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Colour photography by Frank Hurley

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HYPOCALYMMA ROBUSTUM—The Swan River Myrtle

A small shrub for your garden. Full details of cultivation are given. Other wildflowers described include "Native Orchids", "Eucalypts", "Pussy-tails", etc.

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PROPAGATION OF WILDFLOWERS

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Propagation of Hypocalymma by E. Wittwer—page 101. Propagation methods that can be widely applied.

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HYPICALYMA

by H. M. Hewett, Plant Recording Officer, N.S.W. Region

Two species of *Hypocalymma* have proved reliable in Sydney under practically all garden conditions.

***Hypocalymma angustifolium*.** Some recorded specimens of *H. angustifolium* are approaching 10 years of age and continue to produce their annual floral display in brilliant profusion to the delight of myriads of bees. In fact, on garden inspections I have often heard the sound of their humming before sighting the object of their attentions.

Hypocalymmas are small shrubs of the family MYRTACEAE. *H. angustifolia* grows to about 2' 6" high and commences to flower in early winter. Propagation by cuttings taken from newly grown tips is both fast and sure, and this has undoubtedly contributed to its popularity among native plant gardeners. It responds favourably and I might say even shows improvement when pruned hard after flowering, even if cut back annually almost to ground level.

Although as stated above it has shown reliability under all garden conditions, I would say it has produced faster growth in sunny positions and in sandy mediums free from root competition from trees or large shrubs.

It has not shown any tendency to suffer from fungal troubles and appreciates regular watering, although in the absence of same and under dry seasonal conditions, the usual effect is merely a slowing of the growth rate. In Western Australia, from where this species originates, it is distributed over a wide part of the south-west of the State, and is found in a variety of soils from light sand to heavy granite loams and under ground water conditions varying from well drained to almost completely saturated in winter and spring, along drains and watercourses. The flower colour varies from pure white to red ageing to white, and it is this latter characteristic, which, when produced in profusion from almost every leaf axil over the whole specimen makes *Hypocalymma angustifolium* surely one of our most beautiful and graceful small shrubs.

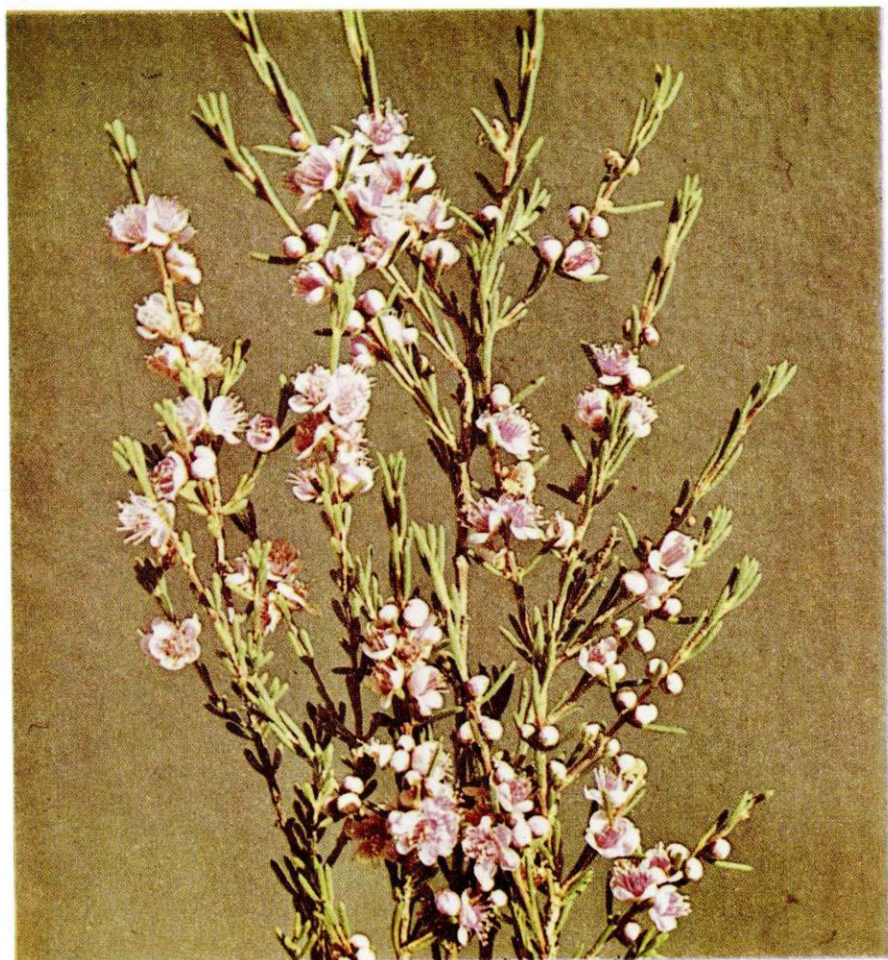
***Hypocalymma cordifolium*,** the other widely grown species is not so conspicuous or spectacular in flower, the same being smallish, white, and to a certain extent hidden by the lush greenery of the cordate, or heart-shaped foliage, but nevertheless it retains a certain charm with its ascending habit of growth.

Like *H. angustifolium* it is a particularly easy species to propagate by vegetative means, and although hardy under practically all conditions of soil and exposure, it shows to most advantage when grown in broken to reasonably heavy shade, or with leaf association of other low growing shrubs. It is best when capillary moisture is present in the soil as might be expected when one appreciates the fact that in winter and spring it can be observed along the southern coast of W.A. actually growing through water in badly drained sections of the roadside verges.

One word of caution however should be noted in connection with summer watering. In my experience die back of foliage has occurred when the leaves have become wet during the heat of the day.

Editor's Note: The last issue No. 30 describes the prominent petalled forms of the great family Myrtaceae such as *Baeckea*, *Micromyrtus*, *Leptospermum*, etc., that are a feature of the flora of the eastern States. This issue features plants of the Myrtaceae that hails from W.A. Our next issue will feature the "Geraldton Wax" and its related species and reports of growing experiences with any of these plants should be forwarded to the editor.

This species, as *H. angustifolia*, responds favourably to heavy pruning and for this reason has great potential for usage in planned landscaping treatments.



Colour photography by F. W. Humphreys.

HYPOCALYMMMA STRICTUM (See page 101)

Hypocalymma robustum, the beautiful "Swan River Myrtle", has been frequently tried of recent years by members of our society, but compared to the above varieties, successes have been rather limited. It is of similar height, and leaf shape to *H. angustifolium*, but flowers are larger and a striking medium to deep pink throughout, with plant growth usually a little more open or rangy, particularly in mature specimens.

Propagation, while a little more difficult than with the former species has been most successful from cuttings of fast moving tip growth taken during late summer or early autumn. Once potted on and placed under nursery conditions of humidity and broken shade, growth is usually reasonably rapid. After this stage however troubles begin to show out.

My first introduction to the species was in a garden at Roseville where soil medium was a light yellow coloured Wianamatta shale residual, well drained and consistent in texture for some twenty feet or so. Here, plants were growing with little if any attention beyond an occasional pruning, and were apparently quite hardy, the oldest being some thirteen years.



Colour photography by M. Hewett.

HYPOCALYMMMA TETRAPTERUM (See page 99)

I have since recorded several specimens growing very satisfactorily in areas of deep light grey to white coastal sands with a permanent water table varying from say 2 to 5 feet below surface level. The species has also shown favourable performance in similar sand over sloping shelf sandstone carrying a moisture track 2 feet or so below, but from these conditions my records are a complete blank until reaching almost the opposite end of the soil texture range where some success has been achieved in heavy brown and red clayey loams. In these soils growth seems generally much slower than before, but the plants appear to show some ability to withstand rapid weather changes. This characteristic is particularly evident where specimens are protected by some light shading of taller shrubs, and yet grow in a generally warm situation. I would think that this relatively

more impervious medium would provide a damping effect or slowing down of the conditions of saturation and drying out of the soil, caused by rapid changes in weather, thereby allowing the plant more time to accommodate to same.

For about five years I have personally tried to grow this species but have met with failure upon failure, until recently, when by adopting a different approach, I feel I have at last crossed what has been a very definite hurdle. As well as planting in my natural soil, a medium textured podsolic loam containing flat ironstone ridge gravel in varying sizes, I have also planted specimens in well drained rockeries of sandstone and grey bush sand. Without exception the life of the plant seemed to depend entirely upon the duration of mild weather, and with the advent of the first spell of warm dry conditions, vigour of the tip growth ceased, and in a matter of a few days another *Hypocalymma robustum* had passed on. In desperation I decided to experiment by preventing the soil from drying out, so I selected:-

- (a) A sunny rockery situation as noted above, and
- (b) A cool well drained natural soil location subject to about 75% shade, and near the south edge of a built up garden bed.

In each case I placed pieces of sandstone around the base of the plant to keep the soil cooler and also to help prevent the roots from drying out during the daytime. Watering has always been done in late afternoon or when weather was very hot, in early evening, and I have done so whenever necessary to maintain some moisture in the surface soil. Furthermore, water has always been applied at the base of the plant, taking care to avoid wetting the foliage. Both specimens have continued to make steady growth, but plant "b" is by far the more vigorous. This suggests that the greater quantity of plant food available from the effects of humus in the medium textured podsolic soil is more to the plants liking than the heavily leached grey bush sand. It may be significant at this stage to record a report of a plant in W.A. which grew in a poultry yard and became a most spectacular specimen.

I have also been advised quite recently by a member (although at the time of writing I have not been able to personally inspect his garden), that to establish *H. robustum* it is highly desirable to plant in broken shade, and imperative that plants be prevented from drying out until a degree of maturity has been attained. Perhaps the nursery performance of this species, which indicates a liking for constant humidity would also provide the key to satisfactory garden treatment.

While holidaying in W.A. last September, I was very interested to observe this species growing in its native state, and I was surprised to discover its occurrence under two distinctly variant soil conditions, viz in the deep sand tracks north of Perth and also brown granitic loams such as in the National Park and along the roadside south to Armadale. I did not discover any evidence of its existence in W.A. "sand plain" type conditions where it is usual to find gravel or other reasonably impervious layers of material below a sandy covering of several feet, and where the occurrence of tall *Eucalyptus* species was comparatively rare.

I think perhaps, its behaviour to date in Sydney soil conditions could be explained to some extent by this natural occurrence of the species, which I always found growing as an understorey in association with large trees, tall shrubs and grasses etc. Perhaps also the apparent success being achieved

in my own and other Sydney gardens by maintaining the soil in a moist condition may be explained by consideration of the following natural growing conditions of the species.

(a) Where growing in deep free sand the root system could penetrate deeply to a level of reasonably stable capillary moisture.

(b) Where growing in stoney, granite loams penetration of roots would not be extensive but rapid reaction to weather changes as noted previously would be countered.

In both (a) and (b) associated foliage would provide humid conditions to some extent, particularly at night, and low growing ground cover would maintain soil in a cooler condition.

Whatever means however are used to obtain success with *H. robustum*, the result will be a most rewarding achievement to the grower.

Hypocalymma puniceum has been grown for approx. three years, and to date appears to be reasonably hardy, growing in very poor coarse sand in an open situation. This is an attractive species with individual flowers and leaf form closely resembling *H. robustum*, but flowering tends to be scattered over the shrub and distributed over about nine months of the year, rather than be concentrated in a spectacular flush. According to comments on this species, which I received while in W.A., it responds well to garden cultivation when grown under sandy conditions. I observed it growing naturally in such conditions in close association with *H. robustum*, where it seemed to grow more densely, and also slightly taller.

Hypocalymma tetrapterum is only now being launched, so to speak in the Sydney garden zone and we will eagerly await reports on this most beautiful species. A striking primrose yellow, I found it growing on gravelly roadside verges in sand plain country near Badgingarra, under conditions of full exposure. Plants were from fifteen to eighteen inches high, of symmetrical habit, and as with *H. angustifolium* carried flowers in almost every leaf axil. The soil medium where this species was observed was an open sand containing a high percentage of ironstone pea gravel. Adjacent foliage was generally of a low nature. If this species can be adapted to our conditions it will make a magnificent rockery plant.

Hypocalymma xanthopetalum. The last species of the genus of which I can claim even meagre familiarity is *H. xanthopetalum*. This also has the attractive primrose yellow flower, but unlike the foliage of *H. tetrapterum*, which is short and broadly oblong, this variety has leaves very similar to *H. angustifolium*. I found it growing as an understorey among fairly dense low growing shrubbery in light coloured sand near the Arrowsmith River. I dug down to approx. 2 ft. without striking any semblance of stone or variation in soil texture, although nearby roadside excavations indicated light deposits of pea gravel at 3 ft. Plants of this slender species were of sparse habit, having at most, three or four stems to approximately 18" high.

A further note by R. D. Joyce, Officer-in-Charge, Botany Branch, Dept. of Agriculture, W.A.

The species occurs in three forms as regards leaf shape, but the flower structure is constant in all forms. The typical plant has leaves up to $\frac{1}{4}$ inch wide and $\frac{3}{4}$ inch in length. This is the commonest form and occurs throughout the range of the plant from Muchea in the south to Mt. Lesueur. The form found and described above is narrower in the leaf and occurs in the eastern portion of the area of distribution between Coorow and Three Springs. The third form which is only known from the Mt. Peron-Diamond of the Desert area has longer terete leaves and a denser habit of growth.

HYPOCALYMMMA IN MY GARDEN

by E. Wittwer, Perth, W.A.

The only species of *Hypocalymma* widely known and grown in gardens in Perth is *Hypocalymma robustum*, the "Pink or Swan River Myrtle". Several other species are just as easy to grow, some very showy, others less spectacular but still worth a place in the garden. I will describe here the species growing in my garden, starting with the best and ending with the less attractive ones.

Hypocalymma robustum Endl. An erect shrub 2-3 feet high, with linear-lanceolate leaves half to one inch long. The axillary flowers are rather small but in profusion usually of a rich pink although white or pale pink forms can sometimes be found. The plant grows on coastal sand in the



Colour photography by F. W. Humphreys.

HYPOCALYMMMA PUNICEUM

Perth area mostly as an under-shrub. It flowers in late winter and spring. Moderate pruning after the flowering season will result in a compact, better flowering shrub. This species grows well from seed.

Hypocalymma puniceum C. A. Gardn. A small spreading shrub about two feet high, leaves narrow linear, half to one inch long. The

crimson pink flowers are about half an inch in diameter, always solitary in the axils. The plant is very floriferous. The shrub grows in gravelly loam in the Avon district. I have found this plant profusely flowering on a railway siding where the soil was compacted by heavy wheat trucks. Flowering time is from February to May. What makes this little shrub so outstanding is the flowering time falling in a period when very few other species are flowering.

Hypocalymma angustifolium Endl. A compact shrub 2-3 feet high, leaves linear to semi-terete about one inch long. Flowers axillary, small, white but often with pink throats. The flowering season starts in July and lasts till about the end of October. During this time the shrubs are covered in a profusion of white or pinkish flowers. This species grows over a wide area reaching from the Irwin down to the Warren and Stirling district.

Hypocalymma strictum Schau. A compact bushy shrub 1-2 feet high, leaves linear-terete $\frac{1}{2}$ - $\frac{3}{4}$ inch long. The rather small pink flowers are axillary. In cultivation the flowering time extends over a long period, starting in February and lasting through winter and spring until early summer. A neat little shrub from the Stirling, Warren and Eyre district.

Hypocalymma cordifolium (Lehm.) Schau. A spreading shrub 3-4 feet high with heart-shaped leaves and white flowers. Flowering time is from late winter to early summer. The shrub grows along creeks or in swamps in the Darling, Stirling and Warren district. In the garden it is best grown in a semi-shaded position, it is a good undershrub but needs watering to keep it in good condition.

Hypocalymma myrtifolium Turcz. (Syn. *H. hypericifolium* Benth.) A dwarf shrub to 1 foot high. The leaves are broadly linear and about 1 inch long. The fresh green colour of the foliage contrasts with the red bark of new shoots. The white axillary flowers are small ($\frac{1}{4}$ inch) and appear during spring and early summer. The plant grows in the Stirling Ranges on rocky slopes but in the garden it prefers a light shaded position.

Hypocalymma tetrapterum Turcz. A small shrub mostly under one foot high. The leaves are broadly oblong about $\frac{3}{4}$ of an inch long. The axillary flowers are small rather crowded in the tap axils of the branches and are of a yellowish colour. The flowering time is from late winter to spring. The plant occurs in the Darling district. In the garden it is best grown in between other dwarf shrubs.

THE PROPAGATION OF HYPOCALYMMA

All species of *Hypocalymma* can be reproduced from seeds as well as from cuttings. The later method gives quicker results and is, in most cases, easier to get cutting material than seed. Cuttings taken from semi-hard (seasonal) wood strike readily. The size of the cuttings depends on the species and on the material available; the lengths may vary from 1-3 inches. We can either take cuttings with a keel or make a clean cut directly below a node. All leaves must be removed from the cover parts to eliminate the danger of rotting. A mixture of 4 parts clean sharp sand and one part of peat moss gives a good propagation medium. The right time to take cuttings is when good ripe propagation material is available; here in W.A. this is from February to April. Cuttings taken at this time of the year will have ample time to produce a large root stem before the beginning of the long dry and hot summer. A sandy potting soil of slightly acid reaction should be

(Continued on page 137)

GARDENING ON BUSH SAND

by W. M. Martin, Clarinda, Victoria

My ground is in the coastal sand belt of Melbourne and I am fortunate in having a keen native-grower in my brother, in the heavy clay soil of Forest Hill, ten miles away. We have many of the same species, planted about the same time, which shows an interesting comparison.

My block is 66' x 150' and at present I have 300 species growing, with plenty of room for more small plants. The most numerous of the genera are *Acacias* (20), *Banksias* (10), *Eucalyptus* (29), *Grevillea* (20), *Melaleuca* (28). In addition I am planting my neighbour's block in the rear, and at present have about 50 species planted.

Heavy Clay versus Sandy Soil

As a general comparison with my brother's plants, it is noticeable that most of his have a richer and more dense foliage and form, and usually flower earlier in their life, and are more floriferous. This applies particularly to *Melaleucas*, *Grevilleas* and a few *Acacias* etc. However, he had many losses of small plantings during earlier establishment, and had better results with more advanced plants from 7lb. cans; whereas tiny plants in my sand grew very quickly to good size.

I find that many plants grow too quickly in my sand and as a result are prone to wind damage through being too sappy and brittle, or are too tall for their root system to hold them up. I have lost two magnificent *Leschenaultia biloba* in full bloom because of the latter. Several other species I have lost through wind damage include *Verticordia plumosa*, several *Epacris impressa*, *Hypocalymma robustum*, *Petrophila sessilis* and *Acacia floribunda*.

Water the Problem

I had *Chamaelaucium uncinatum* thriving beside a dripping tap. One week after replacing the tap washer the plant was dead. My theory is that the concentrating nutrients caused plasmolysis. Two specimens of *Leptospermum rotundifolium* were lost successively in the same spot after three years by thorough soaking of a dry embankment in which they were growing. I suspect that plasmolysis was again the cause of death—the soaking would probably dissolve and concentrate the nutrients in the root zone. It appears that a rapid change in the water content in sandy soils can be fatal to many natives, perhaps? In any case I am firmly convinced that seedlings, cuttings and mature plants are continually being lost everywhere by excessive watering. Observation of seedlings and mature plants thriving in sandy heathlands in middle of summer leads to this conclusion.

Except in special places such as in embankments where I have particular plants, I am gradually withholding watering so as to harden off everything. As I have plenty of natural mulch on most of my block now, I think watering will soon be entirely unnecessary.

Bauera sessiliflora is thriving on an embankment facing west, with very little watering. Roots shaded by *Hypocalymma cordifolium*.

Editor's Note: The controversy over natural bush sand versus heavy soil even clay soil for the cultivation of wildflowers is widely known. The last three issues of *Australian Plants* have set out to assure people that are fortunate enough to have heavy soil that with reasonable treatment they can grow the best wildflowers of all. The above article serves to support this.

Correas—most species thrive in any aspect here except *Correa pulchella* which has sulked for six years. A new seedling is not showing any more inclination to grow in a more shaded situation.

Hibbertia sericea, *H. fascicularis* grow well for two or three years then die suddenly. I suspect watering is the trouble. *H. procumbens* & *H. stricta* are both growing well at present. *H. scandens* grows magnificently along my front fence and over a pergola facing west. Has continuous display of yellow flowers for six months every year. I have easily propagated numerous new plants from cuttings. They all appear to grow best when climbing up rather than over ground.

Sun-shade-Feeding

Eriostemon myoporoides thriving on an embankment facing west has been continually tip-pruned and grows nice and dense; but requires continuous feeding with Blood and Bone and Potash.

Gompholobium huegelli thrives here in the sand, and gives a wonderful gold cover to half a yard of ground for many months.

Near to me I have my "happy hunting ground." This is a two acre block of previously natural heathland which has been modified by annual slashing or surface bulldozing to reduce the alleged fire hazard. It has the usual "egg and bacon" plants, and *Hibbertias*, tea trees etc. etc. It is amazing to see the improvement to the *Bossiaes*, *Dillwynias*, *Aotus* etc. after the slashing by rotary mower. This observation led me to prune hard my own similar plants with consequent improvement in density and floriferousness. This year there was also a wonderful display of hundreds of *Thelymitra ixioides* after the surface scraping last year by bulldozer. *Acacia brownii* also has rejuvenated wonderfully well, and *Leptospermum myrsenoides* came up as usual into wonderful bloom.

Micromyrtus—Beautiful Undershrubs—See Aust. Plants No. 30 issue.

Micromyrtus ciliata gives almost 100% strike from cuttings. I have a lovely low-spreading form. I have lost some mysteriously, and haven't quite decided the cause, however I think they prefer shade from summer afternoon sun although at the present moment my best plant is in rock crevice facing west, and a healthy plant is in shade most of day. The plant in shade has nice green foliage, but hasn't flowered, whereas the plant in sun flowers nicely, but foliage is yellow-green. I am commencing some experiments with lime and iron chelates, for plants with yellowing foliage.

Eucalypts—Gum Trees

All my eucalypts grow well except one loss of *E. torrestiana*. All reports I have indicate difficulty in growing this species in Melbourne, particularly in sand belt. *E. torquata* appears to be hardy. My best at present is *E. papuana* which is 9 ft. tall in 14 months since planting as a small seedling. *E. sepulcralis* is healthy but only 2 ft. tall in 21 months since planting. *E. papuana* is particularly attractive with soft semi-glaucous pink tips, and fine pendulous branches.

Proteaceae—Banksia, Grevillea, Telopea (Waratah)

Banksia integrifolia seedlings responded well to lime (Calcium carbonate), while a young *Banksia dryandroides* responded quickly to iron chelates. Oh well, I shall continue to experiment as *Banksia* have been my biggest problem.

Some *Grevilleas* are not easily grown in the sand belt. *Grevillea juniperina*, *G. lavandulacea*, *G. oleoides* var. *dimorpha*, were hard to

establish. I lost quite a few. I think they must have summer watering to survive in sand belt, although they thrive in my brother's block without watering. *G. asplenifolia* requires watering and regular fertilising (including potash) to look its best. The hybrid *G. asplenifolia* x *G. caleyi* is a much more attractive plant. However *G. asplenifolia* is the favourite of my Honeeaters.

I have three N.S.W. Waratahs, *Teloepa speciosissima*, growing well. I feed them Blood & Bone occasionally. They get summer watering, but I don't think they need it. They happen to be close to small stuff that does require watering at present.

My *Hypocalymma robustum*

Hypocalymma robustum grew to 4 ft. in twelve months and was bisected by wind. The remaining half thickened and grew on to 6 ft. next year. It was again bisected by wind while in full bloom. Jack Seaton saw it at this stage and said it was easily the best specimen he'd seen. It is growing right on the edge of 4 ft. embankment which is a dry rock wall. *Brachycome multifida* provides thick ground cover. I have hard pruned it now, and hope to grow it better able to withstand wind.

Melaleuca

There doesn't seem to be any problem with any melaleucas, except *M. decussata* which grew too sparse and unattractive, so I pulled it out. In my brother's garden it is quite dense and attractive. *M. wilsoni*, *M. pulchella*, *M. thymifolia* are all much more dense, floriferous and attractive than mine also.

I had *Chorizema cordatum* in a small tub for three years. I became tired of its sparse foliage and flowers, so planted it in front of a neighbour's garden. It was the showpiece of the street for six months this year. A thousand curses!

Birds

I have severe troubles with birds during spring and summer. I have lost many valuable seedlings to them. I now have to enclose all small plants in wire cages for twelve months. I have suspected in turn sparrows, blackbirds and mynahs. Now I suspect them all. I am attracting many native honey-eaters some of which nest here each year. My apple and other fruit trees never are infested with codlin moth or other pests. Even the damn sparrows which harass the Honeeaters, can be seen hunting for grubs among the foliage. I spend many delightful (wasted—according to my wife) hours watching the antics of the birds in the ponds and pools I have provided. Perhaps it may be needless to say that I fully endorse the remarks of Mrs. Salter and others in regard to pesticides, and the delights of native gardens with their complement—the birds.

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NATIVE PLANTS ON CLAY SOILS

By Wandel Flentje, Dept. of Agriculture, Victoria

Clay soils may be defined as those with more than 50 per cent of clay size particles in the top few inches of the profile and there are many areas in Victoria with this type of soil. Notable examples are the heavy clays of the Goulburn Valley and the black earths of the Wimmera. They are also found in cities such as Melbourne where there are many home gardens.

In Melbourne there is a wide range of soil types from the sand belt in the south-east of the city to the heavy clays of the western suburbs. There is also a large area of soil type called the Hallam loam which extends over a large area of the eastern metropolitan area. This is a shallow soil with 6 to 8 inches of a grey loam overlying a fairly impermeable yellow clay and it has associated with it some of the problems which are found for gardeners on the heavier clay soils.

In southern Victoria many of the heavy clays have been formed from basalt and may be red or black in colour. Black clays are usually very sticky in winter and so are hard to cultivate and often become waterlogged. They may also set hard in summer although some are self-mulching.

The red clays are generally easier to work and both types are good chemically although phosphate levels may be fairly low.

The lighter grey soils which are found extensively in southern areas of Victoria are easier to cultivate than the clays and are less subject to water-logging but they also set hard in summer and show more marked mineral deficiencies. Phosphate, nitrogen and potash are all of low status in these lighter soils.

In order to improve clay soils for the growth of plants they should be drained well and their structure improved. Most plants grow best on well-drained soil and it is essential that the naturally poor drainage of the clay is improved. This can be achieved by the installation of underground drains to remove excess water from the soil.

Improvement of the structure of the clay can be achieved in several ways. The addition of gypsum will aggregate the clay particles and make the clay more permeable to air and water. Organic matter, added by the mixing of organic manures with the soil or by the growth and ploughing in of a green manure crop, will improve the structure of the clay.

Where native plants are to be planted, liming is not recommended because it reduces soil acidity; most native plants require an acid or neutral soil.

To sum up, it can be said that most clay soils in Victoria can be used for the growing of native plants and for those plants requiring different soil conditions than are found under most clay soils. All clays or soils with clay in them can be improved and this is usually achieved by good drainage and the addition of gypsum or organic matter.

Editor's Note: Other issues have specifically mentioned the treatment of clay soils, this article being for Victoria.

GYPSUM AS AN IMPROVER FOR CLAY SOIL—A note by G. Wallis, Roseville, N.S.W.

The excellent article by C. Loxley in *Australian Plants*, page 345, Vol. 3, recommends the use of gypsum as a soil improver for clay soil. He may have given a wrong impression however, when he describes it as "a very hard mineral." In comparison with the hardest, diamond, 9 on the hardness scale, it is almost soft at 1.5 to 2. It can be scratched with a finger nail. The reason for it needing to be finely ground is its poor solubility.

KURRAJONG

BRACHYCHITON POPULNEUM AS A STREET TREE

by R. W. Boden, Research Officer, Parks and Gardens Section, Canberra

One of the most drought hardy native trees suitable for planting as a street tree in inland areas is the Kurrajong, *Brachychiton populneum* R.Br.

Kurrajong is native to inland areas of N.S.W., north-eastern Victoria and southern Queensland with mean annual rainfall less than 25 inches and long, hot, dry summers. Its main natural occurrence is on plain country where it is common to see Kurrajongs left standing in wheat paddocks cleared of other trees. The reasons for this are twofold. Firstly the foliage is highly palatable to stock and may be a major fodder reserve in periods of drought, and secondly, it is an effective shade and shelter tree.

It also occurs naturally in tableland areas where it is confined to slopes and hillsides, but does not grow in valleys subject to poor drainage or intense frost.

The features which make Kurrajong a useful park and street tree are its drought hardiness, evergreen habit and compact round headed crown of bright, green leaves. The juvenile foliage is often trilobed and differs markedly from the mature leaves, which are generally ovate and entire. The attractive creamy white bell-shaped flowers are followed by 3 inch brown boat shaped pods.



Brachychiton populneum as a street tree in Gilgandra, N.S.W.

Editor's Note: The genus *Brachychiton* was fully described in our No. 20 issue and all the species introduced. Each species will again be described in future issues as they are of special value to the horticulturalists. Please send in a report of your experiences with these trees especially the "bottle tree" and the "flame tree".

The above article is one of a series by H. Oakman and R. W. Boden on Australian Trees for Street Tree Planting. Why is not more effort made to beautify our streets? The tree on page 108 is recommended as a street tree in our No. 15 issue.

Growth in the early stages may be slow but it is reliable. Only light pruning is required in the young stage to shape the crown. Pruning of established trees should be avoided as the regrowth is likely to be uneven.

The bark of Kurrajong is soft and easily damaged thus care should be taken when staking young plants to prevent ties cutting into the stem.

Propagation is from seed which germinates well, and most street planting is done with 1-2 year old seedlings. There is considerable variation in stock raised from seed, and grafting or budding of selected forms has been carried out successfully to help reduce variation. One of the particular features for which selection is desirable is sparse fruiting as a heavy crop of brown pods detracts from the otherwise neat appearance of the crown.

Trees may be transplanted safely even when quite large, provided this is carried out during the spring or summer months when there is rapid regrowth of roots. Transplanting in winter may result in death or severe "set back" as the fleshy roots when damaged have a tendency to rot in cold soils.

When transplanting from the seed bed it is advisable to give a heavy root and top pruning, which assists in establishment and enables trees to be planted directly from the nursery bed to the permanent site. Kurrajong should be raised in open seed beds where the long tap root can develop unobstructed; if raised in pots or small tins the main tap root will be forced to curl and circle in the tin becoming completely pot bound.

Successful growth of Kurrajong has been recorded in the Street Tree Study Group from Meriden and Cottesloe (Western Australia), Alice Springs (Northern Territory), West Torrens (South Australia), Wentworth, Griffith, Leeton, Gunnedah, Gilgandra, Dubbo, Casino (N.S.W.) and Melbourne (Victoria).

It is recommended as a street and park tree for inland areas with annual rainfall greater than 15 inches, and relatively mild winters. Kurrajong may be damaged by severe frosts which cause browning of the foliage and branch shedding.

BOOK REVIEW

These Books are not available from the Editor or the Society, but from your Bookseller.
WILD AUSTRALIA by M. K. Morcombe

Price: \$4.50

A feature of this 112 page book is the large full colour plates, dozens of them all proclaiming the superb photographic skill of the author. The author's aim is to capture Australia in the wild in full colour and the chapter headings will indicate the scope of the book—"The Eucalypts", "Wrens", "Banksias", "Honeyeaters", "Creatures of the Night", "Parrots, Cockatoos, Lorikeets", "The Avid Lands", "Birds Beneath the Ground", "Mistletoes", "Forest Life", "The Western Wildflower" and "Dependent on Water". The simple text adequately describes the drama of nature, the interplay of animals, birds and wildflowers in their natural stage—Wild Australia.

LETTER TO READERS OF "AUSTRALIAN PLANTS"

I am impressed by the tremendous interest in growing native plants of Australia and the impetus which fostered initiation of *Australian Plants*. Nothing like it exists in the United States, although we have people interested in growing native plants and many special plant societies.

At the U.S. National Arboretum, we are building an herbarium with broad objectives as a national and international centre for research and investigation on cultivated plants. The collection is world wide in scope and consists of specimens of ferns through the seed plants—herbaceous and woody, temperate and tropical species and their cultivated derivatives (hybrids, cultivars, and other elite materials).

We would be very glad to receive herbarium specimens of cultivated Australian plants, although we realise that most gardeners and horticulturists usually don't do this kind of thing. However, we would be glad to make arrangements with anyone interested and could assure them of our appreciation in getting material which would be kept in the most modern air-conditioned quarters. Co-operation invited.

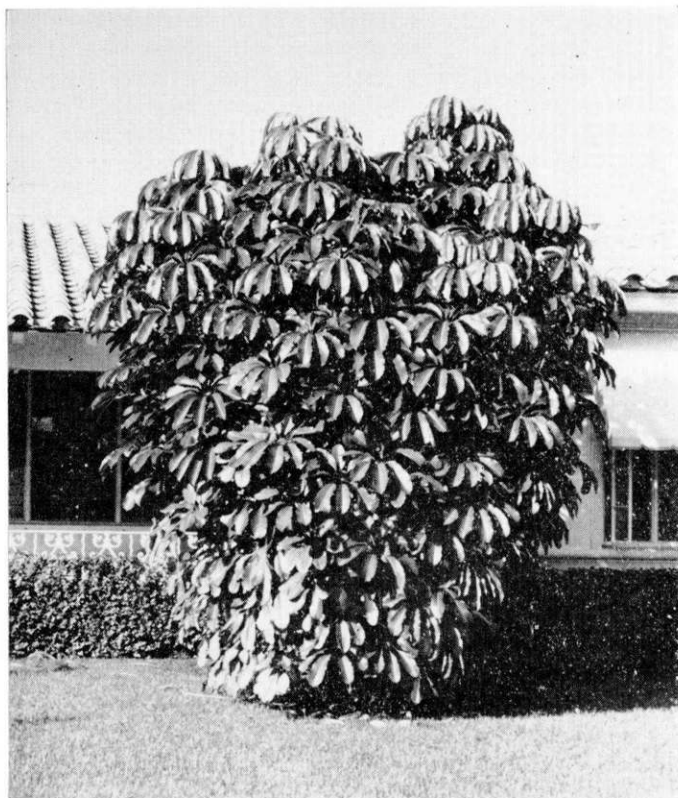
Dr. Frederick G. Meyer.

Herbarium, U.S. National Arboretum, Washington, D.C. 20250

BRASSAIA IN FLORIDA

by Alex D. Hawkes, Coconut Grove, Florida, U.S.A.

The most popular Australian tree grown here is *Brassaia actinophylla*, a splendid member of the Araliaceae. It is known here as the Queensland Umbrella Tree. Since South Florida is visited almost annually by storms Specimens of *Brassaia*, for example, in excess of thirty feet tall are rare.



Brassaia actinophylla, when allowed to mature—and it is a very rapid-growing tree even in our often poor, rocky soils—flowers profusely, usually during the autumn months. Its fantastic, radiating inflorescence of red flower-clusters is always attractive, and has given it the additional local vernacular name of Octopus Tree, and as such it is frequently offered hereabouts.

This araliad seeds freely, and the seedlings are widely offered elsewhere in the United States as house plants, and when larger, are extensively utilized as pot-specimens in hotels and other buildings. Interestingly enough, birds eat the copious fruits, and it is not a rarity to find seedlings of *Brassaia* sprouting as epiphytes (or semi-epiphytes) in the boot-jackets of our indigenous palm, *Sabal Palmetto*, and even on mossy, fern-hung branches of dicotyledonous trees within the city limits of Miami.

THE GENUS *PTILOTUS* R.Br.

by G. Benl, F.L.S.

Botanische Staatssammlung Munchen, Germany

Ptilotus is a member of the Amaranthaceae family, which embraces *Alternanthera*, *Amaranthus* and *Gomphrena*, too. Since *Trichinium* has become fused with *Ptilotus* (s. J. M. Black, Fl. S. Austr. 2: 324, 1948) the latter became the largest genus of the family in Australia, comprising more than 80 species recognised at present.



Photography by W. Schacht

Plate I. — *Ptilotus obovatus* var. *obovatus*

Branch with flowerheads. For a full description of this plant see page 114.

GROWING *PTILOTUS*

In different botanic gardens it was possible to grow *Ptilotus* from seed. Thus Sir George Taylor, Director of the Royal Boanic Gardens Kew, wrote us: "At present we have plants of *P. manglesii* F. Muell. and *P. villosiflorus*

F. Muell. in cultivation. The former was received as a plant from the Royal Horticultural Society's garden at Wisley, where it was presumably raised from seed. We have in the past raised plants of *P. obovatus* F. Muell. and *P. spathulatus* Poir." King's Park and Botanic Garden, Perth, recently sent seed material to Munich Botanic Garden, where *P. obovatus* has already begun to thrive, under glass-house conditions of course (on account of our geographical situation), the essential requirement of *Ptilotus* being a hot position. As Dr. J. S. Beard informed us, all the seed had been "collected in the wild. We have had very limited success in the cultivation of these species as they occur mostly in the tropical part of the state, and as we have no facilities for glasshouse cultivation we have not found them to do well in the open. We do, however, endeavour to cultivate from seed . . ."

Notes—If you succeed in growing up *Ptilotus* from seed, write your observations to the editor. If you should meet specimens indeterminate, please send them to the author. His address: Botanische Staatssammlung, 8 München 19, Menzingerstrasse 67, Germany.

Being a very polymorphic genus *Ptilotus* presents us an amazing variation in size, habit, spike form, and floral structure. We meet with small slender annuals as well as robust perennial types up to 1.5 metres and over in height, with simple and few-branched stems as well as spreading bushes or straggling shrubs 1m. across. Stems and foliage may be more or less glabrous, velvety or covered with woolly, stellate and dendroid hairs. Cauline leaves are narrow lanceolate or obtuse with pungent point, bract-like to spoon-shaped, coriaceous and flat or soft and fleshily thick; occasionally a rosette of long petiolate leaves being attached to base of blooming stems.

Masses of colourful, long-lasting flowers form dense globular to ovoid heads, sessile in leaf axils or pedunculate in compound corymbs, but are often arranged in terminal, nicely conical to cylindrical spikes ("*Pussy-tails*", "*Lamb-tails*", "*Fox-tails*") attaining 30 cm. or over in length. Their extremely variable colours range from shining white or silver through greenish yellow to mauve and wonderful shades of purple often fading to pink; red is again the prevailing colour, true of Australian plants in general.

The "*Mulla-mullas*" are indigenous to Australia except for one (*P. conicus* R.Br.) which extends to southern Malaysia, too. As a sun lover *Ptilotus* favours (semi-)arid subtropical and tropical regions, but is distributed over all states including Tasmania. Main blooming time normally covers spring, but is not strictly seasonal, and quite a number of species seem to flower almost continuously.

"Many of them are really well worthy of the attention of horticulturists, and only require to be known in order to become familiar objects in the garden. Most of them will stand a phenomenal amount of heat, and they will grow in the driest soils once they got fairly established, so that there is little difficulty in cultivating them" (F. Turner, *The Forage Plants of Australia*, 1891: 84). But "although many members . . . are exceedingly pretty with their pinkish ever-lasting heads, often enveloped in white wool they do not seem to have attracted the attention of horticulturists", regretted L. Farmer in 1905 (s. Bull. Herb. Boiss. ser. 2, 5: 1087). It is not before sixty years later that the gardeners' interest was seriously drawn to this valuable addition to garden and rockeries by D. F. Nelson (s. "*Australian Plants*" 3/22: 84-85)

As a matter of fact, most of the variously appearing species are handsome plants, and massed they would make a fine show in a garden with their abundant flowering. As longevity is an essential character for plants which have to perform structural duties, the author chiefly selected attractive perennials for a detailed discussion.

THE FLOWER

The bisexual flowers consist of five, i.e. 2 outer and 3 inner rigid perianth segments (tepals), five stamens mostly unequal, and a $\pm$ stalked pistil (Fig. 1, g) with an undivided style, central or lateral. The tepals becoming dry and often connate at base into a short indurated tube (Fig. 1, a), are more or less copiously clothed externally with straight, jointed denticulate hairs, thus causing a plumose appearance of flowers (the Greek word "ptilotos" means "feathered"); the three inner segments sometimes wear inside a close wool of intricate crispy hairs. An outstanding flower feature being the membranous cup or ring produced by union of the filaments below (Fig. 1, f), occasionally with interposed fringed lobes or teeth called pseudo-staminodes (Fig. 2, a-c). Papery flower-bracts are often persistent.

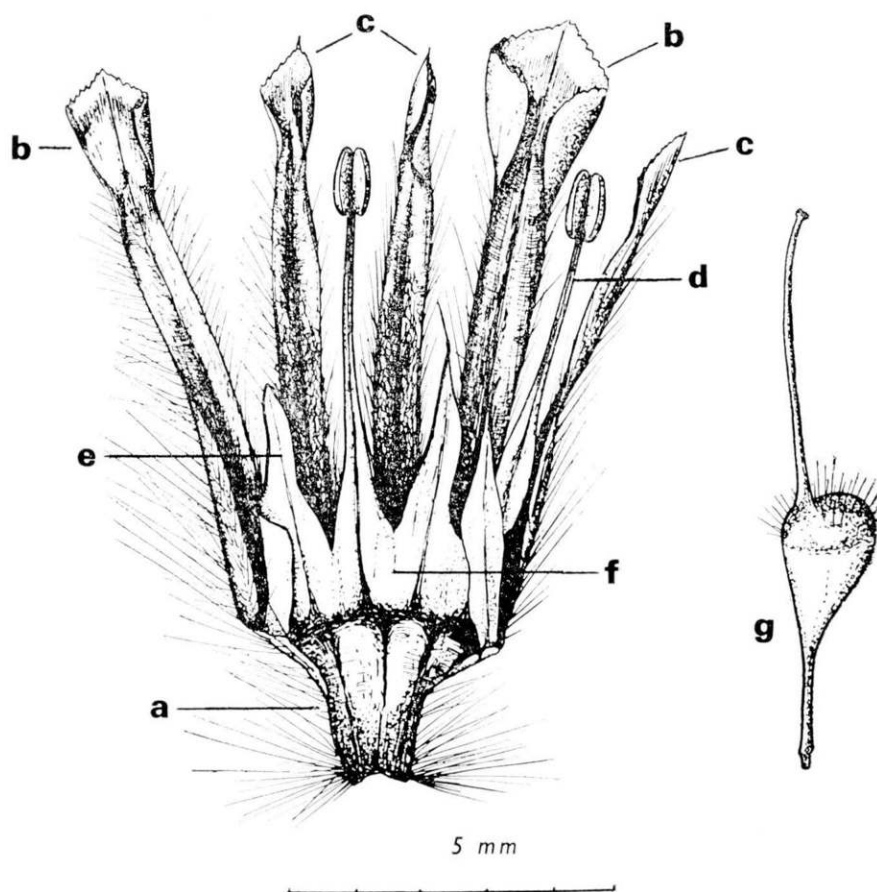


Fig. 1.—Expanded flower of *Ptilotus appendiculatus* (see page 120), inner view. a = perianth tube; b = outer perianth-segment (tepal); c = inner perianth-segment (tepal); d = fertile stamen; e = sterile stamen; f = staminal cup spread open; g = pistil (length of stalk corresponding with length of perianth-tube).

1. *Ptilotus exaltatus* N. ab Esenb. ex. Chr. Lehmann

This plant is a well-known member of the genus. Reported from all states of the continent it extends across the arid interior and reaching the south-, west- and north-coasts in desert regions. Because of its large iridescent pinky-mauve to lilac-purple spikes becoming 30 cm. in length and 5 cm. in diameter the "*Lamb-tails*" may be considered as a highly desirable horticultural plant. Several branched and spreading stems from a common rhizome grow to and over 1 m., and carry conspicuous bright- to blue-green spatulate leaves, fleshy and partly reddish tinted as are the stems of smaller specimens. Pointed floral bracts are dark brownish and very striking in conical-shaped young inflorescences (Plate II), stamens purple, the 3 inner and smaller tepals copiously beset inside with beardy-like wool below the middle. This showy herb ranging up to a subshrub at times occurs in skeletal soil near sandstone or granite hills, in brown earth on lime-stone as well as in heavy red plain along water-courses. It seems to flourish nearly the whole year.

There is a var. *semilanatus* ("Hairy-tail") reported especially from Qld. and N.S.W., where it favours open grassland. It is well distinguished by the shorter and lankier stems with linear leaves and small capitate spikes.



Photography by W. Schacht

Plate II.—*Ptilotus exaltatus* var. *exaltatus*

Spikes in young stages shown in natural colour. The photograph was made from a herbarium specimen.

2. *Ptilotus polystachyus* (Gaud.) F. v. Muell. emend. Benl

Formerly *P. alopecuroides* (Lindl.) F. v. Muell., this is another fairly common, woody based perennial distributed over all states of the continent and widely spread in deep red sand or coarse clayey soil between rocky hills. The straggling stems (0.2-1 m. and more high) with their long narrow leaves finally becoming glabrous may form clumps about 1 m. across; they bear narrower candle-like spikes (up to 25 cm. long, 2-4 cm. in diameter) of silky, greenish to golden-yellow tinged flowers (sweetly scented!) with usually broad bracteoles (4 mm.). The $\pm$ oblique cupula is bordered with distinct cilia. The plant was met with blooming any time of the year. Local names: "Long-tails", "Bottle-washers", "Prince of Wales-feather".

We have a forma *rubriflorus* (formerly *P. longistachyus* W. V. Fitzg.) more handsome with its purplish flowers (Plate III) constantly every season from the same regions.



Photography by W. Schacht

Plate III.—*Ptilotus polystachyus* f. *rubriflorus*

Branched stem bearing candle-like inflorescences.

3. *Ptilotus obovatus* (Gaud.) F. v. Muell.

With its soft tomentum of the much-branched stems and cream to greyish white, obovate or orbicular leaves this is the most common and widespread species throughout Australia (excepting Tasmania), the stiff sprawling shrubs with intricate branchlets reaching diameters up to and over 1.2 m. Their innumerable globular to ovoid, white-hairy flowerheads (1.3 cm. in length) vary greatly in regard to colour and form of floral bracts, but all have right-angled inferior peduncles, and the violet-purple to pink perianth (Plate I) and a hairy ovary. This hardy and drought-resistant species, its stems becoming finally dark-barked, is frequent in sand plains and arid rocky soil (such as on travertine outcrop, limestone ridge, quartzite hills, weathered granite, in schistose rocks, red clay, gravelly slope etc.) all over the desert country, though often in small restricted areas only. It blooms any time of the year. Vernacular names: "Silverbush", "Smoke-bush", "Flannel-flower", "Silver-tails", "White-foxtail".

Colour plate on page 212—No. 19 Australian Plants.

Closely allied taxons are var. *parviflorus* (N.S.W., Qld., N.T.?) with a sparse indumentum of its stems and greenish leaves, var. *lanceifolius* (Qld.) with striking lanceolate leaves and var. *griseus* (N.T.) recognisable by dendroid hairs in the vegetative parts and extremely pilose bracts; all of them having a glabrous pistil.

4. *Ptilotus atriplicifolius* (A. Cunn. ex Moq.) Benl

Formerly *P. obovatus* var. *grandiflorus*, this is another red-spiked spectacular subshrub (0.2-0.8 m. high) with a profusion of purple to mauve inflorescences making a fine display. It resembles the foregoing species in general appearance, but differs among others in decidedly larger leaves and flowers with longer naked tips, and crisped woolly hairs inside the inner tepals. This plant, too, occurs in all states of the continent, flowering specimens having been found all the year round on red sand dune, coarse red gravel etc.

5. *Ptilotus clementii* (Farmer) Benl

A medium-size plant (20-40 cm., to 60 cm. at times) with soft indumentum throughout, thus indicating its natural habitats in dry soil (W.A., Qld., N.T.), it frequents bare patches on limestone slopes. The pale to dirty yellowish-green feathery flowers borne in globose, sometimes nodding heads 5 cm. across or in spikes of 10 cm. in length are conspicuous at the top of almost unbranched stems several of them sprouting forth from one vigorous stock. Leaves may be clustered. Dilated laciniated pseudostaminodial lobes in the broad sinus between basal-fused filaments are worthy of mention (Fig. 2, a). Flowertime is spring to autumn. Local names: "Tassel-top", "Pussycat's tail".

6. *Ptilotus calostachyus* (F. v. Muell.) F. v. Muell.

P. calostachyus has rather lanky branching stems (spindling up to 1.8 m) of pruinous looking surface with narrow distant leaves and a lot of pedunculate spikes to 8 cm. in length and 1.5 cm. in diameter, conical at top. The marginate tepals densely clothed with fine hairs outside are coloured by a vivid red to mauve-purple, finally restricted to the centre; the staminal ring is marked out by fimbriate ligulate scales between filaments, as will be seen by Fig. 2, c. Habitats hitherto reported belong to W.A., Qld. and N.T., where this sparse straggly bush has an extensive range in lateritic sandy soil, blooming any time of the year; on rocky areas it is often associated with *Triodia pungens*.

The larger and more branched var. *procerus* exhibits woolly floral bracts. Its spikes pendulous at times get a length of 1.5 cm., its pseudostaminodes being smaller than in the typical form.

Fig. 2.—Staminal cup (cupula) spread open of *Pt. clementii* (a), *Pt. helipteroides* (b), *Pt. calostachyus* (c), and *Pt. polakii* (d).—Inner view.

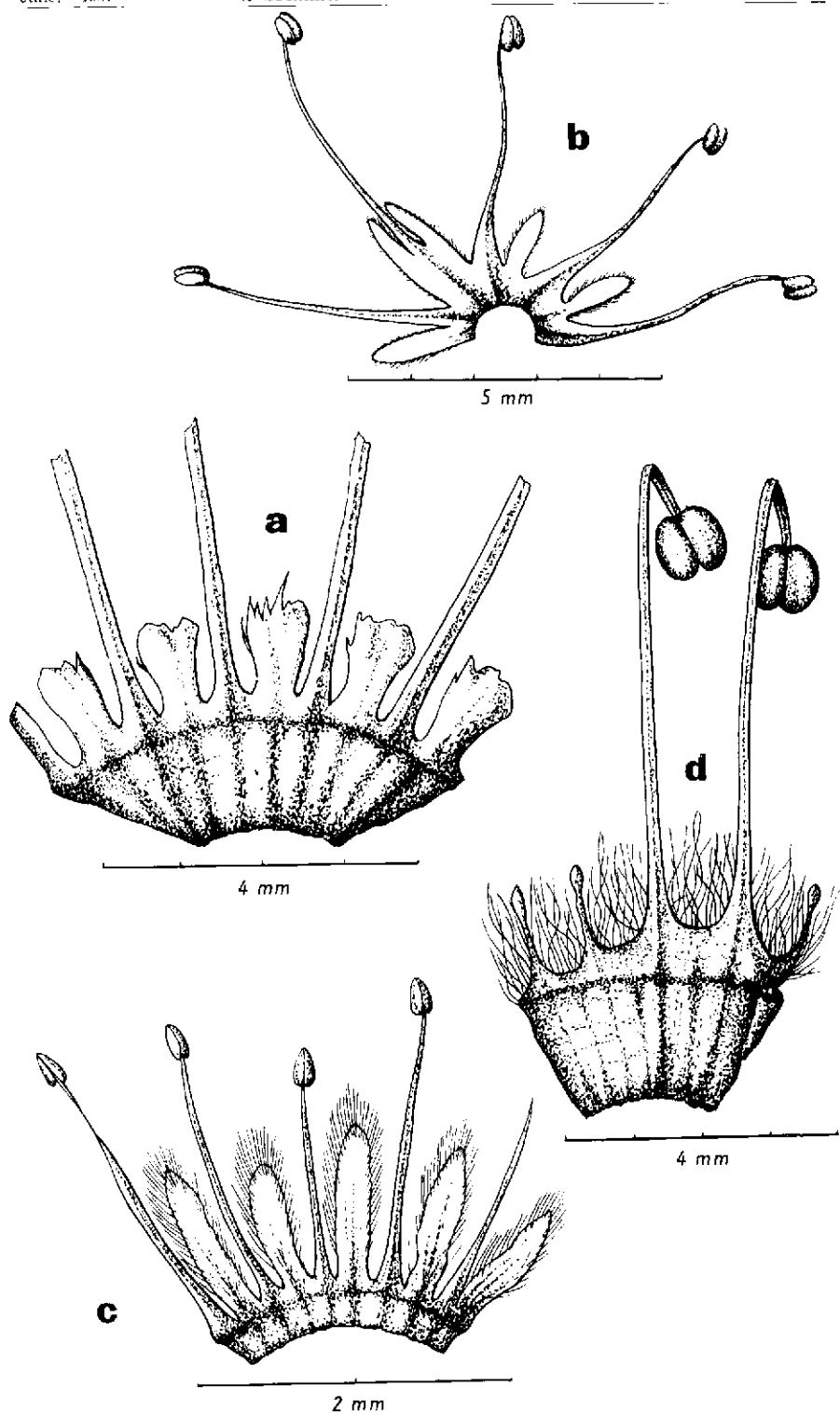
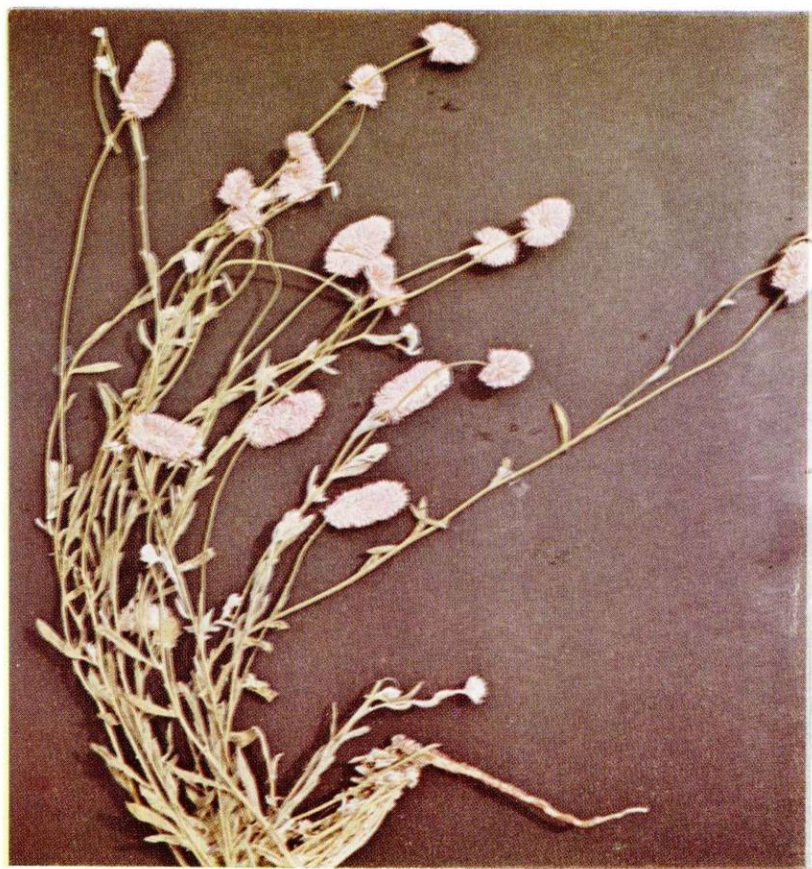


FIG. 2

7. *Ptilotus helipteroides* (F. v. Muell.) F. v. Muell.

P. helipteroides gives a neat appearance with its silver-grey silky pubescence all over stems (to 0.5 m. and over in length) and slightly lanceolate foliage, and its gracefully iridescent spikes mauve, deep pink or purple-lilac (Plate IV), up to 5 cm. long and 2.2 cm. across, gleaming in the sun. Flowers produced every season are noticeable for their large transparent papery bracts and for their intrastaminodial fringed lobes attaining the considerable length of 2 mm., as is shown with Fig. 2, b. A typical inhabitant of red sand, of hillsides and stony ground in lateritic area of W.A., S.A. and N.T., in places quite common.

In var. *minor* the tidy capitula never exceed a diameter of 1.2 cm., nor the pseudostaminodes one of 0.8 mm.



Photography by W. Schacht

Plate IV.—*Ptilotus helipteroides* var. *helipteroides*

Flowering plant clothed with fine silver-grey pubescence.

8. *Ptilotus seminudus* (J. M. Black) J. M. Black

P. seminudus derives its name from the outer perianth segments looking hairless in lower part, the narrow tepals being purple tinged and becoming greenish. With its silky-brilliant, ovoid flowerheads to 5 cm. long it may be considered an ornamental plant for dry areas in a rocky garden (Plate V). Described in 1916 as a *Trichinium* and transferred to *Ptilotus* in 1948 by the famous Australian Botanist, the species is reported from sandy plains in W.A., S.A., N.S.W. and Vic. It blooms almost continuously.



Photography by W. Schacht

Plate V.—*Ptilotus seminudus*

showing deep rootstock and conspicuous flowerheads.

9. *Ptilotus manglesii* (Lindl.) F. v. Muell.

The species has been known since 1839 and recommended as a garden or pot-bound plant since 1852 (s. Bot. Mag. 20, t. 5448, 1864). Its $\pm$ erect and unbranched stems growing to 60 cm., with a basal rosette of glabrous and long-petiolate leaves, are crowned by a sizeable globular spike (to 6.5 cm. in diameter) of surprising beauty, the flowers being lustrous with their amaranth-purple or rose-coloured tepals protruding from white articulate hairs. In early stages the dark-brown bracts will astonish the spectator. Style very eccentric. The perennial is native to N.T. and N.S.W., but especially to W.A., its habitats being in gravel upon clay, in low heath etc. Flower period autumn to winter, rarely springtime.

Colour plate on page 140, Australian Plants, No. 30 issue.

10. *Ptilotus nobilis* (Lindl.) F. v. Muell. emend. Benl

Ptilotus nobilis produces grey- to yellowish-green perianths crowded to lofty spikes up to 22 cm. In old stages they resemble the corresponding inflorescences of *P. exaltatus* having lost their mauve colour. (Besides the foliage is nearly the same. However, they are fairly distinctive on account of a denser pubescence of acuminate brown bracts (1.5 cm.) and the lack of the characteristic beard inside inner tepals. The stout plant (Fig. 3, a) with its divergent branches occurs in any state of the continent (growing on stony terrain, on light red loamy soil, dry pastures etc.) and flowers all through the year.

Specimens from S.A. (Flinder's Range) of a lower and bushier stature with considerably narrower leaves and smaller flowerheads belong to var. *angustifolius* (Fig. 3, b).

11. *Ptilotus erubescens* Schlecht.

Very variable in stature this *Ptilotus* will grow in tufts of almost herbaceous, erect or ascending stems (up to 10 in number, to 40 cm. in height) from a stout rhizome; it carries medium-sized globular heads (3.2 cm. in diameter at most) of fluffy purplish flowers with upcurved tepals and brownish-golden bracts. It "makes a fine show in arid patches" (T. Y. Harris, *Australian Plants for the Garden*, Sydney 1953: 134). Numerous petiolate basal leaves (12 cm. and more long) are another useful diagnostic character. In its native habitats (red clay loam; tertiary scrub) of S.A., N.S.W. and Vic. it comes into bloom from October to spring.

12. *Ptilotus parvifolius* (F. v. Muell.) F. v. Muell.

A semi-prostrate, rigidly branching subshrub to 0.5 m. high with a black bark. The blue-green minute leaves (0.5 to 1.6 cm. at most) are sometimes clustered, the pretty uncompact flowerheads (up to 5 cm. in length) with golden bracts and pale lilac-purple to pink, plumose perianths terminate the many angular branchlets almost any time. Staminal cup densely pilous. *P. parvifolius* is not infrequently seen in W.A., S.A., N.S.W. and N.T., on desert loam soil or on rocky hills, mostly.

13. *Ptilotus polakii* F. v. Muell.

P. polakii known from different localities in W.A., N.S.W. and Vic. is similar to *P. parvifolius* in general habit, copious exquisite inflorescences up to 3.2 cm. in length being composed to rich panicles. The less hairy perianth consists of tepals with a naked and distinctly visible purple apex fading to pink. Two stamens only being functional—another distinguishing feature—the pilous staminal cup is rather oblique (s. Fig. 2, d). This fine-leaved representative (syn.: *Ptilotus depressus* W. V. Fitzg.) is well worth consideration for gardens.

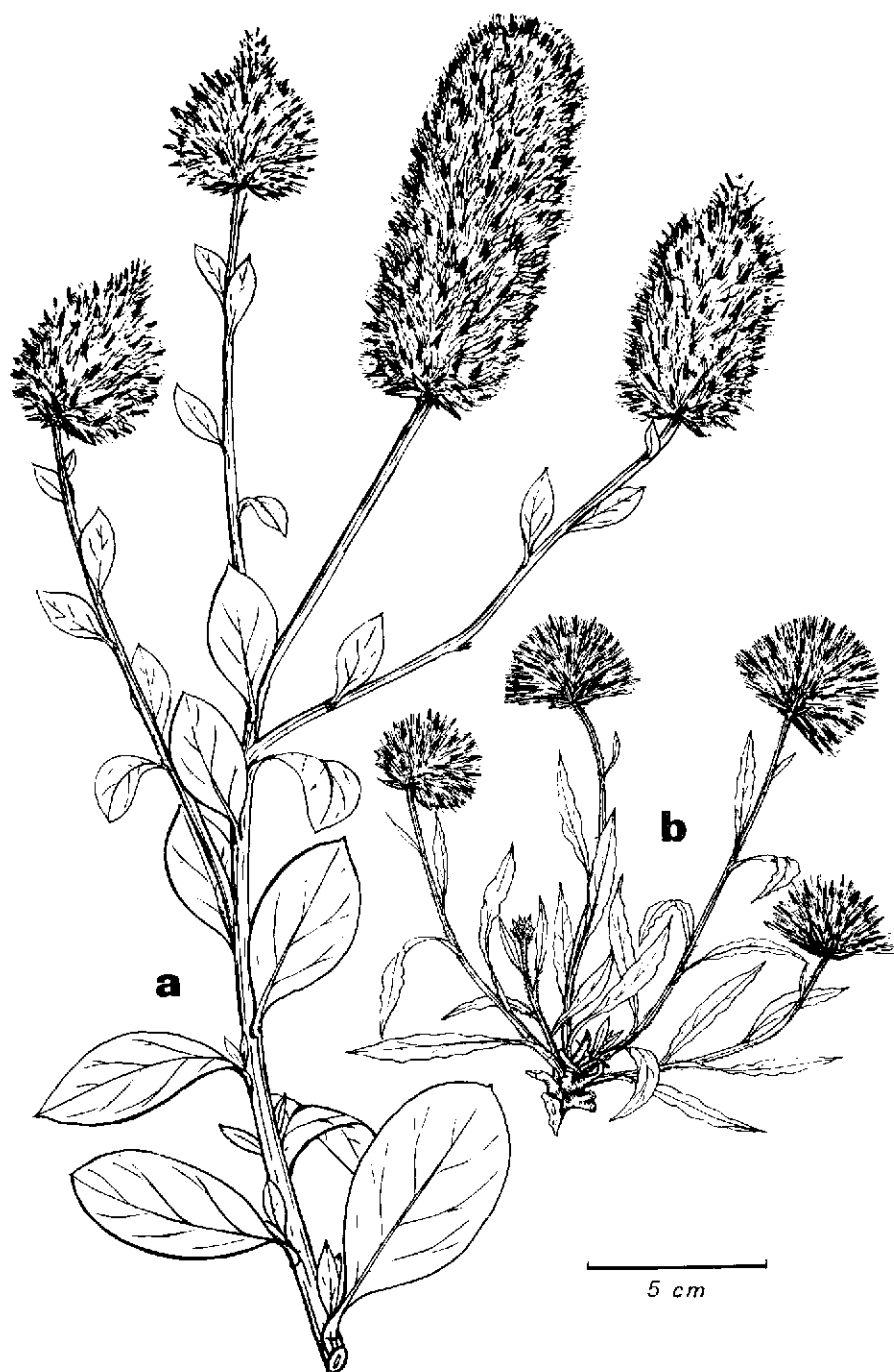


Fig. 3.—a = *Ptilotus nobilis* var. *nobilis*; b = *Pt. nobilis* var. *angustifolius*.

14. *Ptilotus axillaris* (F. v. Muell. ex Benth.) F. v. Muell.

P. axillaris with glabrous petiolate and acuminate leaves is noteworthy for its purple looking, feathery flowerheads (to 4 cm. in diameter) single and axillary on short peduncles in the lower, and composed to corymbs in the upper part of the slender, more or less trailing stem attaining 1.2 m. and over in length (Plate VI). Style eccentric. *P. axillaris* is native to W.A. and N.T., and was collected on stone hills as well as on mud flats; its flowertime covers April to October.



Photography by W. Schacht

Plate VI.—*Ptilotus axillaris*

Part of the slender stem with purple spikes.

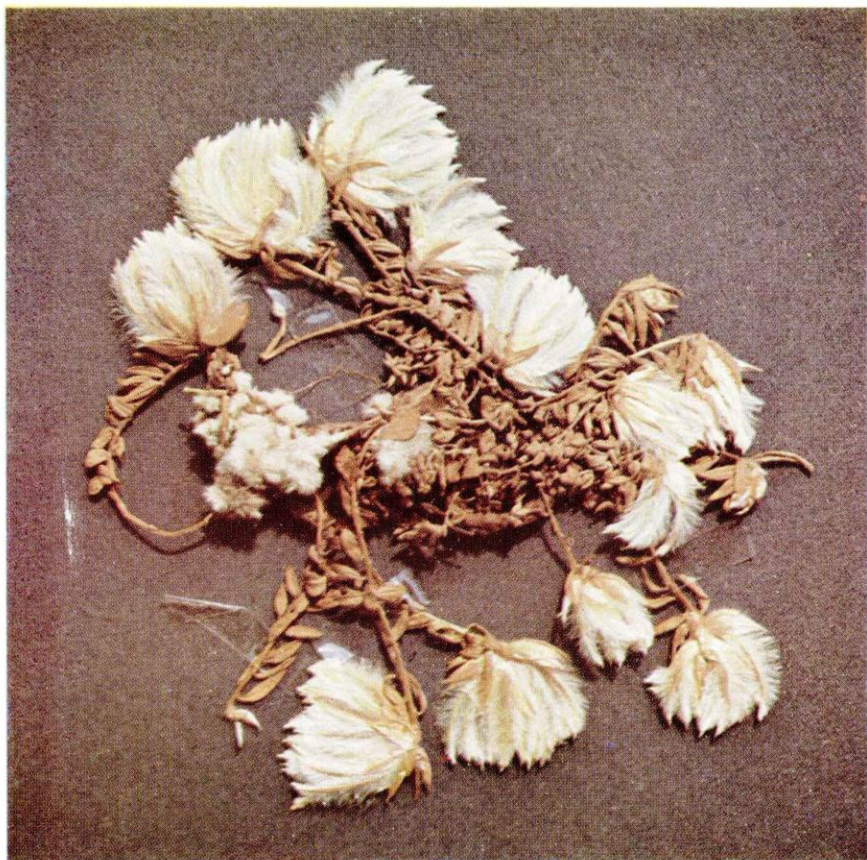
15. *Ptilotus appendiculatus* Benl

P. appendiculatus strikes us at first glance with anomalous rhomboid appendage-like extremities of its purple to pink perianth-segments, measuring 2.5 mm. in length at outer tepals, as will be readily seen in Fig. 1.

Branched villous stems to 0.5 m. high carry approximate greyish leaves with a woolly axil each and tapering into pungent point. Spikes become ovoid and 4 cm. long. Representative localities are at Ashburton, Cane, Yule and Fortescue River, W.A.

16. *Ptilotus declinatus* N. ab Esenb.

Showing a superficial likeness to *P. erubescens* in some stages, *P. declinatus* is best distinguished from it by the lack of radical tufted leaves. Furthermore the usually undivided but densely clustered, curved stems (up to 30 and more in number, up to 25 cm. in height, but mostly shorter) seem to arise from a woolly base. The capitate, greenish white inflorescences (to 4 cm. across) with their touch of purple are supported by a number of narrow, relatively long top-leaves (Plate VII); a peculiarity being the exceedingly elongated and S-shaped filament of the imperfect stamen. Apparently confined in its distribution to W.A. (on meadows and bushy hills in sandy clay and gravel), flourishing from September to December.



Photography by W. Schacht

Plate VII.—*Ptilotus declinatus*

A specimen with clustered short stems bearing fluffy flowerheads.

17. *Ptilotus incanus* (R.Br.) Poir.

Resembling *P. obovatus* in general facies, *P. incanus* differs sharply in the following respects: the yellowish to grey stem and leaf hairs are longer (to 1.8 mm.) and dendroid—in *obovatus* leaf hairs being stellate! The ovoid to elongate (3 cm.) pinkish to dirty red spikes sessile or shortly pedicellate, bracts (6-8 mm.) very villous and aristate (2.3 mm.); the glabrous tips of the 2 outer tepals being more visible. This appealing undershrub (to 60 cm. in height) with its supply of blooms chiefly inhabits open rocky hill slopes in W.A., S.A. and N.T. Its flowering lasts from spring to winter.

Within its specific range are to be placed var. *parviflorus* from S.A. with longer but less dense hairs, and var. *elongatus* from N.T. with shorter hairs, smaller flowers, and a less acuminate but extremely woolly bract.

18. *Ptilotus spathulatus* (R.Br.) Poir.

P. spathulatus produces from a thick rootstock (1.8 mm.) a lot of spathulate radical leaves and irregular procumbent unbranched stems (40 cm.) terminated by upturned greenish-white or honey-coloured longish spikes to 12 cm. in length and 2.2-2.7 cm. in diameter; tepals show a fairly soft vestiture and are often nicely purple-tipped. This species ("Pussy-tails", "Cat's-paws") was not uncommonly found on sandy or dry loamy pasture in temperate regions of Tasmania and of the whole continent except Qld., so far. It flowers during spring continuing into autumn, and will be excellent for rockeries.

From W.A. and S.A. a forma *angustatus* is known with narrower spikes 1.5-1.8 cm. across only.

19. *Ptilotus macrocephalus* (R.Br.) Poir.

The greenish-white to straw- and honey-coloured flowers (reddish tipped at times) bloom every season forming solitary heads ("Feather-heads") up to and over 8 cm. across (s. "Australian Plants" 2/19: 212), but ranging to large cylindrical spikes 20 cm. long and 3.5-6 cm. broad. Transparent bracts are shiny, tepals very narrow; leaves chiefly at the ground exceptionally lanceolar, to 13 cm. in length and 1.5 in breadth. Specimens of this worthwhile species with its several (semi-)erect stems (1 m.) from perennial rootstock were collected in all states of the continent, where it occurs $\pm$ abundantly on quite distinct habitats: amongst rocks on hillside, in gravelly red sand, flooded red brown soil, heavy earth amongst grasses, in grey-brown swampy soil etc. Colour plate on page 212, Australian Plants, No. 19.

20. *Ptilotus gaudichaudii* (Steud.) J. M. Black

P. gaudichaudii rarely reaches a height of 1 m. with its mostly erect spreading stems sparsely foliated. The head-like spikes which average 3 cm. in diameter are remarkable for the lack of a distinct pubescence in their greenish to golden-yellow glossy flowers, short and rigid yellow hairs being restricted to base and midrib of the scariously marginate tepals. We have specimens from any state of the continent, especially from W.A. and S.A.; here you may see the plant growing in red brown fine sandy loam amongst herbs under mulga (*Acacia aneura*) and flowering all over the year.

Besides a var. *parviflorus* was found in W.A., S.A. and N.S.W. with less than ten individual florets (7 mm. long each) composed to an inflorescence.

21. *Ptilotus rotundifolius* (F. v. Muell.) F. v. Muell.

P. rotundifolius is easily recognisable by thick orbicular leaves closely woolly and by cylindrical rosy spikes (to 12 cm. long), 2-3 united at the top of tomentose stems 0.7-1.5 m. in height, becoming woody below and darkly-barked. Tepals exterior beset with silky white hairs are bright purple-pink in their upper, greenish in their lower halves. This handsome shrubby plant with its attractive foliage grows on stony hillsides and is recorded for W.A. and N.T. where it seems to flourish every season.

See colour plate on the rear cover of Australian Plants, issue No. 31.

22. *Ptilotus carlsonii* F. v. Muell.

P. carlsonii is an ascending herb of small to moderate size (from 4 to 30 cm. or more) with terminal, capitate flowerheads gaily coloured; its perianth-segments (about 1.3 cm. long) have just a few hairs at the base, thus showing the bright orange-red ranging to carotid and saffron of the blunt tepals which give a nice contrast to the blackish bracts. The species undoubtedly occurs in W.A. preferring there red clay, but it is recorded from N.T., too. It seems to be in bloom from August to November.

23. *Ptilotus albidus* (C.A. Gardn.) Benl

Known only from W.A. (Ereman Province), up to the present, *P. albidus* grows into a dense, intricately branched, puberulent and small-leaved subshrub to 60 cm. high with short flowerheads to 1.7 cm. across, cream from being completely involved in hairs, and produced in abundance during spring and summer. A species of great decorative value!

24. *Ptilotus roei* (F. v. Muell. ex Benth.) F. v. Muell.

A native from W.A. only, where it is seen flowering during July to October in mulga scrub. The tomentose whitish branches of the leafy stem (20 cm. high and more) bear plentiful spikes up to 3 cm. long and 1.3 cm. broad, sessile or shortly pedunculate. The campanulate flowers are noteworthy for their conspicuous bracts and bracteoles, as well as for their white hairy tepals greenish in lower, reddish brown in upper half and limbed by a straw-coloured margin.

25. *Ptilotus auriculifolus* (A. Cunn. ex Moq.) F. v. Muell.

P. auriculifolus develops an unusually elongated staminal tube (8 mm.) all stamens being full in function. It grows with closely inserted, ear-shaped, fresh green and fleshy leaves towards the base and a compact panicle of 5-10 yellowish to golden spikes (3-4 cm. long each) at the top of its branched stem (to 60 cm. in length) pubescent in youth. The species is known from quite distinct localities in W.A. and N.T., and continues flowering from May to October.

26. *Ptilotus helichrysoides* (F. v. Muell.) F. v. Muell.

A prostrate, sometimes cushion-forming perennial without any close affinities with any other species. *P. helichrysoides* is readily distinguishable by reason of short-branched stems being densely clothed with thick velvety persistent foliage the darkening remainders of which wrapping up the stock. The sessile, greenish-cream to golden-yellow spikes (2 cm. in diameter) appearing in summer and autumn are relatively infrequent and hidden among leaves by part. The low, shrubby plant (20-50 cm.) is only found in W.A., up till now.

27. *Ptilotus humilis* (N. ab Esenb.) F. v. Muell.

P. humilis resembles *P. spathulatus* to some extent, but is markedly smaller (spikes 1-4.5 cm. long, to 1.5 cm. in diameter); the greenish- to yellow-white and pale golden perianth being clothed with longer and denser hairs, the short staminal cup fimbriate. This prostrate-decumbent and narrow-leaved species grows in dry areas (granite outcrop) of W.A. and comes into bloom from August to November.

A var. *parviflorus* tending to smaller and less densely pilous segments was described by G. Benth.

28. *Ptilotus carinatus* Benl

P. carinatus brings forth a lot of lovely ovoid spikes to 3.5 cm. long on branchlets of stout glabrescent stems growing up to 0.7 m. and over. The rosy looking white-haired flowers with their dark bracts are remarkable because of a ciliate prominent keel in the lower part of the tepals, rendering

the plants different from all other species. Though only recently described, this perennial seems to be not very rare in W.A., where it favours rocky red loam areas. Flowering period January to August, as far as known.

29. *Ptilotus holosericeus* (Moq.) F. v. Muell.

P. holosericeus shows its spherical to ovoid spikes (up to 4 cm. long) at the top of tufted, procumbent or ascending, very slender stems glabrescent as are the numerous spatulate leaves, and widely varying in length from a few to about 40 cm. Greenish-cream tepals with a golden-brown hue wear plenty of sericeous hairs outside, not just reaching the blunt purplish tips; the membranous bracteoles are nearly as long as the tepals. Fertile stamens 3, for the most part. So far as observed in W.A., the species chiefly inhabits alluvial or gravel soils, and continues to flower from June to December.



Photography by W. Schacht

Plate VIII.—*Ptilotus aristatus*

Flowering stems.

30. *Ptilotus aristatus* Benl

P. aristatus from N.T. exhibits slightly glaucous leaves and stems (15-30 cm. long) with dainty terminal spikes (up to 3.5 cm. in length) of a tender violet-rose to pink-purple tinge (Plate VIII). The arista-like points of the villous floral bracts and of the hyaline bracteoles are worthy of mention as is the biserial pilose ovary.

LYSINEMA R.Br.

by Betsy R. Jackes (Townsville University College)

A Western Australian genus distinguished from *Woolisia* chiefly by the leaves which are small, erect and acuminate, or when spreading they are obtuse. Allied to *Epacris* but the corolla-lobes are always contorted, the cylindrical corolla-tube separating into distinct petal-claws. The filaments are free from the base of the corolla-tube or slightly adnate for a short distance. Numerous bracts cover the peduncles of the flowers which are axillary in the upper axils of the leaves forming a leafy head or spike, occasionally they are scattered along the branches.

Erect or straggly shrubs, usually found in wet swampy places. Although the leaves are alternate, in *L. ciliatum* and occasionally in *L. elegans* they are almost decussate.

KEY TO THE SPECIES

(Abridged from Blackall and Grieve "Western Australian Wildflowers" Part III).

- | | |
|---|-------------------------|
| A. Flowers in one-sided spikes, scattered. Corolla-tube hairy with small lobes | 1. <i>L. lasianthum</i> |
| Flowers close together, few or forming a dense terminal head or spike | B |
| B. Anthers wholly included. Petal-claws cohering at least at the throat | C |
| Anthers protruding from the corolla. Petal-claws separate | 2. <i>L. elegans</i> |
| C. Leaves lanceolate, acute, awl-shaped. Bracts and sepals scarcely ciliate | 3. <i>L. conspicuum</i> |
| Leaves ovate to lanceolate, obtuse. Bracts and sepals woolly-ciliate or fringed | D |
| D. Bracts and sepals woolly-ciliate. Corolla-tube usually less than 15 mm. | 4. <i>L. ciliatum</i> |
| Bracts and sepals fringed. Corolla-tube usually exceeding 20 mm. | 5. <i>L. fimbriatum</i> |

NOTES ON THE SPECIES

1. *Lysinema lasianthum* R.Br.

A slender infrequently branched shrub. The flowers which are almost sessile in the axils of the linear leaves, are mainly pendulous on the lower side of the branch. The corolla-tube is densely ciliate on the outside. The stamens are free or slightly adnate to the corolla-tube.

2. *Lysinema elegans* Sond.

This species is distinguished from the others by the tips of the anthers which are exserted and recurved. The bracts and sepals are minutely ciliate. The ovary and style are pubescent.

The linear to oblong-lanceolate leaves which occasionally appear virtually opposite are adpressed to the stem.

3. *Lysinema conspicuum* R.Br.

A slender plant with lanceolate acute leaves, the white flowers forming dense terminal spikes. The stamens are adnate to the corolla-tube, at the base of which there is a considerable amount of nectar. The ovary as well as the base of the style is lightly pubescent.

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

Editor's Note: This article is one of a series on genera in the family Epacridaceae. This series is usually illustrated by line sketches as well as full colour plates but in this case I could not get a suitable slide. You will note from the following article that these plants are suitable horticultural subjects and further reports and colour slides are required. Plants to be described in the next few issues are *Archeria*, *Cosmelia* and *Wittsteinia*. I would like reports and colour slides of these plants.

with bee-hives, producing the well known "Leatherwood honey."

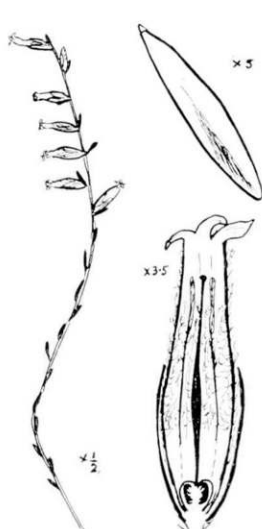
4. *Lysinema ciliatum* R.Br.

Curry Flower, also Curry and Rice.

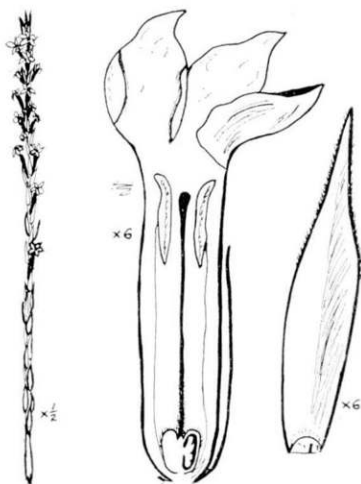
As the specific epithet implies, this plant is characterised by the presence of hairs, which are short and densely matted on the outside of the bracts and sepals, quite long on the corolla-tube, filaments, ovary and base of style. The stamens are free.

There is considerable variation in the arrangement of the thick, ridged, ovate to lanceolate leaves. They may be alternate and widely spaced or crowded so as to appear almost decussate.

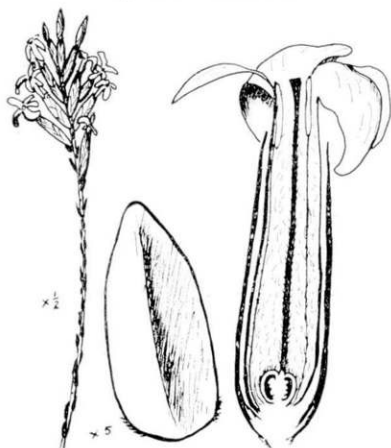
L. ciliatum may be found growing in sandy areas as well as on coastal limestone ridges. A variety *L. ciliatum* var. *ericoides* is an inland form with smaller leaves.



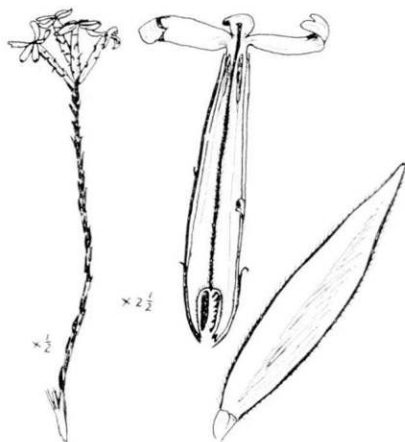
Lysinema lasianthum



Lysinema conspicuum



Lysinema ciliatum



Lysinema fimbriatum

5. *Lysinema fimbriatum* F.v.M.

The thick ovate to lanceolate leaves are keeled and bear small marginal hairs. The margins of the bracts and sepals split forming scariosus crisped teeth. There is some pubescence on the ovary, style and the upper portion of the corolla-tube.

LYSINEMA by Ken Newbey

The genus *Lysinema* belongs to the family EPACRIDACEAE and is confined to W.A. where there are 5 named species. Most of them have attractive flowers and would be useful additions to rockeries or small gardens.

Lysinema ciliatum

Found growing in sand this upright, rigid stemmed shrub reaches 3 ft. in 15"-30" rainfall. Leaves are linear, up to $\frac{1}{4}$ " long and from $\frac{1}{16}$ " to $\frac{1}{8}$ " wide, slightly folded lengthways, usually upright and close to the stem and sometimes imbricate, other times recurved. There is great variation of leaf arrangement within the species. Often they are crowded close together but sometimes scattered. Flowers are cream, up to $1\frac{1}{8}$ " in length and about $\frac{1}{8}$ " in diameter, surrounded by numerous narrow triangular, brown bracts and sepals which almost enclose the flower. The last $\frac{1}{8}$ " to $\frac{1}{4}$ " of the petals are bent out at a right angle. Flowers are axillary, sessile, forming spikes which may be either crowded or open and up to 4" in length. Sometimes they form almost terminal heads. Flowers from August till January.

An attractive plant in flower.

Lysinema conspicuum

Grows as a rigid stemmed, upright and open shrub to 18" in 25"-30" rainfall. Leaves are linear, $\frac{3}{8}$ " long by $\frac{1}{16}$ " wide, slightly folded lengthways with a drawn out point and almost imbricate. Flowers are about $\frac{5}{8}$ " long and $\frac{1}{10}$ " in diameter surrounded by upright, very narrow triangular bracts and sepals about $\frac{2}{3}$ the length of the cream flower tube. The last $\frac{1}{8}$ " of the petals are bent out at right angles to the corolla. The flowers are axillary and sessile, forming dense spikes up to 5" in length which are broader at the top than the base. Flowers in the summer time.

An attractive species in flower only for all situations.

Lysinema fimbriatum

An open, little branched, upright or spreading shrub to 15" found growing on sand in 20"-35" rainfall on either well drained plain country or mountain summits where it would experience occasional snow. Leaves are linear, keeled, under $\frac{1}{4}$ " in length and slightly over $\frac{1}{16}$ " in width, close together and green in colour. Flowers are about $\frac{3}{4}$ " long, upright in terminal heads of from 1 to 5 but usually 3. The corolla is about $\frac{1}{8}$ " in diameter surrounded by brown bracts and sepals. The narrow, white petals open out at right angles above the sepals forming a flower $\frac{1}{2}$ " in diameter. Flowers from July till November. An attractive small species in flower.

Lysinema lasianthum

Found in wet swampy places in 35" rainfall this species grows as an upright, single, very slender, tough stemmed, rarely branched plant to 3 ft. Leaves are narrow linear, about $\frac{1}{4}$ " in length and $\frac{1}{16}$ " in width, more or less opposite, held fairly close to the stem and about $\frac{1}{2}$ " or more apart. Flowers are axillary, about $\frac{1}{2}$ " long, mainly on the underside of the last 3" of the arching branches. The corolla which is slightly constricted at the top is surrounded by dark brown bracts at the base and light brown to yellow sepals up to three-quarters of its length. The last $\frac{1}{16}$ " of the yellowish white petals are bent out at right angles. Flowers July to September.

SOME GARDEN EUCALYPTS — 2

Part 2—Propagation by Richard C. Barnard, M.A. (Forestry)

Reprinted from the Vol. XCL, Part 5 issue of the "Journal of the Royal Horticultural Society", England, with permission.

WHEN TO SOW—

With such fast growing subjects as eucalypts which are intolerant of root restriction or any check to growth, timing is most important for really good growth. Eucalypts are never completely dormant and are very sensitive to root damage so it is logical to plant them in their final positions whilst young and small, in active growth and when the soil is warm so they may grow on without a check and any damage to roots is quickly made good by new root growth. I have planted small seedlings at all times of the year from early May to October. May to July has given the best results, August and September good survival but little growth before winter and later planting has resulted in many casualties during the first winter (unprotected).

SOWING THE SEED—

Eucalyptus seed should be sown in the same manner as the small-seeded half-hardy annuals but particular attention should be paid to cleanliness. Commercial seed compost and soil-less sowing composts have both proved suitable but the loam in any home-made composts should have been sterilized to kill weed seeds and the damping-off disease fungus. Seed boxes or pans should be 3 inches deep (not less), filled with compost, firmed, levelled at $\frac{1}{2}$ inch below the rim, watered and allowed to drain. A thin layer of compost is then sieved over the surface to fill any cracks or depressions and lightly pressed with a board. Seed should be sown thinly and evenly. Owing to the great variation in the proportion of seed to chaff the quantity required for a standard seed box varies but for reasonably clean seed an eighth of a teaspoonful is plenty, but if there is much chaff, half a teaspoonful may not be too much. These quantities do not, of course, include sand added to dry off cold-stored seed.

There are two opinions on seed covering; one advocates no, or a very thin, covering and pressing and the other covering to a depth of $\frac{1}{8}$ to $\frac{1}{4}$ inch with sieved compost or washed coarse sand. Germination is epigeal, i.e. the cotyledons are raised above the ground on $\frac{1}{2}$ inch stalks and my preference is to cover. This appears to give the seedlings more support to stand up to watering. It is considered that light is needed for the germination of some species so a single sheet of newspaper over the covering glass may be preferable to any covering which excludes light. The covering of glass and paper is not essential but reduces moisture loss and watering is not usually necessary until germination. When lifting the glass each morning to wipe off condensation, it appears important to avoid drops of water falling from the glass onto the compost if possible. I marked the spots where drops fell one year and, in seed trays where "damping-off disease" developed later, found that the disease in several

Editor's Note: It may seem odd that an Englishman should be the author of such a comprehensive article on our Eucalypts. However we are indebted to Mr. Barnard for an article that is not only based on considerable experience but is written in such detail as satisfy any query that the layman home gardener should wish to make. The article should also serve to prove to our overseas subscribers, the adaptability of the Australian Eucalypt and serve as a guide to their application in colder regions.

cases started from such spots. With a soil temperature of around 60°F. germination will start in six to fourteen days or in two to six days with cold-stored seed. As soon as germination starts the glass must be removed. Elevation of the cotyledons is very rapid and, if germination is even and the glass left on, a tangled mass of "drawn" seedlings can develop in a few hours.

CARING FOR THE SEEDLINGS—

If good seedlings are to be produced, eucalypts need full light and adequate soil moisture from the start. Light conditions in February-March under glass in this country are seldom more than seedlings will tolerate once the cotyledons have expanded. If prolonged periods of sunshine occur before germination is completed, I fix a length of muslin to wires along the roof of the glasshouse with clothes pegs to shade the seed-boxes only and remove it as soon as clouds obscure the sun. Once germination is complete regular damping from a sprayer with a fine nozzle is preferable to shading. I started raising seedlings in glass to ground, metal framed, cold frames with soil warming, covered at night with sacking when frost seemed likely, with good results and now keep a minimum night temperature of 40°F. in a glasshouse. A high ambient temperature does not seem necessary. Ventilators are opened at about 55°F. and 65°F. is not to be exceeded if it can be avoided. Strong winds on sunny days occasionally make this difficult in a small glasshouse.

The watering of seedlings presents some problems. "Damping-off" disease is an ever-present danger particularly during long periods of dull misty weather which occur frequently near Dartmoor. The roots of seedlings develop rapidly and grow straight to the bottom of the seed-tray if moisture in the surface layers is inadequate which makes subsequent transplanting without root damage difficult. Seedlings are very sensitive to any temporary shortage of water but must have full light. The solution of these problems under my local conditions has been found to be as follows—add permanganate of potash to all water to colour it paeony pink, water by overhead mist and never faster than the water sinks in (I use a knapsack sprayer with a "fan" nozzle) to keep the compost moist throughout, but moister in the upper layers than at the bottom. This may mean several applications at short intervals if the compost has become on the dry side and, on a hot sunny day, eight or ten applications during the day to replace evaporation. During the last two seasons, losses of seedlings, in seed boxes and after transplanting, have been negligible under this treatment which is not difficult but takes a considerable time and day-long attention is necessary. The delicate young seedlings collapse quickly if short of moisture and, though they may recover, damping-off disease appears to follow in most cases. I have tried watering seed-boxes from below, on a capillary bench and by periodically standing boxes in an inch of water. The seedlings have done well in the seed boxes but the development of long roots has been excessive making transplanting difficult and casualties heavy after potting-off. If a seed box remains waterlogged for any length of time (as has happened under an unnoticed drip in a cold frame) roots are quickly killed.

POTTING THE SEEDINGS—

To minimise damage to roots, seedlings should be potted-off into the containers from which they will be planted out, not potted-off into boxes

or small pots and potted-on again into larger. Successful transplanting was so rare during the earliest attempts to raise eucalypts in Australia that it was considered necessary to sow seed in four-gallon containers (paraffin tins), thin to one seedling which was grown on for about nine months and the tin cut away at planting. This practice is still followed when raising ornamental species in desert areas. It was eventually discovered that seedlings could be transplanted successfully whilst very small and the time to do this is when the second pair of seedling leaves is showing but before the third pair is more than just showing. Such seedlings will be between $\frac{1}{2}$ inch and 1 inch tall but their roots will be $2\frac{1}{2}$ to 5 times as long. It seems beneficial to harden-off seedlings before transplanting, moving the seed-trays off bottom heat as soon as the first pair of seedling leaves appears and to cooler conditions a few days before potting-off. Depending largely on light conditions, seedlings will reach the correct stage in three to five weeks from germination in spring. If germination has been irregular, potting-off must be done as individual seedlings reach the correct stage.

EUCALYPTS AS DYE PLANTS

by Don Renfro, 35 Abbott Drive, Oakland, Calif., U.S.A.

In the United States there has been a steady influx of experimentation in the ancient art of plant dyeing. Just a few short years ago, weavers and dyers confined their palette to the traditional dye plants and let it go at that. Madder, Weld, Indigofera, and a few other selective plants and lichens represented the major plant dyes for colours in this palette. Today, that picture has changed and a new breed of weaver and dyer has emerged: the modern artist. The modern artist is a creative person, bringing to this emergence, a host of new techniques, concepts, materials, and dye plants. Two such dye plants are *Eucalyptus globulus* and *Eucalyptus ficifolia*. Few plants have performed more beautifully. The dye colours they give are breath-taking.

EXPERIMENTS WITH *E. GLOBULUS* AND *E. FICIFOLIA*

Several months ago I began experimenting with dyes I had extricated from these eucalypts. It began with the testing of a seemingly new concept, "every plant is a dye plant." Soon afterwards I came upon my first eucalypts, *E. globulus* and *E. ficifolia*. In California, it is difficult not to come across *E. globulus*. They dot the landscape as far as the eye can see. So it was little wonder that the "Gum" was one of the first to find its way into the dye pot.

The experiments were conducted at the San Francisco State College Art Department, under the direction of Professor Margery H. Livingston. She had initiated quite a bit of work in plant dyes and is largely responsible for its revival in California. I was indeed flattered to have her take an interest in my work. The results of these experiments are as follows:

COLOURS FROM *E. GLOBULUS*

Mordant	Colour
alum	light cream
copper	khaki
iron	medium brown
alum/copper	creamy/green
alum/iron	light grey
iron/copper	light brown
alum/copper/iron	light olive

COLOURS FROM <i>E. FICIFOLIA</i>	copper/iron/tin	chartreuse
	iron/copper/tin	light khaki
	iron/copper/tin/chrome	dark khaki
	alum/copper/iron/tin	pale green
	Mordant	Colour
	alum	pale orange
	copper	tan
	iron	brown
	tin	light orange
	alum/iron	light tan
	alum/tin	bright pale yellow
	copper/tin	bright medium gold
	iron/tin	dark orange
	alum/tin/iron	dark yellow, light orange
	alum/tin/chrome	light brown
	alum/iron/tin/chrome	light senna
	copper/tin/iron/chrome	burnt gold

WHAT THIS MEANS

The sequence of mordanting is written above under "mordant." Take for instance, the colour light senna. This was made with the mordants "alum/iron/tin/chrome". This means that the colour was derived by using wool mordanted with ALUM, and the mordants, IRON, TIN, and CHROME, were added to the dye bath in the sequence they are shown in here. But more of this will be discussed later, under DYEING THE WOOL.

HOW THE DYES WERE MADE

With *E. globulus*, juvenile foliage was used. The foliage was taken from a vigorous seedling about six feet high. Using the traditional formula, "ONE POUND OF DYESTUFF (FOLIAGE, BARK, ETC.) FOR ONE POUND DRY WOOL", one pound of fresh leaves were cut up and put into an enamel pot. Two gallons of water was added and the whole thing brought to a low boil. This was permitted to simmer for two hours, adding water as it evaporated. At the end of this time the water had taken up most of the dye from the leaves. It was then drained into another container, straining it through a double layer of cheesecloth as it was poured. This liquid became the dye extract for dyeing the wool at a later time. In extract form, it has a very good storage life.

Working with *E. ficifolia* was essentially the same. In this case, fresh adult foliage was used, taken from a mature tree.

PREPARATION OF THE WOOL

Before dyeing with plant dyes, the wool must first be washed to remove any soil that may be in it. Fleece, of course, contains great quantities of natural oils. Factory-spun wool contains small amounts of machine induced oil. Washing in a soft water bath with a mild soap will usually remove these oils.

MORDANTING THE WOOL

Wool must be treated with a mordanting agent before dyeing. This assures that there will be an equality in the bond between the wool and the dye. Many substances can serve as a mordant. Household items such as ammonia, vinegar and salt can be used. These do not always prove to be the most satisfactory agents, however, as they work well with some plants but not with others. For the best results and all around use, the METALLIC SALTS such as ALUM, IRON and TIN, are most reliable. Mordants used here were selected for their reliability and ease in handling. Selection of mordanting agents was also based upon the fact that most of colours extricated from the eucalypts were the results of compound mordanting.

That is, more than one mordant was used to make a colour. Six basic mordants were selected. They are as follows:

ALUM (potassium aluminium sulphate)
CREAM OF TARTAR
TIN (stannous chloride)
IRON (ferrous sulphate)
COPPER (copper sulphate, blue vitriol)
CHROME (potassium bichromate)

With each of the mordants a skein of wool was mordanted according to the following formulas: (these may deviate from the traditional formulas)

ALUM—three ounces of alum and one ounce of cream of tartar for each pound of wool to be mordanted.

COPPER—one-half ounce for each pound of wool.

IRON—one-half ounce for each pound of wool.

TIN—one-half ounce for each pound of wool.

CHROME—add directly to the dye bath in the quantity of one-half ounce for each pound of wool.

NOTES ON MORDANTING

Mordant immediately after washing and rinsing the wool. Time can be saved by having the wool wet. Unless the wool is wet throughout, it will not mordant evenly, thus causing streaks when dyed.

Begin mordanting by dissolving the proper amount of metallic salts in a hot water bath. Add the wool and bring to a low boil. Simmer for one-half an hour, stirring periodically with a wooden ladle or stick. Metal of any kind has an adverse effect upon the mordant bath. The wool can then be allowed to dry or it can be entered directly into the dye bath.

DYEING THE WOOL

With each new dye plant, colour samples should be made before commencing to dye large pieces of wool. As many as twenty colours and hues can be extricated from a good dye plant. In traditional dyeing this is not always possible, but by the use of compound mordanting a great deal can be done. In fact a single plant may offer such a diversity of colours and hues that you will not have to look further.

From the dye extract that has been made, about 32 ounces is poured off for experimental purposes. The rest is saved until needed for larger pieces of wool. Adding 32 ounces of water, the extract is brought to a low boil and allowed to simmer. Then 18 inch lengths of mordanted wool are put into the bath, one at a time. When the first has taken on good colour it is removed, rinsed in hot running water, marked and hung to dry. Another piece of wool is then put into the bath and the process is repeated until a sample of all the mordanted wool is made. If, at any time, a darker or lighter hue of a colour is made, it is treated in the same manner. For *E. ficifolia*, a good sequence of dyeing has proven to be: ALUM-TIN-COPPER-IRON, in that order. For *E. globulus*, the sequence is ALUM-COPPER-IRON-TIN.

This then, brings to an end some of the dye possibilities of *Eucalyptus ficifolia* with these mordants. It has taken some time, but has been worth every second of it.

There is reason to believe that many of the other eucalypts will yield strong dyes. Try them. Try the bark, the fruit, and the flowers, see what secrets they hold. Good luck.

Editor's Note: The author goes on to describe a specific example using Alum-Tin-Iron-Copper sequence. Because of space limitations this description had to be cut out but it will appear in the next issue.

DENDROBIUM ADAE

Dendrobium adae—F. M. Bail., PROC. ROY. SOC. QLD. 1(1884) by P. Fetherston

The natural habitat of this plant is in the highland rain forests of North Queensland, and hence, although originating in tropical latitudes, it is quite amenable to outdoor culture at lower altitudes, at least as far south as the New South Wales Central Coastal areas.



Photography by P. Fetherston.

The plant is of similar habit to *Dendrobium fleckerii*; but the stems, arising from a short creeping rhizome, are more robust, and about 30 to 40 cm. in length, usually with three lanceolate leaves at the apex. In size the leaves are about 8 cm. long and 1.5 to 2 cm. broad and in colour a deep green on the upper surface, and a paler shade on the under side.

The species flowers in Spring, bearing terminal racemes 4 cm. or more in length carrying about five blooms, usually about 2.5 cm. in diameter, but there is much individual variation. The flowers are of a greenish white colour outside (blotched with a pinkish shade in some forms), and a

gleaming white inside. The anterior margins of the midlobes of the labellum are folded under, to give a very succulent appearance. The flowers are strongly and beautifully perfumed on warm days, but on cloudy days and at night the perfume is not evident, and the flowers remain part closed.

Some growers have reported success growing this orchid potted in fibre, but as it is purely epiphytic in nature there seems no justification for confining it in a container. It will grow quite well firmly attached to a "fibre block" (slab of tree fern stem) and hung in a protected spot. It seems to prefer partial shade (50% plastic shade cloth—"Sarlon", "Saran" etc.) to full sunlight. Good ventilation is essential, as is protection from dry winds, whether they be hot or cold. The plants will thrive in Summer showers and thunderstorms, with supplementary watering as required during dry spells; as regards watering, a good "rule of thumb" would be to treat similarly to *Dendrobium gracilicaule*, which is fairly widely grown.

This *Dendrobium* is one of our loveliest native orchids, and rivals many exotic species. It behoves us as conservationists, to grow it and to propagate it, "selfing" it when possible, and growing from seed, lest it be threatened with extinction.

A NEW SPECIES OF *DENDROBIUM* OF THE SECTION *MONANTHOS*

(Orchidaceae)

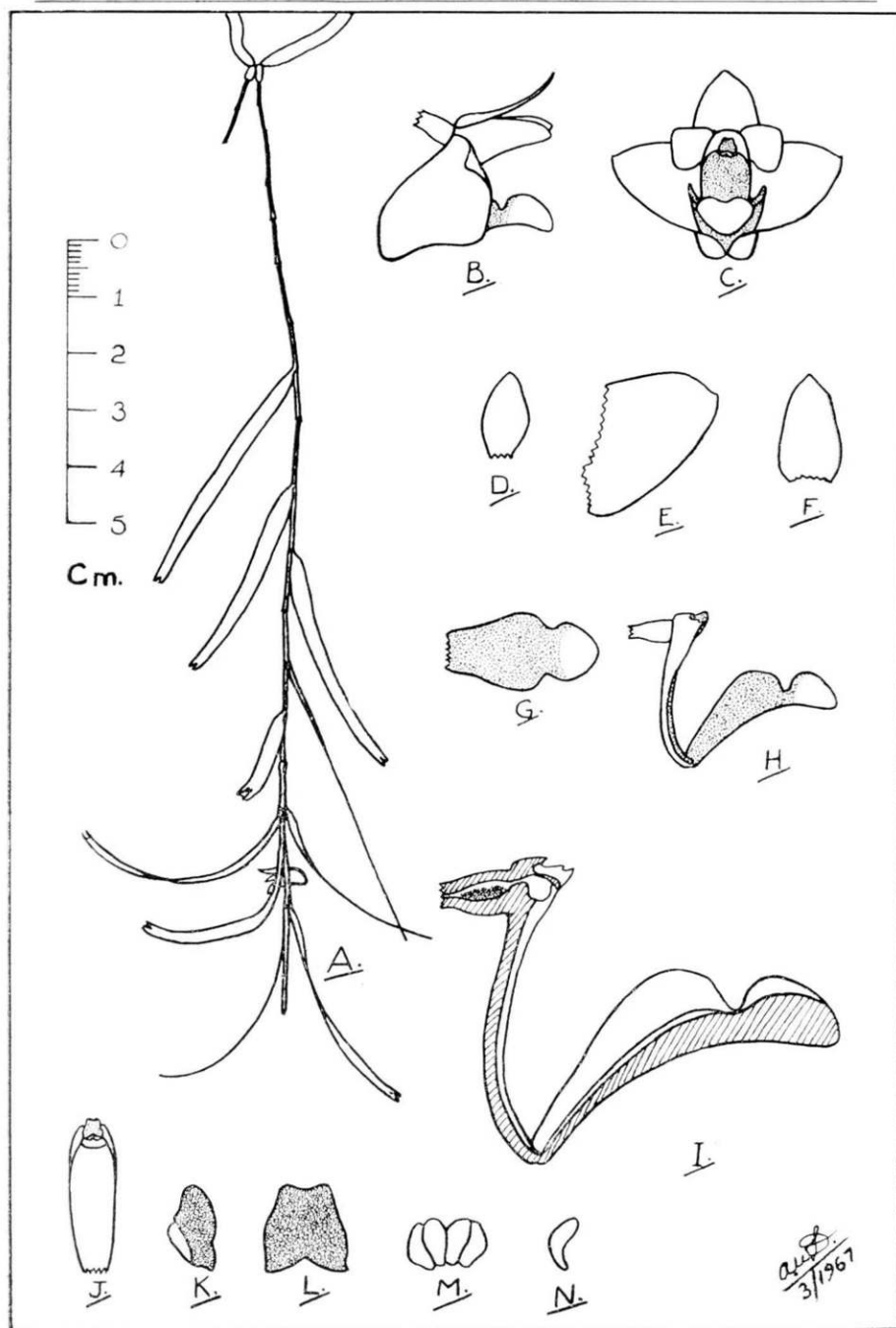
by A. W. Dockrill

Dendrobium malbrowonii Dockrill species novum *D. rhytidotherci* Schltr. affine, sed praecipue: caulibus brevioribus et haud complanatis; floribus brevioribus; sepalis lateralibus pro ratione latioribus 4.0 x 4.5 mm. (non 10 x 7 mm.); mento aequilongo quam sepalis lateralibus (non sepalis lateralibus quam mento 2-plo longioribus); basi labelli angustiore; lobo medio labelli haud ruguloso; pede columnae quam columna ipsa 4-plo longiore (non 2-plo longiore) differt.

Holotype: McIlwraith Range Cape York Peninsula (M. Brown 4-3-67—Herb. BRI.).

Stems 12-25 cm. long x about 0.5 mm. diam., not flattened. Leaves 10-20, 3-6 x 0.2-0.3 cm., more or less linear, deeply emarginate. Flower about 8 mm. diam., widely opening, sepals and petals cream, disc. and lateral lobes of the labellum and column foot deep shining purple, mid-lobe of the labellum yellow; mentum about 4 x 2 x 3 mm. Dorsal sepal about 3.0 x 1.5 mm., subovate. Labellum about 5.0 x 2.5 mm.; disc with 2 vestigial keels; lateral lobes about 1.0 x 2.5 mm., subcrescentic or broad triangular, highest near the front; mid-lobe clearly separated from the remainder of the labellum by a neck, porrect, about 1.5 x 2.0 mm., broad ovate, very thick. Column porrect on the ovary, about 1 mm. long, apical teeth one on either side at the front, rather large, bilobed; foot almost at right angles to the column but curved slightly forward, about 4 mm. long. Stigma very small. Anther very dark purple, almost black, verruculose. Pollinia broad.

This species has obvious affinities with *D. rhytidotherci* Schltr., differing mainly by the plant being of smaller size (12-25 cm. tall compared with 35-45 cm. tall); stems not flattened; leaves smaller (3-6 x 0.2-0.3 cm. compared with 8-12 x 0.35-0.4 cm.); flowers smaller; lateral sepals comparatively broader (4 x 4.5 mm. compared with 9 x 6 mm.); mentum as long as the lateral sepals rather than only half their length; base of the labellum narrow; mid-lobe of labellum not rugulose. Column foot four times the length of the



DENDROBIUM MALBROWNII Dockr.

- A. One stem of a plant . . . to indicated scale
 B. Flower from the side . . . to scale x 5
 C. Flower from the front . . . to scale x 5
 D. Petal . . . to scale x 5.
 E. Lateral sepal . . . to scale x 5.
 F. Dorsal sepal . . . to scale x 5.
 G. Labellum from above . . . to scale x 5
 H. Column & labellum from the side . . . to scale x 5
 I. Longitudinal section of column & labellum . . . to scale x 10
 J. Column from the front . . . to scale x 5
 K. Anther from the side . . . to scale x 20
 L. Anther from the front . . . to scale x 20
 M. Pollinia from the front . . . to scale x 20
 N. Pollinium from the side . . . to scale x 20

column rather than only twice its length; the walls of the clinandrium have a very large bilobed tooth at the anterior on either side compared with 3 very small teeth on either side at the posterior.

This species is named in honour of Malcolm Brown who has contributed considerably to our knowledge of the orchid flora of the northern half of Cape York Peninsula. Some of his outstanding discoveries have been 3 new species, at least one species not previously recorded in Australia and the rediscovery of at least 2 species not recorded for three-quarters of a century.

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PROPAGATION & CULTIVATION OF HYPOCALYMMMA—Continued from page 101
 used for all species from sandy areas. Some peat moss may be added for *H. cordifolium* whereas *H. puniceum* prefers a heavier gravelly soil. Potting should be done as soon as the roots are about half an inch long, longer roots tend to break easily. The freshly potted plants should be kept in a sheltered portion until they are established.



Block donated by N. B. Thomson.

The Coast Myrtle—*Hypocalymma angustifolium*

Shown here growing in the wild as a small compact bush with white flowers, the plant will grow just like this in a sunny position in your garden. The "flowers" go pink as they age and the various shades of white through almost to red make an attractive plant.

Except for *Hypocalymma robustum* and *H. angustifolium* growing from seed is rarely done and seed of the other species is mostly not available. The natural germination time is after the first soaking autumn rains till winter and in early spring. Here in Perth seed can be sown from mid April to mid May or in late August to September. The soil used in seed boxes or pots should be of sandy texture and slightly acid reaction. The seed should only be lightly covered. Germination starts after about 3 weeks. The young seedlings should be singly picked out when about half an inch high. At this stage the transplanting can be done with a minimum of root disturbance. If possible the seedboxes should be left for another season as a later germination may take place. Seed sown in autumn germinated after a few weeks, in spring a second lot germinated and the following autumn some more seedlings came up. Young *H. robustum* seedlings should have the tips nipped off when about 2-3 inches high. This will induce branching out. The young plants may have a few flowers in the first year but a two year old plant will give a fair display. The other species take 3-4 years to produce any amount of flowers.

Editor's Note: The species of the genus that are not described above can be briefly listed:

- Hypocalymma ericifolium* Benth. A little known shrub with yellowish flowers.
- H. linifolium* Turcz. A small shrub to 18 inches with yellow flowers—sand heath.
- H. longifolium* F. Muell. A small shrub with erect branches from the Murchison River area.
- H. phillipsii* Harv. A shrub to two feet with yellow flowers.
- H. speciosum* Turcz. A slender shrub with pinkish flowers.

It is apparent from this list that we know very little of these plants. Will our West Australian readers please seek them out, photograph them and forward a description.

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PUSSY TAILS



Ptilotus rotundifolius

A feature of this issue of *Australian Plants* is a 16 page booklet on the wildflowers mostly from the dry inland areas known as "Pussy-tails", "Lamb-tails", or even "Fox-tails" or sometimes "Mulla-mullas". Thirty species of special horticultural interest are described. *Ptilotus rotundifolius* is common in the heavier soils of the pastoral areas of W.A., particularly in more elevated situations.



***Ptilotus
manglesii***

See page 118.

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