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Australian Plants — Is It A Success?

Each subscription renewal time must cause a review, "is it worth renewing, what value am I getting from it?" A great deal of effort goes into the needs of the various readers who seek value for one or more of the following:

- for the colour photographs alone it is exceptional value. No other book or journal provides such a range of beautiful flowers many of which have never been produced before and probably never will be.
- a simple reference to the plants that make up our unique flora. A great deal of effort goes to make it as simple and accessible as possible. No other publication provides this service. The use of scientific botanic names turns a lot of people off. There are so many hundreds of plants, the common names do not serve. From time to time the pronunciation of these names is given. All pronunciations are in the index. Hence *Chorizema* is cor-ee-ZEEM-a. Let us try to make the generic name such as *Chorizema*, the common name and the deterrent to the use of scientific names disappears.
- cultivation details for growing wildflowers. No other reference provides these details adequately, they usually refer to "plant in a well drained sunny position" for most plants regardless of where they come from. Without *Australian Plants* as a reference there would be no guide in the future.
- as a reference! It is unlikely that many people read it from cover to cover on receipt. You check out the articles of interest and file it away for future reference. As such it is the only complete, up-dated reference to the Australian flora for the non-technical person.
- it is the only semi-technical reference to the flora. As scientists publish results of their research, we reproduce it in a form most people who go to a little effort can follow as with *Chorizema* in this issue. Most people will be able to identify the species just from the sketches. The jargon used in published scientific papers is so heavy and wordy, scientists not heavily involved in botanical naming, use *Australian Plants* as a quick reference — where else will they see the range of colour photographs anyway.
- because we are contributing to the store of knowledge at a level not provided elsewhere. Without your support, each of you, the numbers sold would drop below an economic level. If the numbers were halved, the cost per issue would be \$6–\$12, the latter figure more likely.

There will come a day when you realise what a treasure you have. ■

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COVER PLATE

Daviesia rhombifolia

The photograph by Colin Woolcock has captured another pea-flowered plant for us.

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Growing Our Pea-flowered Plants

by W. H. Payne

What do I mean by Pea-flowered plants? This group of plants are in the plant family Fabaceae and all have characteristic flowers as shown on the cover of this issue and the following colour photographs. For those who want to get technical and would like to know how this flower is made up, I will refer you to Figure 1 on page 101. You will see that it has unusually shaped petals enclosing stamens bearing pollen, and a style in the centre to receive pollen, be fertilised and mature to seed. The seed of this large group of plants develops in a pod and is a legume.

Why grow this charming, usually small decorative plant? **Because** they produce numerous very picturesque **flowers** that are especially attractive in the garden, just look at the colour photographs of this issue; and because they are **easy to grow** as discussed below; and because, if you want a healthy attractive wildflower garden, **you need to grow them** for reasons given.

What Species Shall I Grow?

It is often a matter of what plants you can get. I grow many local pea-flowers, especially *Gompholobium*, *Pultenaea*, *Jacksonia*, etc., as well as some from interstate. My favourite is *Chorizema* (pronounced cor-ee-ZEEM-a). They come from Western Australia and are described in this issue. Why is it my favourite? You would know if you saw my garden in springtime. I feel that it is good to grow as wide a range of plants as you can and create a botanical zoo but, you need a number of theme plants that appear everywhere and link up the garden. One of my theme plants is *Chorizema cordatum*; it is easy to propagate by seed or cuttings, it is easy to grow, just plant and water until established and it is a low scrambling plant usually to 50 cm high with long arching racemes of red/orange/yellow flowers in abundance.

So what species should you grow? Whatever you can get, local or from elsewhere but include *Chorizema* and another hardy West Australian, *Brachysema*, the Swan River Pea. **Plants hard to get?** Strange isn't it as they are so easy to grow from seed. Simple sure-fire successful methods for growing this type of seed are given in previous issues of *Australian Plants*. No special facilities are required. You can purchase seed or collect your own in late November, early December.

How do you grow them? They prefer well drained usually light soil but they will grow in most soils that will grow most plants. Some do appear to be difficult but I believe it is related to how well the soil is aerated, open to receive air and water for reasons given below. For general hints on growing these and all wildflowers I suggest you study the suggestions by the experts in the next article.

Why do I need to grow them? Because your garden needs them. They are nature's instrument in feeding the other plants in your garden. If you want to know why and can stand to get a little technical on the subject refer to my article "Nitrogen Fixation — Nature's Role For Pea-flowered Plants". ■



△ *Gastrolobium grandiflorum*

Photography by C. Woolcock

▽ *Mirbelia spinosa*





△ *Viminaria juncea*

Photography by R. Reinschmidt

▽ *Bossiaea bossiaeoides*



Australian Native Gardens

By Diana Snape

Experienced Gardeners Reveal Basic Garden Practices

The following notes have been culled from a book entitled "Australian Native Gardens — Putting Visions into Practice", by Diana Snape*, describing thirty successful gardens devoted almost entirely to Australian plants. "Visions into Practice" is an appropriate subtitle as she has attempted, most successfully, to project these gardens as the creator sees them. To appreciate the excellence of this presentation you will need to buy the book. In one section Diana Snape encouraged them to reveal their basic secrets of success, their thoughts on reflection. I have taken the liberty of making the following quotes, completely out of context but taken together make up the critical factors in the creation of a wildflower garden — Editor.

Don Burke, Sydney: "It's like painting — it all depends on your basic preparation before you start. Get your soil right, sculpting it and making sure of its quality. There's the organic matter you keep adding to it, and the leaf litter which is rotting down into the soil the whole time. If you're committed to getting the soil right, the plants look after themselves. Never hand water, use a sprinkler and soak . . ."

Sib Corbett, Tasmania: "Do one area at a time, from start to finish. Get a whole garden bed constructed, building the bed up because drainage is important. Use rocks and logs to get the bed into a pleasing shape to begin with, then try to plant it all in one go."

Gordon Ford, Melbourne: "The first basic principle is to 'non-define' your geometric boundary with planting . . . Next plant the environs of the house. Think of terraces and outdoor living areas as extensions of the house, outdoor rooms, somewhat separate from the rest of the garden, then plant the intervening area."

Kath Deery, Melbourne: "A garden is not a static thing. I like movement in the design of a garden, with paths winding around curved beds and disappearing in the distance, and changing vistas. Lawns are banned . . . I'm mad about tree trunks . . . I love foliage, and I try to use foliage always in my gardens regardless of flowers, which are here today and gone tomorrow. I do plant with flowers in mind . . ."

Roger and Gwen Elliott: Using local plants "to provide and maintain habitat for the wildlife of the region . . . we share our garden with over 50 species of native birds, an echidna, ring-tail and brush-tail possums, numerous lizards and skinks, several snakes, butterflies, insects and other creatures."

Neil and Jane Marriott: "Do your soil preparation before you start because it saves a bit of work . . . it reduces maintenance and the plants grow better. Good drainage is most important, and even if you've got heavy soil you can grow a huge range of plants . . . In some of our beds where we've planted the same species in low mounds and higher mounds, you can see the difference. In beds that are 1 metre high the plants are really big and luxuriant, whereas in low mounds they'll grow, but they don't flower as well and never look as good."

***Australian Native Gardens, Putting Visions into Practice** is a new book by Diana Snape, available at your bookseller for \$45.00. Since preparing this review Diana has agreed to lead a new Study Group — Garden Design Study Group — see page 132 for details.

Paul Thompson: "The aspect of water is important . . . All the water from the block drains down and feeds one area, then another area, and eventually finds its way to the street or dam . . . water conservation through creative landscaping. I do not water most of the garden at all, because I am interested in growing plants at the limits of their tolerance."

Brian Crafter, Adelaide: "Go to a reputable native nurseryman to find out the varieties which are likely to grow well in your area. As you need to know and understand the type of soil you have and its pH, take along a soil sample."

Bruce Champion, Tasmania: "Don't try to grow exotically flashy natives at first. Try to grow some that will be reliable and get your garden established. Start off mulching. I don't think you can come in later and successfully recover a garden that hasn't been mulched . . . Prune from the moment you plant."

Max Hewett, Sydney: "I would mound all beds and grade all plants accordingly to the size they're going to grow. For large plants . . . use vegetative mulches, but for the small plants . . . maintain sterile conditions such as with a gravel mulch. Most of my plants are not watered artificially although some may receive a little to get them started. You may lose some plants and others may defoliate and recover later. A healthy root system is essential." ■

Nitrogen Fixation — Nature's Role For Pea-flowered Plants

by W. H. Payne

Nitrogen is a vital element for plant growth. Much of the Nitrogen found in soil comes from dead organic materials existing in the form of complex organic compounds. However, these are rapidly decomposed into simple compounds by soil-dwelling organisms using the proteins for their own need and releasing excess Nitrogen in the form of ammonium. This is dissolved in the soil water where it combines with protons to form the ammonium ion.

Several species of bacteria common in soils are able to oxidise ammonium, the process being known as nitrification. This is an energy yielding process and the energy released is used by these bacteria to reduce Carbon Dioxide in much the same way that photosynthesis uses light energy for the reduction of Carbon Dioxide from the air, at the leaf surface. This produces nitrite that is toxic to plants but it rarely accumulates in the soil. Another group of bacteria oxidises the nitrite to form nitrate which is the form in which almost all Nitrogen moves from the soil into the plant roots. The incorporation of Nitrogen into organic compounds needed for plant growth takes place largely in **young, growing root cells**.

Where the soil is Oxygen deficient such as in **badly drained situations** that are thus poorly aerated, the bacteria will release Nitrogen gas into the air to obtain the Oxygen/energy instead of making Nitrogen in a form suitable for plant life. Another source of Nitrogen loss is the removal of plants. Soils under cultivation often show a steady decline of Nitrogen content and this often occurs in established gardens where a decline in plant vigour and flowering is obvious.

Continued on page 118

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Chorizema dicksonii

△ plant, photo: C. Woolcock

▽ flower, photo: M. Crisp



Chorizema

M. D. Crisp and J. M. Taylor, based on their revision of the genus in *Aust. Syst. Bot.* 5(3) 1992. Drawings mostly by D. Fortescue; also by M. Crisp, J. Marsh, P. Masters and C. Woolcock.

Chorizema is a genus of pea-flowered small shrubs belonging to the legume family (Fabaceae). This family is instantly recognised by its fruit, which is a legume (pod, bean). Its economic products make it one of the most familiar plant groups, e.g., foodstuffs (peas and beans), fodder (clover, lucerne) and timber (black bean, blackwood). Ecologically the family is very important because virtually every plant community includes some legumes which enrich the soil with nitrogen fixed by their *Rhizobium*-containing root nodules.

In Australia, everybody knows the acacias or wattles, whose golden blossoms signify springtime. Many of the drier landscapes are dominated by acacias such as Mulga, Gidgee and Brigalow. With 180 genera and 1,900 species, the legumes are Australia's most diverse family. Only two families have more genera: the daisies or Asteraceae (200) and the grasses or Poaceae (217, including 66 introduced), and none has near as many species. For a general account of Australian Fabaceae, see Morley and Toelken (1983). The Fabaceae have three subfamilies, all well represented in Australia: Mimosoideae or wattles (17 genera, 700 species), Caesalpinioideae or baubins and cassias (21 genera, 85 species) and Faboideae or peas (136 genera, 1,100 species). The pea flower is a distinctive butterfly shape, comprised of five petals: the upright standard or banner, two wings, and enclosed within these, a keel of two partly joined petals.

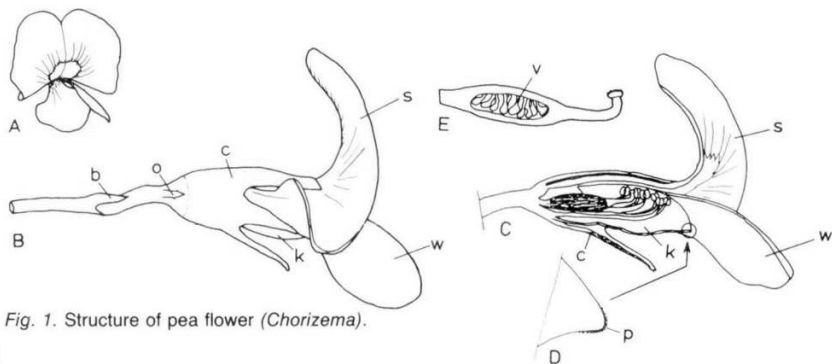


Fig. 1. Structure of pea flower (*Chorizema*).

A, whole flower, front view; B, same, side view (b = bract; o = bracteole; c = calyx; s = standard or flag petal; w = wing or side petals; k = keel, formed from two petals joined along their lower edges); C, lengthwise section through flower, showing the enclosed sexual parts. Note the keel is much shorter than the wings in this genus; D, tip of keel (circled in C) showing papillae (p), which are minute blunt "hairs" or projections; E, lengthwise section through the pistil (female organ) showing the many ovules (v) characteristic of *Chorizema*. After fertilisation, the ovules develop into seeds.

Many of Australia's native peas (Faboideae) are representative of larger groups found elsewhere in the world, e.g., indigo (*Indigofera*), coral trees (*Erythrina*) and rattlepods (*Crotalaria*). Even the spectacular tribe¹ Galegeae, which includes the Darling Pea, Broughton Pea and Sturt Pea (*Swainsona*) has thousands of closely related species spread through most temperate regions of the world.

¹A formal grouping of genera within a family or subfamily.

Australian Pea-flowers

However, there is one large and familiar group that is entirely Aussie. These are the egg-and-bacon peas, the tribes Bossiaeeae and Mirbelieae. They probably originated from a single common ancestor in Australia millions of years ago. All their descendants have remained "true blue" except for a single species which has just managed to cross Torres Strait into Papua New Guinea. Together these tribes have 700 species, or more than half of all the peas in this continent. With few exceptions, they can be recognized by their distinctive "egg-and-bacon" flowers (see photographs), in which the petals are yellow or orange with red markings, especially towards the centre of the standard petal, and on the wings and keel. Among the few exceptions is *Chorizema*, in which many species have orange and pink flowers, or variations on this theme.

The Bossiaeeae and the Mirbelieae are distinguished by their stamens. In the Mirbelieae the filaments are all free from one another, whereas in the Bossiaeeae they are all fused into an open sheath. Bossiaeeae comprise the genera *Bossiaea*, *Goodia*, *Platylobium*, *Ptychosema*, *Muelleranthus* and *Aenictophyton*. The Mirbelieae are much more diverse, and include *Gompholobium*, *Daviesia*, *Sphaerolobium*, *Erichsenia*, *Viminaria* (all of these belonging to the *Daviesia* group); *Jacksonia*, *Leptosema*, *Isotropis*, *Oxylobium*, *Chorizema*, *Mirbelia*, *Gastrolobium*, *Callistachys*, *Brachysema*, *Jansonia* (the *Oxylobium* group); and *Pultenaea*, *Aotus*, *Urodon*, *Latrobea*, *Almaleea*, *Dillwynia*, *Euchilopsis*, *Phyllota*, *Eutaxia* (*Pultenaea* group), plus several genera yet to be described. From this listing, it can be seen that *Chorizema* belongs to the Mirbelieae, and more specifically to the *Oxylobium* group of genera. Characteristics of genera in each of these three groups are shown in the drawings opposite and the photographs.

The most recently published key to all the genera in the Mirbelieae is that by Crisp in Morley and Toelken (1983). However, definitions of genera and their relationships within this group are problematic, and are the subject of ongoing research (e.g., Crisp and Weston 1987). The key on page 104 incorporates the results of research since 1983, and the state of uncertainty is reflected in the appearance of several odd species and one undescribed genus within the key. Changes from the 1983 key are as follows: *Almaleea* is newly described (Crisp and Weston 1991); *Callistachys*, *Podolobium* and *Urodon* have been resurrected from synonymy; *Burgesia* has been included within *Leptosema*, *Burtonia* within *Gompholobium*, *Cupulanthus* within *Brachysema*, and *Nemcia* within *Jansonia*. The old *Oxylobium*, which has been a "dumping ground" for species that did not fit anywhere else, has been drastically rearranged, with some species going into *Gastrolobium*, *Callistachys*, *Chorizema*, and *Podolobium*. The remainder of *Oxylobium*, as currently circumscribed, has about five species, all restricted to southeastern Australia.

References

- Crisp, M. D. and Weston, P. H., 1987. Cladistics and legume systematics, with an analysis of the Bossiaeeae, Brongniartieae and Mirbelieae. In: 'Advances in Legume Systematics, Part 3.' (ed. C. H. Stirton) pp. 65–130. (Royal Botanic Gardens: Kew.)
- Crisp, M. D. and Weston, P. H., 1991. *Almaleea*, a new genus of Fabaceae from southeastern Australia. *Telopea* 4: 307–311.
- Morley, B. D. and Toelken, H. R., 1983. 'Flowering Plants in Australia.' (Rigby: Adelaide.)
- Taylor, J. M. and Crisp, M. D., 1992. A revision of *Chorizema*. *Australian Systematic Botany* 5: 249–335.



Fig. 2. Pea-flowered plants belonging to the tribe Mirbelieae (eggs-and-bacon with stamens free from one another). A, the ten free stamens common to all species of tribe Mirbelieae, as shown the anthers are versatile. B-E, *Daviesia laevis*. B, habit showing an inflorescence (arrangement of flowers) arising from the point where the leaf joins the stem (known as an axillary raceme), the leaves being arranged spirally ("alternate") along the stem; C, a single flower in side view. Note the absence of bracteoles (cf. Fig. 1B); D, the triangular pod enclosing one seed (often two in this genus); E, seed with an aril (the fleshy structure at the point of attachment of the seed stalk (funicle). F-I, *Oxylobium* (= *Podolobium*) *alpestre*. F, habit showing the leaves in a whorl (arising at about the same point and encircling the stem) of three, with flowers in short axillary racemes; G, a single flower in side view. Note the presence of bracteoles at the base of the calyx, and the recurved (turned backwards) calyx lobes, the latter being characteristic of this genus and *Gastrolobium*; H, the hairy pod containing several seeds; I, seed with no easily visible aril (actually there is a very small one). J-N, *Pultenaea retusa*. J, habit showing scattered, spirally arranged leaves, and flowering in terminal heads; K, a single flower in side view. Note, bracteole (black) attached to calyx tube; L, leaf with stipules (black outgrowths at base). In *Pultenaea*, and no other genus of Mirbelieae, the stipules are joined together behind the petiole (leaf stalk); M, pod containing one or two seeds; N, seed with aril.

Key to the genera of Mirbelieae

The following key will provide a guide to the genera that comprise the Mirbelieae, a group within the plant family Fabaceae, all with egg-and-bacon pea-flowers whose stamens are all free as in Figure 2. Many of the botanical features used in this key are given in Figures 1, 2 and 3.

- 1 Leaves absent or reduced to spines or scales 2
- 2 Flowers yellow, in long terminal racemes and panicles; calyx teeth equal, shorter than tube; pod ovoid, thin, indehiscent *Viminaria*
- 2* Not as above
- 3 Flowers in axillary racemes, sometimes umbellate or reduced to one flower; barren bracts present on peduncle; pod triangular (rarely ovoid) (see Fig. 2B–E) *Daviesia*
- 3* Not as above
- 4 Style with a membranous wing near apex; upper two calyx lobes much enlarged and united; bracteoles large, round, early deciduous; pod globular *Sphaerolobium*
- 4* Not as above
- 5 Calyx lobes imbricate (overlapping) in bud 6
- 6 Ovary and/or pod partly divided longitudinally inside and/or pod grooved longitudinally above; standard not purple-veined behind *Mirbelia*
- 6* Ovary and pod not as above; standard with purple veins behind *Isotropis*
- 5* Calyx lobes valvate (abutted) in bud 7
- 7 Standard more or less orbicular, conspicuous; ovules 2, rarely 3 or 4 *Jacksonia*
- 7* Standard not orbicular, greatly modified, inconspicuous, usually acute and shorter than keel; ovules usually more than 2 *Leptosema*
- 1* Leaves developed, simple, of one leaflet, or compound 8
- 8 Stipules subulate (awl-shaped) to filiform (thread-like), free; at least the lower bracts usually trifid (with three small teeth or lobes, but mostly entire, reddish and deciduous in *Gastrolobium*); leaf venation conspicuously reticulate (netted) 9
- 9 Standard much smaller than keel, more or less narrow and inconspicuous; petals red, green or blackish 10
- 10 Flowers in nodding heads enclosed by four overlapping bracts; petals enclosed within calyx lobes *Jansonia*⁴
- 10* Flowers in short racemes; petals exerted from calyx *Brachysema*
- 9* Standard the largest petal, more or less orbicular; petals usually yellow or orange with red markings 11
- 11 Calyx lobes spreading or recurved in flower 12
- 12 Pod ovoid to ellipsoid; plants toxic with fluoroacetate; hairs not laterally attached; western central and northern Australia *Gastrolobium*²
- 12* Pod elongated and narrow, sometimes warty; plants not toxic; hairs laterally attached; southeastern Australia (see Fig. 2F–I) *Podolobium*³
- 11* Calyx lobes more or less erect in flower 13
- 13 Inflorescence a short, condensed raceme, sometimes head-like. *Jansonia* (incl. *Nemcia*)⁴
- 13* Inflorescence an elongated, open raceme with many flowers 14
- 14 Bracteoles present; tall bushy shrub to small tree (4–8 m) with whorled leaves *Callistachys*⁵
- 14* Bracteoles absent; slender erect shrub to 3 m with scattered leaves *Oxylobium lineare*⁶
- 8* Not the above combination — if bracts obviously 3-lobed or 3-toothed, then stipules fused behind petiole (*Pultenaea*) 15
- 15 Style with a membranous wing near apex; upper two calyx lobes united into a broad notched lip; lower three very small and narrow; bracteoles large, round, deciduous; leaves less than 1 cm long, usually deciduous; pod globular *Sphaerolobium*
- 15* Style without a membranous wing; or calyx, bracteoles, leaves and pod without the above combination 16
- 16 Ovary and/or pod partly divided longitudinally inside and/or pod grooved longitudinally above; standard not purple-veined behind *Mirbelia*
- 16* Ovary and pod not as above 17
- 17 Ovules four or more 18
- 18 Standard purple-veined behind; upper two calyx lobes united almost to apex in a broad lip; pod turgid, narrowly oblong in outline *Isotropis*
- 18* Standard not purple-veined behind; upper calyx lobes united only part-way; pod globular to ovoid or obovoid 19

²Includes the old *Oxylobium parviflorum* group, with four or more ovules and fluoroacetate (Crisp and Weston 1987). However, *Gastrolobium* series *Axillares*, with two ovules, condensed racemes and no fluoroacetate belongs in *Jansonia*.

³Includes the old *Oxylobium ilicifolium* and *O. scandens* groups (Crisp and Weston 1987).

⁴Until recently, only the single bird-pollinated species was recognised (*J. formosa*), but the old *Gastrolobium* series *Axillares* (= *Nemcia*) belongs in this genus (paper in preparation; see also Crisp and Weston 1987).

⁵Includes only one species, formerly *Oxylobium lanceolatum*.

⁶Generic status unclear, but does not belong in *Oxylobium*.

- 19 Calyx lobes abutted in bud; pod globular; leaves usually compound with three or more usually sessile leaflets *Gompholobium*⁷
- 19* Calyx lobes overlapping in bud, often narrowly; pod ovoid or obovoid; leaves simple 20
- 20 Upper surface of leaf covered with many tubercles (small bumps); keel about equal in length to wings, not beaked; leaves more or less opposite or whorled *Oxylobium*⁸
- 20* Upper surface of leaf without tubercles; keel much shorter than wings, or beaked, or both; leaves usually spirally arranged⁹ *Chorizema*
- 17* Ovules two
- 21 Calyx lobes abutting in bud; pod globular, leaves compound with three or more, usually sessile leaflets *Gompholobium*⁷
- 21* Not as above 22
- 22 Flowers in axillary racemes, sometimes umbellate or reduced to one flower; barren bracts present on peduncle; pod triangular (rarely ovoid); bracteoles absent (Fig. 2B–F) *Daviesia*
- 22* Not as above 23
- 23 Leaves terete (long, narrow and cylindrical), hooked at apex; standard purple-veined; calyx lobes rounded at apex *Erichsenia*
- 23* Not as above (*Pultenaea* group) 24
- 24 Stipules conspicuous, with thin transparent margins, fused behind the petiole (see Fig. 2J–N) *Pultenaea*
- 24* Stipules minute (or none), uniform in texture, free 25
- 25 Leaves concave or paler on upper surface, or terete to triquetrous (3-sided) and longitudinally grooved above, often keeled on lower surface; aril present on seed 26
- 26 Keel about equal in length to wings 27
- 27 Standard ovate, peaked at apex; pod flattened, triangular; calyx lobes uniform *Latrobea*
- 27* Standard rounded and notched at apex; pod turgid; calyx lobes unequal *Pultenaea selaginoides*¹⁰
- 26* Keel much shorter than wings
- 28 Leaves three-nerved on lower surface; calyx with five or 10 ribs 29
- 29 Leaves opposite and decussate, margins not ciliate, ribs of calyx not conspicuous *Eutaxia*
- 29* Leaves arranged spirally, margins ciliate; calyx prominently ribbed *Pultenaea neurocalyx*¹¹
- 28* Leaves with a single mid-nerve below; calyx not ribbed 30
- 30 Inflorescence a head surrounded by an involucre of leaves progressively modified into bracts by enlargement of the stipular base; bracts persistent *Almaleea*¹²
- 30* Inflorescence various but if head-like then lacking an involucre; bracts more or less deciduous *Dillwynia*
- 25* Leaves with recurved margins, or if flat then darker on the upper surface, not keeled below; aril absent 31
- 31 Bracteoles absent; leaves in whorls of three or more, often irregularly *Aotus*
- 31* Bracteoles present; leaves arranged spirally 32
- 32 Leaves flat; style longitudinally winged *Urodon*¹³
- 32* Leaves with recurved to revolute margins; style not winged 33
- 33 Calyx with upper two lobes enlarged and rounded, lower three lobes minute; hairs laterally attached *Euchilopsis*
- 33* Not as above 34
- 34 Keel beaked, lobed near the base only on the upper margin; pod glabrous inside *Phyllota*
- 34* Keel rounded at apex, lobed asymmetrically near the base on both upper and lower margins; pod pubescent inside Genus aff. *Aotus*¹⁴

Using this key to find *Chorizema*

- 1* Leaves developed, simple, of one leaflet or compound (*Chorizema* has simple leaves).
- 8* Stipules minute to absent; bracts minute, not trifid; leaf venation reticulate in some species.
- 15* Style without membranous wing near apex; calyx lobes as in Fig. 3.
- 16* Ovary and pod not partly divided longitudinally inside.
- 17* Ovules four or more (for *Chorizema* it is usually many).
- 18* Standard not purple-veined behind; upper calyx lobes united only part way as in Fig. 3.
- 19* Calyx lobes overlapping in bud, often narrowly; leaves simple.
- 20* Upper surface of leaf without tubercles (small lumps); keel much shorter than wings, or beaked or both; leaves usually spirally arranged.

⁷Includes *Burtonia* (Crisp and Weston 1987).

⁸In the new, narrow sense, includes only *O. arborescens*, *O. cordifolium*, *O. ellipticum*, *O. pultenaeae* and *O. robustum*.

⁹*C. obtusifolium* has keel scarcely shorter than wings and leaves more or less whorled, but petals are orange and pink, as in typical species of *Chorizema*.

¹⁰Generic status is unclear (Crisp and Weston 1991).

¹²Recently described (Crisp and Weston 1991).

¹³Reinstated by Crisp and Weston (1987) and (1991).

¹⁴Generic status is unclear (Crisp and Weston 1991).

¹⁴See Crisp and Weston (1991).

Chorizema

What is a *Chorizema*? See Figure 3 with caption on page 108.

The species of *Chorizema* may be subdivided into three sections of similar species, the larger section further divided to enable similar species to be described on one page opposite illustrations showing features of the plants for ready recognition.

Section Hirtistylis

1. Leaves with secondary venation unbranched between midrib and the margin.
2. Hairs on the calyx of two colours and lengths.
3. Anthers basifixed, 0.8–1 mm long.

Section Parviflores

1. Leaves with secondary veins looping and joining. This can be difficult to observe on leaves with revolute margins, Fig. 7, but can be seen in Figs 8 and 9.
2. Hairs on the calyx uniform in length and colour.
3. Anthers versatile and less than 0.5 mm long.
4. Petals yellow with dull red markings, keel petals lacking papillae.

Section Chorizema

1. Leaves with secondary veins looping and joining.
2. Hairs on the calyx uniform in length and colour.
3. Anthers versatile.
4. Leaves with secondary veins looping and joining and tertiary veins branching, conspicuously reticulate (Figs 11b, 13c, 19d, 23c).
5. Flowers with orange and pink petals; keel petals with marginal papillae, Fig. 1D.

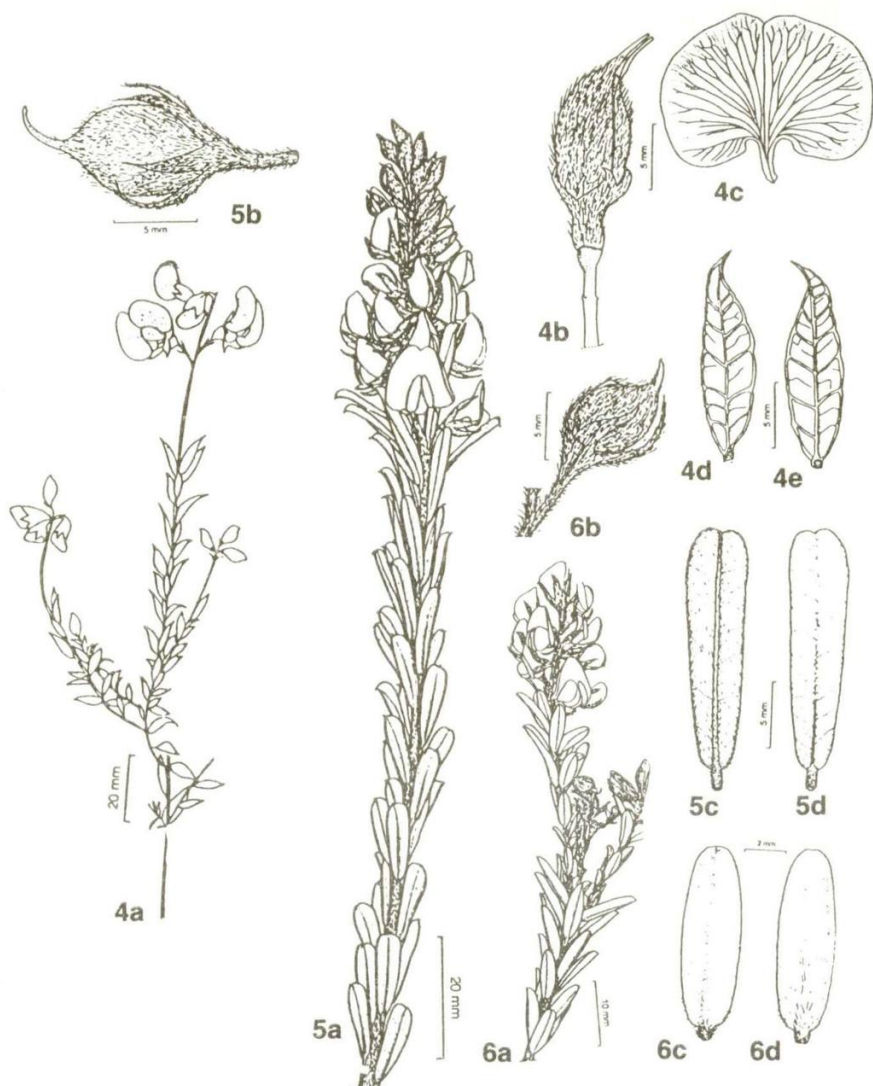
Chorizema

Species in the Section Hirtistylis

Chorizema dicksonii is an erect shrub, 30–100 cm tall with erect or spreading branches, with appressed hairs or glabrous; leaves alternate, pungent at the tip, 5–20 × 2–7 mm, with scattered hairs when young. Flowers reddish, in terminal racemes of about four flowers. The style is abruptly incurved near the ovary with a tuft of white hairs close to the stigma. Photographs, page 100.

Chorizema spathulatum is an erect or diffuse shrub to 30 cm tall; leaves alternate, smaller on lower branches, 7–30 × 2–6 mm, the upper side becoming glabrous with scattered hairs below; margins recurved; midrib prominent. Racemes terminal, 2–3 cm long, with 5–15 crowded flowers, elongating when in fruit; flowers yellow. It occurs in tall forest or open woodland or in heath in a range of soils.

Chorizema carinatum is an erect or spreading shrub to 60 cm high with hairy branches when young; leaves alternate, the largest leaves on the lower stem. Leaves flat or slightly folded up, with hairs more numerous on the underside. Flowers yellow, in terminal racemes. It is closely allied to *Chorizema spathulatum* which has larger leaves, usually with recurved margins, the smaller leaves being at the base of the plant. It occurs in *Eucalyptus* woodland growing in sand or clay-sand soils.



The *Chorizema* species in Section *Hirtistylis*

Fig. 4. *Chorizema dicksonii* — 4(a) flowering branchlet; 4(b) pod; 4(c) standard or upper petal; 4(d) leaf, upper surface; 4(e) lower surface, showing unbranched venation. Photo page 100.

Fig. 5. *Chorizema spathulatum* — 5(a) flowering branchlet; 5(b) pod; 5(c) leaf, lower surface with midrib prominent; 5(d) upper surface, margins recurved.

Fig. 6. *Chorizema carinatum* — 6(a) flowering branchlet; 6(b) pod; 6(c) leaf, upper surface; 6(d) lower surface.

What is a *Chorizema*?

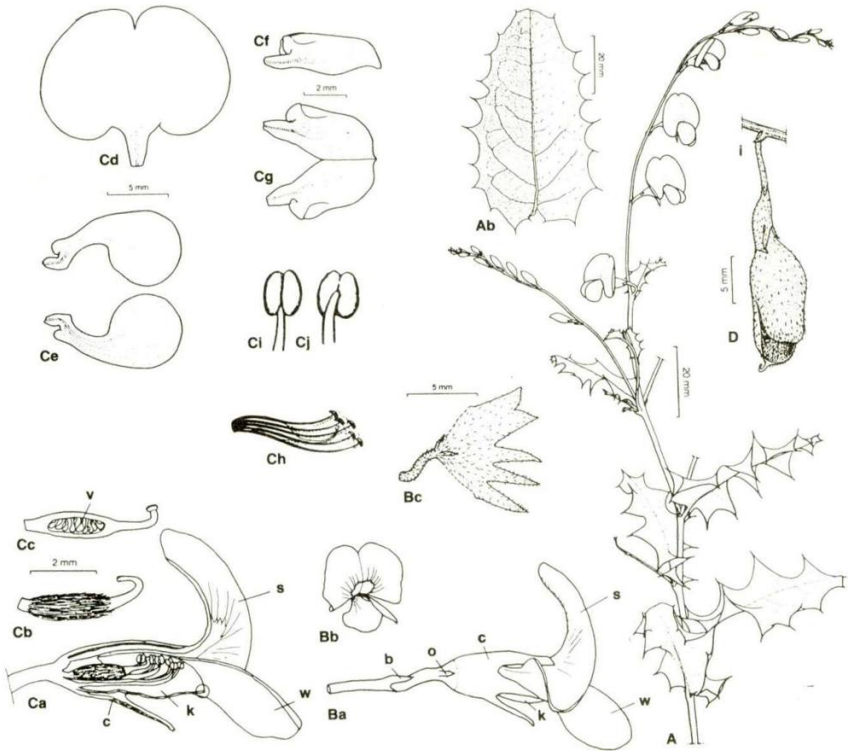
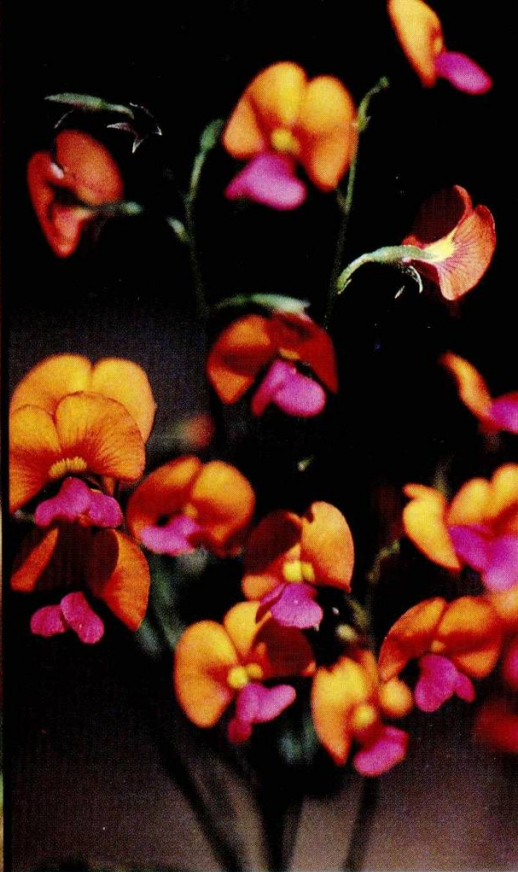
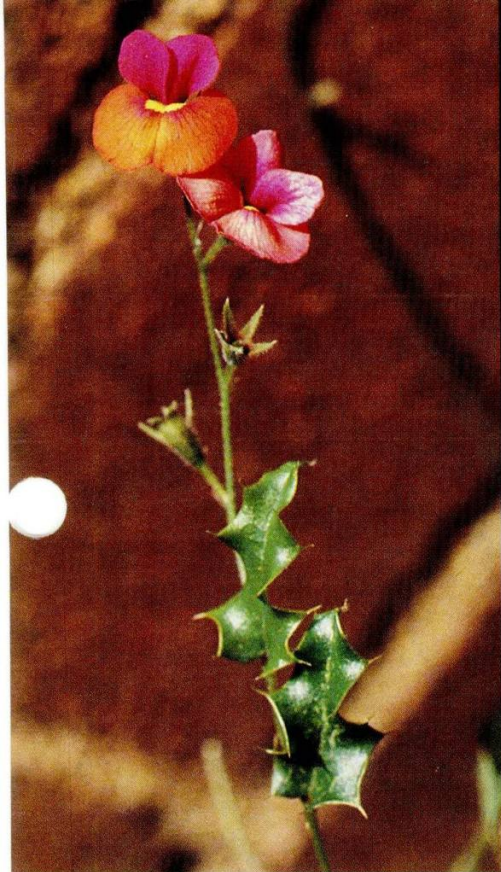


Fig. 3. The general features of *Chorizema* are displayed using this drawing of *Chorizema cordatum*.

- A — A flowering stem showing the weak often sprawling growth, the leaves in this case being multi-pointed along the margins; Ab, leaf in detail, the lower surface showing the venation on the left hand side and scattered hairs on the right hand side.
- B — A flower, Ba, reproduced from Fig. 1 (Ba–Bb). The calyx, c, the tube that cups the flower, is shown opened out; Bc, the calyx and the flower stalk or pedicel are hairy.
- C — The flower is shown in section to illustrate its parts comprising the five petals: the standard, s, shown opened out in detail, Cd; the two wings, w, opened out in detail, Ce; the keel, k, and detail, Cf, which comprises two petals opened out in detail, Cg. The central part of the flower is the pistil, detail Cb, and the section, Cc, shows many ovules in the ovary. The pistil consists of ovary and the style with the stigma on the end. The pistil is surrounded by 10 free stamens, Ch, the anthers on the ends of the stamens may be basifixed as in Ci for species in section *Hirtistylis* or versatile, Cj, as for all other *Chorizema* species. Pollinators, usually bees, are attracted by the large flamboyant standard petal. They alight on the keel and the wings act as a lever to pop the stamens out of the keel and deposit pollen on the bee's abdomen. In the process of the visit or a visit to another flower, the pollen is deposited on the stigma on the end of the style. Some ovules are fertilised and develop into seed.
- D — The seed pod, in which the seed has matured, has opened to release the seeds. In this species the pod, the calyx and the stalk (pedicel) are sparsely hairy.



△ *Chorizema cordatum* Photo left by M. Crisp, photo right by W. H. Payne
 ▽ *Chorizema cordatum* × *Chorizema varium* Photo by H. Thompson



Chorizema

Species in the Section Parviflores

Characters common to all species in this group are:

1. Leaves with secondary veins looping and joining.
2. Hairs on the calyx uniform in length and colour.
3. Anthers versatile and less than 0.5 mm long.
4. Petals yellow with dull red markings; keel petals without papillae.

Chorizema racemosum is a spreading or erect shrub to 60 cm tall with branches often spinescent; leaves 4–8 × 1 mm, occasionally to 15 mm long with revolute margins. Flowers are yellow with dull red markings. It has been confused with *Mirbelia spinosa* because of its similar spinescent habit and small flowers. It has affinities with other small flowered *Chorizema*, *C. genistoides* and *C. humile*, but these have obovate or cuneate leaves that are flat and the margins never revolute. It grows in a variety of soils including yellow sand, sandy clay, calcareous loam, granitic red loam and alluvial soils in flood-channels and river beds.

Chorizema humile is a small, sprawling, prostrate or decumbent shrub with branches to 35 cm long, striate or ridged, with scattered hairs. Leaves alternate, 4–16 × 3–5 mm, often with appressed hairs; margins slightly recurved. Flowers yellow with dull red markings. *C. genistoides* is superficially similar but has erect or spreading branches, leaves sparse at flowering, keel petals much shorter than the wing petals and the style abruptly incurved; sandy clay or red loam.

Chorizema parviflorum is a small shrub with woody rootstock; branches weakly ascending or semi-prostrate to 40 cm long, angular or ridged with scattered hairs; leaves alternate and very variable, 8–45 mm × 1–7 mm, with recurved margins. Flowers pale yellow with dull red markings. While other *Chorizema* spp. are restricted to W.A., *C. parviflorum* is endemic to Qld and NSW, on headlands, often close to the cliff edge, dry sclerophyll forest, open heath, grassland or swampy places, in a wide variety of soils.

Chorizema genistoides is an erect or spreading shrub to 40 cm; leaves alternate, flat, 5–18 × 2–5 mm. The flowers are yellow with dull red markings; wing petals are much longer than the keel. A variety of soils in W.A.

Chorizema

Species in the Section Chorizema

This group of species has the following common characteristics:

1. Leaves with secondary veins looping and joining.
2. Hairs of the calyx uniform in length and colour.
3. Anthers versatile.
4. Leaves with tertiary venation reticulate, often conspicuous.
5. Flowers with orange and pink petals; keel petals with marginal papillae.

This large group of species may be further divided into the following groups:

Chorizema Group A — Leaves holly-like, i.e., with spine-tipped lobes on the margins, rarely the lobes very shallow and the margin almost entire, page 114.

Chorizema retrorsum, *C. cordatum*, *C. ilicifolium*, *C. varium* and *C. nanum*.

Chorizema Group B1 — Leaves spine-tipped; margins entire or crenulate and without spines.

Chorizema nervosum, *C. aciculare* and *C. rhynchotropis* — see page 118.

Chorizema Group B2 — Leaves without spines. Leaves usually broad, if narrow then broad leaves present on the lower stem; margins slightly recurved or flat.

Chorizema glycinifolium, *C. trigonum*, *C. reticulatum*, *C. diversifolium* and *C. rhombeum* — see page 122.

Chorizema Group B3 — Leaves without spines. Leaves linear or narrow ovate (broad leaves never present), margins recurved to revolute.

Chorizema cytisoides, *C. uncinatum*, *C. ulotropis*, *C. obtusifolium* and *C. circinale* — page 125.

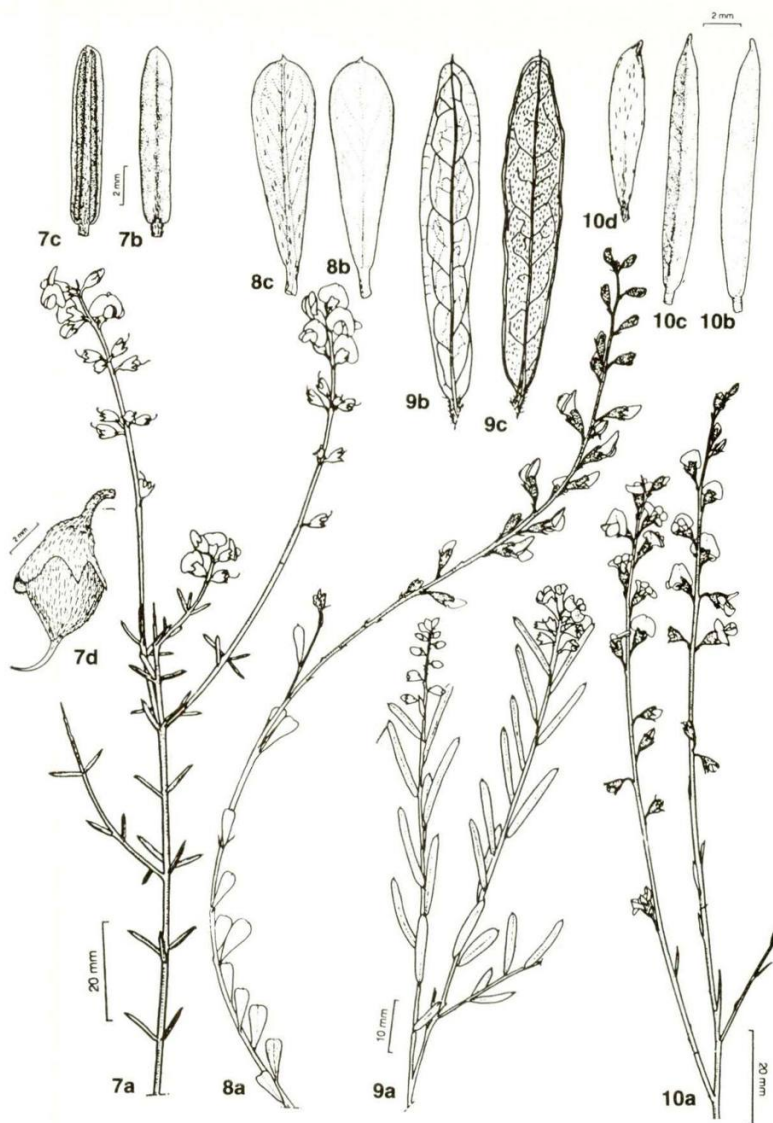
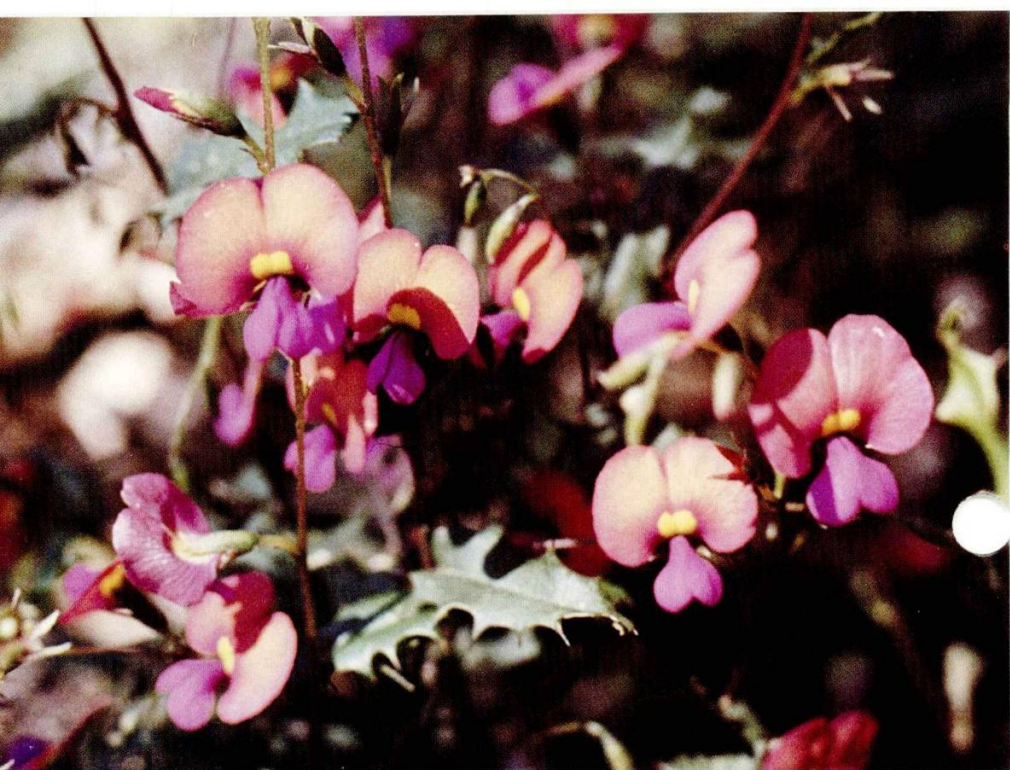


Fig. 7. *Chorizema racemosum* — 7(a) flowering branchlet with small leaves and spinescent habit; 7(b) leaf, upper surface, venation not conspicuous; 7(c) leaf, lower surface with recurved margin; 7(d) pod.

Fig. 8. *Chorizema humile* — 8(a) sprawling flowering branchlet; 8(b) leaf, upper surface; 8(c), same, lower surface with scattered hairs.

Fig. 9. *Chorizema parviflorum* — 9(a) flowering branchlet; 9(b) leaf, upper surface; 9(c) same, lower surface with scattered hairs; margins recurved; venation may be prominent.

Fig. 10. *Chorizema genistoides* — 10(a) flowering branchlet, almost leafless; 10(b) leaf, upper surface; 10(c) same, lower surface; 10(d) leaf, upper surface; leaves flat or slightly folded up; scattered hairs may be present.



△ *Chorizema retrorsum*

Photography by C. Woolcock

▽ *Chorizema rhombeum*





△ *Chorizema glycinifolium*

Photography by C. Woolcock

▽ *Chorizema aciculare*



This group has a long history of cultivation and taxonomic confusion. *Chorizema ilicifolium*, *C. nanum* and *C. cordatum* have usually been "lumped" under either the first or last of these names. Adding to this confusion has been *C. varium*, which until recently was thought to be extinct in the wild, and which has been hybridised with *C. cordatum* in cultivation. *C. retrorsum*, undescribed until recently, was previously confused with *C. cordatum* and/or *C. ilicifolium*.

Chorizema retrorsum is a vigorous shrub with scrambling stems to 3 m long; leaves alternate, ovate, narrow-ovate or oblong with retrorse spines on the toothed or lobed margin; flowers with pink and orange petals. Distinctive characters are the retrorse spines on the leaves, calyx lobes twice as long as the tube, and the straight style with a capitate stigma. It occurs in Western Australia on sandy loam in tall eucalypt forest. Photograph, page 112.

Chorizema cordatum is an erect or spreading shrub to 1.5 m tall; leaves alternate, 25–70 × 17–50 mm including spines to 3.5 mm long, undulate or flat, glabrous above with scattered short hairs below, light green. Racemes terminal and axillary; flowers with the calyx 5–7 mm long and standard 10–13 mm long. *C. ilicifolium* differs in the entire, triangular leaf apices. *C. nanum* differs in the weak flexuose habit, leaves elliptic or oval and smaller flowers. *C. varium* differs in having broad-ovate or cordiform leaves with recurved margins, more or less bullate above, with dense, spreading hairs below. In W.A. *C. cordatum* grows on sandy or gravelly soils, occasionally near streams or water courses, often in closed heath or low woodland. Photograph, page 109.

Chorizema ilicifolium is an erect or spreading shrub; branches with scattered, appressed short hairs; leaves alternate, 14–40 × 6–25 mm, undulate or almost flat, dull green. Racemes to 12 cm long with one to four flowers. A distinctive character that readily separates this from other holly-leaf species is the entire triangular leaf apices which are longer than any of the marginal teeth or lobes. It is found in W.A., close to the coast, often exposed, windswept or barren places, on stabilised dunes or on limestone hills, in deep sand or calcareous soils.

Chorizema varium is an erect or spreading shrub; branches pubescent or hirsute; leaves alternate, spinous-toothed or lobed or rarely almost entire on the margin, 40 × 30 mm, bullate, glabrous above, pilose below, grey-green. It bears a close resemblance to *C. cordatum*, both having holly-like leaves and racemes of orange and bright pink flowers. *C. cordatum* leaves are neither bullate or with recurved margins and racemes are arching, usually much longer than the leaves and with scattered flowers. *C. varium* occurs in Western Australia on coastal sandhills or on low limestone hills. In its pure form, *C. varium* is easily distinguished from the other holly-leaved *Chorizema*. However, hybrids between this and *C. cordatum* have been known in cultivation since the 19th century and can be bought today from garden centres, usually under the name "*C. cordatum*". Plants can have stems up to 4 m long. Photograph, page 109.

Chorizema nanum is a small, open shrub with spreading flexuose branches, almost glabrous; leaves alternate, 20–60 × 12–30 mm including spines up to 5 mm long, undulate, glabrous above, with scattered hairs below, dark green. Racemes filiform with 3–8 smallish flowers; calyx 4–5 mm long; standard 7–9 mm long; wing petals narrow. *C. cordatum* is more vigorous and upright with more numerous leaves and flowers. *C. nanum* occurs in W.A. on lateritic soils, red brown loam or sandy loam or on sandy clay often with leaf litter on top.



Fig. 11. *Chorizema retrorsum* — 11(a) scrambling flowering branchlet; 11(b) leaf, lower surface, right side showing venation; 11(c) leaf, upper surface, leaves variable in shape and size with retrorse spines; 11(d) pod.

Fig. 12. *Chorizema cordatum* — 12(a) flowering branchlet; 12(b) leaf, lower surface; leaves undulate or almost flat.

Fig. 13. *Chorizema ilicifolium* — 13(a) erect flowering branchlet; 13(b) leaf, upper surface, leaf apex triangular and longer than any of the teeth on the margin; 13(c) leaf, lower surface.

Fig. 14. *Chorizema varium* — 14(a) flowering branchlet; 14(b) and 14(c) leaves, lower surface, left side of each showing indumentum (hairs), right side of each showing venation; bullate above with recurved margins.

Fig. 15. *Chorizema nanum* — 15(a) weak flowering branchlet; 15(b) leaf, lower surface, right side showing venation.



△ *Chorizema reticulatum*

Photography by C. Woolcock

▽ *Chorizema trigonum*





△ *Jacksonia restioides*

▽ *Oxylobium alpestre*



This group comprises species with leaves spine-tipped, margins entire or crenulate and without spines.

Chorizema nervosum is a shrub to 70 cm tall with erect or spreading, pubescent branches; leaves broad-ovate, cuspidate, undulate, 7–14 × 8–14 mm including the 2–3 mm apical spine; margins crenulate or almost entire. Flowers yellow or orange with a pink keel. *C. nervosum* occurs on sandy or gravelly soils in coastal heath or rocky gullies in Western Australia.

Chorizema aciculare is a small shrub to 50 cm tall; with branches erect or spreading; axillary shoots usually well-developed forming short, leafy branchlets; leaves alternate, linear or very narrow-ovate, pungent at the apex, 8–28 × 1–4 mm, glabrous or with scattered short hairs, margins revolute. Racemes terminal and axillary, often numerous. The sub-species *aciculare* has pink or orange flowers; the underside of the narrow leaves being completely obscured by the revolute margins. The sub-species *laxum* has yellow, pale yellow or orange, rarely pink flowers; the underside of the leaves being partly visible between the rolled under leaf edges. *C. aciculare* occurs on sandy soils in coastal heath or woodland. Photograph, page 113.

Chorizema rhynchotropis is a small, open shrub to 30 cm tall, with straggling branches and few branchlets; leaves widely spreading or almost reflexed, rigid, linear, pungent, 9–17 × 1 mm, glabrous, margins revolute. Racemes terminal, rarely also in uppermost axils; flowers orange, reddish or salmon pink with yellow markings. *C. aciculare* is similar but has axillary shoots well developed and racemes terminal and axillary, numerous. In Western Australia it is found on gravelly sand or sandy loam in open forests.

Continued on page 122

Nitrogen Fixation — Nature's Role For Pea-flowered Plants — continued from page 99

If the Nitrogen that is removed from the soil is not steadily replaced, virtually all life on this planet would finally flicker out. Nitrogen is replenished in soil by **Nitrogen fixation**. This can only be carried out to a significant extent by certain bacteria and blue-green algae in a process on which all living organisms are now dependent, just as all organisms are ultimately dependent on photosynthesis for energy.

One to two hundred million tons of Nitrogen is added to the earth's surface each year by biological systems, far exceeding man's puny exercise with inorganic fertilisers. Of the various classes of Nitrogen-fixing organisms, the symbiotic bacteria are by far the most important in terms of total amount of Nitrogen fixed. The most common of the Nitrogen-fixing symbiotic bacteria is *Rhizobium*, a type of bacterium that invades the roots of leguminous plants in the plant family Fabaceae.

The beneficial effects on the soil of growing leguminous plants has been recognised for hundreds of years. The rotation of crops includes a legume that is harvested leaving behind Nitrogen rich roots or turned back into the soil. The application of trace elements cobalt and molybdenum needed by the symbiotic bacteria, are required for the best results with Australian soils.

Grow pea-flowered plants and wattles, savour their beauty for the first few years of their most vigorous life and chop them out replacing with fresh young plants. ■

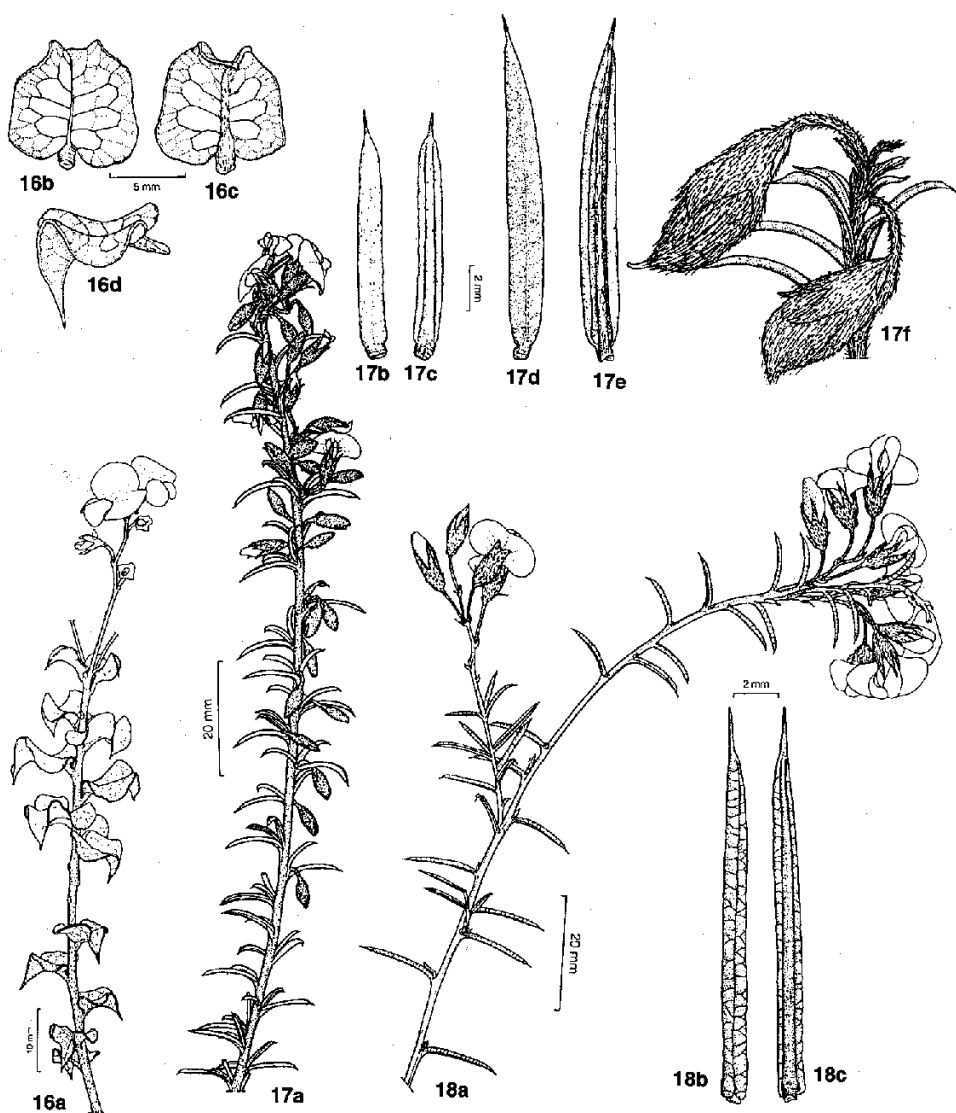
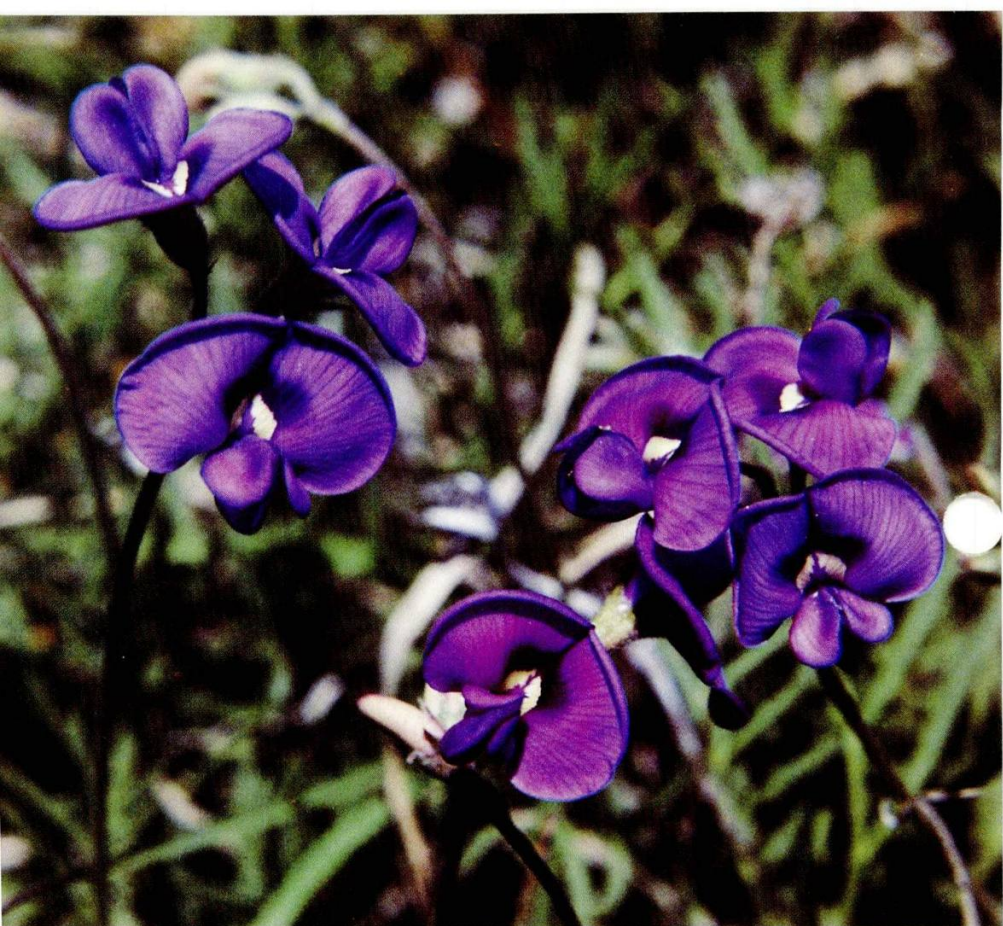


Fig. 16. *Chorizema nervosum* — 16(a) flowering branchlet; 16(b) leaf, upper surface with reticulate venation; 16(c) same, lower surface; 16(d) leaf, side view showing undulate, crenulate margin and recurved apex.

Fig. 17. *Chorizema aciculare* subsp. *aciculare* — 17(a) flowering branchlet with axillary shoots well developed; 17(b) leaf, upper surface, pungent at the apex; 17(c) same, lower surface; 17(f) fruiting branchlet with pods. *Chorizema aciculare* subsp. *laxum* — 17(d) leaf, upper surface; 17(e) same, lower surface showing loosely revolute margins.

Fig. 18. *Chorizema rhynchotopsis* — 18(a) flowering branchlet; 18(b) leaf, upper surface; 18(c) same, lower surface, pungent at the apex and with revolute margins.



Swainsona behriana

Photography by John Eichler

The purple flowers are in a terminal umbel at the top of an upright flower stalk. Prostrate stems bear finely hairy, pinnate leaves with narrow lanceolate leaflets. It gives the appearance of the feathery leaves of a wattle lying on the ground. *Swainsona* is still locally common in remnant areas on the northern plains of Victoria but it is close to extinction south of the Divide. It flowers in September and October. It has been incorrectly listed as *S. oroboides*. It is difficult to distinguish it from *Swainsona placoides* which is very similar. *Swainsona sericea* is also similar but with larger red flowers.

Field Guide to Victoria's Grasslands

Edited by N. H. Scarlett, Victoria Press

Nature grasslands and grassy woodlands once covered vast tracts of the Victorian lowland plains. Of this 99.5% is gone leaving small isolated remnants. The aim of this book is to raise awareness of the unique beauty, diversity and significance of these remnants and to stimulate their conservation. The plants (121) are shown in colour (two on these pages) with a short description as above. Of vital importance is a chapter "Managing Native Grasslands" which is a practical guide to their care and restoration. This book will be a treasure for Victorians and visitors to their picturesque state. Available for \$17.95 plus \$3.30 postage from Victoria Press, 28 Queensbridge Street, South Melbourne 3205.

Why have I chosen two *Swainsona* pea-flowers from the colour photographs in the book when there are so many fascinating wildflowers illustrated? Because they belong to the vast family of pea-flowers presented in this issue and because they are a vital factor in the **nitrogen fixation** so crucial for the growth of other plants. You could also collect seed and easily grow your own plants — bring the nitrogen doctor to your own garden. What do they look like when in seed? An upright stick with seed pods on it, thrusting up from a feathery leaved prostrate stemmed plant growing on the ground. Are you interested in conservation? — Editor.



Swainsona swainsonioides

Photography by John Eichler

This, the Downy Swainson-pea, has long racemes of large 2 cm wide mauve to purple flowers with a noticeably twisted keel. The prostrate stems bear downy, pinnate leaves with numerous ovate to oblong leaflets. It flowers from September to October. Once common in the Wimmera of Victoria, it is now close to extinction and is listed as "endangered".

Chorizema Group B2**Species in Section Chorizema**

This group of species has the following common characteristics: leaves without spines, usually broad, if narrow then with broad leaves present on the lower stem, margins slightly recurved or flat.

Chorizema glycinifolium is a small shrub with erect, or weak and sprawling branches to 80 cm long; leaves alternate, usually broadest towards the base of the plant, very broad-ovate to almost linear, acute at the apex, upper side glabrous, dark green, underside paler with short hairs, $15-75 \times 1-15$ mm, margins recurved or loosely revolute; venation conspicuous; flowers orange, pink or reddish with yellow markings. It shows some superficial resemblance to *C. trigonum* and *C. rhombeum*. *C. trigonum* has stems and branches rigid, angular, usually three-sided. *C. rhombeum* has branches ascending or spreading, ridged or rarely terete and leaves rhombic, obovate or ovate, rarely narrow. It occurs in Western Australia in seasonally swampy areas, on gravelly ridges or in exposed coastal localities on a range of soils. Photograph, page 113.

Chorizema trigonum is an erect shrub to 60 cm tall; branches rigid, angular, usually three-sided, glabrous; leaves sparse, alternate, narrow-ovate or almost linear, occasionally broad-ovate, $20-60 \times 4-25$ mm, thickly coriaceous, glabrous or with scattered hairs; flowers orange-pink or orange-red with yellow markings and the keel pink. It occurs in Western Australia in coastal areas with scattered occurrences inland on a variety of soils. Photograph, page 116.

Chorizema reticulatum is a small shrub to 40 cm tall; stems erect, wiry, with few branches; leaves usually crowded on the lower part of the stem, ovate or elliptic; $9-30 \times 2-10$ mm, dark green above, paler below, with slightly recurved margins; venation conspicuous; flowers pink and orange in erect racemes. *C. reticulatum* occurs in Western Australia or gravelly or sandy loam in open forest heath. Photograph, page 116.

Chorizema diversifolium is a shrub with twining or trailing, slender branches to 1 m long; leaves alternate, ovate or almost linear, flat or with margins slightly recurved, glabrous or with scattered short hairs below, $10-95 \times 3-20$ mm; flowers pink, orange or reddish with yellow markings. It occurs in Western Australia on sand or sandy loam often in the vicinity of granite or limestone outcrops. Photograph, page 124.

Chorizema rhombeum is an erect or sprawling shrub with angular, ridged branches 30-60 cm long; leaves alternate, variable, rhombic, obovate or broad ovate, acute at the apex, upper leaves often narrow, $6-40 \times 4-14$ mm, flat or with margins slightly recurved, dark green above, paler beneath, usually glabrous; flowers deep salmon pink or red with yellow markings. Occasionally confused with other species in this group but flowers have oblique stigmas, whereas those of the others have terminal or capitate stigmas. It occurs in Western Australia in diverse habitats and on a variety of soils, in open forest or coastal heath. Photograph, page 112.

Fig. 19. *Chorizema glycinifolium* — 19(a) flowering branchlet; 19(b) leaf, upper surface; 19(c) same, lower surface with recurved margins; 19(d) leaf, upper surface with reticulate venation; 19(e) same, lower surface with scattered hairs.

Fig. 20. *Chorizema trigonum* — 20(a) flowering branchlet; 20(b) leaf, upper surface; 20(c) leaf, lower surface; both leaves with conspicuous, reticulate venation.

Fig. 21. *Chorizema reticulatum* — 21(a) flowering branchlet; 21(b) leaf, upper surface; 21(c) same, lower surface; both leaves with conspicuous, reticulate venation.

Fig. 22. *Chorizema diversifolium* — 22(a) flowering branchlet with twining stems.

Fig. 23. *Chorizema rhombeum* — 23(a) flowering branchlet with sparse flowers and leaves; 23(b) leaf, lower surface with scattered hairs; 23(c) leaf, upper surface with reticulate venation.

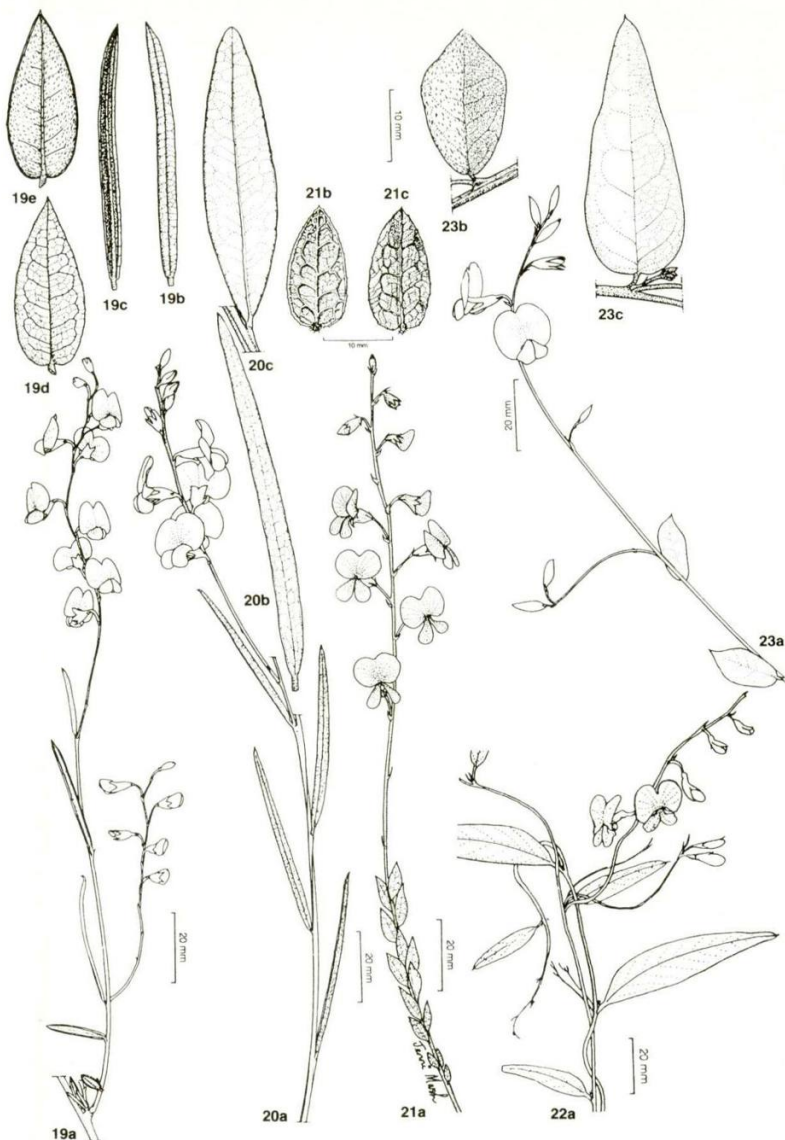


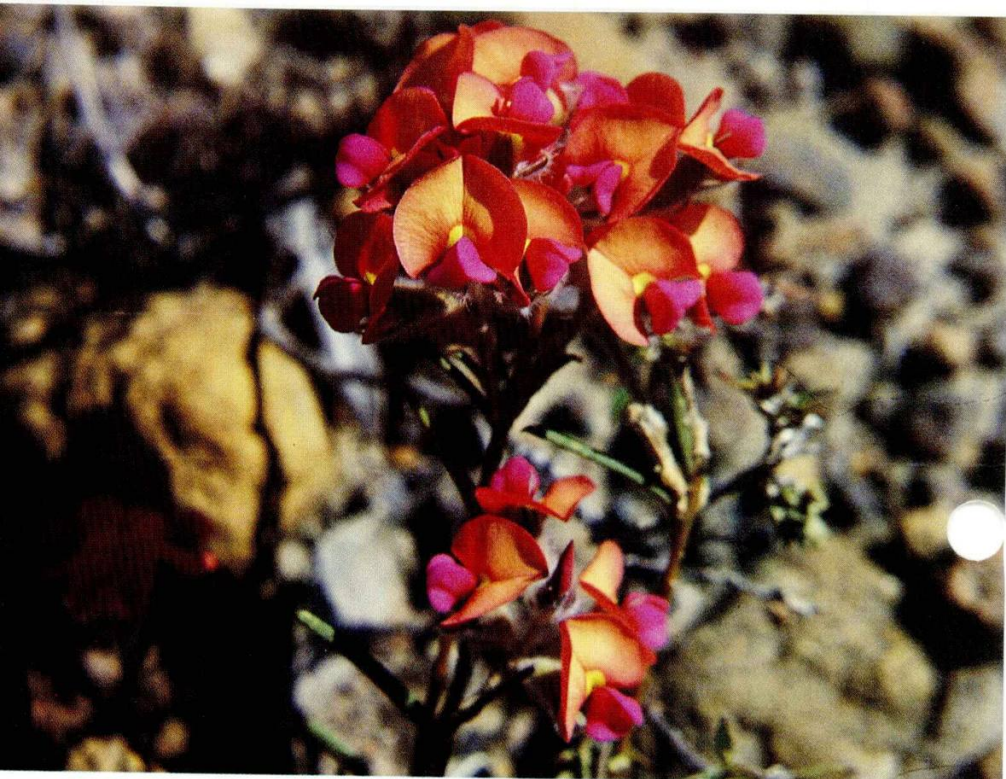
Fig. 19. *Chorizema glycinifolium* — 19(a) flowering branchlet; 19(b) leaf, upper surface; 19(c) same, lower surface with recurved margins; 19(d) leaf, upper surface with reticulate venation; 19(e) same, lower surface with scattered hairs.

Fig. 20. *Chorizema trigonum* — 20(a) flowering branchlet; 20(b) leaf, upper surface; 20(c) leaf, lower surface; both leaves with conspicuous, reticulate venation.

Fig. 21. *Chorizema reticulatum* — 21(a) flowering branchlet; 21(b) leaf, upper surface; 21(c) same, lower surface; both leaves with conspicuous, reticulate venation.

Fig. 22. *Chorizema diversifolium* — 22(a) flowering branchlet with twining stems.

Fig. 23. *Chorizema rhombeum* — 23(a) flowering branchlet with sparse flowers and leaves; 23(b) leaf, lower surface with scattered hairs; 23(c) leaf, upper surface with reticulate venation.



△ *Chorizema uncinatum*

Photography by C. Woolcock

▽ *Chorizema diversifolium*



This group of species has the following common characteristics: leaves without spines; linear or very narrow ovate (broad leaves never present), margins recurved to revolute. Drawings of the following species are on page 126.

Chorizema cytisoides is an open shrub to 30 cm tall; branches straggling or erect with hairs persistent in the leaf axils; leaves alternate, opposite or in whorls, linear, acute at the apex, $10\text{--}25 \times 1.5\text{--}2$ mm, glabrous above with fine grey hairs below; margins revolute, flowers orange or reddish with purple venation and yellow blotch on the standard, wings pink or purple, keel usually purple. It grows in Western Australia on sand plains or gravelly ridges. *Chorizema uncinatum* differs in having leaves 10 mm, rarely 15 mm long, calyx with loosely appressed hairs and calyx lobes scarcely longer than the tube.

Chorizema uncinatum is a small, open shrub to 40 cm tall; branches ascending or sprawling, slightly ridged; leaves alternate, opposite or in whorls, linear, narrow-oblong or narrow-ovate, acute at apex, uncinata, $4\text{--}15 \times 1.5\text{--}3$ mm, usually 10×2 mm, glabrous or scabrous above, appressed hairs below, margins revolute; flowers orange, salmon-pink or reddish brown with yellow markings at the base of the standard. It grows in Western Australia on sand plains or rather barren exposed places close to the coast with heath on sand or gravelly clay. Photograph, page 124.

Chorizema ulotropis is a sparse straggling shrub to 45 cm tall; branches slender, wiry, almost glabrous; leaves often sparse, alternate or sub-opposite, linear, $8\text{--}20 \times 1$ mm, glabrous or with scattered hairs; margins revolute. Racemes terminal, head-like, $10\text{--}15$ mm long with up to 10 flowers, petals orange-yellow with markings on the standard and reverse side dark red-brown. Keel long-attenuate at the apex, the tips 2–4 mm long, incurved or curled. It is similar to other narrow leaved species particularly *C. cytisoides* which has wider leaves and racemes not compact. It occurs in Western Australia in flat or undulating areas of sand or sand with gravel or clay.

Chorizema obtusifolium is a shrub to 45 cm tall; branches erect or spreading, ridged, silky pubescent, later glabrous; leaves irregularly in whorls of three, opposite or alternate, linear, acute at the apex, $20\text{--}50 \times 2\text{--}4$ mm, glabrous above, silky hairs below, margins revolute. Flowers orange or pink with dark pink or reddish markings and a yellow blotch on the standard. It grows in Western Australia mainly near the coast on sandy soils. It resembles *C. cytisoides* both species having more or less linear leaves with revolute margins and conspicuous venation. *C. cytisoides* differs in having leaves $10\text{--}25 \times 2$ mm, calyx lobes longer than the tube, calyx with long spreading hairs, and keel petals acuminate at the apex.

Chorizema circinale is a small shrub to 30 cm tall arising from a thick, woody rootstock; branches wiry, almost glabrous; leaves sparse, alternate or sub-opposite, strongly recurved, linear-ovate, acute at the apex, $4\text{--}12 \times 2\text{--}4$ mm, scabrous above, dense, appressed hairs below; margins revolute. Racemes terminal with one to four flowers; petals dull yellow with orange-red markings on the standard, keel yellow or greenish. It has the most strongly recurved leaves of all the narrow-leaved species. It grows in Western Australia in sand, often deep and yellow on a flat landscape. Drawings of species — next page. ■

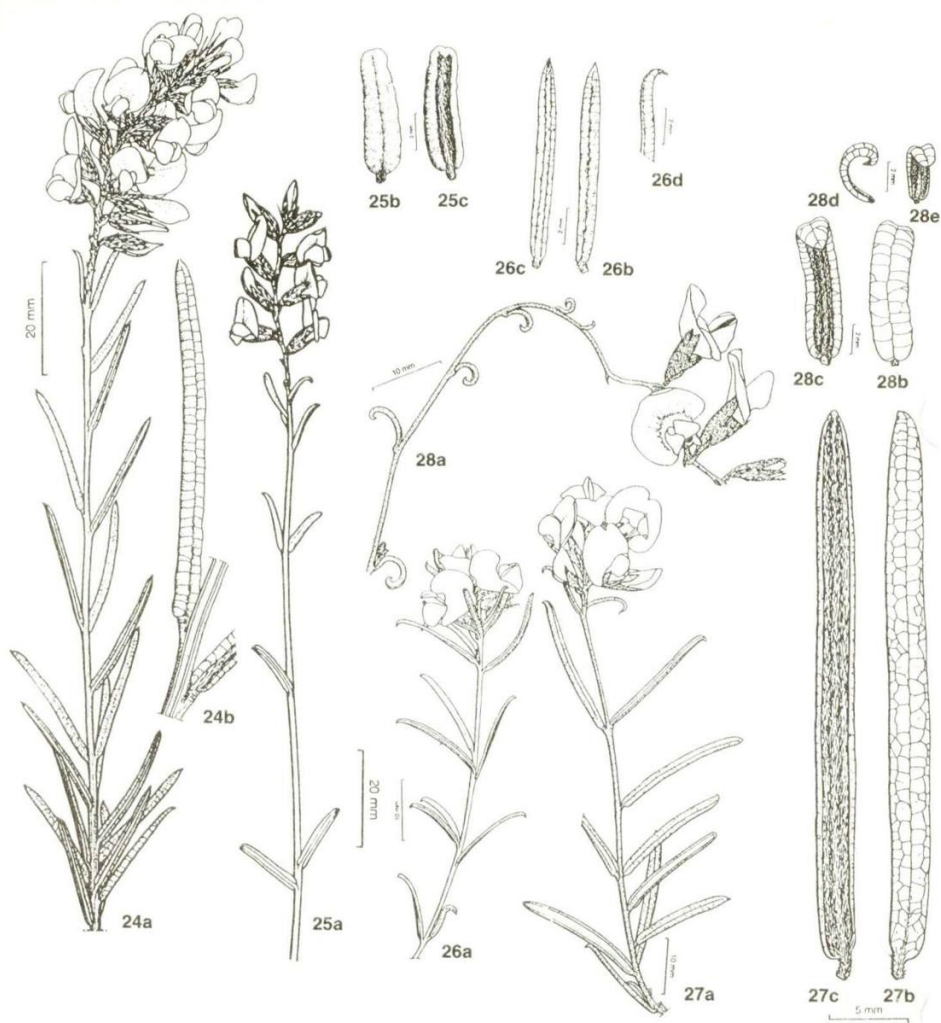


Fig. 24. *Chorizema cytisoides* — 24(a) erect flowering branchlet; 24(b) stem with leaves; leaf at the left showing upper surface; leaf at the right showing lower surface and revolute margins.

Fig. 25. *Chorizema uncinatum* — 25(a) flowering branchlet; 25(b) leaf, upper surface; 25(c) same, lower surface with appressed and revolute margins.

Fig. 26. *Chorizema ulotropis* — 26(a) a slender wiry branchlet with sparse leaves; 26(b) leaf, upper surface; 26(c) same, lower surface with revolute margins; 26(d) recurved leaf apex, side view.

Fig. 27. *Chorizema obtusifolium* — 27(a) erect flowering branchlet; 27(b) leaf, upper surface with conspicuous venation; 27(c) same, lower surface, hairy with revolute margins.

Fig. 28. *Chorizema circinale* — 28(a) slender, wiry flowering branchlet with sparse small leaves; 28(b) leaf, upper surface with conspicuous venation; 28(c) same, lower surface with appressed hairs; margins revolute; 28(d) leaf, strong recurved, side view; 28(e) same, side view.

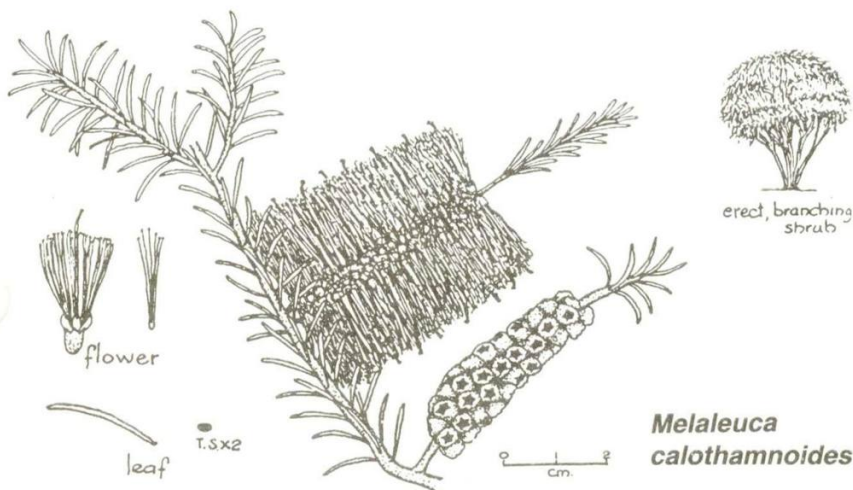
Melaleuca conothamnoides and Melaleuca calothamnoides

by Ivan Holliday

In the No. 128 issue of *Australian Plants* (on p. 164) my photograph of *Melaleuca calothamnoides* was featured but incorrectly labelled as *Melaleuca conothamnoides*. *Melaleuca conothamnoides* was featured on the cover of the last journal and now briefly described are these two quite different species.

Melaleuca calothamnoides F. Muell. is a well-branched, erect shrub, normally 2–3 m high with *Calothamnus*-like foliage and rough bark. The branches are very brittle and snap easily when bent. Flowering in late spring, the cylindrical flower spikes, 4–5 cm long, occur over a long period. These are unusual in that they grade from green near their centre to red, some spikes almost red, others mostly green. They occur on lateral shoots, mostly on old wood. It is found in the Murchison River area of Western Australia.

Melaleuca conothamnoides C. Gardner is a low branching, spreading and bushy shrub, usually under 1 metre high with smooth rigid oblong leaves, 2.5–4 cm long by 0.5–0.8 cm wide. Flowers occur in terminal, prominent, globular heads of deep purplish-pink with yellow anthers, usually in October. It occurs on sandy or gravelly soils of the inland drier wheat belt of Western Australia. It was prominent along the road verges between Bunjil and Maya Siding. Sketch on next page. Photograph on 16: 164P.



A Field Guide to Melaleucas

by Ivan Holliday

The above sketches are from an excellent field guide, 110 species of *Melaleuca*, each with a large colour photograph of the flowers and each with sketches such as these. This well known, widely sought after series which also includes "A Field Guide to Australian Trees", "A Field Guide to Australian Native Shrubs" and a "Gardeners Guide to Eucalypts" each available for \$24.25 plus \$7.50 postage.



Melaleuca conothamnoides

The Names of Acacias

by N. Hall and L. A. S. Johnson

This unusual book lists all species of *Acacia* naturally occurring in New South Wales and gives the reason for the choice of the species name. Hence, *Acacia brachystachya* Benth. is from *brachys* (short), *stachys* (an ear of corn which in modern botany means spike). This refers to the relatively short spikes (often only 1.5 cm). There is a very learned chapter on the latin used in botanical nomenclature meant to present the correct application of the latin and its pronunciation. For the following species the pronunciation is given as (bra-chy-bò-try-a). The pronunciation for most species is given in this way, the diphthong above O presumably meaning that the emphasis is upon this letter. Unfortunately the use of such language appendages has fallen into misuse and the pronunciation aid in this manner will be lost to most. However, in a very few cases, there appears to be exceptions and in this case the authors have added — pronounced "brackeeSTAKEeeaa".

It is now clear precisely what consumer market the book is aimed at but copies can be obtained from R.B.G. Bookshop, Botanic Gardens, Sydney 2000 for \$15.00 plus \$2.50 post.

Acacia — Are Not Any Botanical Names Sanctified by Popular Demand and Usage?

There is an ominous warning that the name *Acacia* that we have grown to love as referring to the Australian wattle, is to be replaced by the name *Racosperma* for most Australian species. In comparison with the widely accepted name *Acacia*, even by ignorant John Citizen, the name *Racosperma* is an abomination. I am well acquainted with the strict rules applying to the orderly naming of species using latinised scientific names but cannot common sense prevail just once? Need we, as orderly citizens of Australia, be compelled to toe the line drawn by Big Brother when something we hold so dear to our way of life is to be besmirched. The use of the name *Racosperma* has been deferred for at least 10 years while the academics furiously debate some obscure technical point. Is there any chance of clemency should we beseech *en masse* to let common sense, dare I say decency, prevail. Let us keep our *Acacia* or, if this offends the purist so much, adopt a similar name such as *Acayscha*, the recommended pronunciation. There is no doubt that the common name will be *Acacia* as well as *Wattle* but this is not enough. —Editor. ■

Grevillea

by D. J. McGillivray and R. O. Makinson

A really magnificent book retailing at \$225.00 (contact your SGAP Society for a special price). The objective is to present scientific descriptions of 253 species of *Grevillea* and this appears to have been done in a very competent manner. Much effort and expense has been undertaken to broaden the appeal of this scientific book, much of it quite successfully. The botanical terms used are well illustrated and a reader could readily learn this new language. There is a colour photograph of most species.

A botanical key is presented to assist in the identification of a species and as these are so many this key is presented in distinct groups. What I liked about the book is the way in which this botanical key is then ignored and the species described in groups based upon "natural" groups of species. The key to the way these groupings are made is hidden in an appendix at the rear. Unfortunately, some of these groups are quite large but even in the generally small groups, no attempt has been made to define how one species in a group differs from a similar species. The excellent sketches should assist in this regard as finding a relationship in the main key to the species is daunting indeed.

In a previous issue of *Australian Plants*, I felt obliged to warn of some reservations concerning this book because of its price. These still stand but there should be no misunderstanding, this book is a very fine work. It will not fit on many bookshelves being 35 cm high.

Acacias of South-east Australia*

Identify the wattles in your area

by Terry Tame, notes prepared by the Editor

This incredible book will allow you to identify any wattle growing in south-east Australia quite easily. The whole thing is done by sketches. The botanical descriptions are there for anyone to read should you wish, the terms used being shown on the sketches below. But! You do not need to use these terms to identify your *Acacia* plant.

Just look at the flower head. If it is elongated (a sausage wattle in my terms — Editor) then the species belongs to Group A† *Juliflorae* which is divided into five subgroups using the simple readily recognised features of the leaves. All of this is shown in the simple sketches on the next page.

If the flower is a small globular head (a ball wattle) and has normal looking leaves (not binnate), it belongs to Group B and one of the six subgroups as illustrated on the next page.

All the *Acacia* species in the area have been given in their groups A–K. Now look at the full page of sketches in the book of each species in the group that suits your plant and you will easily select the species you are looking at. What makes it even easier and surer is the colour photograph of each species. Two of these are reproduced on page 133.

Acacias for Cultivation

How to Grow

Most wattles prefer a sunny position in a light, well-drained soil. However, many are quite adaptable and you will have to try them in your situation to find out. Many are also drought tolerant and hence useful in dry areas. Frost tolerance is also variable, though most once established will survive a degree of frost. As a general rule, species from the coastal forests and woodlands are less tolerant of semi-arid conditions and vice versa.

Wattles are particularly beneficial as garden plants. They are fast growing so will quickly fill up a gap or give protection for other plants. Because of this it must be appreciated that their best vigour and fresh appearance usually lasts only a few years when they should be replaced. Their fresh lush growth and different foliage, texture, habit and colour make them ideal for a landscaping specimen or to add interest by contrast in a garden. Once again, the best effect usually lasts only a few years. As noted elsewhere in this issue, the adequate supply of nitrogen to the soil is vital for healthy growth of all plants and the wattles, being a legume, are major contributors to nitrogen soil enrichment.

The main concern is to select a wattle of the right stature that is suitable for your area. The book lists species as "low to small shrubs", "medium to large shrubs", tall shrubs and small trees, all subdivided into species for "cool-dry", "cool-humid", "warm-dry" and "warm-humid" areas. ■

***Acacias of South-east Australia by Terry Tame.** This incredible book is available at your bookseller for \$45.00. As well as a simple guide to the wattles, the book includes a botanical key, a distribution map and habitat for each species together with notes on *Acacia* biology.

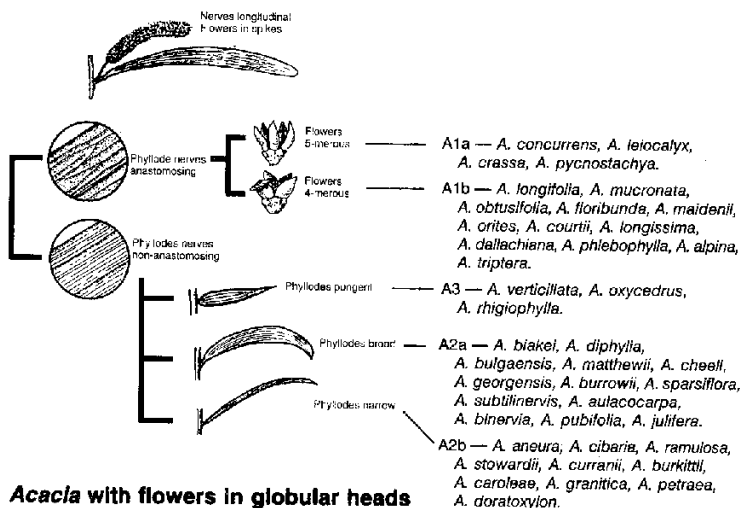
†The author has chosen to present the seven groups of *Acacia* alphabetically whereas other texts number them 1–7. This is a pity. I have chosen to stick with the author in this case. —Editor.

Birds and Wattles

A Survey

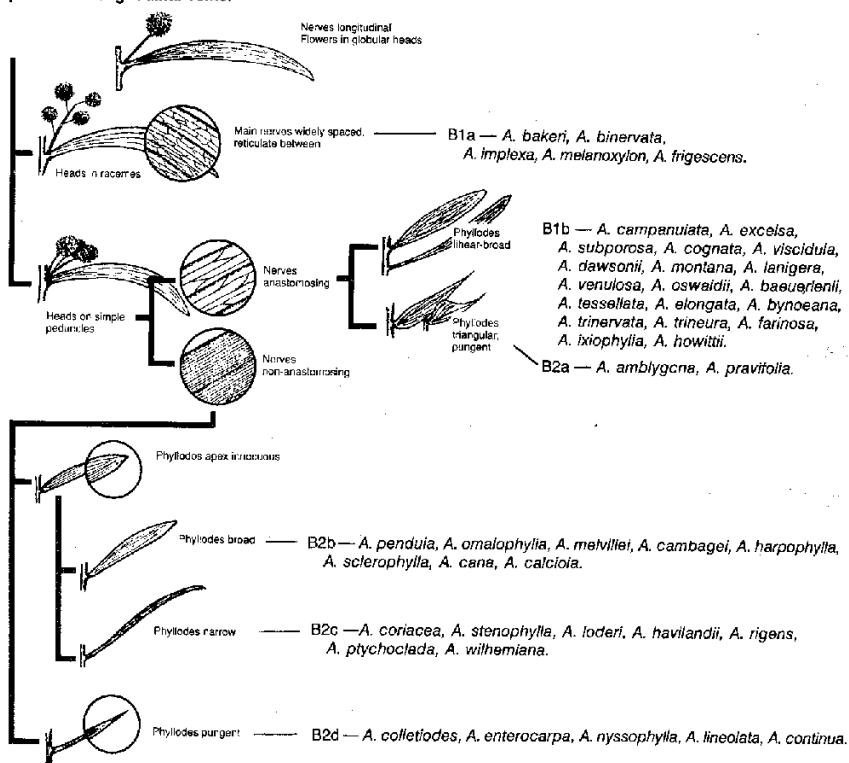
The Bird Observers Club of Australia are commencing a survey of how birds utilise *Acacia* species. While there are some records of particular species of birds eating wattle seeds there has not been an overall published study of which species nor how else birds and wattles live together. Would you like to take part in this study. For further details and a copy of the record sheet to be used, write to the Bird Observers Club of Australia, P.O. Box 185, Nuriawading, Victoria 3131.

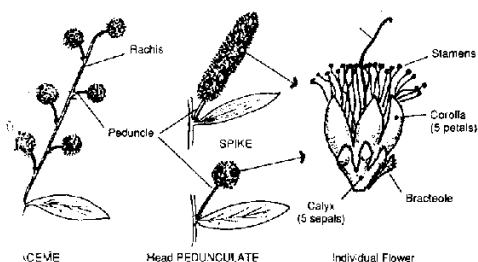
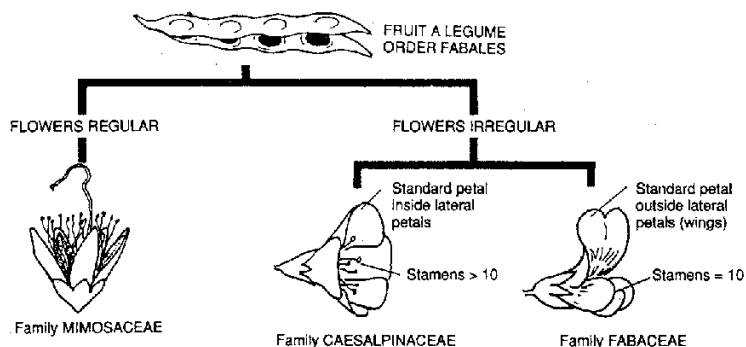
Group A *Acacia* with flowers in long spikes



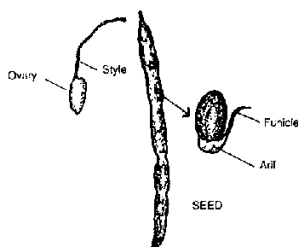
Acacia with flowers in globular heads

Group B — Phyllodes with two to several prominent longitudinal veins.

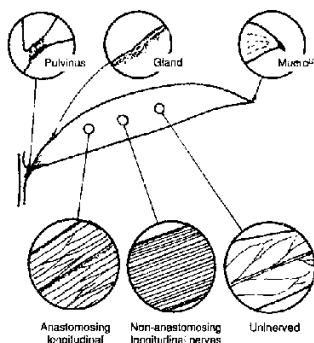
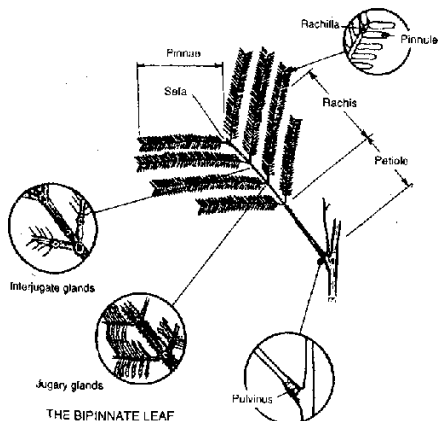




INFLORESCENCE



LEGUME



THE PHYLLODE

Groups C, D and E also with flowers in globular heads

Group C — Phyllodes square in section or round, and usually pointed — *A. ulicifolia*, *A. brownii*, *A. asparagoides*, *A. echinula*, *A. aculeatissima*, *A. quadrilateralis*, *A. genistifolia*, *A. carnei*, *A. tetragynophylla*, *A. phasmoides*.

Phyllodes absent on old plants — *A. spinescens*.

Group D — D1, Phyllodes with one or no midnerve, flowers in globular heads, singly — 28 species.

D2, Phyllodes nerveless, < 3 mm wide, clustered on branchlets or whorled — *A. baueri*, *A. brunioides*, *A. gordonii*, *A. conferta*, *A. tindeleeae*.

D3, Phyllodes with one nerve, globular flower heads in racemes — 60 species.

Group E — the mature leaves are bipinnate — 35 species.

Australian Plants Is Ideal For Libraries

Readers Will You Help?

Enclosed in this issue is a brochure promoting the bound copies of *Australian Plants*. Please take this together with your copy of *Australian Plants* and show it to the local public library. Recommend that they keep a copy in their reference section and a copy in their lending section. If necessary, give them your copy of *Australian Plants* and I will send you another copy. This is the only way to make contact with the chief librarian in a way that they can assess its real value. Do not leave it to someone else, do it yourself and let me know which library you contacted. I will arrange a follow-up.

Quite frankly, we need your support in this way or *Australian Plants* is in danger of folding. —Editor.

Why Series A Australian Plants of the 80's

Do you have a complete set of *Australian Plants* back to Volume 11 of 1979. If not, purchase volumes 12, 13, 14 and 15 of Series A, presented as an ideal reference to the Australian flora. For next Christmas, they will make a beautiful present. ■

Plant Study Groups

These groups comprise people with a similar interest who compare experiences and assist each other with seed and plants. The groups are nation wide and operate mainly by correspondence. These groups are listed in our No. 128 issue, Vol. 16: 179 (changes to this list given below). There is a very important addition:

Garden Design Study Group — Leader, Mrs Diana Snape, 3 Bluff Street, East Hawthorn, Victoria 3123, Telephone: (03) 822 6992. The group will produce a newsletter, so with postage, this means an annual fee of \$5.00. This could be a very important group for us all; we all would like to improve the presentation of our gardens.

ACACIA — Mr Bruce Clark, "The Elms", Panmure, Victoria 3265	\$4.00
BIRDS AND NATIVE PLANTS — Mrs Judy Elliott, 10 Highcrest Street, Ocean View, Queensland 4521	\$5.00
CALECTASIA — Mrs Ruth Brookes, 14 Tighe Street, Cloverdale, Western Australia 6105	\$4.00
PLANTS IN CONTAINERS — Mrs Norma Gilli, P.O. Box 386, North Ryde, NSW 2113	\$5.00
CORREA — Mrs Maria Hitchcock, "Faghorn", Old Inverell Road, Armidale, NSW 2350	\$5.00
PROSTANTHERA AND WESTRINGIA — Mr Robert Miller, Sylvan Grove, Picnic Point, NSW 2213	\$5.00

Conservation

Endangered Plant Programme

Among our conservation objective policies for the year 2001 it may well be asked "where do we stand and what action is being taken on the Endangered Plant Species?" Our action programme is primarily concerned with where Australia is going after the year 2000. Unless something dramatic is done, most of our flora, and most of our human population for that matter, will be endangered. Our proposals are designed to maintain the standard of living, while living in balance and sympathy with our environment. In the long term man is dependent on his environment as much as the environment depends upon him. Our proposals concern good management of our resources based on love for each other and the environment, and on the scientific approach.

What about the endangered species of 1994? Working through the Australian National Parks and Wildlife Service, ANPWS, the government budgeted for \$4.36 million for this work in 1992/1993. This programme is continuing to good effect and is well organised. It is supported by a large number of our Society members. For anyone wishing to help or enquire, write to the Endangered Species Network Co-ordinator, c/- Australian National Botanic Gardens, Canberra, ACT 2600. ■



△ *Acacia jennerae*

▽ *Acacia amblygona*



Bignoniaceae

Australian Representatives of the Family Bignoniaceae excluding *Pandorea*

by E. James, Horticultural Research Institute, Knoxfield Department of Agriculture and Rural Affairs, P.O. Box 174, Ferntree Gully, Victoria 3156. The descriptions have been compiled from a number of different sources listed at the end of the article. *Pandorea* were described in *Australian Plants* 15:367.

***Tecomanthe hillii* (F. Muell.) Steenis**

A rampant vine, 2° branches often pendant, leaflets 5; leaflet blades narrowly ovate, apex acuminate, base rounded $\pm$ oblique, margin entire 2.5–8 cm $\times$ 1.5 $\times$ 3.5 cm glabrous. Racemes up to 10 flowers, pedicels 1–1.5 cm long occurring usually on old and mature wood although may flower from newer growth later in the season. Calyx 2–2.5 cm long. Corolla rosy pink, paler inside, 5–8.5 cm long, with the tube marked inside with purplish lines, lobes with minute hairs, otherwise glabrous. Stamens shorter than the style. Capsule 5.5 $\times$ 2 cm. Seeds flattened with wings. Known from Fraser Is. and adjacent mainland areas. In coastal rainforest. Flowers winter-spring. Photo, page 136.

***Deplanchea tetraphylla* (R.Br.) F. Muell**

A tree without buttresses, 4–25 m, bark grey to grey/brown, corky, furrowed and rectangular flaking. Leaves chartaceous to coriaceous, usually obovate or oblong-obovate, underneath yellow velutinous, base somewhat cuneate to stunted, exceptionally chordate, on the base above with 1–7 cup-shaped large glands, 11–23 (–60) $\times$ 7–14 (–30) cm; petiole 2.5–5 cm. Peduncle 4–12 cm, rachis 3–9 cm. Branches 2–7.5 cm. Inflorescences terminal, indeterminate. Calyx 12–14 mm comprising 5 fused sepals. Corolla yellow, strongly zygomorphic, lowermost lobe concave. Stamens and style long-exserted. Frequently dark brown nectar droplets. Known from N.E. Queensland including Thursday Island and Fitzroy Island, New Guinea and the Aru Islands (Trangan and Wokan Islands). Flowers May–October. May be pollinated by lorikeets. Photo, page 137.

***Neosepicaea jucunda* (F. Muell.) Steenis**

The status of *Neosepicaea* in Australia is unclear. Van Steenis (1977) lists a single endemic species, *N. jucunda*. It has been found ranging from Big Tableland near Cooktown to the Paluma Range near Townsville where it is extremely common (G. Sankowsky, pers. comm). Thomas and McDonald (1989) mention a second species, *N. viticoides*, as a poorly known species in Australia whose conservation status is unknown, whereas van Steenis (1977) considers it to be endemic to New Guinea. It was presented by Williams (1987) as *Pandorea* sp. nov. but has since been identified from a cultivated plant of *N. viticoides* which had been collected as a seedling from the Iron Range in North Queensland (McDonald, pers. comm.). It is possible that the present distribution of *N. viticoides* reflects recent naturalisation of the species. G. Sankowsky, however, has collected *N. viticoides* from the Iron Range and considers it to be fairly common and most definitely a naturally occurring species.

A tall, glabrous woody climber of tropical coastal rainforest. Leaves trifoliate, digitate, articulate at end of petiole. Leaflets bright green, oval or elliptical, shortly acuminate. Inflorescence a short raceme, terminal or in uppermost leaf axils. Flowers purple, corolla 2.5–3 cm long, tubular, hairy inside. Stamens bright golden, hairy at their insertion below the middle of the tube, exserted. Capsule 10–15 $\times$ 2.5 cm, smooth, tapering to both ends, opening loculicidally. Seeds flat, winged, 3 $\times$ 1 cm. Found in tropical scrubs. Sea-view Range, Rockingham Bay, Freshwater Creek, Cairns.

***Neosepicaea viticoides* Diels**

First named by Diels in 1922

A large liane with distinct gland field on twig nodes, leaves digitately compound; leaflets 3–5, sessile to 1.5 cm stalked. Thyrses many flowered, terminal and in uppermost leaf axils, 5–20 cm long. Pedicels 0.25–0.5 cm, petiole 3–10 cm. Calyx cupular 3–5 × 3–5 mm, shallow lobed and glandless. Mature corolla 2.5–3 cm, outside papillose, basal tube about as long as the widespread upper tube and as the lobes, brown with dark streaks inside; lobes long-hairy within, 3–4 mm; tube with long hairy zone inside to the insertion of the stamens. Flower colour defined variously dull ochre, dull yellow with maroon markings, dull red, brick purple, probably in part due to age of flowers. Found in New Guinea and northern Queensland.

***Dolichandrone spathacea* (L.f.) K.Sch.**

An evergreen glabrous tree, 5–20 m; mangrove, wood soft-white. Leaves usually 3–4 jugate, 15–35 cm, stalked; leaflets thin, ovate-oblong to lanceolate, unequal-sided, entire, long-tipped (in seedling, sometimes toothed) 6–16 × 307 cm, underneath with hairy domatia. Racemes 2–8 flowered. Pedicels 2–4 cm. Flowers not articulated. Calyx conical, coriaceous with many microscopical glands. Corolla tube 12–18 cm long, the mouth 7–12 cm wide; basal tube 9–12 cm gradually funnel shaped, expanded above the throat for 4 cm; lobes 5, broad, sub-equal, frilled around the edge with large glands, 2.5–3 cm. Stamens not exerted. Style exerted. Capsule flattened — cylindrical, 25–70 × 2–3 cm. Seeds dark grey, rectangular in many rows 12–18 × 6–8 cm including thick corky wings. Distribution: from coast of Malabar throughout tropical S.E. Asia, New Guinea, Micronesia, Solomon Is., New Hebrides, New Caledonia, N. Queensland. Confined to back mangroves and banks of tidal rivers and estuaries.

***Dolichandrone filiforme* Fenzl ex F. Muell.**

A sparse tree 5–6 m. Bark, pale-grey, tessellated, corky. Leaves to 35 cm, glabrous, irregularly opposite, pinnate, divided into 2–4 pairs of light green needle-like leaflets plus terminal leaflet, mostly 10–27 cm long. Flowers on terminal racemes, creamy white, tubular, slightly scented, 4–8 cm long. Several on stalks 5–6 cm long. Fruit a dehiscent capsule, smooth, terete, narrow, curved, 20–35 cm × 1 cm, pale grey-brown. Seeds thin, winged, packed densely, several per capsule. Found in northern Australia including Copeland Is., in open forest and woodland and mixed woodlands in sandstone country.

***Dolichandrone heterophylla* (R. Br.) F. Muell.**

First named by Robert Brown as *Spathodea heterophylla* but renamed *Dolichandrone heterophylla* by von Mueller.

A glabrous shrub or tree to 4 m. Leaves thickly coriaceous, crowded onto young shoots, often in whorls of three. Simple or pinnate, 3–13 leaflets, narrow-elliptic or narrow-lanceolate, obtuse 3–10 cm long. Flowers on short, terminal, simple racemes with long peduncles. Pedicels 1–2 cm. Calyx 2.5 cm. Corolla tube slender, to 4 cm long, dilated only at top. Lobes 1 cm broadly rounded with the margins undulate. Very fragrant. Capsule 15–25 cm, valves slightly concave. Seeds winged, broadly cordate, 8 mm wide. Found on sand dunes in Western Australia, Northern Territory and Queensland.

***Dolichandrone alternifolia* (R. Br.) Bailey**

A tree evidently allied to *D. heterophylla* and should probably be regarded as a variety of *D. heterophylla* as suggested by Seeman.

Van Steenis (1977) considers that *Dolichandrone heterophylla* and *D. alternifolia* should be regarded as a single variable species as suggested by Seeman (1870) who accepted the epithet *heterophylla*. Van Steenis (1977) states that another species, *D. spathacea*, does not occur in Australia. Thomas and McDonald (1989) however, have not only listed it amongst the rare species of Queensland but have also given locations. Its natural occurrence is restricted to the Olive River and Cowal Creek (one plant) near the tip of Cape York (N. Duke, pers. comm.).



Tecomanthe hillii

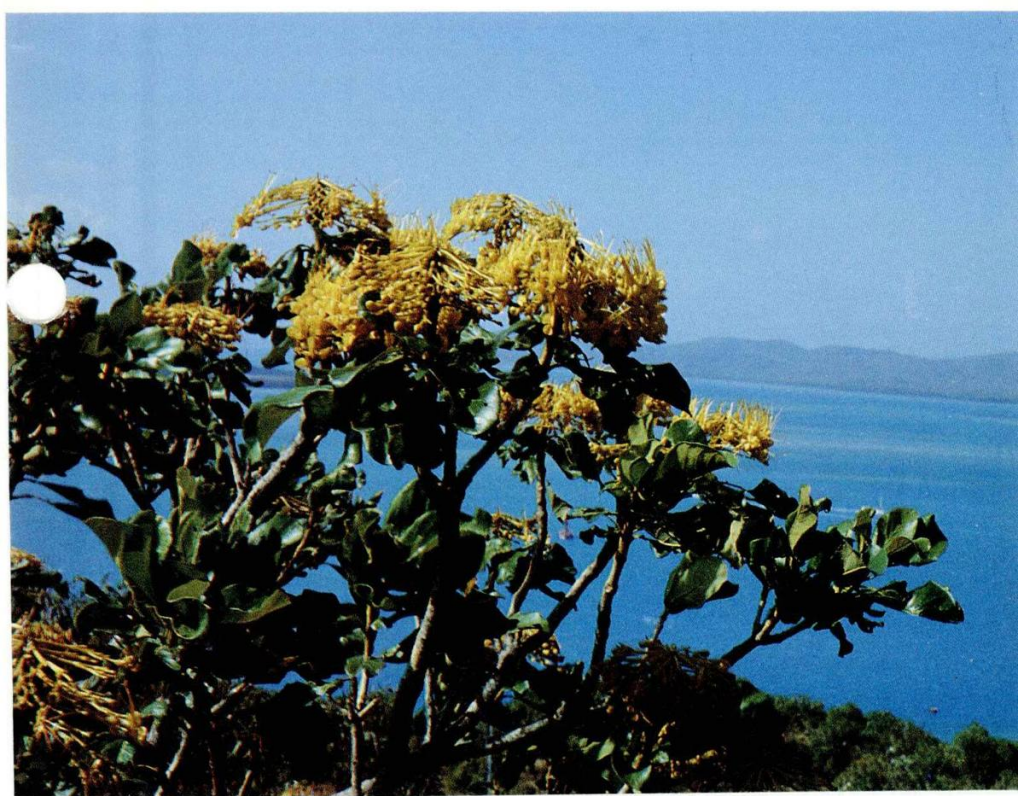
Photo D. Hockings



Deplanchea tetraphylla

△ flower, Photo: C. Bosworth

▽ tree, Photo: D. Hockings



National Wildflower Seminar/Conference/Tours Sydney, September 1993

Want to learn about wildflowers? Want to see wildflowers? Sydney is where you want to be and enjoy a warm welcome as well.

Pre-conference tour starting 20th September for five days taking in the marvellous Hawkesbury sandstone area, Blue Mountains, Hunter Valley, Port Stephens, Watagan Forest, Central Coast, etc.

Seminar at Macquarie University, 25th September to 1st October, in-house accommodation available.

Post-conference tour, five days from 2nd October taking in Burrendong, Gilgandra, Pilliga Scrub, New England, Mt Kaputar, coastal rainforest, etc.

Enquiries to: SGAP Ltd, P.O. Box 410, Padstow, NSW 2211.

Wildflower Nurseries in Queensland

Fairhill Plants and Botanic Gardens — Fairhill Rd., Yandina, 4561. Tel. (074) 46-7088. Large range of trees, shrubs, ground covers, climbers, ferns, palms and orchids for the sub-tropical and tropical east coast. Extensive display gardens open 8.30 a.m. to 5 p.m. any day. New comprehensive catalogue \$14.00 posted.

Wildflower Nurseries in New South Wales

Bryants Native Plant Nursery — Cosy Camp Road, Bex Hill, N.S.W. 2480. Tel. (066) 28-4323. 15 kms north of Lismore. Open 7 days (from 11 a.m. on Sundays). Extensive range of trees, shrubs, groundcovers, rockery, grafted Grevilleas, rainforest plants. Excellent quality and service.

Cranebrook Native Nursery — R23 Cranebrook Road, Cranebrook, N.S.W. 2750. Tel. (047) 77-4256. Five km north of Penrith, between Tadmore and Taylor Roads. Open 8.00 a.m.-6 p.m. Sunday 1 p.m.-5 p.m. Also at Great Western Highway Warrimoo, N.S.W.

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Kuranga Native Nursery has the largest range of Australian plants in Melbourne. Decorative flowering plants, hardy varieties, indigenous plants, grasses, etc., advanced grass trees, rainforest plants and more. Kuranga Native Nursery, 393 Maroondah Highway, Ringwood 3134. Mel. Ref. 50 B5. Tel. (03) 879 4076 — open 7 days.

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Flower Arrangements — Rear Cover

by Elizabeth George

Some will have noticed that the cover of our last issue did not match the cover plate caption on page 46. When the colour plates and proofs arrived after the rest of the journal had been printed, the defects of the slide became apparent. Judge for yourself, it is reproduced on the rear cover.

This arrangement features the red and white *Banksia coccinea* at the top softened by the foliage of *Calothamnus* with *Banksia praemorsa*, *B. media*, *B. solandri*, *B. leptophylla* and *B. ashbyi* on the lower left, counter balanced by the silvery foliage of *Eucalyptus rhodantha* on the right, the woolly grey centre piece being *Lachnostachys cliffonii* above the brilliant red of *Verticordia grandis*.

To further embarrass me the credit for the lovely arrangement on page 43 of our No. 133 issue was incorrectly given to Elizabeth George, and should have been Marion Blackwell.

"Australian Plants", The Australian Flora Periodical

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