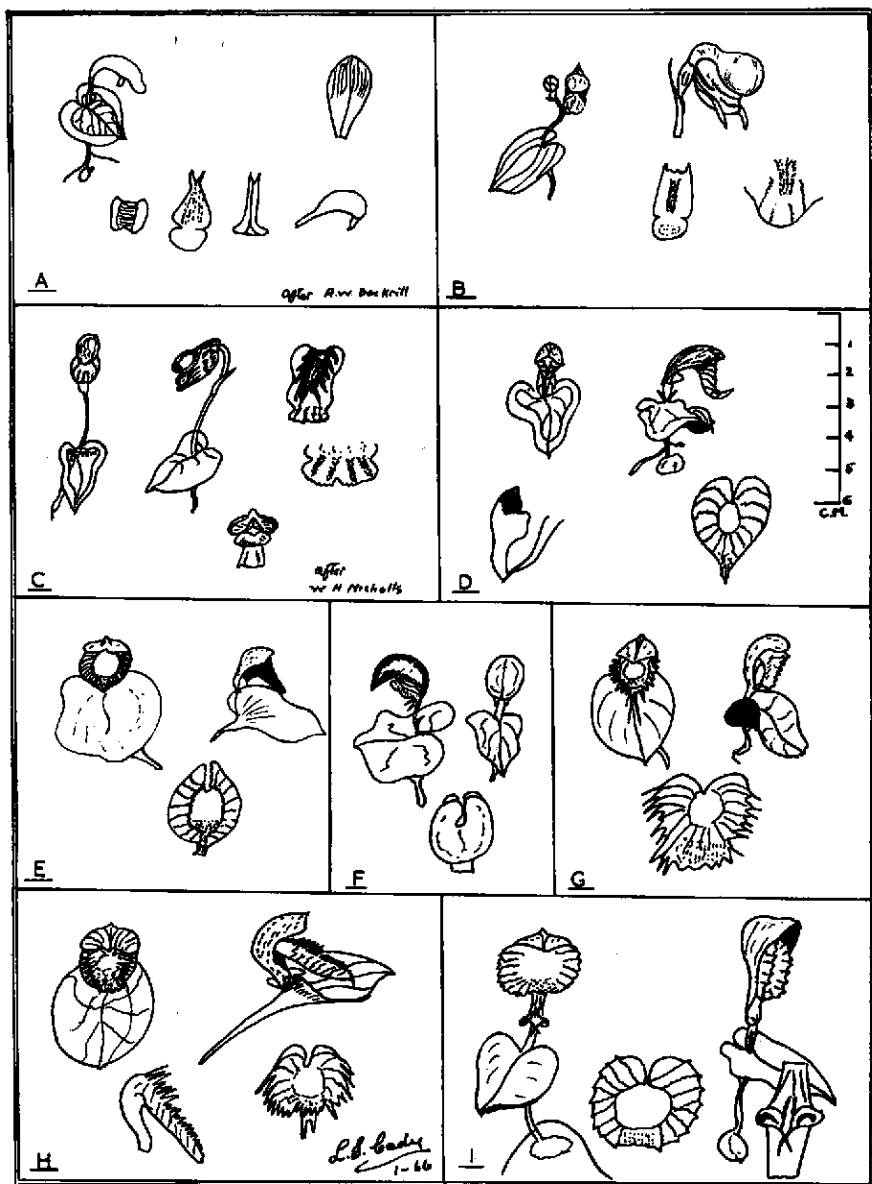
District: North, Central and South Coasts of N.S.W.

Flowers: 5 and 6 months.

Remarks: Another very rare species which grows usually under *Melaleuca nodosa* in the north, *Melaleuca* spp. on the Central Coast and under *Eucalyptus* cover in the South.

5. *Corybas diemenicus* (Lindl.) Rupp et Nich.

A small species resembling *C. fimbriatus* in leaf. Flower smaller, very squat on the leaf, deep purple or dorsal sepal dark grey. Dorsal sepal flattish when viewed above slightly keeled, lateral sepals and petals very minute, petals minutely emarginate at their tips. Labellum lamina about as long as the tube, the margins very dark, inturned and serrulate. Central boss prominent, basal auricles largish.



KEY TO PLATE

- A. *C. abellianus* x 2 to scale.
Also dorsal sepal, labellum in various positions x 10.
- B. *C. unguiculata* x 3.
Flower side — labellum top. Apex of lamina showing calli.
- C. *C. jordhamii* x 3. Flower side and front.
Labellum alive. Lamina apex showing veins. Column top.
- D. *C. undulatus* x 2 side and front.
Column side, labellum top.
- E. *C. diemenicus* x 2 side and front.
Labellum front.
- F. *C. aconitiflorus*, natural size side and front, labellum front.
- G. *C. pruinoseus*, natural size side and front. Labellum front.
- H. *C. fimbriatus*, natural size side and front. Labellum side and front.
- I. *C. dilatatus*, natural size side and front, labellum front. Column showing auricles and lateral sepals and petals.

District: Central West N.S.W., Batlow N.S.W., Vic., South Australia, Tasmania.

Flowers: 7 and 8 months.

Remarks: Until a few years ago this species had only one N.S.W. record, Mudgee, but owing to the diligent collecting of the Giles Brothers of Orange and Batlow and other keen inland collectors, this plant is now recorded much more widely spread in N.S.W. than was first thought.

6. *Corybas aconitiflorus* Salisb.

One of the more common species of the genus, a robust plant for this genus. Leaf cordate but variable, reddish beneath, fairly thick in texture. Flower also most variable in size and colour (up to 24 mm. long) dull metallic reddish purple or wholly white, the whole flower galeate. Dorsal sepal large very cucullate, protruding well over the labellum. Lateral sepals and petals minute below labellum. Labellum tubular lamina with much recurved and entire margins, these usually white, two prominent spurs at its base, the upper section of lamina completely covered by the dorsal sepal.

District: All states except Western Australia also New Zealand.

Flowers: 4 to 7 months.

Remarks: A very common species which habits open *Eucalyptus* forest amongst leaf litter and mould. A completely white form is at times encountered, this is usually larger than the typical plant.

7. *Corybas pruinosus* (Cunn.) Reichb. f.

A medium size species for the genus. Flowers slightly erect on an almost orbicular leaf, at times exceeding 2 cm. in height. Colour purple with translucent patches. Dorsal sepal greyish green with darker spots, cucullate rather narrow. Lateral sepals and petals filiforme the sepals longer than most other Australian species. Labellum with a pale green boss, tubular margins not much incurved, basal auricles very small almost non-existing.

District: N.S.W. Coast and Tablelands.

Flowers: 4 to 7 months.

Remarks: This species is very closely related to the next *C. fimbriatum* but is more erect, lighter in colour and the labellum fringe is not as incurved.

8. *Corybas fimbriatum* (R.Br.) Reichb. f.

The largest of the Australian species of the genus, up to 3 cm. long. The flower is very closely set on the orbicular leaf which is usually pale green; is a deep reddish purple. Dorsal sepal very broadly cuneate, cucullate. Lateral sepals and petals minute and filiforme. Labellum very large, tubular at the base, expanding very widely to a heavily fimbriate margin, the fringe often incurved towards the bottom. A whitish or darker boss is in the centre of the lamina. Two largish auricles at labellum base.

District: Queensland, N.S.W., Vic. and Tasmania.

Flowers: 4 to 7 months.

Remarks: A reasonably common species found growing in damp water-courses in rain forest, or in the dampish areas behind the sand dunes on the ocean front under Melaleucas. It grows usually in very large colonies, the leaves tightly packed together like a large green carpet, their largish purplish flowers adding to the beauty of the mament.

9. *Corybas dilatatus* Rupp et Nich.

A large and robust plant up to 4 cm. high. Flowers consociuous to 20 mm. long reddish purple, very erect on a orbicular cordate leaf. Dorsal sepal erect at first then flattened somewhat, incurved extending over the

labellum. Lateral sepals filiforme extending below the lobellum. Petals minute. Labellum tubular at first, widely expanding at the apex, lamina recurving parallel to tube, its central boss large smooth, white, ornated below with dark calli to the margins, these shortly dentate with radiating dark veins to the centre of the lamina, auricles fairly large.

District: N.S.W. (Batlow), Vic., South Australia, Tasmania and Western Australia.

Flowers: 6 and 7 months.

Remarks: A distinct species seen at its best in its West Australian forms, it habits the open forest areas, in damp places or in the fern-tree gulleys in the southern States, where it has evolved an interesting habit of climbing the caudex of the tree-ferns.

HOW TO GROW CORYBAS

CORYBAS IN SOUTH AUSTRALIA by R. C. Nash

The genus *Corybas* is represented by 3 species in South Australia. These being *Corybas dilatatus*, *diemenicus* and *unguiculatus*.

Corybas dilatatus Rupp. et. Nicholls, is perhaps the most commonest forming large colonies in some areas, blooming in June and July.

Habitat—Mt. Lofty Ranges, more to the western side, the south east of S.A., Kangaroo Island and York Peninsula.

Compost is made up of 70% coarse washed sand and 30% sawdust or leaf mould. The lower one-third part of the pot is filled with broken pot and sand. The middle one-third is filled with clean coarse sand. The compost then fills the pot and the tubers are planted in this to a depth of one inch. Place the pots in deep shade, sheltered from wind. A hot wind on the flowers or buds will dry them out within a few hours. When plants are in bud and flower, see that they are supplied with ample water.

When the plant population has built up to about 20 plants in a 4 inch pot, divide them up and plant out into other pots. For some reason if left to crowd in a pot most plants will die off.

Corybas diemenicus (Lindl.) Rupp. et Nicholls. Blooms June to August.

Habitat—Mt. Lofty Ranges more common along the eastern side, usually favouring drier areas than *C. dilatatus*. South east of S.A. Both species do occur in the same area. Forms colonies.

Compost and culture, same as that used for *Corybas dilatatus*.

Corybas unguiculatus (R.Br.) Reichenb. Blooms July and August.

Habitat—Mt. Compass, Myponga areas, Bridgewater and the lower south east of South Australia. This plant is very rare. I know of one area only where it still grows.

This plant may respond to a very sandy well drained compost with a sawdust/leaf mould topping, e.g., the compost I have used for *Pterostylis vittata*. Place pots in deep shade.

A light spraying of Urea could be beneficial to these plants.

Growing Terrestrial Orchids

Study Group—Exercises by R. NASH

The following is a list of experiments and observations, that members of the group and any other person may participate in. Participants may choose their own exercise, the only reservation is consistency.

EXPERIMENT 1.

Lifting and storage of tubers, during the dormant period.

Two groups of as many species as can be spared to be tried.

Group a. These tubers not to be lifted.

Group b. These tubers to be lifted each dormant period and stored.

In storing, these tubers should be packed in dry sand or saw dust and kept in a cool place. Check after 6 weeks and then every week, to see if there is any sign of growth, if growing plant them.

In both cases careful counts should be made of the numbers of plants before dormancy and after. Note the numbers of tubers stored and the numbers surviving storage and those that failed storage. Those failing storage, try to reason out why they failed.

Note any difference in the plants and flowers of both groups. In this experiment we are trying to find out if anything is to be gained from storage.

EXPERIMENT 2.

Another dormant period experiment. In this one we are trying to see what are the effects of moisture on the resting tubers. Set up 3 groups of tubers of as many species as possible.

Group a.—Keep compost full dry.

Group b.—Keep compost in a just damp condition. To obtain this condition water once or twice a week.

Group c.—Keep compost in a damp condition. To obtain this condition, water lightly every day.

Again keep notes on the numbers of plants before and after the dormant period. Note the quantity and quality of blooms and the general health of plants. Which group comes up first in the season? Any failures to be investigated and again try to reason out why. Any exceptional happenings to be noted.

EXPERIMENT 3.

Some growers have had exceptionally good results when tubers have been growing in sand. So a few experiments with sand seemed to be called for. Set up 3 groups of as many species as can be spared. Again keep notes on quantity, quality and the rate of increase of plants.

Group a.—Pack tubers under your normal potting conditions.

Group b.—Pack tubers in clean fine sand, otherwise use your normal potting method.

Group c.—Pack tubers in clean coarse sand, otherwise use your normal potting method.

EXPERIMENT 4.

In this experiment we are to try and determine the multiplication rate of various species, both under cultivation and if possible in the bush. When

(Continued on page 255)

WILDFLOWERS FROM SEED

WILDFLOWERS AT KING'S PARK, PERTH, NEWSLETTER No. 2

SEED LISTS—With the issue of the 1965 Seed List we have introduced, as growers will probably have noticed, a new series of reference numbers. This has been made possible by the publication of our Descriptive Catalogue of W.A. Plants. Previously each year's seed list had the items numbered from 1 and no little confusion has arisen since patrons did not always state which year's list they were ordering from and we received complaints that seed sent was not as ordered. Now we have numbered a copy of our catalogue in series right through and every species will retain the same number year after year. Anyone using an old list however should please state the year of issue.

It very often happens that seed stocks of any one item are small and easily exhausted. In such cases we endeavour to restock the following season but it is regretted that owing to the volume of work involved we are unable to hold over orders from one season to another in the hope that seed may become available. During the year ended 30th June, 1965, the number of seed packets issued by the King's Park Seed Room was 8,179 packets and it will be readily understood that this necessitates taking a number of short cuts.

SOWING—We have been asked to give details of our techniques for sowing of native plants and while these may be helpful it must be stressed that methods may have to be varied according to climatic conditions and our methods may only be strictly taken as applicable to the soil and climate of Perth. First of all, what is the nature of this? The annual rainfall averages 35 inches of which 80% falls in the winter months, April to October. During winter months, very heavy rain is experienced, sometimes totalling 12 inches in a month. Twenty-five rainy days a month is usual for the winter while in the summer it may be 2 or less. Evaporation is thus extremely low in the winter, the equivalent of about 2 inches a month, rising to 10 inches in January. Sunshine may be only 3 hours a day in midwinter rising to 11 hours in January. Average temperatures may be, for winter, max. 62°, min. 50°; summer, max. 85°, min. 65°. Extremes are more important than averages. In winter extremely low temperatures are not experienced and frost is virtually unknown but in summer heat waves with maximum temperatures of 105°, sustained for some days, are not uncommon. The soil in King's Park is a light, loose sand.

The second point to emphasise is that most West Australian native plants which are grown in gardens are creatures of sand-heaths and grow in light, leached sandy soil, often with a substratum of pea-ironstone and that their average rainfall is rather less than for the Perth area being of the order of 15-20 inches per annum.

Such plants are accustomed to relatively warm temperatures, the absence of heavy rain and in particular the absence of any factor of adverse drainage. For the successful cultivation of such plants the physical structure of the nursery soil is of the highest importance. Since in the very early stages the seedling is usually nourished by reserves within the seed, fertility of the sowing soil is of no major importance, but it is important to simulate nature to the extent of preventing waterlogging in the pots, and avoiding low temperatures, particularly at times when waterlogging is liable to occur. Losses that are ascribed to damping-off in many cases may be traced to adverse physical factors which initiate the attack by damping-off fungi.

Under Perth conditions we frequently have difficulty in observing these requirements and have had to make screens to be placed over the nursery beds when heavy rain is expected. Plants growing in pots are much more liable to waterlog than those growing in the open ground.

It has been remarked that practices may have to be varied in accordance with climate and this should be borne in mind. In the southern parts of

Australia it would seem that spring sowing is indicated whereas autumn sowing may be quite feasible in New South Wales and indicated as desirable in Queensland.

We have no special rules for the preparation of sowing soil and follow standard horticultural practices. A sandy, friable soil should be taken as a basis and fortified with compost. No artificial fertiliser is necessary. Peat moss may be used if there is no compost available or if a specially high acidity is required. Details of our procedure are given below.

When planting out young stock, attention should be paid to "foster habitats and matching environments." Plants raised under controlled nursery conditions of regular watering, shading and prepared soils, cannot be expected to succeed if suddenly planted out into a totally different environment. Some attempt must be made to match the condition under which they were propagated, at least for the first year or two of the plant's life.

HOW WE PROPAGATE FROM SEED

Potting soil is prepared and is sterilised in our special sterilising machine. For the small private grower this is not necessary. The principal function is to destroy weed seeds and reduce nursery costs rather than to sterilise the soil against fungi.

Soil is placed in boxes and pots. Large seeds such as those of *Banksias* are commonly sown direct into 5 inch polythene pots with 1, 2 or more seeds per pot according to the expected germinative capacity. Smaller seeds are sown in boxes about 4 inches deep.

After sowing, the seed is firmed onto the soil surface and covered with a light stone mulch of small $\frac{1}{4}$ inch granite road metal or of a slag which is marketed in West Australia as "Easymulch." Other covering materials can of course be used, such as sand, sifted compost and so on, but we prefer the stone as it prevents caking of the surface, prevents wash in heavy rain or watering and maintains a dry surface which is beneficial to young seedlings and can be expected to reduce damping-off.

After germination, seedlings in the boxes are pricked out at a suitable stage into 5 inch pots.

BOOK REVIEW (Books not available from the Editor)

ORCHIDS OF THE WEST by Rica Erickson

Price \$4

A very complete and competent work this book has become a standard reference text book on the terrestrial orchids native to Western Australia. Of particular interest to the layman, the bushwalker or the orchid crank, is the pleasing, easily read and understood style of the author and the very numerous full colour plates and clear line sketches. A second edition is now available, the principle difference being an entirely new key to the genus *Caladenia* following further studies by the author. Several changes have been made in nomenclature including the deletion of the genus *Goodbyella*.

HOW TO KNOW WESTERN AUSTRALIAN WILDFLOWERS—PART III

Price \$5

So popular with layman and professional botanist alike, this series of books on the wildflowers of Western Australia needs no introduction. The format of Part III is similar to the previous two parts, many plants of each family being arranged in the form of a fully illustrated key. Those who found a little difficulty with Part I in identifying plants will have no trouble at all with Parts II and III. As well as the key features of the plant used for identification purposes, a leafy flowering branch is also clearly drawn for each species making it very easy for the layman to identify the plant. Add to this full colour plates of forty-five plants and you have a very valuable book on the Western Australian wildflowers.

Part III deals with 15 plant families that include *Epacridaceae*, *Boraginaceae* and *Lamiaceae* (Labiatae) names which mean very little to the layman but include over 600 species of beautiful wildflowers.

LEATHERWOOD

WILDFLOWERS OF TASMANIA — Part 2 by A. M. Gray

Eucryphia lucida, "Leatherwood" is a very common Tasmanian tree in wet forests in sub-alpine and lowland situations. It belongs to the family Eucryphiaceae which is closely allied to Rosaceae and Saxifragaceae. Two other species of *Eucryphia* occur in Australia, another endemic to Tasmania—*E. milliganii*—and one in Victoria and New South Wales coastal districts—*E. moorei*.

Eucryphia lucida occurs as a tall shrub or a fair sized tree in rainforests and sub-alpine shrubberies in most areas of Tasmania. It likes rich soils and tolerates a very high annual rainfall—60-100." It is one of the faster growing trees, forming dense thickets from seed fallen by roadsides where other trees have been removed. In late spring and summer, masses of large white flowers, resembling small single roses, cover the trees, attracting innumerable



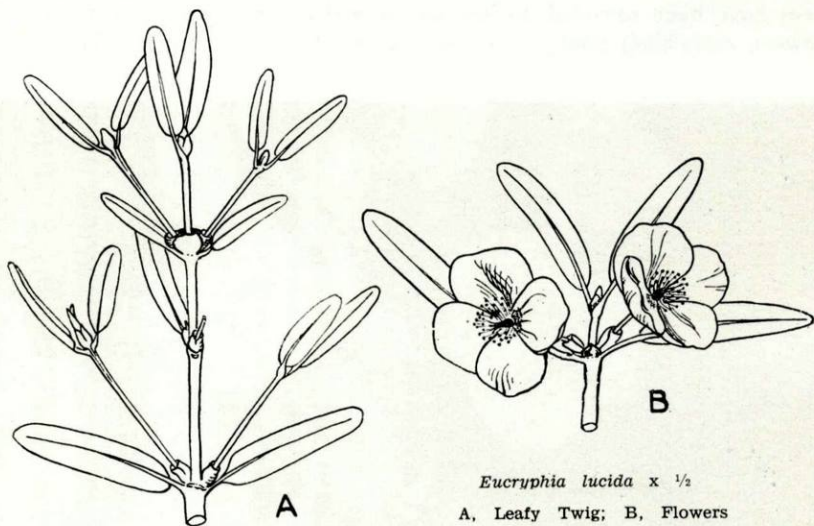
Colour photography by H. J. King.

EUCRYPHIA MILLIGANII

A prostrate or sub-erect shrub up to 6' high. Similar to *E. lucida*, but the leaves and flowers are much smaller. It occurs in areas of higher rainfall and tolerates greater exposure than *E. lucida*.

insects. The flowers have a strong, sweet perfume which is very noticeable on warm days. Honey producers have been quick to utilize the large quantities of nectar produced, and in summer many forest roads are lined with bee-hives, all engaged in producing the well known "Leatherwood honey." This species is well worth planting as a garden specimen, being quite easy to cultivate and makes a fine display in the summer months.

Eucryphia lucida (Labill.) Baill. (syn. *E. billardieri* Spach.) "Leatherwood". A medium size tree or large shrub, 6-30', but sometimes 80' high in favourable positions. Leaves shortly stalked, opposite, 1-1½" long, simple, elliptical-lanceolate, the apex blunt and rounded. The margins entire, the upper surface dark and glossy, lower surface white. Young leaves and buds covered with a sticky, gummy substance. Flowers large and conspicuous occurring singly in the axils of the upper leaves on stalks about ½" long. Sepals 4, thin but stiff, joined at the apex and forming a cap which is pushed off as the petals unfold. Petals 4, spreading widely, broadly oval in shape, about ¾" in diameter, white. Stamens numerous in several whorls. Fruit a capsule, leathery, opening into boat-shaped sections, valves tipped by the persistent styles. Seeds numerous, winged.



Eucryphia lucida x ½

A, Leafy Twig; B, Flowers

PROPAGATION—

E. lucida is easily propagated from seed or cuttings. However, seeds give much quicker results. The seed ripens in the capsules during February to April and falls very soon after. The best medium for propagation is one with good moisture holding properties but with adequate drainage. A recommended mixture is as follows: one part fine bush loam, one part coarse, well rotted forest humus and one part coarse sand. This mixture serves well as a germinating medium and a potting medium. When the seeds germinate, which usually takes from 6-8 weeks, they should be allowed to grow until approximately ½" high, then either potted into small pots or planted out into boxes. After attaining a height of 4-5" they may be transplanted into a permanent position in the garden. The position they require is one shaded from the hot summer sun and winds with plentiful moisture and adequate drainage. When the tree reaches 4-6' in height it can be pruned after each flowering season, either to keep it to a reasonable height or to form a compact, shapely shrub. In cooler wetter areas it would make a fine street-planting tree, provided it was given protection from damage in the early stages of growth.

EUCRYPHIA

EXTRA TASMANIAN MEMBERS by J. H. Willis

The generic name is euphonious enough, but its derivation ("well concealed") from the Greek is not particularly imaginative. Only a single *Eucryphia* occurs on the Australian mainland, viz. *E. moorei* which carries the opprobrious vernacular "Stinkwood"; it is sometimes known also as Pinkwood and Plumwood, but Eastern or Northern Leatherwood would surely be preferable. The natural range of this small to moderate-sized, handsome tree is limited to moist forested gullies of the near-coastal ranges between Macquarie Pass in the Kiama hinterland (N.S.W.) and the Howe Ranges of extreme eastern Gippsland (Vic.)—a lineal distance of some 210 miles. It differs markedly from its Tasmanian allies in having pinnate leaves, with the narrowly oblong leaflets 1-2 ins. long and much paler on the downy underside. The solitary, white 4-petalled and rose-like blooms are commonly about 1 in. wide—smaller than those of *E. lucida*—while the tough close-grained timber has a pale pinkish-brown colour. A severe bushfire some years ago in the Cape Howe Ranges destroyed the best gully of *Eucryphia* in Victoria; it is feared that the rare Orange-blossom Orchid (*Sarcocilus folcatus*) may have vanished too, since it grew habitually on the former tree.

The genus reappears in Chile where three attractive species occur (viz. *E. cordifolia*, *E. glutinosa* and *E. patagonico*), a noteworthy example of the affinity between the floras of far southern America and south-eastern Australia. *Eucryphas* have been cultivated for at least a century in the gardens of Britain where they do particularly well, especially in the milder west of Scotland, Wales and Cornwall. Several interesting hybrids are known, of which *E. nymansensis* ("Nymansay") is probably the most floriferous and popular; this originated as a cross between the Chilean *E. cordifolia* and *E. glutinosa* at the famous Nyman's Garden in Sussex, and in 1925 it won an award of merit at the Royal Horticultural Society, London. Of special interest to Australians is the hybrid *E. hillieri*, developed from a self-sown seedling at the nursery of Hillier & Sons, Chandlers Ford (Hampshire) about 1953; its parent species were *E. lucida* of Tasmania and *E. moorei* of New South Wales. More intriguing still, perhaps, is *E. hybrida*, developed from Tasmanian *E. lucida* and Chilean *E. glutinosa*. The horticultural possibilities of these lovely leatherwoods have hardly been realised yet by gardeners in Australia.

GROWING TERRESTRIAL ORCHIDS—Continued from page 250.

studying the rate of increase under cultivation, place 1 to 3 tubers in a pot and count them after one full season. Repeat for at least 3 years.

When studying the plants in the bush, an area must be marked out in the bush and a careful note made of the plant population in this area each year. This may take many years to get good results, so participants must be very keen and consistent.

Editor's Note: Mr. Nash leads our Study Section on the "Terrestrial Orchids." Enquiries and reports can be forwarded c/- The Editor. We hope that country residents will take an interest in these fascinating little plants and assist us in our research to ensure their preservation.

CALOSTEMMA — THE GAR LAND LILY

by N. LOTHIAN, Director, Botanic Gardens, Adelaide, S.A.

It is strange that Australian bulbs are not more freely cultivated. The average home gardener has limited space and for that reason a few of the bulbous species are ideal for their gardens. One which immediately seeks recognition is the Garland Lily *Calostemma* spp.



Colour photography by W. H. Payne.

CALOSTEMMA PURPUREUM (pink) & C. LUTEUM (yellow)

These very hardy plants were photographed just as they are growing in my garden. Unfortunately the leaves are not shown being up to a foot long and $\frac{1}{2}$ inch wide from a bulb as shown on page 259. The flowers are about twice the size shown above. The flowers of *Eurycles amboinensis* described on page 258 are very similar but white. The plants are very easy to grow given normal garden conditions, the only thing to watch is that the bulbs do not rot in damp badly drained situations. The round balls in the photograph above are the fruit or seed vessels which have been formed when the flower dies. They will drop off and rest on the ground. Leave them there and do not bury them. You will be fascinated to see a new green shoot pop out and turn down entering the ground. Soon you will have another self sown plant. This is the best way of propagation. Let nature take its own course and then move the small plants when established if you want them in another position. In a few years you can develop a whole border or row of plants from one plant that is allowed to seed itself. Conversely the plant will never rampage and become a pest.

E. J. DALLEY, East Gosford, N.S.W. writes . . .

I obtained a couple of bulbs of *Calostemma purpureum* and the plants have done well here. I consider that it is worthy of efforts to improve it by selection or hybridisation. Some of my bulbs had as many as six flowering stalks which followed one another, each 9 inches high and with a cluster of pink blooms on them.

Distributed over various parts of South Australia, but principally in the above 20 inch rainfall regions, also in north-western Victoria and western New South Wales, *Calostemma purpureum* is frequently found in open forest country or more rarely in heathland areas. The bulb is as large as the average size *Narcissus* bulb but more plump. A number of long linear leaves are produced. These are flaccid and generally shining green, sometimes with a reddish green.

The flower stalk is cylindrical up to 18 inches high, usually erect, at the top of which 10 to 15 or even 20 flowers are produced as an umbel. These are pinkish or reddish-purple in colour but some forms are clear deep pink.

Not so well known, and in fact in South Australia they usually are found in distinct localities, is *C. luteum*. This is a more robust-growing plant with flower stems over 2 ft. and often as many as two dozen blossoms on a head. The flowers are somewhat larger than the other species, measuring up to an inch in diameter and about $\frac{3}{4}$ inch long. The colour normally is a clear yellow. It makes a spectacular garden plant.

Bailey (Flora of Queensland) records a white and cream coloured form, presumably of *C. luteum*. Very rarely have pale coloured flowers of *C. purpureum* been recorded, although in Victoria some years ago a white flowering form was noted.

There is some confusion botanically concerning the identity of *C. luteum*. J. M. Black in his "Flora of South Australia" simply states "scarcely differs from *C. purpureum* except that the flowers are yellow, are larger and sometimes more numerous." However, in its distribution in this State *C. luteum* is found always in the dry, arid parts, whereas *C. purpureum* is found through savannah woodland regions.

Both species are readily raised from seed which usually is freely produced. This should be sown about $\frac{1}{4}$ inch deep. The germination is quite interesting and results in plants being produced readily. Both species will grow freely in the garden and while *C. purpureum* prefers some slight shade, *C. luteum* grows in full sun.

THE GENUS CALOSTEMMA

Notes from the National Herbarium of N.S.W.

The species that have been described are as follows:

- C. purpureum*, S.A., N.W. Vict., W. N.S.W., W. Q.
- C. luteum*, S.A., W. N.S.W., W. Q. (I am at present unable to distinguish this satisfactorily from *C. purpureum*. Field work may enable one to discern the characters. If the two are united, *C. purpureum* would be the correct name.
- C. scott-sellickianum* Bailey in Q. Ag. J. XV 899, described from Cohen, Q.
- C. cunninghamii* said to come from "Australia." I have not seen a description of this nor mention of it in recent literature. It could be a synonym of *Eurycles cunninghamii*?
- C. carnea*, described from Goulburn Range, N.S.W.—included in *C. purpureum*.
- C. candidum*, described from S.E. of Narrabri, N.S.W.—included in *C. luteum*.
- C. aureum*, a synonym of *C. luteum*.
- C. album*, described from Turtle Island, Gulf of Carpentaria and included in both the Flora of Queensland and the Flora of the Northern Territory on the basis of the one locality. It could be a species of *Eurycles*.

EURYLES AMBOINENSIS

THE SO-CALLED CARDWELL LILY by K. Kennedy

Lecturer on Bush House Botany, Adult Education Centre, Townsville, N.Q.

To those who take interest in the cultivation of Australian bush-house plants, *Eurycles amboinensis*, which is the botanical name of the Cardwell Lily, is well worth growing. Being a tropical plant it does best in warm climates, but with care it can be grown as far south as Sydney. In the cooler parts of Australia it needs a hot house.

Although generally known as the Cardwell Lily, it is not a lily but belongs to the family *Amaryllidaceae*, so should be called the Cardwell Amaryllis. The term Cardwell was given to it by the settlers of that district, but it also grows in places around Townsville and extends northwards as far as the Molay Archipelago, as is indicated by its specific name which means "of Amboina." Bailey in his "Comprehensive Catalogue of Queensland Plants" 1909, informs us that the Cardwell aborigines called it Bitamon.

The inflorescence is an umbel arising from a scape of up to 3 feet high. When the calyx and corolla are of similar colour and texture in a flower the term perianth is used. In *E. amboinensis* the perianth consists of six parts or segments, lobed at the distal end and united into a tube at the proximal end, all being of the purest white.

A feature of the flower is the corona, which looks like a miniature interior corolla. This is formed by an outgrowth from the union of the lower parts of the six stamens. It is divided into six lobes, from between each arises the filament of each of the stamens. Each lobe is again divided at the apex, giving the whole corona a fimbriated (fringed) appearance.

The gynoecium is 3 celled with a filiform style and an obtuse stigma, and being an amaryllis is below the insertion of the perianth. The fruit is semi-succulent with 3 seeds.

Apart from the flowers, the broad glossy leaves of *E. amboinensis* make it a handsome bush-house plant. They are radical, that is arise from the ground level, and have petioles. Their outline is mostly orbicular-cordate, about 7 inches broad, with parallel veins that stand out like ribs. Unfortunately they sometimes die down during the short tropical winter when the plant perennates. The petiole is interesting, for it is channelled to allow moisture, condensed from the air by the broad lamina, to trickle down to the stem which is underground. This is a device to obtain water during the long dry spells which sometimes occur in the tropics. The channelling also gives strength to the petiole, as a girder does to a building or bridge. The underground stem is a tunicated bulb, brown in colour.

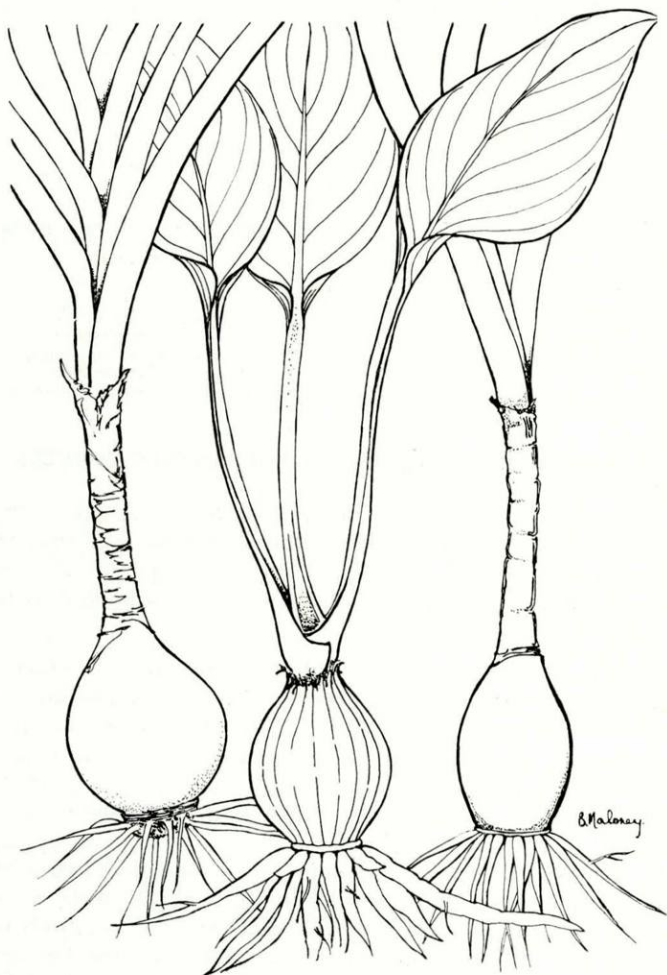
In its natural habitat *E. amboinensis* prefers shaded open forest land at the foot of hills, and never far from the sea. Although it is often found in clayey decomposed granite soil, when cultivated it does best in rather sandy soil with the addition of old mortar or shells to provide lime. Propagation is by offsets from the bulbs, or by seeds, but the latter are hard to get as the fruit is appreciated by birds and does not get a chance to ripen. In a closed bush-house this of course does not happen. It is best to sow the whole fruit with its three seeds. The fruit is green when it falls, and remains so.

THE AUSTRALIAN AMARYLLIDACEAE

by A. M. Blombery

The family Amaryllidaceae is found chiefly in the temperate and warmer temperature regions of the world. It contains many beautiful and widely cultivated exotic garden plants such as "Daffodil" (*Narcissus*), "Spider Lillies" (*Nerine*), *Hippeastrum*, *Belladonna*, *Eucharis* and others too numerous to mention, as well as the culinary "Onion" (*Allium cepa*). Following Hutchinson's classification (see "Some Differences in Classification of Amaryllidaceae" in this Journal), there are 3 Australian genera—*Calostemma*, *Crinum* and *Eurycles*—of which *Crinum* is the better known as there are a number of exotic species and hybrids in general cultivation. Two Australian species, *Crinum pedunculatum* and *Crinum flaccidum* are often cultivated.

The Australian Amaryllidaceae may be simply described as bulbous herbs with radical leaves which often die down each year and are frequently

*Crinum flaccidum**Eurycles cunninghamii**Calostemma purpureum*

large; flowers in a terminal umbel on a long flower stalk, with the inflorescence subtended by an involucre of two or more bracts; the flowers are trumpet shaped or the 6 perianth lobes are spread widely apart; there are 6 stamens.

In the genus *Crinum* the plants are often large, the radical leaves are stem claspings at the base and linear to broad large and sword shaped. The large flowers of white, pink or rarely yellow are trumpet shaped or the perianth segments are spread widely apart; the 6 stamens are free. The genera *Calostemma* and *Eurycles* are closely allied but may be simply separated by the shape of the leaves. In *Calostemma* the radical leaves are fleshy and strap-like resembling the exotic "Snowdrop." In *Eurycles* the radical leaves are fleshy and shovel shaped with a long petiole. The trumpet shaped flowers of both genera are similar with a number in a terminal umbel on a long flower stalk; the filaments of the stamens are united into a tube. The flowers of *Eurycles* are white or cream and usually larger than in *Calostemma* where the flowers are red to reddish purple or yellow sometimes pink or rarely white.

The following simple key may be applied to the Australian genera of the Amaryllidaceae.

Bulbous herbs; leaves fleshy, often dying down each year, flowers arranged in a terminal umbel subtended by an involucre of 2 or more bracts, flowers trumpet shaped or with the 6 perianth lobes widely spread; stamens 6 free or united.

(1) Stamens long and not united.

Flowers large, white pink or rarely yellow, trumpet shaped or with segments widely spreading; leaves linear to broad and sword shaped, stem clasping at base.

Crinum.

(2) Stamens with filaments united into a tube for part of their length, flowers small and trumpet shaped.

(a) leaves linear, flowers pink to reddish purple, yellow or rarely white.

Calostemma.

(b) leaves broad, shovel shaped on a long petiole, flowers white or cream.

Eurycles.

The features of the three genera are clearly shown in Betty Maloney's excellent illustrations.

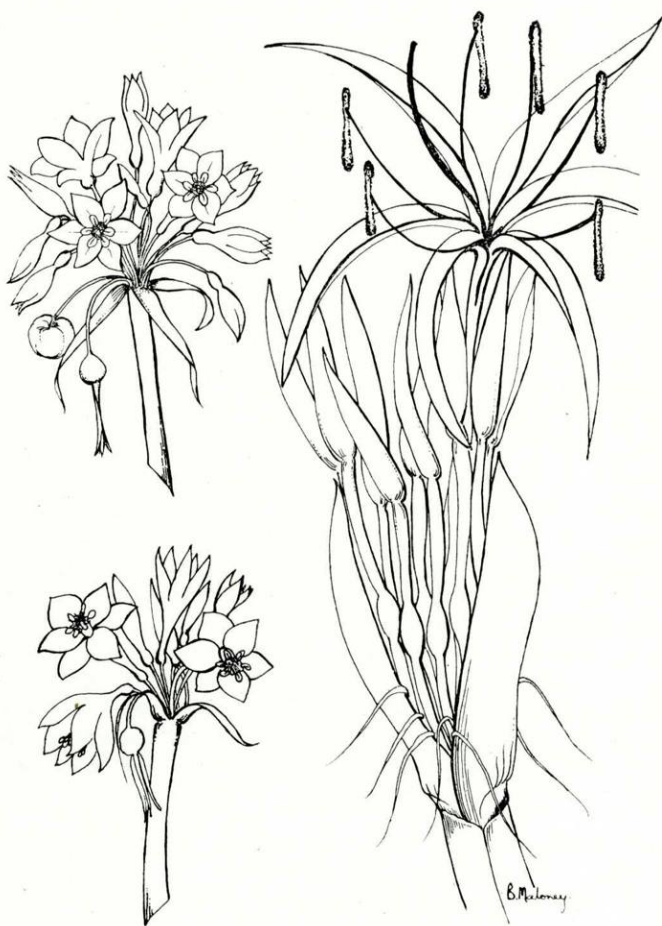
PROPAGATION—A SIMPLE METHOD WITH CERTAIN SUCCESS

The fruit of the three genera is a capsule containing several fleshy seeds which when ripe fall from the plant. The seeds have a common characteristic in that when stored for a period they will begin to germinate even without the presence of moisture. It will be seen that propagation from seed is easy.

Older plants are readily transplanted at any time but it is often necessary to dig deeply to obtain the bulb for, as the plants develop, the roots gradually draw the plant more deeply into the ground. Seeds may be sown in seed box or other type of container which have approximately four inches depth of soil as the roots grow deeply. The plants may be allowed to grow for several months in the seed box before transplanting, preferably into deep containers, such as large beer cans or prune tins where they are best allowed to develop for 12 months or more into fairly large plants as they are favourite subjects for snails in their early stages. Providing they are watered regularly and protected against snails and slugs they may be transplanted direct from the seed box into the ground. A period of three to five years is usually required from seed to flowering stage.

GROWING THE PLANTS OF AMARYLLIDACEAE

All species of Amaryllidaceae prefer a fairly rich soil with a plentiful supply of water during the growing season. *Crinum* and *Calostemma* will grow readily under a wide range of conditions but a sunny position is desirable for the best flowering. *Eurycles* do best in a warm moist half-shaded position and require protection from frosts. In the southern parts of Australia, *Eurycles* often flowers irregularly and is best grown in a large pot or tin in a bush house or glass house.



INFLORESCENCES . . .

Top left—*Calostemma purpureum*.

Right—*Crinum pedunculatum*.

Bottom left—*Eurycles cunninghamiana*.

Note the umbelliferous floral arrangement and the involucre bracts in each inflorescence; also the free stamens in *Crinum* and the united stamens in *Calostemma* and *Eurycles*.

THE CRINUM GENUS

by L. S. HANNIBAL

The genus *Crinum* consists of some 140 or more recognised species. Other Australian Amaryllids are described by another author. Related genera outside Australia are the *Ammocharis*, *Cyristetes*, *Nerine*, *Brunsvigia* and the Cape *Amaryllis belladonna*, and since numerous intergeneric hybrids such as the *Crinodonna* (or *Amarcrinum*) are possible all are closely allied. The greatest quantity of *Crinum* species are native to Africa which is undoubtedly the birthplace of the genus. The most typical African species to be found in Australian gardens are *C. moorei* and *C. bulbispermum alba* (Ex *C. capense*), which are members of the subgenus *Codonocrinum*—a group recognised by the long curved tepal tubes to the nodding blossoms and a declinate, compact arrangement of stamens and style. Two other subgenera are recognised, *Stenaster* with features typical of the Australian species *C. pedunculatum* with erect blossoms, narrow linear tepals, either patent or ascending, and spreading filaments; and *Platyaster* with features much like *Stenaster* but with the tepals lanceolate and the style suberect. The Australian species *C. flaccidum* is a good example of the latter although the tepals are wider than in most typical species.

Crinum's wide distribution is attributed to seed being carried in river and ocean currents. Thus they have wandered into Arabia, tropical and subtropical Asia as far north as Japan, over to the Dutch Indies, Australia and across the Pacific to central America and along the east coast to South America and northerly along the many shores of the Caribbean. During the last several hundred years man has been a major vector in distributing many of the more floriferous and accessible species, and due to the rate of seeding and hybridizing the probability of finding exotic forms or contaminated native species is becoming more and more common, particularly along the old trade routes. In 1835 it was complained that hybrids were taking over the garden at Calcutta, and apparently the same happened with Lancaster's collection at Lucknow, India. At present no extensive collection exists of tropical forms, however some modest collections of hardy species and hybrids are available. About ten species are considered hardy to light frosts or wet winters, which include *C. bulbispermum alba*, *C. moorei*, *C. scabrum*, *C. americanum*, *C. yemense* and *C. asiaticum*, and the Australian species, *C. pedunculatum* and *C. flaccidum*. These are usually the backbone of the hardier hybrids, several of which date back 100 years or more in Sydney.

Several difficulties plague those that attempt to define *Crinum* species. Hybrids are the first stumbling block, particularly in areas like Florida or Hawaii. Then Kew descriptions are often based on immature bulbs; their growth and habits are often quite different in the tropics. And finally the interrelationships are poorly evaluated. Right now we need a complete re-evaluation of *Crinum asiaticum* and *C. pedunculatum* with the work being done under both temperate and tropical conditions. It is very possible that some *C. asiaticum* forms are a *C. pedunculatum* and the same applies to the gigantic *C. gigas* of Iwo Jima, and finally we need to know more about the species from the north coast of Queensland.

AUSTRALIAN CRINUM

Although there are a dozen *Crinum* species native to Australia, considerable confusion exists over the identity and characteristics of each, and surprisingly one seldom finds the bulbs in garden use although several could grow in all but the cooler winter areas of Victoria, as do the long established South African species.

Crinum flaccidum is the most widespread native species, with its long recurving semi-limp onion like leaves. This plant is generally reported as growing west of the divide in northern New South Wales, and is found in areas occasionally subject to periodic summer flooding along with *Calostemma luteum*. However, *C. flaccidum* is a stranded aquatic species that covered much of the interior when that part of the continent had far greater rainfall than at present, so one finds remnant colonies ranging from down along the Murray River near Mannum on over to the west side of Flinder's Range bordering Lake Torrens and Eyre. Some localized adaptation and evolution has occurred, thus there are minor variations. The most interesting is a yellow flowered form that grows in the hills near Port Augusta. This particular colony warrants protection to prevent loss.

Apparently the distribution of *Crinum flaccidum* can be traced back to the Gulf of Carpentaria. Migration was from there down to Lake Eyre, also into Central Queensland and down into the Darling River area. Downstream migration is relatively simple as seed or bulbs can be carried down in storms, but upstream migration is a very slow process taking centuries. As a consequence species divergence occurs with upstream migration. In the case of *C. flaccidum* there is a shift from narrow linear petals to short elliptical, and spreading filaments are becoming compact and declinite. The greatest divergence appears at Quirindi but may also be present in the Murray River Lily which I have not had the opportunity to examine as closely as desired. However this change is not only specific, but subgeneric too.

For some time I wondered if this change was due to crossing of two *Crinum* species, but the species which would bring this about is up in India. Since then, upon learning that *C. asiaticum* is polygot species, I have wondered if the original *C. flaccidum* were the same, and that this divergence is actually a throwback to some of the primitive parentage in the *Flaccidum* group. I wish I had the opportunity to go into the matter further, but it has been rather interesting to find this much evolution in action.

Crinum flaccidum desires a deep clay or silt soil, little winter rain, full sun, and an occasional summer soaking. The blossoms come in early summer and range from an off white to a faint amber or light lemon yellow. There are a few with a touch of pink. The plants seed freely and most of the seed will sprout immediately on the moist ground. The specie's one failing feature is the pungent odour while in blossom, which is near overpowering at dusk. For this reason the bulbs should never be located near a bedroom window.

Crinum pedunculatum in turn is a coastal plant which grows naturally in Queensland and as far south as the Hunter River in N.S.W. Plants with their great stiff semi-erect leaves may be seen in tidal areas along streams or ditches a few miles inland from Newcastle, and from there north. In the tropical areas the growing crown develops so rapidly that the plant is on an elevated root stump (hence the name) and it has no distinct

bulb, but in N.S.W. where cooler, the root stump fails to develop while a large urn-shaped bulb (6" wide) evolves. This is not due to different variations of the species being encountered but to actual physical changes brought about by the climates. Transplanting the bulbs from one zone to another will cause these changes to reverse in a ten-month period. *C. asiaticum* will behave in the same manner. The leaves of *C. pedunculatum* are two to six inches wide by forty or more in length, depending upon the strain. A scape 30-40 inch tall may carry 20 to a hundred or more blossoms. These are pure white, flat faced or patent with narrow linear petals. Only a score or so blossoms open at a time and these have a wax-like fragrance.

This is a good garden plant and grows rapidly if given ample water and fertilizer.

Crinum amabile has been reported in northern Queensland. The plant resembles *C. pedunculatum* except that the foliage is not as rigid and the leaf tips often break over and droop down. The blossoms are quite large, flat faced, fragrant, and marked with a vivid red stripe in the middle of a white background on each petal. The bulb will require some winter protection in Sydney in order to avoid winter decay. The Queensland species differs in minor details from the type form found in Sumatra.

Crinum brisbanicum from the Brisbane River resembles *C. flaccidum* in a number of respects. In fact it is apparently the coastal form of the latter, being isolated from those in the interior by the dividing range. The writer's experience is that it is difficult to grow. The bulb can take neither cold weather nor exceptionally hot. The other *Crinum* species are listed below. Little is known about the latter as they have been almost unobtainable. Several bulbs reported about the Rockhampton area appear to be new species.

The *Crinum* "Amabile" in the Sydney Botanical Gardens with the copper red foliage appears to be a misnamed *C. asiaticum* hybrid. Plants with such foliage are common to Calcutta and Honolulu. Since seedling bulbs from these pigmented plants run true to colour it is believed that these are a transgressive cross involving *C. augusta* or some other species.

PROPAGATION

Seed of all *Crinum* sprout readily if left in a damp place, and fair sized bulblets may form ere planting becomes necessary. Little is known about breeding Australian *Crinum*; however, preliminary attempts suggest that they should cross as easily as the South African species. Recommendations are that selected broad petalled *C. flaccidum* such as the Quirindi or Quorn types be used with *C. pedunculatum* or *amabile*,

CHECK LIST OF AUSTRALIAN CRINUM

Subgenus *Stenaster* radial symmetry to flowers, segments linear, stamens spreading.

1. *Crinum douglasii* Bailey—Queensland Flora Bull. 4: 27, 1890. Native to Thursday Island. Differs from *C. asiaticum* by columnar scape.

2. *C. pedunculatum*, R.Br. Prodr. 297; Ker in Bot. Reg. Plate 52. Native to Queensland along coast.

Subgenus *Platyaster*—Radial symmetry, segments lanceolate, stamens spreading.

3. *C. brevistylum* Bailey—Queensland Agr. Bull. 2: 197-198, 1898. Native to Turtle Is., Q. Resembles *C. brachyandrum* Herbert.

4. *C. venosum*, R.Br. Prodr. 1:297, Baker p. 83, 1888. Native to tropical Australia, similar to *C. angustifolium*.

5. *C. uniflorum*, Muell. Fragm. 3:23, Baker P. 83, 1888. Native to north Australia in sandy flats.

6. *C. angustifolium*, R.Br. Prod. 1: 297; Baker p. 83, 1888. North Australia, resembles a narrow leaf *C. asiaticum*.

7. *C. pestilentis* Bailey, Queens. Agr. Jour. 2: 198, 1898. Bulloo River, Q. Odour of flowers sickening, resembles *C. flacc.*

8. *C. brisbanicum* Bailey, Queens. Agr. Jour. 4, 47-48, 1899. Brisbane River, Q.

9. *C. flaccidum* Herb. Bot. Mag. Plate 2133. Originally considered subgenera *Codonocrinum* in error. Inland rivers of Q., N.S.W., Vic. & S.A.

Subgenus *Codonocrinum*; bilateral symmetry, tube curved, segments oblong, stamens compact and declinate.

10. *C. brachynema* Herb. Bot. Reg. Plate 1842, Misc. No. 28. Native to Bombay and possibly the north coast of Qld. and N.T.

In addition to the above we have a report of two new *Crinum* species in Queensland.

ON SPROUTING DIFFICULT SEED

The methods used to sprout seed are legion. However, the basic requirements are proper temperature, moisture or high humidity during the sprouting period and least recognised, aeration. Like a number the writer has tried moist spagnum moss, peat, vermiculite, exploded perlite, fine glass beads and several other media, including floating seed on water. But the greatest success has been the placing of seed onto fine mesh brass screens, stacking these screens, and placing them under a slow drip. Often the seed can be left on the screens until the primary leaf stage, then be picked off and planted in a suitable growing medium. Traces of copper discourage dampoff or mildew and the circulation of moist air promotes rapid germination. Trials on several Australian seeds indicate no problem. For fine seed 200 mesh or finer screen may be needed but these have the fault of plugging if silt get onto them. Stacked sieve assemblies such as used in a soil's laboratory are the most convenient. Oftentimes these become worn and do not grade the fines properly, so are thrown away.

It has come to my attention that many seeds contain a germination inhibitor such as ferulic acid. It is the leaching out of this material or its equivalent that breaks the dormancy of the seed.

EURYCLES AMBOINENSIS—Continued from page 258.

I have got best flowering results by allowing the bulbs to increase and crowd in a cement pot nine inches across. The crowding seems to induce flowering which occurs in the month of October.

Another species of this genus grows in Southern Queensland, where it was discovered near the Brisbane River by the botanist and explorer Allan Cunningham. Its flowers are smaller than the northern species, and its leaves are ovate instead of cordate. In honour of its discoverer it was given the name of *E. cunninghamii* by the botanist Aiton of Kew, London.

FROM H. D. CALDWELL, Bemerside, Nth. Qld.

Eurycles amboinensis grows naturally about 6 miles north of here in "Wallum" country. It is a mixture of black and white sand, with clay base. The plants grow mostly near creeks or gullies in association with black wattle, broad leaf tree, bloodwood oak and gums with a scattering of *Grevillea pteridifolia*. The flower spike appears in October to December depending on the winter rains, 18 to 24 inches high and about 1 inch diameter at the base. It can have up to 40 flowers at the head. After flowering the leaves appear.

CRINUM ANGUSTIFOLIUM R.Br.

by K. Kennedy

Lecturer on Bush House Botany, Adult Education Centre, Townsville, Qld.

Crinum angustifolium grows naturally in the Townsville district of North Queensland, consequently to cultivate it warm conditions are needed. It grows well in shady positions, but a certain amount of sunlight is required in order that it may flower. In its wild state it is not particular as to soil, growing equally well in clayey and in sandy soil, in both cases slightly tinged with salt, for its habitat is in the vicinity of salt pans, but not actually in them. The writer has grown them successfully in a mixture of decomposed granite and sand, with leaf mould added, and being near the sea the saline air is sufficient to add traces of salt.

Crinums are found in many parts of the world, especially in tropical and sub-tropical regions, and many species are cultivated as garden plants. F. M. Bailey in his "Catalogue of Queensland Plants", lists ten species of crinum in Queensland, of which five grow north of the tropic of Capricorn. He also mentions a variety of *C. angustifolium* as var. *blandum*, with leaves broader than the species, with broader perianth segments, and with whitish filaments to the stamens. The Townsville species has fairly broad to narrow segments, but the filaments and style are definitely purple.

The name *Crinum* is derived from an ancient Greek word "krinon" which means a lily, but crinums are not lillies, they belong to the Amaryllis family, for the carpels that comprise the seed box are below the insertion of the perianth.

The plant has a short underground stem enclosed in a tunicated bulb about 7 to 8 cm. in diameter. On top of this bulb is a short swelling, which is a continuation of the stem enclosed in the fleshy bulb scales. From this arise the leaves which are rather narrow, that is why the specific name of *angustifolium* was given. The width of the leaves averages 5 cm., with a length up to 60 cm., and taper away to a point. Being a monocotyledon, the venation is parallel. Leaf surface is glabrous, but by drawing a finger along the edge of a leaf, especially near the base, it feels scabrous or rough. Under a microscope this roughness is seen to be caused by a layer of translucent cells which have grown from out the edge of the lamina, and become hardened. This is one of the distinguishing characters of this particular species.

Before maturity, the inflorescence is enclosed in a membranous spathe consisting of two bracts that have cohered. When the umbel of flowers burst forth the spathe splits into its two original bracts which hang down. They are wedge-shaped, and measure about 6 cm. in length and about 2½ cm. along the base. In addition to the bracts a number of filaments hang down. These are abortive bracts, and with the two spathe bracts correspond to the number of flowers in the umbel.

Each flower has a perianth consisting of a long greenish tube which about two-thirds of its length from the base expands into six white lanceolate segments or lobes about 7 cm. long and ½ cm. wide. While in bud each perianth tube is curved downwards, then when the flower unfolds it straightens up.

A touch of colour is added to the flower by the stamens. There are six of them with purple filaments which become lighter near their bases and so blend with the white perianth. Their anthers are versatile and bear bright yellow pollen and so with the purple filaments and white perianth, make a nice ensemble. Seen under a microscope, the pollen grains are broadly fusiform and glabrous.

Three carpels make up the pistil which has an elongated style that extends beyond the perianth and stamens, and is tipped with a small capitate stigma. It is flexuose and, like the stamen filaments, is coloured purple.

The fruit is a fleshy indehiscent capsule with three loculi formed by the folding of three carpels, each loculus containing six seeds. As the capsule does not open the seeds are probably distributed by animals that eat the fruit. Because of this if seeds are required, the capsule should be enclosed in gauze or mosquito net until ripe.

Apart from its flowers *C. angustifolium* can be grown for its foliage, for the leaves are persistent although rather drooping.

CRINUM PEDUNCULATUM R.Br.

(by K. Kennedy, The Museum, Townsville)

Crinum pedunculatum is a native of Southern Queensland and does not grow in a wild state in the tropics. However, it is easily cultivated as a garden plant in the Townsville district. Being one of the larger crinums, the leaves are long, reaching up to three feet in length. It differs from *C. angustifolium* in that the swollen neck of the bulb-covered underground stem elongates and grows into an upright stem.

The bulb is dispensed with because the stem becoming succulent can store all the material required for flowering and tiding over a dry season.

The leaves are borne on the end of the stem which below them is bare. Sometimes the stem branches and reaches up to a height of three feet. Many rather large flowers form the umbel, the flowers opening one after the other to prolong the flowering season. They are like those of *C. angustifolium* in having a greenish perianth tube, white segments, reddish filaments, yellow pollen and purple style.

The fruit is a capsule, rather solid, containing eight or nine irregular shaped seeds pocked tightly together, their angles fitting into each other.

For cultivation a spot sheltered from direct sunlight is best, and the soil should be sandy, otherwise the plant will rot. If required for a bush-house it can be grown in a tub.

Addendum. A recent report by a competent observer of a *Crinum* similar to *C. pedunculatum* on Hinchinbrook Island could extend the range of this plant considerably when confirmed.

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AMARYLLIDACEAE

SOME DIFFERENCES IN THE CLASSIFICATION by A. M. Blombery

For the person who does not specialise in botany, it is often confusing to see the same plant genera classified into different families by various authors. The case in point is that of Amaryllidaceae. The systems of plant classification adopted by various botanists have differed over the years. Of the various systems used, that of Benthom and Hooker in their "Genera Plantarum" 1862-1883, is of considerable interest to all Australians, as these two eminent botanists played a most important part in early Australian botany. Benthom's "Flora Australiensis" of 7 volumes is a classic, which has never been equolled in Australian botany. Benthom and Hooker separated the Liliaceae from the Amaryllidaceae chiefly by the position of the ovary, being superior in Liliaceae and inferior in Amaryllidaceae. In Benthom and Hooker's "Genera Plantarum" the following genera were included under Amaryllidaceae:—

Campynema, *Hypoxis*, *Curculigo*, *Crinum*, *Eurycles*, *Calostemma*, *Doryanthes*. They included the following genera under Haemodoraceae: *Haemodorum*, *Phlebocarya*, *Tribonanthes*, *Conostylis*, *Blancoa*, *Anigozanthos*, *Macropidia*. The Haemodoraceae was later included under the Amaryllidaceae by Engler and Prantl in "Die Natürlichen Pflanzenfamilien." This arrangement with slight modification is still followed by some botanists. It is usual however for most modern botanists to follow the arrangement of J. Hutchinson in "The Families of Flowering Plants," Volume 11, Monocotyledons, 1959. In this work Hutchinson follows a more natural classification and divides the Amaryllidaceae into a number of smaller families, which are as follows:—

Amaryllidaceae—*Calostemma*, *Crinum*, *Eurycles*.
Haemodoraceae—*Anigozanthos*, *Blancoa*, *Conostylis*, *Macropidia*, *Phlebocarya*, *Haemodorum*, *Tribonanthes*.

Agavaceae—*Doryanthes*, *Cordylina*, *Draceana*. (The two latter genera were included under Liliaceae by Benthom and Hooker).

Hypoxidaceae—*Campynema*, *Hypoxis*, *Curculigo*.

It will be seen from the above that under Hutchinson's arrangement there are now only 3 of the Australian genera included under Amaryllidaceae. Applying Hutchinson's arrangement, the following descriptions may be applied to the Australian representatives of the above families and will show some of the natural characteristics which readily separate the families.

Amaryllidaceae—Bulbous herbs with radical leaves, chiefly long and linear, flowers arranged in a terminal umbel subtended by 2 or more thin spathaceous bracts, flowers trumpet-shaped or with the 6 perianth lobes spread widely apart; stamens 6, fruit a capsule.

Haemodoraceae—Herbs with a short rhizome, roots clustered from the underside, leaves radical and often "iris" like. Flowers arranged in a cyme, raceme or panicle, and often tubular in shape and densely covered with hairs; fruit a 3-celled capsule.

Agavaceae—Perennials with a short or long stem, often growing into large clumps, rootstock a rhizome and sometimes with thick contractile roots, leaves crowded at the base or apex of the stem, linear, to broad large end sword-shaped. Flowers arranged in a raceme or panicle

sometimes large and crowded into a head on a long leafy scape; flowers bell to trumpet shaped; stamens 6. Fruit a capsule or a berry.

Hypoxidaceae—Herbs with a tuberous rhizome or a corm, covered with a membranous or fibrous sheath; leaves chiefly radical linear to lance-shaped, veins prominent, often hairy. Flowers solitary or in a short raceme, 6 spreading perianth segments. Stamens 6 or 3; fruit a capsule or indehiscent and fleshy.

To further show the characteristics of the families one better known genus from each is illustrated. It will be readily seen by fig. 1 (*Crinum pedunculatum*), that apart from the bulbous nature of growth, the umbelliferous



FIG. 1

Crinum pedunculatum (plant greatly reduced) representative of the family showing inflorescence in bud stage, flowers being enclosed by spatheous bracts. Right inflorescence showing umbelliferous arrangement subtended by involucral bracts, one flower being open and the remainder with developing fruits.

inflorescence subtended by involucre bracts simply separates the Amaryllidaceae from the other families. Fig. 2 (*Anigozanthos manglesii*) shows the "Iris" like leaves and the roots clustered below the short rhizome with the tubular flowers arranged in a raceme which simply separates this representative of Haemodoraceae from Amaryllidaceae.

In fig. 3 it will be seen that the crowded leaves on a short branched rhizome of the small plant of *Doryanthes excelsa* with thick roots and the trumpet shaped flowers in a dense panicle simply separates this representative of Agavaceae from the former families. With fig. 2 (*Hypoxis hygrometrica*) it will be seen that the leaves arising from a corm and the few flowers with spreading perianth segments arranged in a short raceme simply separates this representative of Hypoxidaceae from the other families.



FIG. 2

Left—*Anigozanthos manglesii*. A small plant and inflorescence representing Haemodoraceae. Note short rhizome with roots clustered beneath, "Iris" like leaves and tubular flowers in a raceme.

Right—*Hypoxis hygrometrica* representing Hypoxidaceae showing leaves arising from the corm, flowers in short racemes, with spreading perianth segments.

It is hoped that this article has assisted in showing some of Hutchinson's reasons for the change of classification in Amaryllidaceae.

I wish to extend my thanks to Betty Maloney for her work in providing the illustrations which greatly simplify the descriptions.



FIG. 3

Right—A small plant of *Doryanthes excelsa* showing short branched rhizome with thick roots and crowded leaves.

Left—An inflorescence of *Doryanthes excelsa*. Note that although flower somewhat resemble *Crinum*, they are not in an umbel, bracts although present are not in an involucre, also anthers are basifixed.

Lagunaria patersoni

by H. OAKMAN

It is not uncommon for those with some botanical training to complain about the confusion in plant nomenclature caused by an excess of common names. *Lagunaria patersoni* has its share of common names—Norfolk Island Hibiscus, Pyramid Tree and Sugarplum Tree. But in addition this tree has had its share of botanical names—*Hibiscus patersonius*, *Fugosia patersonii* and now *L. patersoni*. In New South Wales, it is generally referred to as the Norfolk Island Hibiscus while in the south, Pyramid Tree is more commonly used; in America the standardised plant name is Sugarplum Tree.

The *Lagunaria* is an excellent tree for coastal planting because of its tolerance of salt winds, however it cannot stand full exposure to the sea front and its foliage will burn even when some distance from the ocean, if it is not sheltered from persistent seabreezes. It has been used fairly extensively in coastal resorts as a street tree and has been reasonably successful because of its hardiness and capacity for growing in beach sand. Its climatic range is from the sub-tropics to areas of mild frost.

Typical shape is pyramidal, average height is around 25 feet, but there are excellent specimens in the Richmond River District as high as 80 feet with a spread of 36 feet. Branching is dense with thick foliage, making it a good shade tree. It flowers throughout November and when in full bloom is quite showy with its cover of pale pink flowers. The leaves are oblong, 3 to 4" long, somewhat leathery, white underneath when young, smooth and pale green above. The flowers are bell-shaped, 1½" long and slightly hairy on the outside. The young shoots are fairly densely covered with scales, but otherwise the tree is smooth. The seed capsules are five-celled with numerous small kidney-shaped seeds 1/8" in size. The seeds are well protected by numerous dense sharp hairs that will cause intense irritation. Its native habitat, as its common name implies, is Norfolk Island at the east coast of Australia.

As a street tree, it is rather slow growing and has a tendency to low branching. Young trees have slender branches but can be pruned without ill effect. It does not suffer from disease and insects seem to leave it alone, although occasionally brown scale is a nuisance. It is evergreen and leaf-fall is light. The sharp hairs in the seed capsules could be the cause of complaint, but no cases of inconvenience to humans have been reported. However, farmers are well aware of the discomfort that they cause to animals.

LAGUNARIA PATERSONI IN THE GARDEN

by L. J. BUTT

Holding its own among the really worthwhile flowering trees of the northern State is the "Queensland Pyramid Tree" or as it is known by some, the "Cowitch" tree. Another name for it is the "Norfolk Island Hibiscus," probably because it is to be found on that island as well as the Australian mainland.

This shapely member of the genus *Lagunaria* has many qualities to make it a fine garden subject. My tree is about 7 years old and is 15ft. in height and should reach 20-30 feet. Pyramidal in shape this attractive evergreen from the northern coast of Queensland flowers during October and November

LAGUNARIA PATERSONI



Colour photography by H. Oakman.

This beautiful tree known in various places as the "Queensland Pyramid Tree" and the "Norfolk Island Hibiscus" would be an asset to any garden. It is particularly suited for coastal planting as it is tolerant of salt laden winds. It has also been used as a street tree. Will readers please advise the Editor where a good street specimen may be used in a photograph to illustrate this point.

in such abundance that the bees and insects swarm over it nearly as thick as the flowers. The flower of my tree is rose pink shaded to lilac with yellow colouring in the throat. In appearance the flower is not unlike the hibiscus bloom and this is apparently how one common name arose.

The name "Cowitch Tree" refers to the seed pods which are surrounded with fine golden hairs, these having the same effect as the minute spines on some of the cacti. Seed collectors find to their sorrow that the irritation caused by the protecting hairs is quite considerable. One friend of my acquaintance tells me never to stand under a cowitch tree, because the irritating hairs drop from the bursting pods. So far in my experience I find that the use of gloves when collecting seeds is all the precaution needed.

Despite the setback of unpleasant seed pods, the *Lagunaria patersoni* is really worth cultivation. It is hardy, and can be pruned quite heavily after flowering.

As a cut flower it stands up quite well with those of other flowering trees.

GARDENING TO ATTRACT BIRDS

by KEN STUCKEY, *Furner, S.A.*—PEST CONTROL SERIES

Somehow I see a certain amount of danger in broaching this subject—some of our dedicated gardeners may become full time bird watchers! There is no doubt that a native garden attracts our native birds and once attracted, they eventually become permanent boarders, or to be more correct, put themselves on as members of the staff, and work from daylight to dark without pay.

Eight years ago the "Yellow-winged Honey-eaters" called in during Spring and Summer when the usual exotic annual and perennial flowers were out, but the last few years since the native trees and shrubs have matured they are with us the whole year round. Banksias are perhaps the honey-eaters favourite and if there is a selection of different species there are always some flowers present.

Hakea verrucosa is also a great help as it has masses of pink flowers in the middle of winter (June) closely followed by *H. erinacea* (July) then *H. nitida* (August). From then on of course it's a feast. The larger flowered grevilleas are also good nectar producers. Another particular favourite is *Kunzea baxteri*.

The "White Necked Tree Creepers" are also in permanent residence and remind me of a fly walking on the ceiling as they spend most of their time upside down under limbs of trees searching the bark for insects. The "Yellow Robin" has his special section of garden and being a plump little bird it must take many hundreds of grubs and insects to keep him in such fine fettle. The "White Browed Scrub Wren" is an extremely valuable member of the staff as he assiduously inspects each leaf for marauders. His only trouble is he can become a little too familiar, three years ago they decided to nest in a coil of tie wire in the potting shed—this meant I had to go and buy another coil of tie wire. Next year the nest was built in some branches of *Banksia baueri* hanging up in the shed to dry—this meant no dried material for the floral artist. Last year, the nest was in a maiden-hair fern only a foot from the back door—imagine the inconvenience to the family when no one was allowed to go out the back door!

The various families of "Blue-Bonnets" spend a lot of time arguing the point about their territorial boundaries and that, no doubt, is the reason why they are so extremely busy darting hither and thither over the ground and under bushes trying to make up for lost time. The "Scarlet Robin" is a real task-master, the poor would be gardener is hoeing or digging in the hot sun, with Mr. and Mrs. Robin only a yard or so away making a thorough inspection of the freshly turned earth. The gardener considers he has earned a rest and a smoke in the shade of a nearby tree, but Mr. Robin, sitting on the handle of the idle spade says "Come on get busy, I can't wait around here all day while you sit there doing nothing."

The floppy, raucous "Pied Currawong" covers the same ground as the tree creepers but in search of bigger game. I have seen them rip off great hunks of bark in search of big juicy grubs or borers. This is a very good thing but when it comes to pulling out and scattering around my labels

Editor's Note: Our last issue carried the first article in this giving prominence to the best method of pest control for your natives, the beautiful little birds. Further comments from readers are invited on their methods of attracting birds to the garden.

from the seed boxes it is not such a good thing. Anyone would think it was funny the way the "Laughing Jacks" are nearly bursting themselves.

All in all, the birds are our best friends and slave away in the garden all day, not with a grumble but with the happiest of songs. The birds also talk to us and give warning of danger, many a tiger snake has been dispatched through the signals of danger given by the birds.

FROST HARDY NATIVES — 2

REPORT FROM MRS. M. SIMMONS, LAUNCESTON, TASMANIA

The plants listed below are growing at Legana, 8 miles north of Launceston on a shore facing north close to the Tamar River. As it was not possible to record ground temperatures at Legana, official ground temperatures from the aviation office at Launceston have been used. These may be slightly lower than the temperatures at Legana.

The lowest temperature recorded was 20°F. in late June, with several readings between 22° and 25°F. for the remainder of the winter, which has been considered fairly mild.

The plants in the following lists are arranged in two groups, namely Group I—Plants surviving without damage; Group II—Plants sustaining tip or bud damage and recover to grow on in the spring.

Because of the large number of plants grown it is not possible to give details of aspect etc. but many plants are positioned under tall trees thereby affording some overhead protection. Numbers in brackets after name of plant is the age of it in months.

GROUP I.

- Acacias*. *brownii*, (16). *colletoides*, (15). *brachystachys*, (9). *diffusa*, (18). *iteaphylla*, (9). *lineata*, (18). *murrayana*, (18). *myrtifolia*, (18. local). *taglioriana*, (18). *drummondii*, (18). *pulchella*, (18). *roseana*, (20. lcl.). *rubida*, (18). *urophylla*, (18). *subulata*, (18). *sophorae*, (18. lcl.). *undulatifolia*, (18). *vestita*, (18). *verticillata*, (22). *baileyana*, (6). *cardiophylla*, (7). *bolleycephala*, (8. lcl.). *suaveolens*, (18. lcl.). *stricta*, (15). *actinacea*, (6).
Actinotus. *helianthus*, (8).
Anigozanthos. *flavida*, (8).
Anoplotherus. *glandulosa*, (24. lcl.).
Baeckia. *ramosissima*, (8).
Banksia. *baueri*, (18). *marginata*, (24. lcl.). *speciosa*, (18). *prionotes*, (8).
Brachysema. *sp. round leaf*, (18).
Boronia. *denticulata*, (16). *faucaea*, (18). *megastigma*, (18). *pilosa*, (18. lcl.). *polygallifolia*, (9). *pariana*, (18). *variabilis*, (9. lcl.).
Billardiera. *scandens*, *E. longifolia*, (lcl.).
Callistemon. *citrinus*, (26). *carmine form*, (16). *linearis pumila*, (8). *C. pinifolius* *vir.* (8). *paludosus*, (18. lcl.). *teretifolius*, (15).
Calothamnus. *sanguineus*, (18). *villosus*, (18).
Calytrix. *tetragona*, (18).
Crowea. *exaltata*, (planted April, 1965).
Ceratopetalum. *pummitiferum*, (18).
Chamaelaucium. *uncinatum*, (16).
Chortzema. *cordatum*, (9).
Claematis. *microphylla*, (24. lcl.). *gentianoides*, (12).
Correa. *alba*, (8. lcl.). *decumbens*, (8). *lawrenciana glabra*, (8 lcl.). *C. lawrenciana*, (18). *backhouseana*, (15). *erythromena* *var. latridi*, (14). *globulus*, (18. lcl.). *E. morrisbyi*, (12 lcl.). *perriniana*, (18. lcl.). *torquata*, (6).
Eucalyptus. *lucida*, (24. lcl.). *milligani*, (24).
Freemontia. *gibbifolia*, (planted April, 1965).
Goodenia. *lotifolia*, (24. lcl.).
Goodia. *lotifolia*, (18).
Grevillea. *baueri*, (26).

WOOLLSIA

THE PLANT FAMILY EPACRIDACEAE — Part 2 — by Betsy R. Sackes

This monotypic genus occurs in N.S.W., and Southern Queensland, where it prefers sandy heath-type localities. The length of the flowering season varies with the locality, winter to spring on the coast and spring to summer on the mountains.

The single species was originally described as *Epacris pungens* Cav.,



Colour photography by J. M. Joshua.

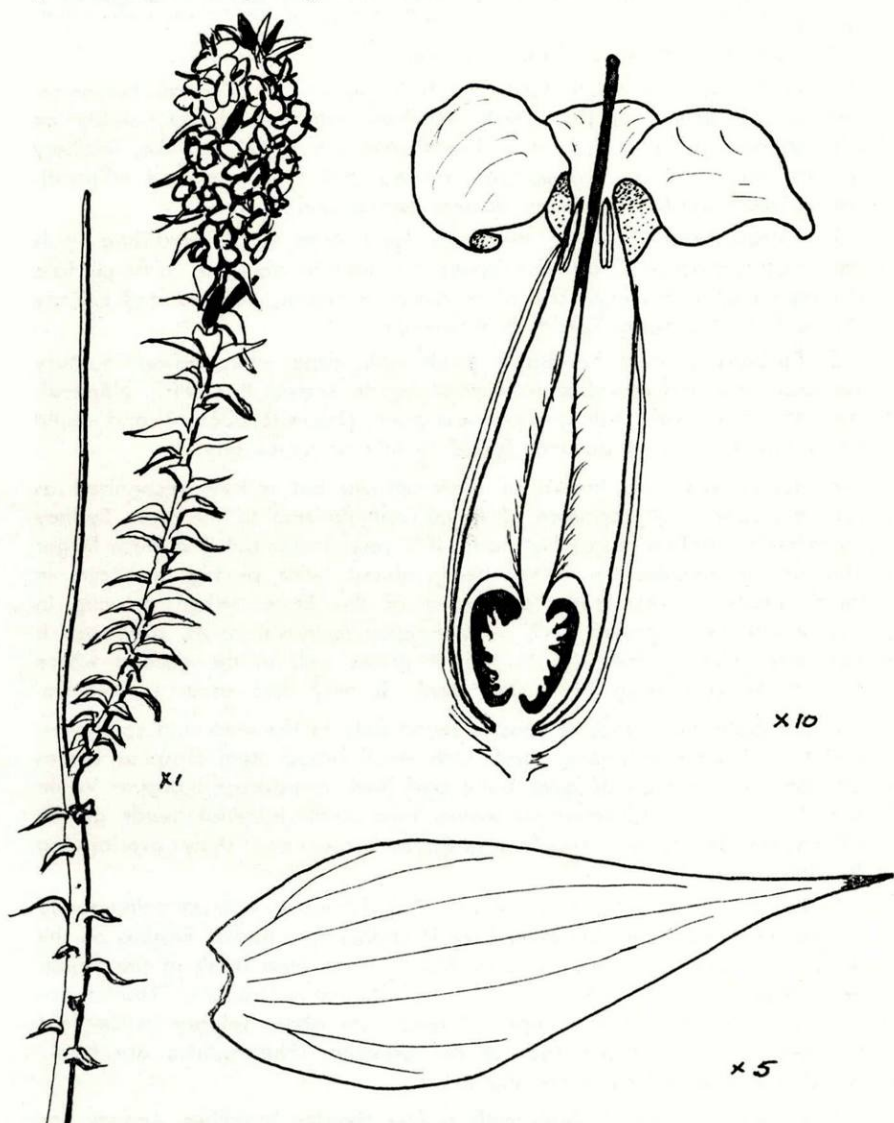
A plant very closely allied to *Epacris* that were the subject of the last issue. This species seems particularly hardy in a sunny position with only occasional watering. A rare pink form as well as the usual white form is shown. The usual size and shape of the plant and flowers are shown on the sketch opposite but in the garden or good situations the plant and flowers could be much larger than shown on the colour plate above.

The principal problem seems to be the obtaining of plants as they are not easy to propagate except in the wild where nature has no difficulty at all. Will any reader who has been successful in the propagation of any species in the family Epacridaceae, please contact the Editor.

The next genus in this series will be *Rupicola* comprising two species, *R. sprengelioides* of the Blue Mountains area and *R. gnidioides* from sandstone cliffs south-west of Nowra, N.S.W. Will any reader who can report on these species either by describing their habit and habitat or giving experiences in cultivation please contact the Editor.

it was subsequently described as *Lysinema pungens* by Robert Brown. In 1875, F.v. Mueller described it as *Woollsia pungens* (Cav.) F. Muell.

It is an erect shrub 20-200 cm. high, with crowded, ovate leaves which taper into a rigid point. Leaves usually glabrous but scattered hairs occasionally occur on the upper surface. The axillary sessile flowers are crowded into the upper axils, giving a spike-like appearance to the inflorescence. The corolla is usually white but sometimes reddish, often fading to a very pale pink. The corolla-lobes which are contorted in bud, are broad and spreading when open. The top of the ovary and the base of the style are covered by long white hairs.



WOOLLSIA PUNGENS

TASMANIAN EPACRIS

by J. SIMMONS, Launceston, Tasmania

The family *Epacridaceae* is well represented in Tasmania with many endemic species. Of the genus *Epacris* 18 species are found, 10 of these being found only in Tasmania.

Of the non-endemic species *E. impressa* is widespread and very abundant.

E. obtusifolia is common in wet coastal heaths; *E. lanuginosa* is frequently found in wet heaths from sea level to 3,000 ft.; *E. heteronema* is found locally in the west and south west; *E. paludosa* is confined to the Strzelecki Peak on Flinders Island; *E. serpyllifolia* is common on mountains above 3,000 ft.; *E. petrophila* is found locally on the Western Tiers at about 4,000 ft.

The species endemic to Tasmania are:

E. myrtifolia is a small bushy shrub found on the Tasman Peninsular mainly in the vicinity of the "Devil's Kitchen" where it thrives, mostly on the wrong side of the safety fence. The flowers are white, star-like, feathery and very attractive. The leaves are crowded, 5-9 mm. long and elliptical-ovate. A good garden specimen, flowers Spring and Summer.

E. marginata is found in the same local area as *E. myrtifolia*, it is a rigid much branched shrub. The leaves are densely crowded, ovate-cordate and pungent pointed (very). The white flower is sweetly scented and solitary in the leaf axils. Flowers Spring and Summer.

E. barbata, a most handsome shrub with large white flowers solitary in the leaf axils and crowded in terminal heads. Leaves flat, thick, elliptical-ovate with a short wide stalk and pungent point. Grows to about 3' and would make a fine show in a garden. Found locally at Coles Bay.

E. gunnii was once known as *E. microphylla* but is now recognised as a separate species. A specimen of *E. microphylla* sent to me from Sydney enabled me to confirm this at first hand. It is very similar but is a much larger version of *microphylla*, the flower being almost twice as big. It occurs in isolated stands in wet heaths over most of the State. When growing in company with other growth such as *Melaleuca squamea* or *M. squarrosa* it is not uncommon to find it 6 ft. tall. It grows well in the garden where one specimen is thriving in a clay bank. It may also occur in Victoria.

E. corymbiflora is another species found only in the west and south-west where it is a small spreading shrub with small broad stem clasping leaves which have an incurved pungent point and thick translucent margins. White flowers in the axils of uppermost leaves form small terminal heads as the name implies. Bracts and sepals prominent, brown and shiny overlapping in 5 vertical rows.

E. exserta and *E. virgata* are two local endemics, *E. exserta* being found on the banks of the South Esk River here in Launceston, and *E. virgata* on the Asbestos Hills which run down to Bass Strait on the west bank of the Tamar River. *E. exserta* is an erect shrub, 2-3 ft. with many branches. Leaves are stalked, elliptical with a blunt apex. Flowers are white, solitary in the leaf axils often clustered at the ends of the branches. The anthers are freely attached and exserted as is the stigma.

E. virgata is a small shrub with a few slender branches. Leaves are ovate but not pungent, approx. 6 mm. and widely spaced along the

branches. The white flower is solitary in the leaf axils, extends along the branches and is very similar to *E. exserta*.

E. mucronulata is a West Coast species where it is local on the banks of rivers. In common with all Tasmanian endemic *Epacris*, the flower is white. The leaves are narrow elliptical with a hardened acute tip. Flowers are solitary in the axils of the leaves at the end of the branches.

E. acuminata is a shrub found occasionally in most parts of the State and is one that I have not seen except for herbarium specimens. The distinguishing feature is its leaves which are very concave, broad and pungent pointed. The flower is of course white, with anthers and stigma exserted.

E. squarrosa is a very variable shrub, my own specimens are from the East Coast and differ in the leaf form compared with those found in the South. Flowers white, in the leaf axils forming a spike on the upper part of the branches. Anthers and stigma exserted, bracts and sepals reddish.

E. stuartii is known only from material collected in the south of the State and is apparently similar to *E. squarrosa*.

CORYBAS SALIS. WITHIN THE TROPICS

by A. W. DOCKRILL

Corybas is the only genus in the subtribe *Corysanthinae* and its Australian members are characterised by being dwarf deciduous terrestrial herbs arising from small round tubers.

Leaf solitary, $\pm$ cordate, reniform or circular, usually resting on top of the ground. Peduncle very short, terminal on the leaf stalk. Flowers solitary on a short pedicel, quite large for the size of the plant. Dorsal sepal large, cucullate. Lateral sepals and petals very small or rudimentary (they are quite long in some exotic species) and usually $\pm$ obscured by the dorsal sepal and labellum. Labellum quite large, deeply concave or tubular in the basal section, which completely envelopes the column and usually has 2 auricles, one on each side, at the base; the labellum becomes expanded towards the orifice and the anterior margins are of great diversity. Column extremely small, erect, without lateral wings but sometimes with small wings at the apex; often there is a large staminode in front at the base. Stigma prominent at the front apex of the column. Rostellum on top of the stigma, really the top surface of the prominent stigma. Anther readily removed, 2-celled, terminal, erect, large, extending very much higher than the column. Pollinia granular or mealy and being so minute are not readily removed without damage, however there are 4 in 2 pairs, all attached without caudicles or stipes to the one retinaculum; retinaculum rather thin, $\pm$ concave below, and rests like a cap on top of the stigma. Usually the peduncle elongates after fertilization of the ovary has been effected.

Only 3 of the 10 Australian species occur within the tropics and they are, for the most part, confined to areas above 2,500 feet in open forest (but under undergrowth) not far from rain forest and in one species within the rain forest also.

***Corybas abellianus* Dockr.** Nth. Qld. Nat. 24, no. 112:1 (Sept. 1955)

Leaf 5-20 x 5-18 mm. $\pm$ cordate, often the veins are white. Peduncle 2-4 mm. long, elongating to as much as 15 mm. after the ovary has been fertilised. Flower usually nodding, 6-10 mm. long, reddish purple with the lobe of the labellum white. Dorsal sepal 6-10 x 4-8 mm., curved right over the whole flower, falcate-galeate, narrowing towards the base, obtuse. Labellum 5-8 mm. long, tubular for over half its length then greatly expanding, anteriorly, to about $3\frac{1}{2}$ times the width of the tube; at the bottom of the anterior margin is a cup-like lobe with rolled margins, which has a horizontal orifice; auricles directed downwards, averaging about 3 mm. long, conical. Column averaging about 3 mm. long, including the anther, with a large staminode in front which is about 1 x 1 mm. and rounded on top.

Flowering period:— February to May.

Distribution:— North-east Queensland—the southern end of the Atherton Tableland and the Evelyn Tableland.

Corybas aconitiflorus Salis.

Parad. Lond. t 83 (1805); Reichb. f., Beltr. 43 (1877); Rupp. Proc. Linn. Soc. N.S.W. 53, pt. 5:551 (Nov. 1928) & Orch. N.S.W. 73 (1943); Hatch. Trans. Roy. Soc. N.Z. 75:367 (1945) et ibid 76:577 (1946).

Corysanthes bicalcarata R.Br. Prodr. 328 (1810); Benth., Flor. Austr. 6:351 (1873); R. D. Fitzg., Aust. Orch. 1: pt. 2 (1876); F. M. Ball., Qld. Flor. 5:1572 (1902); Rupp. & W. H. Nich., Proc. Linn. Soc. N.S.W. 53, pt. 2:88, t 12, srs 6, f 3, 4, 8 & 9 (May 1928); Coleman, Vict. Nat. 48:95 (Sept. 1931).
Corysanthes cheesemantii Hoof. f. ex. T. Kirk, Trans. N.Z. Inst. 3:180 (1871).

Leaf 10-35 mm. long, $\pm$ cordate, sometimes red underneath. Flowers extremely variable in size, from 10-30 mm. long, dull reddish-purple or white (when the latter colour, and large in size, appearing like a miniature mushroom before it expands). Dorsal sepal bent over the whole flower, falcate-galeate, obtuse to acuminate, greatly contracted towards the base. Labellum about half the length of the dorsal sepal, $\pm$ upright, the tubular portion much longer than the expanded portion and very narrow at the base; expanded portion with deeply folded back entire margins which are usually white; auricles directed downwards, 2-3 mm. long, conical. Column 3-4 mm. long, including the anther, with a large dome-like staminode in front.

Flowering period:— March to May in the tropics.

Distribution within the tropics:— Most of the higher ranges to at least as far north as the Evelyn and Atherton Tablelands. It extends throughout Eastern Australia to Tasmania and New Zealand.

Corybas fimbriatus (R.Br.) Reichb. F.

Beltr. 42 (1877); Rupp. Proc. Linn. Soc. N.S.W. 53, pt. 5:551 (Nov. 1928) & Orch. N.S.W. 73 (1943).

Corysanthes fimbriata R.Br. Prodr. 328 (1810) & App. Flind. Voy. 610, t 10 (1814); Benth., Flor. Austr. 6:351 (1873) (but incl. *C. pruinosa* A. Cunn.); R. D. Fitzg., Aust. Orch. 1: pt. 1 (1875); Rupp. & W. H. Nich., Proc. Linn. Soc. N.S.W. 53, pt. 2:83, t 12, f 1 (May 1928).

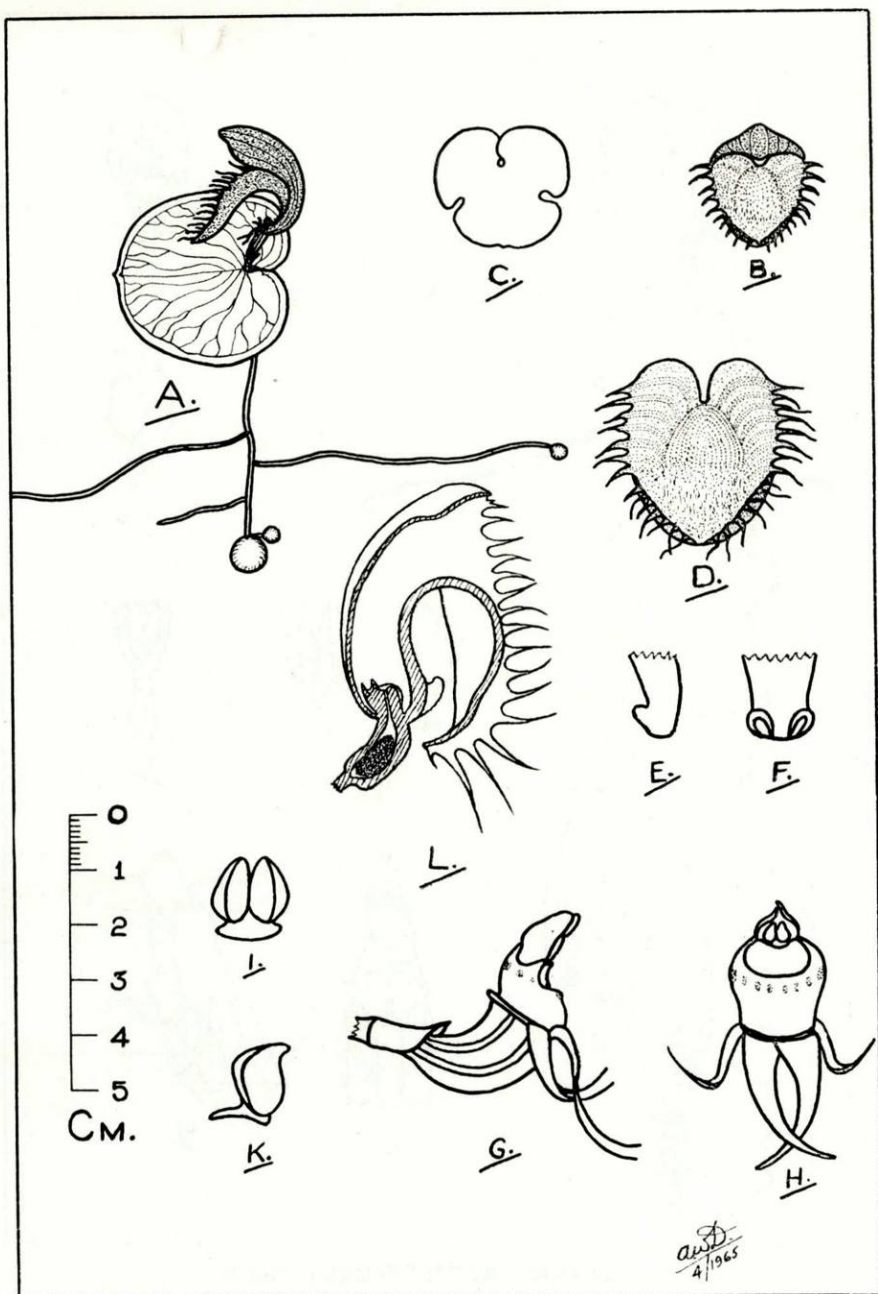
Leaf 12-35 mm. diam., cordate or almost reniform to circular, occasionally trilobate. Flowers 2-3 cm. long, dominated by the labellum, reddish-purple. Dorsal sepal not bent over the whole flower and only slightly acculate, much contracted in the basal half, obtuse. Labellum at least as long as the dorsal sepal, erect and tubular in the basal half, then decurved through about 180° and greatly expanded into an ovate lamina, about 10-17 mm. long, which has its margins deeply fringed with purple fimbriae up to 5 mm. long, and a dome-like boss in the centre; auricles small, directed obliquely upwards or forwards. Column about 3 mm. long including the anther; no staminode present.

Flowering period within the tropics:— March to May.

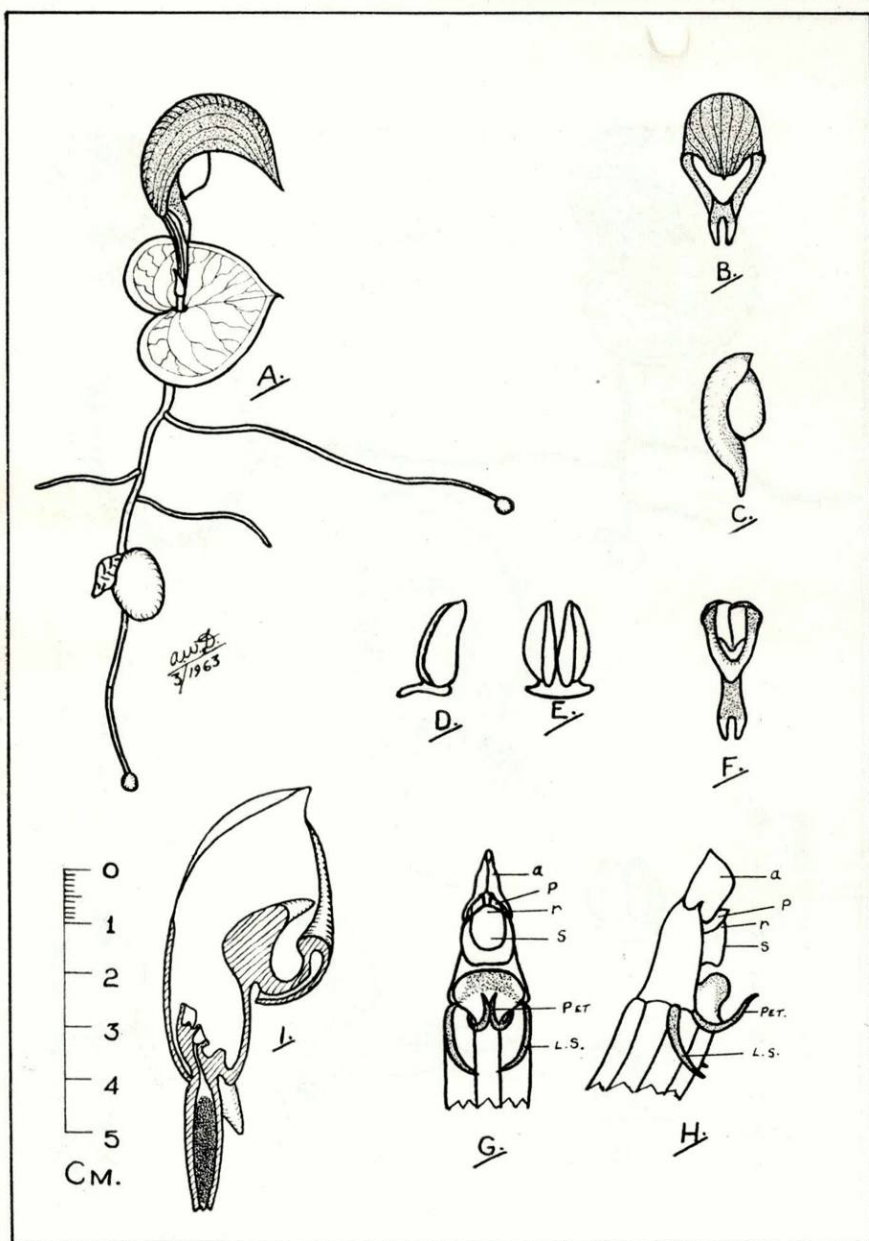
Distribution within the tropics:— So far only recorded from Dunk Island and the Herberton Range. It extends from south-east Queensland to Tasmania.

GROWING CORYBAS

Corybas are quaint flowers and would be quite attractive horticultural subjects if they could be grown successfully. They are rather readily cultivated, if due regard is paid to climate, in moderately heavy shade, in well-drained pots in a usual terrestrial orchid compost of rich sandy loam plus leaf mould or rotted sawdust, but they are highly subject to attack by red-spider, mealy bugs, damping off etc.

*CORYBAS FIMBRIATUS* (R.Br.) Reichb. F.

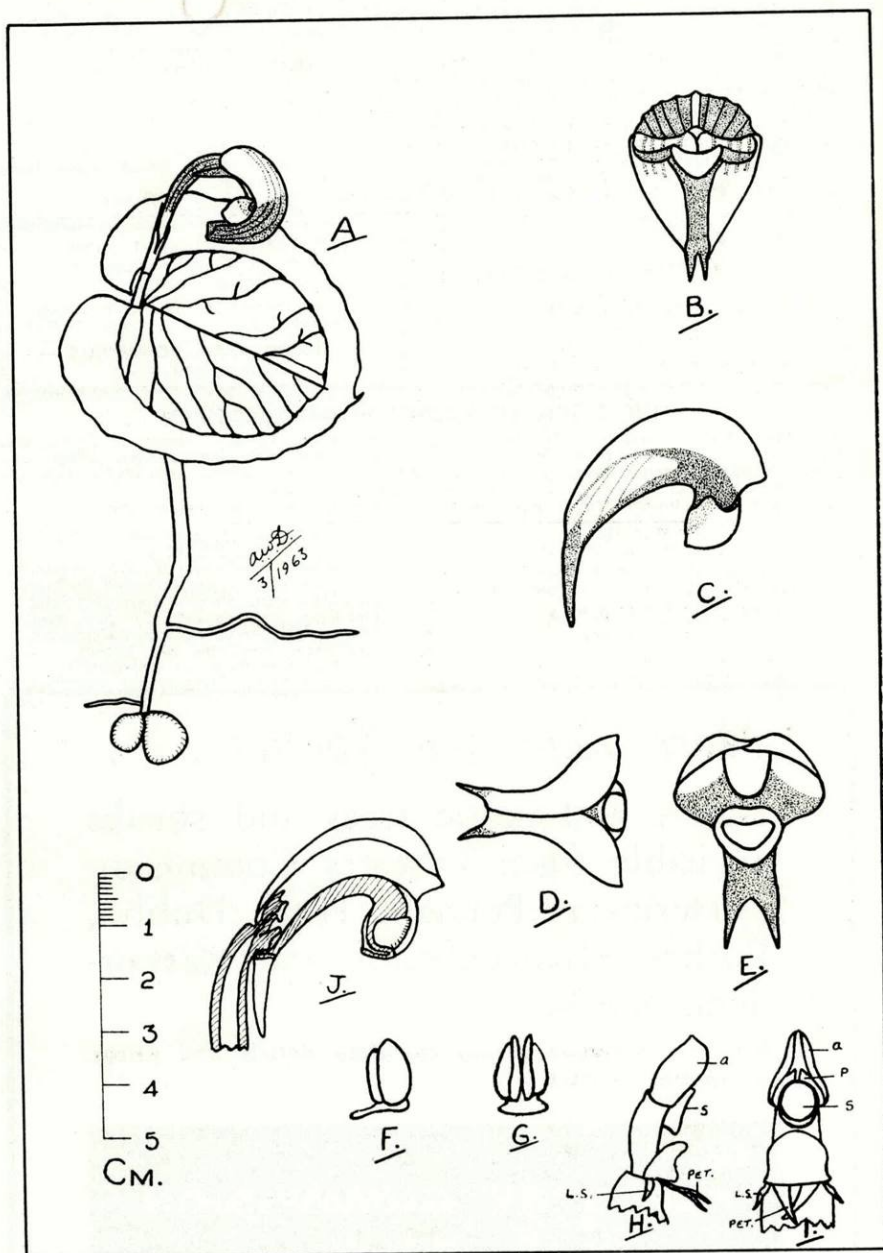
- A. Plant (flower from the side) . . . to scale.
 B. Flower from the front . . . to scale.
 C. A leaf shape sometimes encountered . . . to scale.
 D. Labellum from the front . . . to scale x 2.
 E. Base of labellum from the side . . . to scale x 3.
 F. Base of labellum from the front (showing auricles) . . . to scale x 3.
 G. Column from the side . . . to scale x 7.
 H. Column from the front . . . to scale x 7.
 I. Pollinia from the front . . . to scale x 20.
 J. Pollinia from the side . . . to scale x 20.
 K. Pollinia from the side . . . to scale x 20.
 L. Median longitudinal section of column and labellum . . . to scale x 4.

**CORYBAS ACONITIFLORUS Salisb.**

- A. Plant . . . to scale x 2.
 B. Flower from the front . . . to scale x 2.
 C. Labellum from the side . . . to scale x 2.
 D. Pollinia from the side . . . to scale x 20.
 E. Pollinia from the front . . . to scale x 20.
 F. Labellum from the front . . . to scale x 2.
 G. Column from the front . . . to scale x 10.
 H. Column from the side . . . to scale x 10.

- I. Median longitudinal section of column and labellum . . . to scale x 5.

a—anther
 p—pollinia
 r—rostellum
 s—stigma
 pet.—petal
 L.S.—lateral sepal



CORYBAS ABELLIANUS Dockr.

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ISOPOGON CUNEATUS & LATIFOLIUS

Part 3 of the series on *Isopogon* and *Petropile* this time by E. J. Croxford

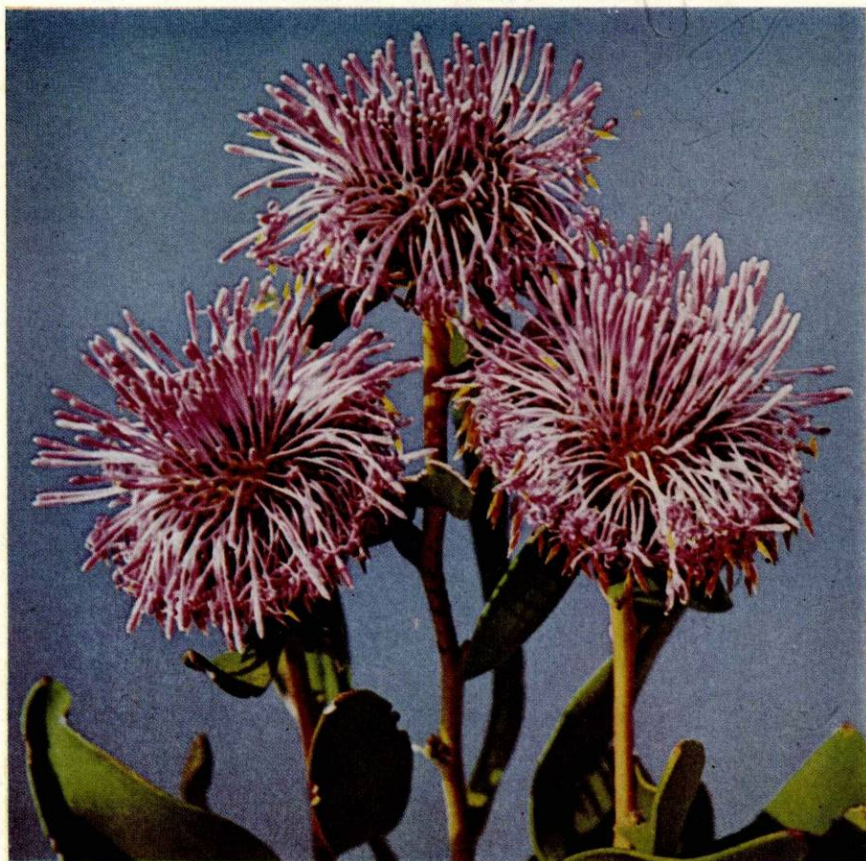
The sight of acres of *Isopogon cuneatus* in flower at springtime used to be one of the attractions in the Albany area but, since the advent of the bulldozer and land development, only those who are really interested in wildflowers know where they are now.

Isopogon latifolius flowers well on the slopes of the Stirling Range National Park and is fully protected. It has been suggested that this species is a mountain form of *I. cuneatus* which is found on open lands, usually in clayey loam with coffee rock subsoil. The two species are practically identical except that the leaves and flowers of *I. latifolius* are slightly larger than those of *I. cuneatus* and there is a difference in the brush which is noticeable under a magnifying glass—*I. latifolius* is a spindle shape and *I. cuneatus* straight and narrow.

I. cuneatus is found in the company of *Banksia brownii*, *Pimelea suaveolens*, *Lambertia petrophila*, *Adenanthos actinodium*, *Banksia repens* and *Banksia sphaerocarpha*. In fact areas where they flower in spring are veritable gardens of colour and beauty. A patch I am interested in is subject to constant cropping by cattle, but it only serves to stimulate the plants to further effort as they shoot out in all directions. This makes me feel they would stand up to garden conditions and pruning, and also live a fairly long while, as this patch has bushes on it that I know are seven-years-old. *I. cuneatus* plants transplanted from the bush have grown on well with regular care and watering. Watering with aquasol has also proved beneficial.

FROST HARDY NATIVES—continued from page 275.

- Hakea elliptica*, (18). *nodosa*, (18. lcl.). *purpurea*, (18). *suaveolens*, (18). *strumosa*, (18).
Hebe formosa, (II. lcl.).
Hibbertia procumbens (lcl.). *scandens*, (8).
Hovea elliptica, (8). *lanceolatus*, (15). *pungens*, (8).
Indigofera australis, (24).
Kunzea ambigua (24 lcl.). *peduncularis*, (18). *recurva*, (18). *baxteri*, (I plant 18 mths., others 8 mths.).
Lambertia formosa, (18).
Lasiopetalum dasyphyllum (9. lcl.).
Leucopogon, various sp.
Leptospermum. *arachnoides*, (9). *laevigatum*, (18. lcl.). *flavescens*, (8). *liversidgei*, (8).
juniperum, (8). *rotundifolium*, (8). *speciosum*, (8). *semi-bactatum*, (8). *sphaerocarpum*, (14). *scoparium* var. (18). *grandiflorum* (8. lcl.).
Melaleuca. *crassifolia*, (18). *elliptica*, (15). *gibbosa*, (12. lcl.). *huegeli*, (14). *incana*, (18).
micromera, (9). *nesophila*, (18). *polygaloides*, (15). *pubescens*, (18). *pulchella*, (15).
squamea, (9. lcl.). *squarrosa*, (24 lcl.). *thymoides*, (24). *wilsoni*, (15). *glaberimma*, (15).
pungens, (8). *leptoclada*, (8).
Marianthus drummondii (11).
Olearia gunniana (15). *lyrata*, (15. lcl.). *floribunda*, (24). *erubescens*, (11). *glandulosa*, (24).
viscosa, (9). *ciliata*, (9).
Oxylobium ellipticum, (12).
Pelargonium rodneyanum, (9).
Pimelea flava, (24. lcl.). *nivea*, (12. lcl.). *filiformis*, (12).
Pomaderris elliptica, (8. lcl.).
Prostanthera lasiantha (24. lcl.). *ovalifolia*, (24). *rotundifolia*, (14. lcl.).
Pultenaea daphnoides v. *obcordata*, (18. lcl.). *hibbertioides* (8. lcl.).
Pittosporum bicolor (12. lcl.).
Ricinocarpus pinifolius, (18. lcl.).
Scaevola aemula, (14). *nitida*, (6).
Sollya heterophylla, (8).
Templetonia retusa, (18).
Tea-pea truncata (lcl.). *speciosissima*, (24).
Thysanotus multiflorus, (18).
Thryptomene micrantha, (21. lcl.).
Tetratheca pilosa, (18. lcl.). *glandulosa*, (6. lcl.).
Veronica derwentia, (18. lcl.).
Westringia rigida, (15. lcl.). *brevifolia*, (9. lcl.). *rubiaefolia*, (9. lcl.).
Westringia. Several other mainland sp.
Zieria aborescens (9. lcl.).
 GROUP II.
Acacia cultriformis, (27). *A. frimbriata*, (18). *A. pruinosa*, (8). *A. podalyriaefolia*, (19). *Agonis flexuosa*, (15). *A. marginata*, (15). *Angophora cordifolia*, (24). *Banksia ericifolia*, (18).
Brachysoma lanceolata, (18). *Dryandra praemorsa*, (8). Badly cut. *Eucalyptus citriodora*, (26).
E. ficifolia, (24). *Hakea petiolaris*, (15). *H. multilinea*, (18). *Indigofera sinata*, (18).
Melaleuca diosmifolia, (18). *Marianthus erubescens*, (6). *Thryptomene saxicola* (Paynes), (8).

ISOPOGON CUNEATUS

Colour photography by F. W. Humphreys.

This species comes into bloom in late winter when flowers are scarce. There is also a great potential for the flowers in the realm of floral art, as they have good strong stems and the lovely shaggy heads of a rosy mauve shade to make an outstanding arrangement. Some heads reach 3" across under good conditions. Tests taken of the soil show a Ph between 5 and 4.

This species is very similar to *Isopogon latifolius* except that the leaves and flowers are slightly larger in *I. latifolius* and there is a slight botanical difference in the flower. For a further description and a guide to their cultivation see page 287.

PROPAGATION OF ISOPOGON

I have found that *I. cuneatus* grows well from cuttings taken after flowering with what are usually known as half hardy cuttings. These should be placed in a mixture of coarse sand and peatmoss, covered with a plastic bag, and kept moist for some weeks. The plastic bag could then be gradually left off and it is usually about six months before rooting takes place. Cuttings taken last year and planted out are now bearing flower heads for next spring. Seed also germinates readily, but one has to be careful not to overwater otherwise the seedlings tend to die.

Seed heads of the previous year are best to collect, and if left in a brown paper bag with a dusting of DDT and put in a dry place for about three months, they are generally ready to fall out.