

**SURVEY OF ENDANGERED POISON PLANTS OF
WESTERN AUSTRALIA**

FIELD GUIDE



Jane Sampson and Stephen Hopper

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by

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Western Australian Department of
Conservation and Land Management in association with the
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1. INTRODUCTION

The toxic species of *Gastrolobium* and *Oxylobium* are a unique group of poison plants which caused some economic loss to stock raisers in the early days of settlement in Western Australia. In the 1930's they were the main reason for the first Government botanist, Charles Gardner, to be appointed. As recently as 1967, the eradication of all plants from infested areas was still being recommended before the areas were used for grazing stock.

Many poison plants occur in the Wheatbelt, an area subject to largescale land clearance. Remnant vegetation now occurs along the road verges and in small scattered nature reserves. Selective destruction of the poison plants means that they are even more susceptible to eradication than most wheatbelt plants.

The toxin poison plants contain has been identified as fluoroacetate. The sodium salt of this compound is the well known '1080' poison used extensively for rabbit control. A remarkable feature of the toxin is that local native herbivores are immune to its effects whereas native herbivores from other areas succumb. It is possible that other important but as yet undiscovered chemicals are present in these plants.

Many of the much maligned poison plants are becoming increasingly rare. An urgent survey is needed to

- (i) establish their distribution
- (ii) ascertain their conservation status
- (iii) establish a seed bank and introduce them to cultivation.

This field guide has been produced for contributors to the 'Survey of Endangered Poison Plants of Western Australia' to assist in the identification of specimens. It summarises the available relevant information on the species included in the survey as well as on some similar common species.

Funding for the field guide and for the Endangered Poison Plants Survey has been provided by the World Wildlife Fund and the

Western Australian Department of Conservation and Land Management. We gratefully acknowledge these sources of support.

The keys to *Gastrolobium* and *Oxylobium* from Blackall and Grieve's 'How to Know Western Australian Wildflowers' have been included with the generous permission of the University of Western Australia Press and the authors. However, four species included in the survey are not covered by these keys, and the systematics of *Gastrolobium* and *Oxylobium* has been reviewed by Crisp and Weston (1987) since they were produced.

All toxic species, including some that were previously in *Oxylobium* and *Nemcia*, are now included in the genus *Gastrolobium*. To minimise confusion, we will always use the new names but we have included the old names in the field guide and on the keys. This will be useful when referring to books written before the revised names were accepted in 1987. Despite these drawbacks, the Blackall and Grieve (1981) keys may be of use in identification of the more common *Gastrolobium* and *Oxylobium*.

There are several other books that may be useful for identification. These include Aplin's 'Poison Plants of Western Australia', Gardner and Bennett's 'The Toxic Plants of Western Australia' and Everist's 'Poisonous Plants of Australia'.

Species descriptions and illustrations

The species are listed in alphabetical order. The common name and a three-letter code for use in the survey are also given. Where the species name has been changed recently, the previous name is also given. The known distribution and habitat, flowering period and a general description of the species are listed together with a section covering distinctive characteristics. This section includes features which highlight differences between the rare species of interest and similar species with which it may be confused. When possible, the main identifying features of the plant are indicated on the drawings for each species.

The illustrations have been drawn using material from the Western Australian Herbarium and may not represent all the variation present in species.

Location maps

The location maps have been produced from records of specimens lodged at the Western Australian Herbarium and from Department of Conservation and Land Management records. The maps were compiled using the FLORAPLOT Computer System at the Western Australian Wildlife Research Centre. Reserve and national park boundaries are usually only shown when there is a record within the boundary and, to simplify the maps, unnecessary place names are not included.

The maps are given as general guides and should not be regarded as covering the entire range for a species. There are very few herbarium records for the species being surveyed and many are old and vague. Furthermore, some populations may since have been cleared for agriculture, road building or other purposes.

Collecting specimens and seed

The species included in this survey are either rare or poorly known so removal or damage of plants should be minimised. However, voucher specimens will sometimes be required to confirm identification. Properly collected, pressed and labelled specimens will be required in the following circumstances:

- For any species located a significant distance from its nearest known location. 'Significant' distances will vary between species. For some highly localised species, a few kilometres may be significant.
- Whenever you are unsure of an identification.
- For unusual or new variants of species.

Guidelines described below suggest techniques for processing specimens that will ensure they remain in a well preserved state and are useful in identification.

1.1 Collectors permits

Permits are required to collect specimens or seed from plants on publicly owned land. They may be obtained from the Senior Clerk Flora, Department of Conservation and Land Management, 50 Hayman Road, Como 6152, ☎ (09) 3670422. Special Ministerial permits are required to collect Declared Rare Flora. Three species included in this survey have been declared rare: *Gastrolobium appressum*, *Gastrolobium glaucum* and *Gastrolobium tomentosum*. Permits to collect these species may also be obtained by applying to the Senior Clerk Flora at the above address and stating the purpose for which you wish to collect specimens and/or seed.

One of the aims of the survey is to establish a seed bank of the endangered poison plants. Therefore, properly labelled mature seed pods containing seed should be collected when available. Pods should be collected from all plants if this is practicable. If the number of plants bearing pods is large then a representative sample should be collected. Sampling should be random so that the collection isn't biased towards a type of plant, for example, large plants or abundantly flowering plants. It is important that seed collections represent the diversity of a species. Populations should not be stripped of seed so that there is an adequate supply for regeneration. Guidelines for collecting, labelling and storing seed are outlined below.

1.2 Labelling and pressing specimens

Each specimen collected (seed or vegetative material) should be labelled with a unique number and your observer code. This is a three letter code which enables us to identify you from the Sight Record Sheets (see the 'Supplement to the Instruction Booklet'). Unless otherwise informed this will simply be your three initials. If you do not have a middle name use 'X'. For example, John D. Smith's first two collections of poison plants will be labelled JDS1 and JDS2. The same number should appear on all specimens and information relating to the plant to allow cross referencing. The unique number and observer code should therefore appear in Field Note Books and in 'Additional Remarks' on the relevant Sight Record Sheet.

We recommend that you collect duplicates of vegetative and flowering specimens. This will allow you to keep an adequate sample and to forward the duplicate to the Survey Co-ordinator. Eventually it will be lodged in the WA Herbarium (see fig. 1). It is not necessary to keep duplicates of seed samples.

In addition, the Australian National Botanic Gardens have asked if we could obtain for them specimens of *G. densifolium*, *G. graniticum*, *G. propinquum*, *G. stenophyllum* or *G. tomentosum*, as well as any doubtful or interesting specimens. Therefore, if there is plenty of material available, triplicate specimens would be greatly appreciated.

Collections should include stems with leaves and, preferably, with buds, flowers or fruits (seed pods). Useful specimens retaining their fresh size and shape may be preserved by using sticky tape (preferably Magic Tape, which dries clear). Fresh floral parts are placed on the sticky tape with forceps and the tape is then applied to a system card ($\cong 20 \times 15$ cm index cards). Relevant collection details can be written on the card (see below under 'Specimen label slips').

Additionally, place the plant parts between sheets of newspaper, spread out so that they can be clearly seen, and press. This should be done as soon as possible after collection. A simple press can be made from two sheets of any non-bending material, strapped together. Some sheets of corrugated cardboard placed between the newspaper sheets will assist air circulation through the press.

Drying of plant material occurs within the press and can be facilitated by keeping it in a warm room and by changing the newspaper daily for the first few days, and then as conditions dictate. Most plants should dry in about a fortnight. Unfortunately, floral parts rapidly wither in this process and are less useful for identification. Once dried, the plants should be placed between clean, dry sheets of newspaper and suitable measures taken to protect the specimens whilst they are in transit.

Mature seed pods should be placed in paper bags and stored in a dry, insect free place until the pods dry and release their seed. Again, drying can be hastened by storing bags of pods in a warm

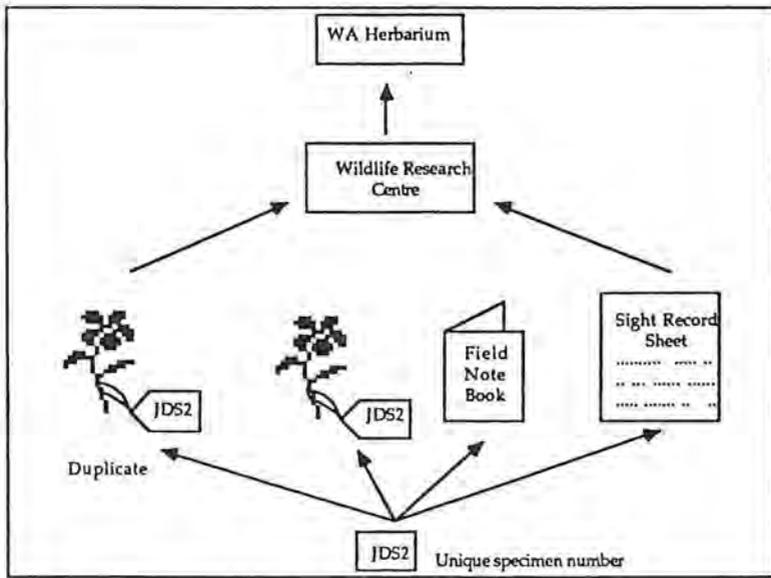


Figure 1 Labelling plant specimens

place. Pods collected from individual plants should be kept separate. Placing labels with the unique specimen number and observer's code in the bag is recommended. When the seed has been released from the pods, they can be transferred to seed envelopes. Again, there are separate envelopes for each seed sample and the unique number and observer code must be included in or on the seed envelope.

1.3 Specimen label slips

These are standardised recording slips which must accompany any specimen when it is submitted to a herbarium. You can fill these out yourselves or the Survey Co-Ordinator will fill them out based on the information provided in the Sight Record Sheet. If you would like to fill in your own Specimen Label Slips, please contact

the Endangered Poison Plant Survey Co-Ordinator, W. A. Wildlife Research Centre, CALM, P. O. Box 51, Wanneroo, 6065.

1.4 Field Note Books

We recommend the use of field notebooks for recording in the field. The relevant information may be transferred to Sight Record Sheets later. It is important that you make notes on most of the features illustrated in figs. 2 and 3 when in the field, especially those that will not be apparent on herbarium specimens (e. g., upright or sprawling shrub, height, colour etc.). Such information should be included on the Sight Record Sheets under 'Additional Information'. If there is insufficient space, please attach an additional sheet of paper. If you have collected a specimen, remember to include its unique number in your field note book for future reference.

1.5 Where to send Sight Record Sheets and duplicate specimens

Please forward your Sight Record Sheets and duplicate specimens to:

Endangered Poison Plants Survey Co-Ordinator
Department of CALM
Wildlife Research Centre
P. O. Box 51
WANNEROO W. A. 6065

1.6 Confidentiality

We urge contributors to be circumspect in divulging precise locations of the rare poison plants to protect the plants from unscrupulous seed collectors. If you feel that plants are at risk from such activities, please use general locations (e. g. Narrogin district) when discussing or writing about your survey work. While we require very precise locations on the Sight Record Sheets to ensure we can determine land status and ownership accurately, publications arising from this survey will not provide precise details or maps for the rarest species.

2. SPECIES DESCRIPTIONS

Gastrolobium R. Br.

Prostrate or erect shrubs, mostly less than 2 m high with the leaves undivided and usually opposite or arranged in whorls of three or more, occasionally scattered. All contain fluoro-acetate and are poisonous. They have typical pea flowers which are yellow, red or both colours and arranged in usually long racemes. The calyx is campanulate (bell-like). The five sepals are united to form a tube for a least half their length and usually the two sepal lobes at the back of the flower are united higher up than the other three lobes. The calyx-lobes reflex when the flower has opened. The standard (the largest petal) is round or kidney shaped. There are ten equal free stamens surrounding the very hairy ovary. The bracts of *Gastrolobium* are entire (not lobed). Bracts are most useful in identification in buds, since the older bracts around the base of the inflorescence in *Gastrolobium* may be lobed. The typical *Gastrolobium* inflorescence is long and open, although there are atypical condensed forms (*G. bilobum* and *G. stenophyllum*). The fruit is stalked, short and squat. (Gardner and Bennetts 1956; Everist 1974; Leigh *et al.* 1984).

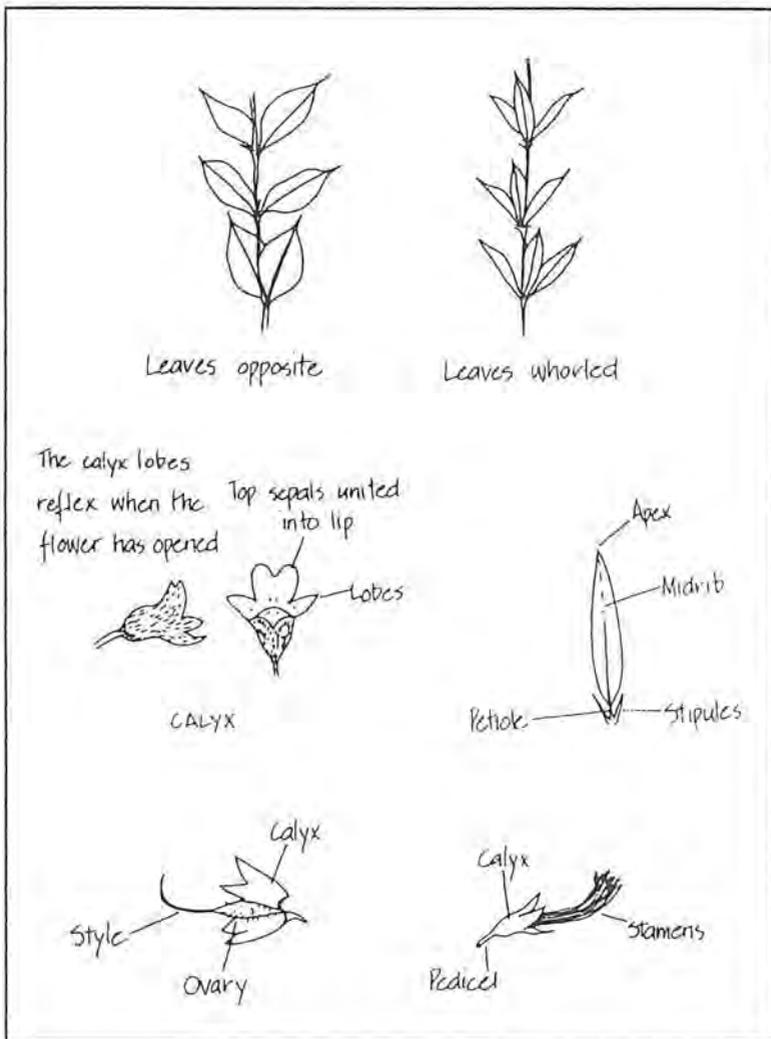


Figure 2 Floral and vegetative structures. After Aplin (1973) and Gardner and Bennetts (1956).

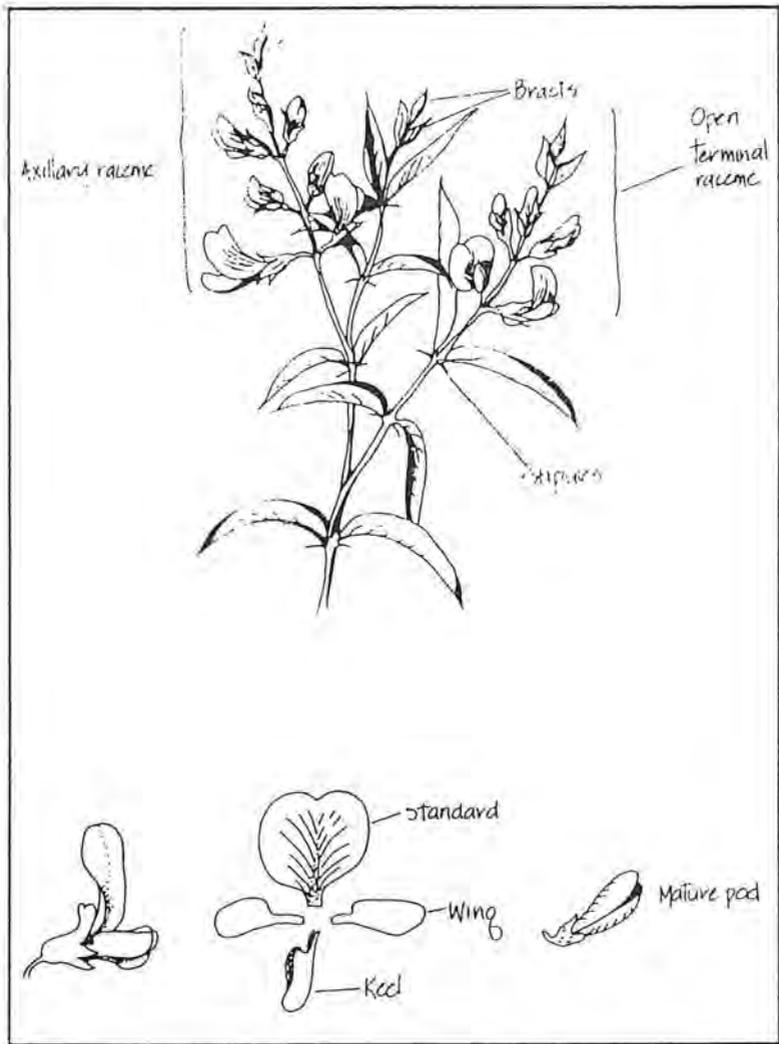


Figure 3 Typical raceme and flower. After Aplin (1969a).

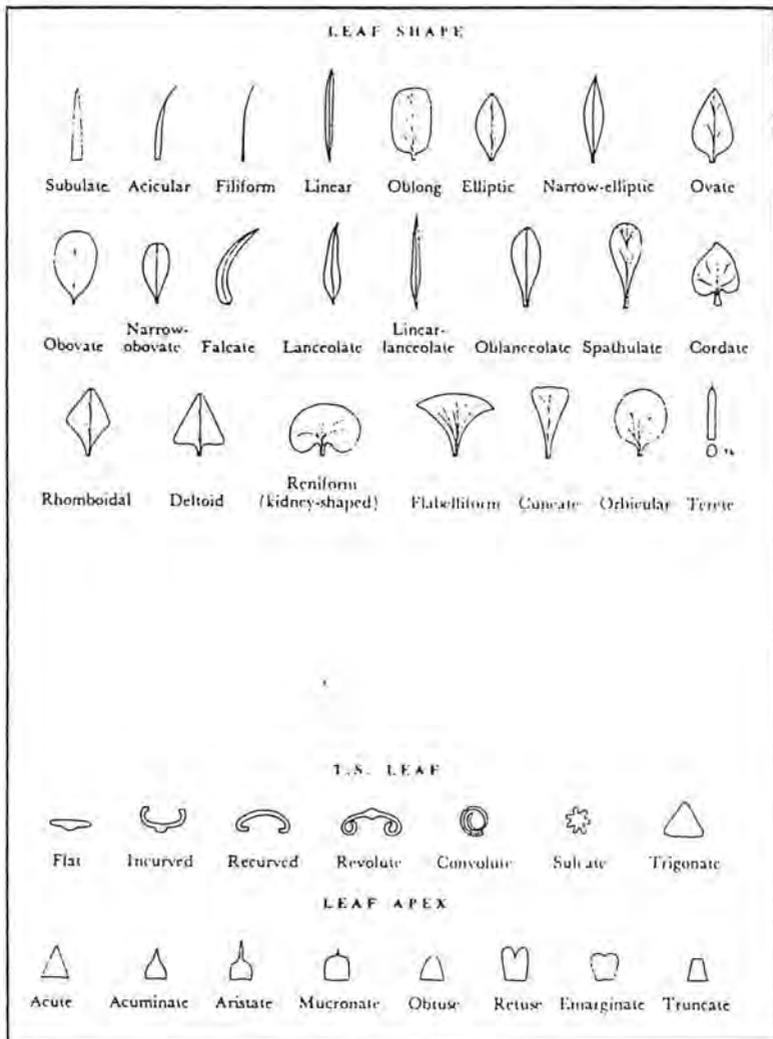
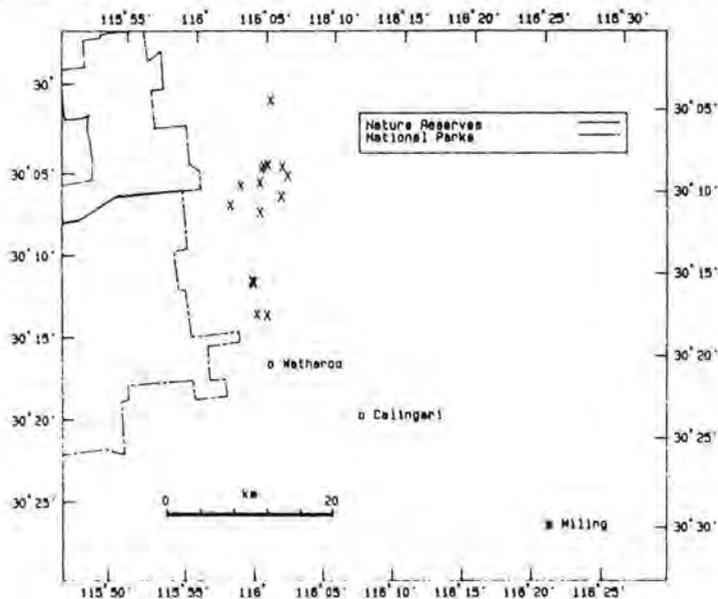


Figure 4 Leaf shapes and apices. After Blackall and Grieve (1981).

Distribution and habitat: Gazetted rare and endangered flora. Known only from a small area in south-west Western Australia in the Gnyidi district between Watheroo and Marchagee. There is also one collection from Miling. It prefers substrates of quartz gravel, quartz derived sand, or disturbed gravel and sand. It grows on slopes or crowns of small hills. Usually found in small shrub plant communities associated with *Casuarina campestris*, *Melaleuca* sp. and *Verticordia grandiflora*.

Flowering period: September to November

Description: A dense, branched shrub up to 30 cm high, with young branches covered with white hairs. The leaves are shortly stalked, leathery, ending in a fine point, sometimes slightly hooked, hairless and pale green. The flowers are about 1 cm long, borne in several whorls of three on silky-hairy pedicels arising in the leaf axils and clustered in small bunches at the ends of branchlets. The petals are two-toned: orange-yellow and reddish purple. Each



flower has a lobed, two-lipped, hairless calyx with the three lobes of the lower lip lanceolate and pointed at their tips.

Distinctive characteristics: The leaves are up to 1 cm long and 0.3 cm wide, borne in whorls of three, closely pressed against the stem and often overlapping the adjacent leaf whorls thus obscuring the stem itself. There are no stipules.

References: Everist (1974), Rye and Hopper (1981), Leigh *et al.* (1984)

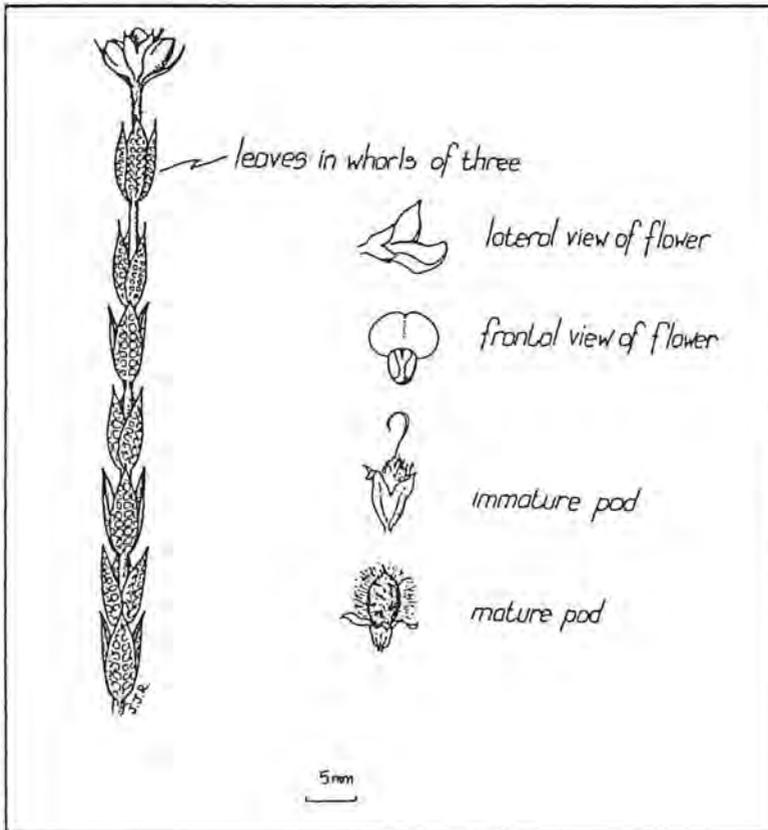


Figure 5 *Gastrolobium appressum*

Gastrolobium callistachys Meissn.

CAL
Rock poison

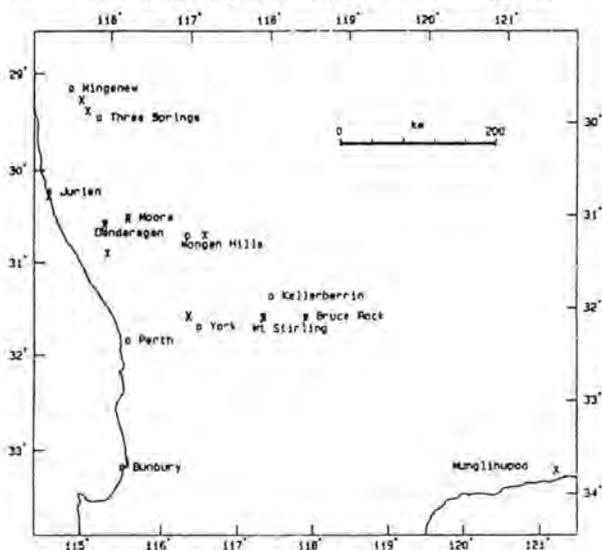
Distribution and habitat: From the Irwin River southwards to the Dale River and eastwards to Mt. Stirling, south of Kellerberrin. It grows on granitic soils, usually on granite outcrops.

Flowering period: September to November

Description: Shrub from 1 m to 3 m, branches erect. Leaves narrow, usually erect, 5 cm long, 1-3 mm broad, blunt or notched at the tip with a very small, fine point, tapering at the base into a short stalk. Stipules are small or absent or falling off very early. The flowers are yellow streaked with red, irregularly arranged in terminal, erect, rigid racemes 15 - 22 cm long. The pod is egg shaped and bluntly pointed.

Distinctive characteristics: Leaves are not whorled, although sometimes they are grouped in loose clusters so as to appear whorled, alternate and separated by leafless areas. Other species with similar long, narrow leaves either have strictly whorled leaves, or shorter inflorescences.

References: Everist (1974), Gardner and Bennetts (1956)



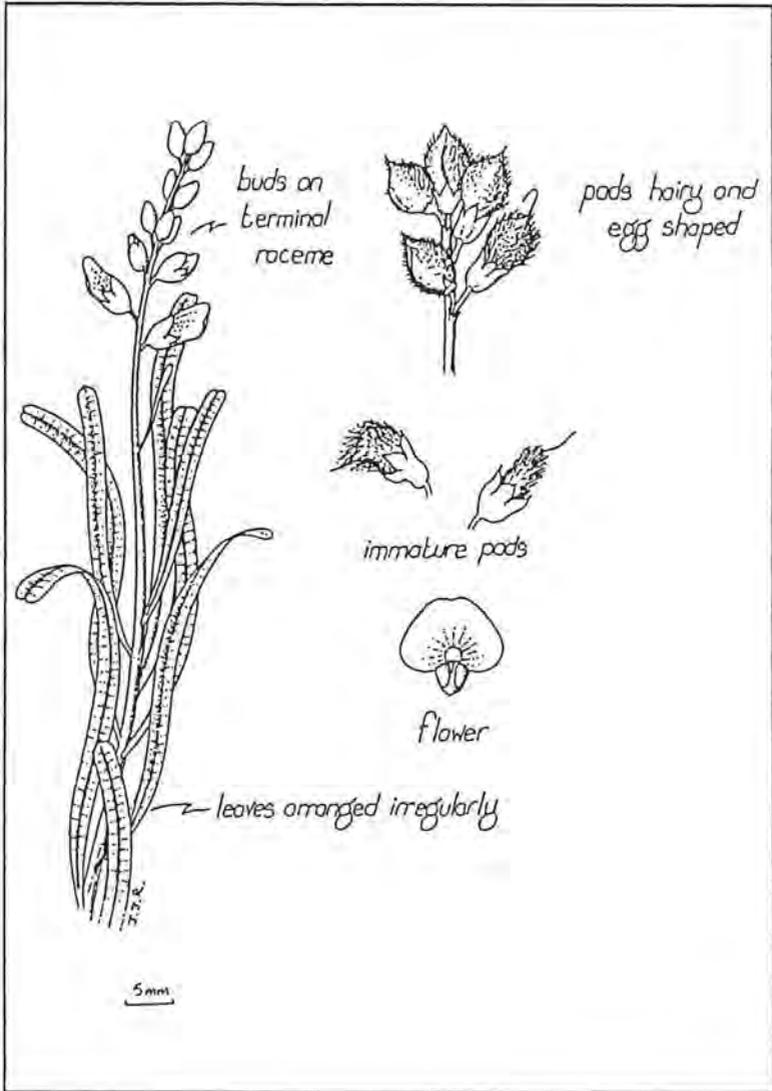


Figure 6 *Gastrolobium callistachys*

Gastrolobium densifolium C. A. Gardner

DEN
Mallet poison

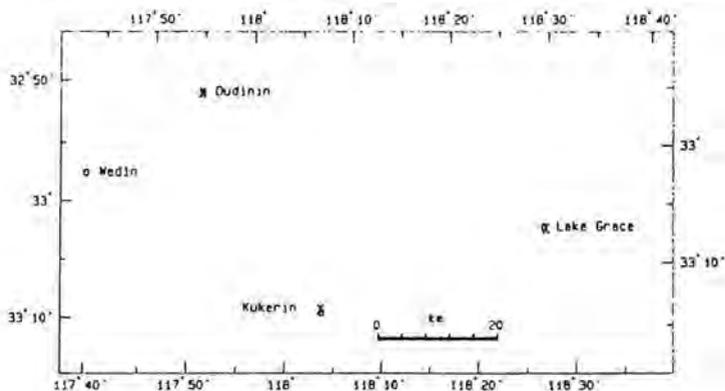
Distribution and habitat: Occurs in the Stirling district mostly near Dudinin, towards Kukerin and eastwards to Lake Grace. It occurs mainly in red sandy or loamy soils, usually associated with the lowland brown mallet (*Eucalyptus astringens*), but sometimes in salmon gum (*Eucalyptus salmonophloia*) areas.

Flowering period: September to November

Description: Shrub 45-60 cm high. Branches spreading outwards from the base, then erect. Leaves usually in threes, crowded on the stems, rigid and tough, narrowly elliptic or lance-shaped, tapering at the tip to a fine point which is turned outward, bright green with a yellow midrib which is expanded at the base and flanked by a pair of dark stipules which taper to a fine point. Flower yellow with a reddish centre, crowded into racemes at the ends of the branches, calyx and young pods covered with long spreading silky hairs.

Distinctive characteristics: Branches are marked with the persistent remains of leaf bases and bases of stipules. This characteristic is not seen in any other *Gastrolobium* except *G. rotundifolium*.

References: Everist (1974), Gardner and Bennetts (1956)



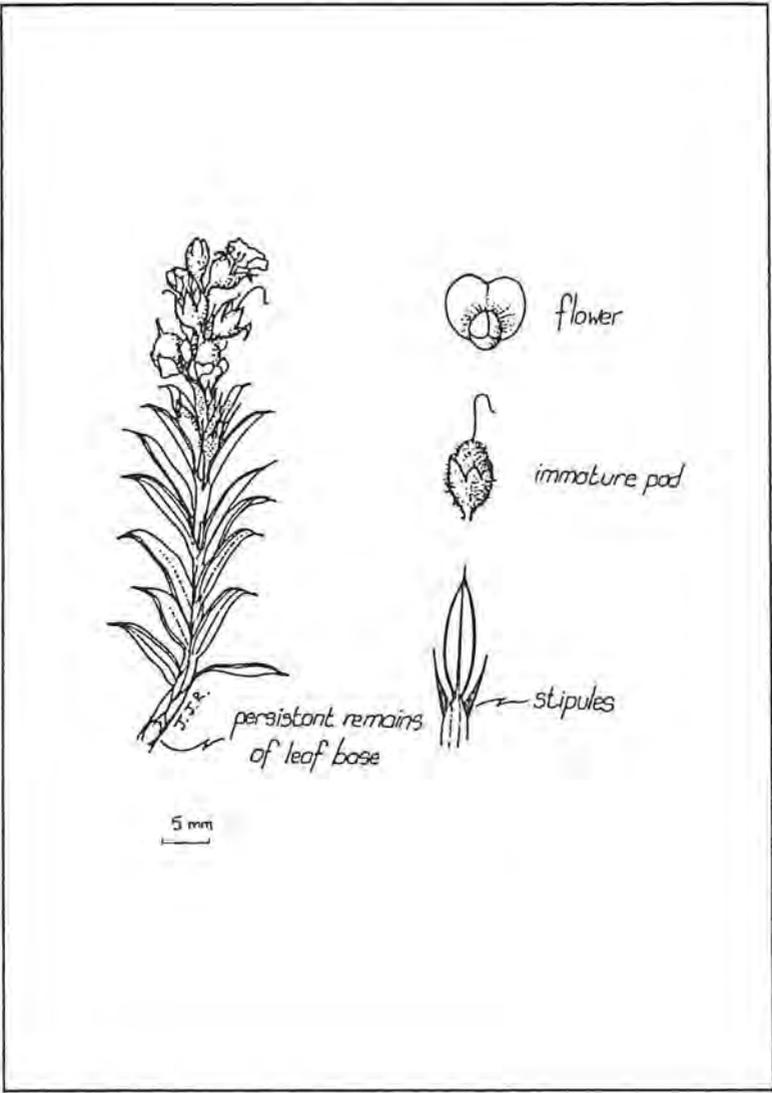


Figure 7 *Gastrolobium densifolium*

Gastrolobium glaucum C. A. Gardner

GLA
Spike or Wongan poison

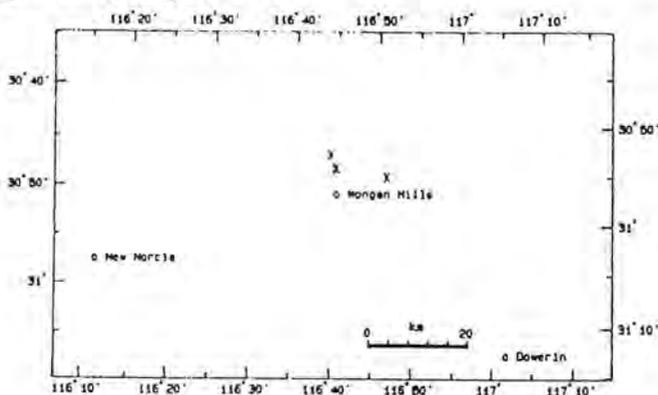
Distribution and habitat: Gazetted rare and endangered flora. Known only from gravelly rises in the Wongan Hills region. Associated with sandplain scrub formations containing *Hakea* sp., *Melaleuca* sp., *Leptospermum* sp. and *Acacia* sp. Another of the survey species, *G. hamulosum*, may be found growing with it.

Flowering period: August to September

Description: A compact shrub with many stems up to 60 cm high arising from a woody stock. The leaves are arranged in whorls of three and held erect, up to 1.7 cm long and 1.3 cm wide, blue-green or almost grey in colour, varying in shape from circular to elliptical or obovate, flat, rather thick and rigid with a very blunt tip bearing a hard prickly point. The flowers are orange and red, well under 1 cm long, in closely clustered whorls of 3, borne above the leaves. The sepals and flower stalks are densely hairy.

Distinctive characteristics: The leaves and small, black stipules. Has some resemblance to *G. hamulosum* and *G. rotundifolium*. It is without the hooked point and small leaves of the former and, unlike *G. rotundifolium*, the stipules of *G. glaucum* are small and black. In *G. rotundifolium* the leaves are dark green (not grey) and undulate.

References: Everist (1974), Gardner and Bennetts (1956), Rye and Hopper (1981), Leigh *et al.* (1984)



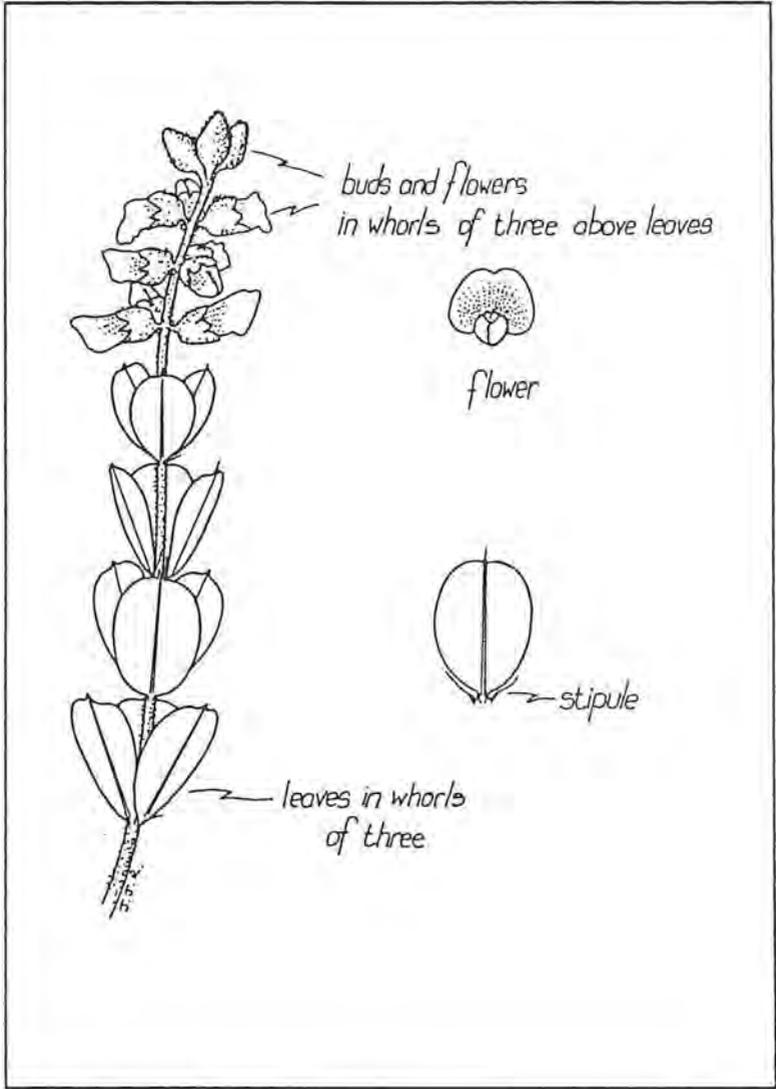


Figure 8 *Gastrolobium glaucum*

Gastrolobium graniticum (S. Moore) Crisp
formerly *Oxylobium graniticum*

GRA
Granite poison

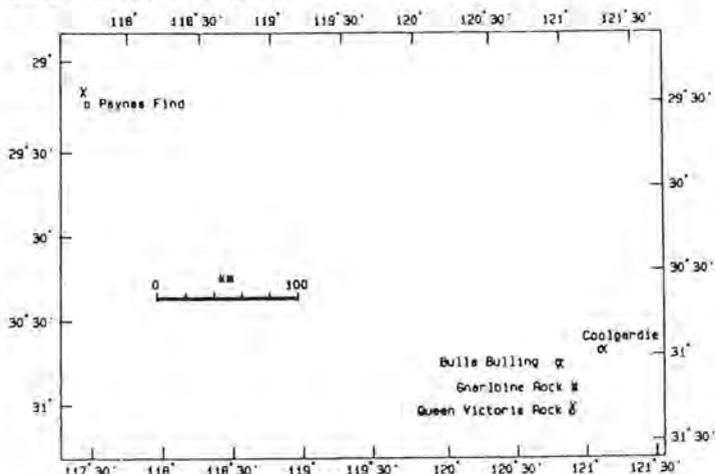
Distribution and habitat: Restricted to the Eastern Goldfields region in the Kalgoorlie and Coolgardie districts. It forms small thickets in sandy or sandy loam soils in the vicinity of granite rocks. There is one record from near Payne's Find.

Flowering period: September to October

Description: Erect shrub commonly 0.9 - 1.2 m but up to 2.5 m. Branchlets purple, leaves opposite, obovate, deep green to grey-green, rather thick, net-veined, flat 2.5 - 6 cm long, tapering at the base into a short stalk, usually blunt or slightly notched at the tip. Flowers yellow and deep red, in large elongated racemes which are mostly at the ends of the branches; calyx glabrous except for a minute woolly fringe on the lobes; pods woody, stalked glabrous, 12 mm long, purplish - black when ripe.

Distinctive characteristics: The long obovate leaves, borne in opposite pairs, tapering into a petiole and calyx with minute woolly fringe on the lobes. Similar to *G. racemosum* but the leaves are obovate rather than ovate.

References: Aplin(1973), Crisp and Weston (1987), Everist (1974), Gardner and Bennetts (1956)



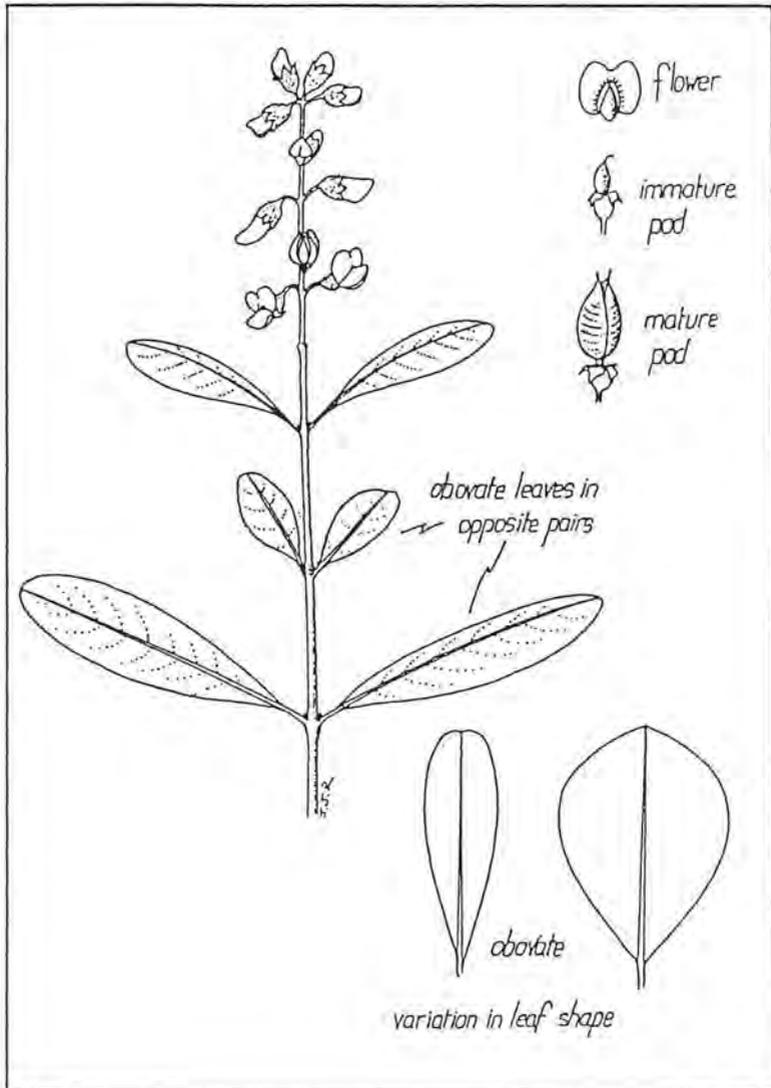


Figure 9 *Gastrolobium graniticum*

Gastrolobium hamulosum Meissn.

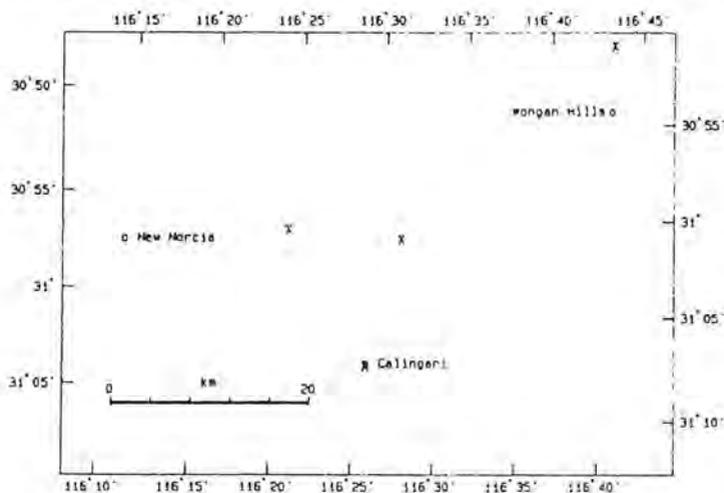
HAM
Hook-point poison

Distribution and habitat: Occurs from north of Moora to Calingiri and Wongan Hills. It is found on gravelly soils on quartzite ridges or on clay flats. Found mainly in scrub which often includes *Hakea*, *Melaleuca*, *Leptospermum* and *Acacia* sp. Near Wongan Hills, it has been found growing with *G. glaucum*.

Flowering period: August to October

Description: Small erect shrub to 45 cm, somewhat straggling growth. Numerous slender branchlets covered with short dense white spreading hairs. Leaves in whorls of three, blue-green, conspicuously net-veined with the midrib raised beneath, obovate, the tip blunt and wide and having a small characteristic hooked point. Flowers in groups along fairly short racemes at the ends of the branches; petals golden yellow streaked with red; calyx silky-hairy with long hairs, lobes deeply divided and tapering to long fine points.

Distinctive characteristics: Similar to the more common *G. parvifolium* (Berry poison). The two species have the same erect habit of growth and branchlets covered with short dense, white



spreading hairs. In *G. hamulosum*, the young leaves and calyces are softly hairy; in *G. parvifolium*, the leaves are glabrous and the calyces virtually so. In *G. parvifolium* the spent flowers nod characteristically. The main distinctive characteristic of *G. hamulosum* is the hooked leaf apex. In *G. parvifolium*, the leaf apex is a minute, but not pungent, point.

References: Aplin (1969b), Everist (1974), Gardner and Bennetts (1956), Leigh *et al.* (1984).

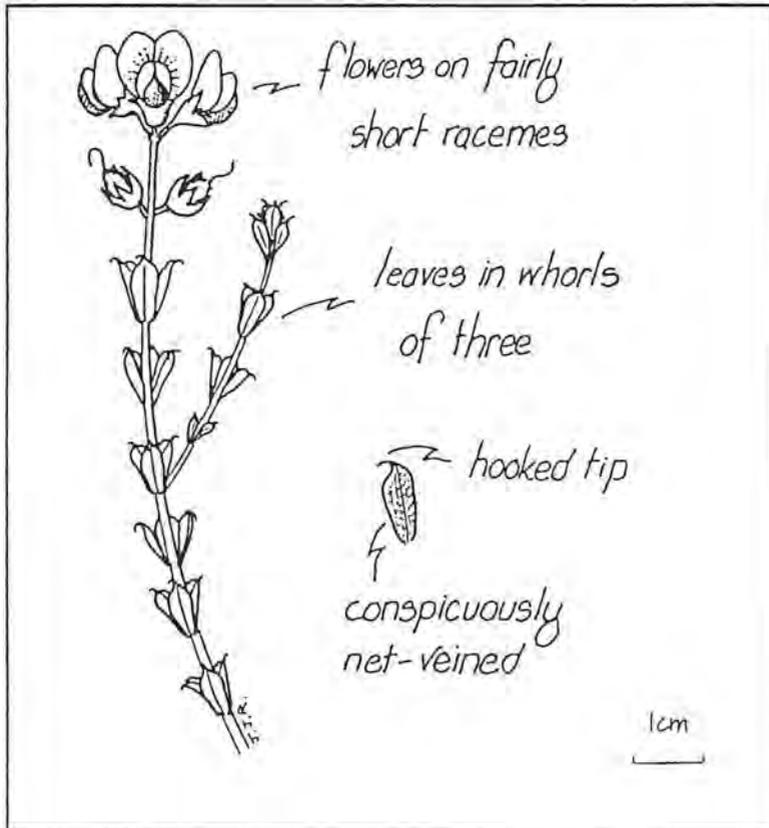


Figure 10 *Gastrolobium hamulosum*

Gastrolobium heterophyllum (Turcz.) Crisp
formerly *Oxylobium heterophyllum*

HET
Slender poison

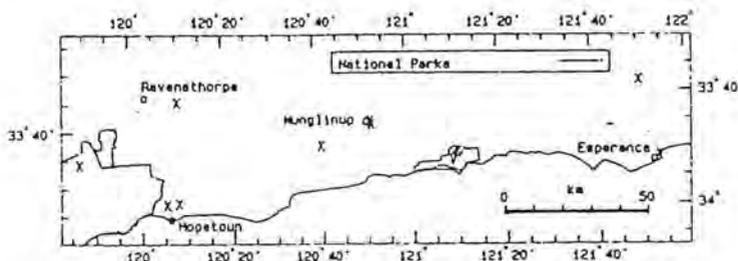
Distribution and habitat: Recorded from around the Phillips River and West River eastward to Gibson, on heavy red soils on flats.

Flowering period: September to October

Description: A little known shrub. The stems are slender, prostrate or trailing and with conspicuous fine stipules longer than the leaf-stalks. Leaves are coarsely or conspicuously open - net veined on the dark green, hairless upper surface, paler underneath with spreading hairs, especially on the midrib. Hairs absent on older foliage. Obovoid pod.

Distinctive characteristics: Similar to the widely distributed species, *Gastrolobium parviflorum* (Box poison, formerly *Oxylobium parviflorum*), but with shorter racemes with few flowers and slender, trailing rather than erect stems. *G. heterophyllum* has conspicuous, fine stipules whereas *G. parviflorum* has small, inconspicuous stipules. Also, *G. parviflorum* has a glabrous undersurface to the leaves. Gardner's informal varieties of the same are hairy beneath the leaves but the hairs are very short and very tightly appressed so as to be inconspicuous.

References: Aplin (1969c), Crisp and Weston (1987), Everist (1974), Gardner and Bennetts (1956).



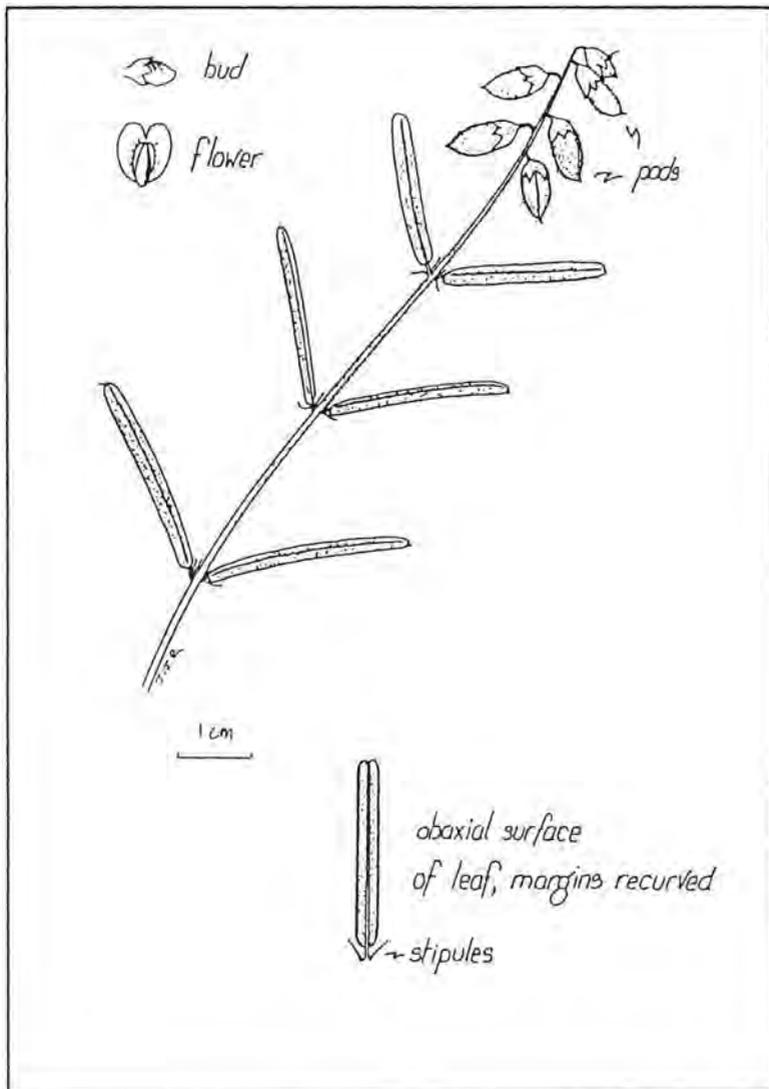


Figure 11 *Gastrolobium heterophyllum*

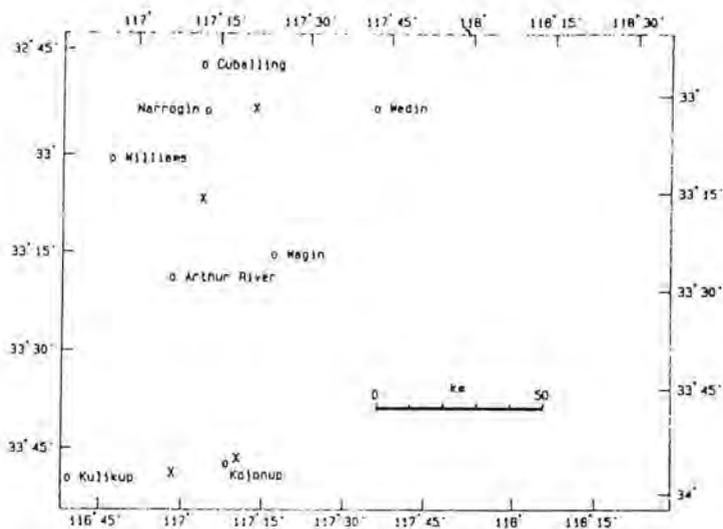
Gastrolobium ovalifolium Henfr.

OVA
Runner poison

Distribution and habitat: Occurs in small, scattered populations from Narrogin and Williams southward to Kojonup, usually on gravelly hills associated with brown mallet (*Eucalyptus astringens*) and *Eucalyptus wandoo*.

Flowering period: August to October

Description: Low spreading shrub with prostrate stems rarely more than a few cm high, forming flat bushes 1.8 - 2.4 m in diameter. Smaller branches and branchlets covered in a thin cottony wool. Leaves in pairs, flat, almost circular in outline, 1.2 - 2.0 cm in diameter, green above but much paler underneath. The flowers are yellow and purple, in long racemes at the ends of the branches. The axis of the racemes and the flower stalks velvety-hairy. The calyx lobes are acute and almost equal.



Distinctive characteristics: The prostrate habit. The round, flat leaves, not crinkled or undulate, with prominent net-venation especially on the under-surface, the spaces between the veins appearing as small pits, thick marginal vein. The under-surface of the leaf is virtually glabrous (in contrast to *G. tomentosum*). The stipules are thin and pointed and often covered with cottony hairs.

References: Crisp and Weston (1987), Everist (1974), Gardner and Bennetts (1956), Leigh *et al.* (1984).

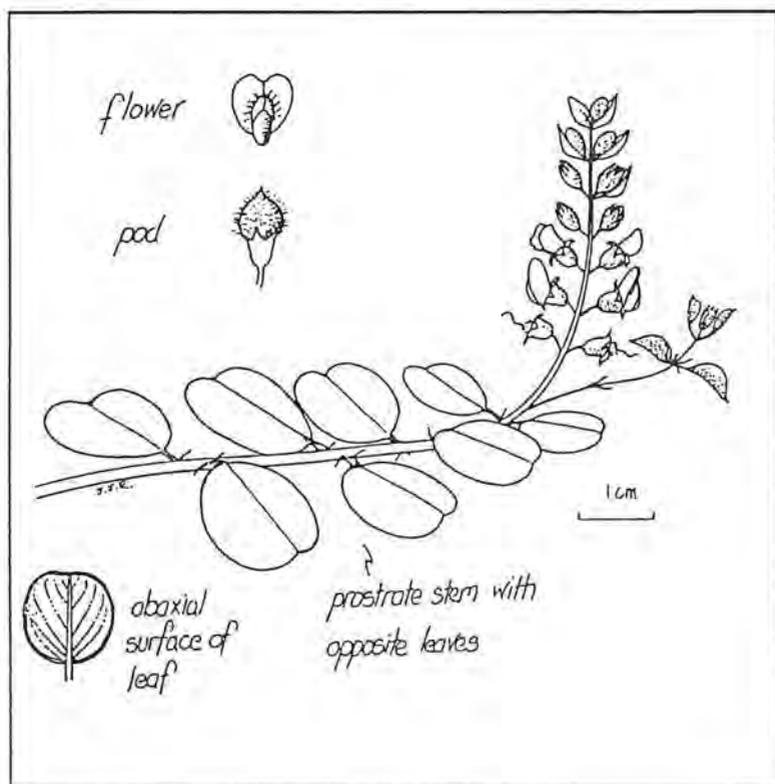


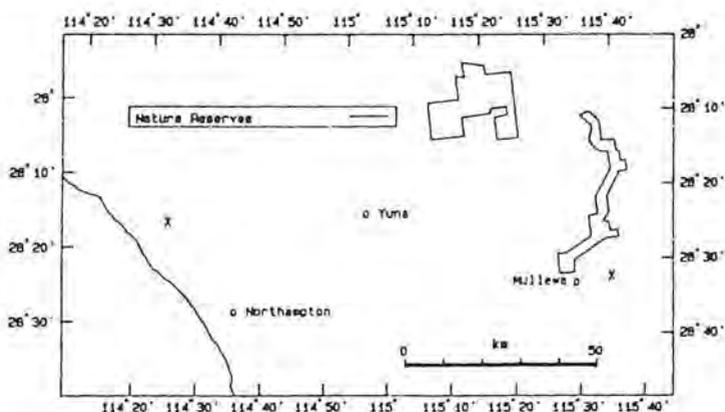
Figure 18 *Gastrolobium ovalifolium*

Distribution and habitat: Two forms of this species have been collected. The first occurs along the Hutt River at White Peak and Isseka and to the south-east of Geraldton, extending east to Walkaway. The second form is found around Mullewa. It occurs on sandy soil among rocks and is associated with species such as *Melaleuca uncinata* and *Acacia* sp.

Flowering period: July to November

Description: A shrub, up to 1.2 m with slender, erect or spreading branches and dark coloured bark, branchlets angled. Leaves mostly in whorls of three, 4 - 5 cm long, olive green to blue-green, narrowly lanceolate, slightly folded upwards, tapered at the tip to a fine sharp point, abruptly contracted at the base into a short, slender stalk whose base is continued downward as a rib or angle along the stem. Stipules fine, black and withering as the leaf matures. Flowers borne in long, slender racemes which are much longer than the leaves and mostly around the ends of the branches or in the axils of the upper leaves. The calyx is less than 6 mm long, sparsely hairy; petals orange yellow and purple. The form found around Mullewa is a much larger shrub and has longer, flatter olive-green to blue-green leaves.

Distinctive characteristics: Sometimes confused with *Gastrolobium*



oxylobioides Benth. (Champion Bay Poison) when not in flower. *G. propinquum* is a taller, more branched shrub than *G. oxylobioides* which grows to 45 cm. The flower is much smaller and the calyx less hairy than that of *G. oxylobioides*. The acute, entire, chestnut-brown bracts are larger than the calyx, pointed and falling off as the flower matures.

References: Aplin (1969d), Everist (1974), Gardner and Bennetts (1956), Leigh *et al.* (1984).

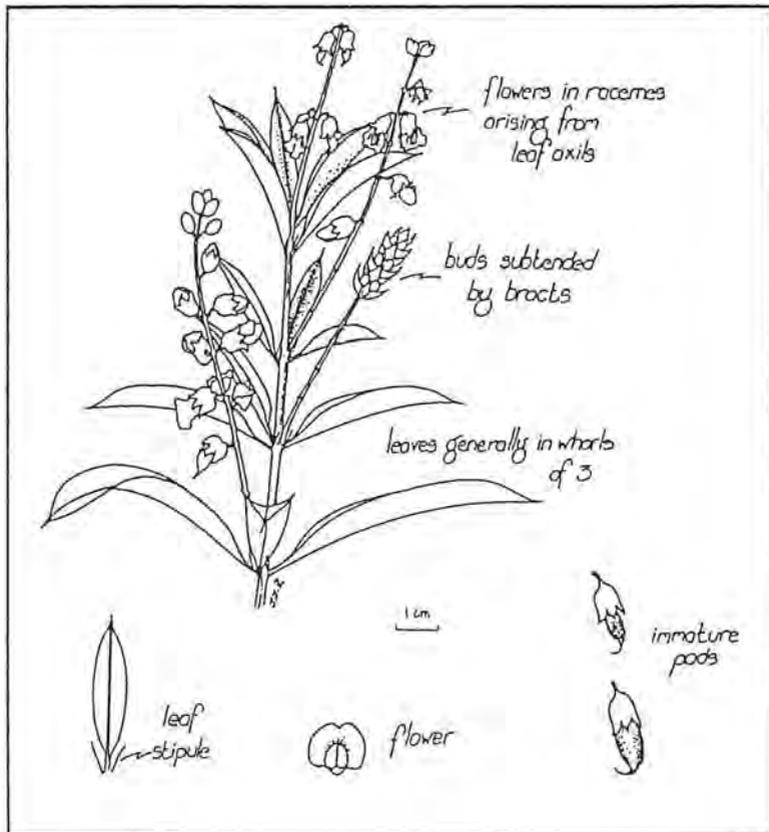


Figure 12 *Gastrolobium propinquum*

Gastrolobium racemosum (Turcz.) Crisp
formerly *Oxylobium racemosum*

RAC
Net-leaf poison

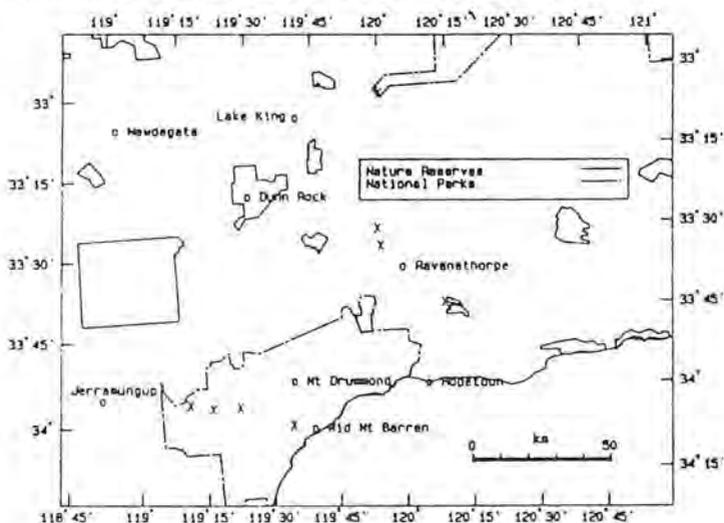
Distribution and habitat: Confined to south-coastal districts from the Gairdner River eastwards to Ravensthorpe. Grows mainly in gravelly clay soils.

Flowering period: October to November

Description: Erect shrub 60 - 12 cm, glabrous except for a woolly fringe on the margins of the calyx lobes; branches purplish; leaves opposite, erect, dull green, leathery, quite flat, with a thick prominent midrib and a network of secondary veins, mostly 4 cm long, narrow elliptical or oblong, shortly stalked, rounded at the base and blunt at the tip. Flowers orange red, in elongated racemes much longer than the uppermost leaves; individual flower stalks about as long as the calyx. Calyx with two uppermost lobes united into a lip; pod hard, dark purple or black, 6 to 8 seeded.

Distinctive characteristics: The elongated raceme together with the two uppermost lobes of the calyx being united to form a lip. Similar to *G. graniticum* but the leaves are ovate rather than obovate.

References: Everist (1974), Gardner and Bennetts (1956)



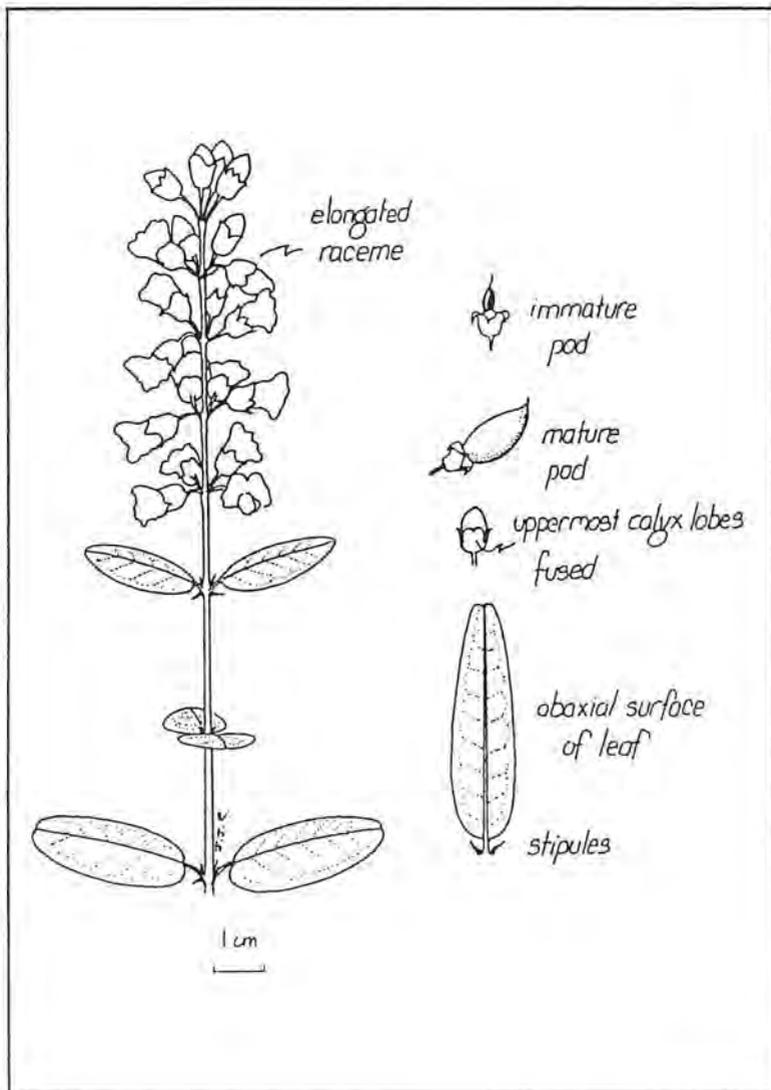


Figure 13 *Gastrolobium racemosum*

Gastrolobium rigidum (C. A. Gardner) Crisp
formerly *Oxylobium rigidum*

RIG
Rigid-leaf poison

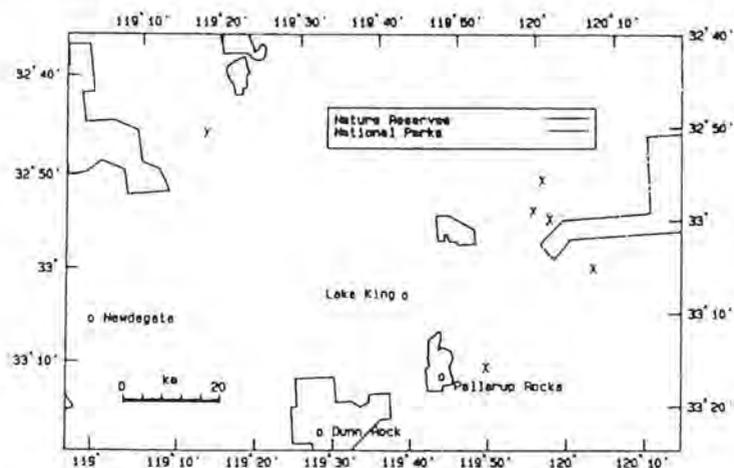
Distribution and habitat: The typical form of the species is known only from a small area from Kalgarin to Mt. Gibbs and Mt. Madden, in open sandplain country. A larger form is found in the mallee country at Tarin Rock

Flowering period: October to November (from herbarium specimens)

Description: Low shrub usually about 30 cm high but one form up to 90 cm high. Stems from a woody rootstock, repeatedly forked: leaves opposite on short stalks, blue-green in colour, oblong-ovate in shape, rigid flat with a prominent midrib. Racemes short with few flowers: flowers yellow on short stalks: pods stalked, silky hairy. The branchlets have prominent yellow midribs (contrast *G. racemosum*) and are very wiry. Midrib also is very yellow.

Distinctive characteristics: Short racemes with relatively few flowers, together with short petioles.

References: Everist (1974).



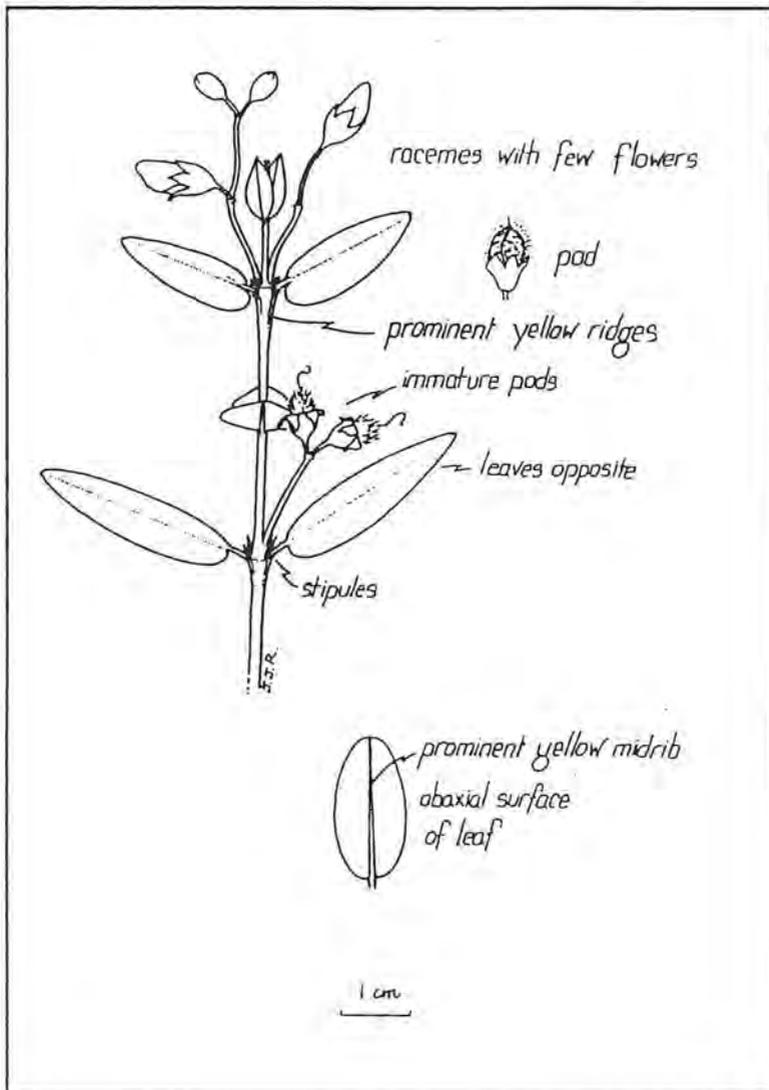
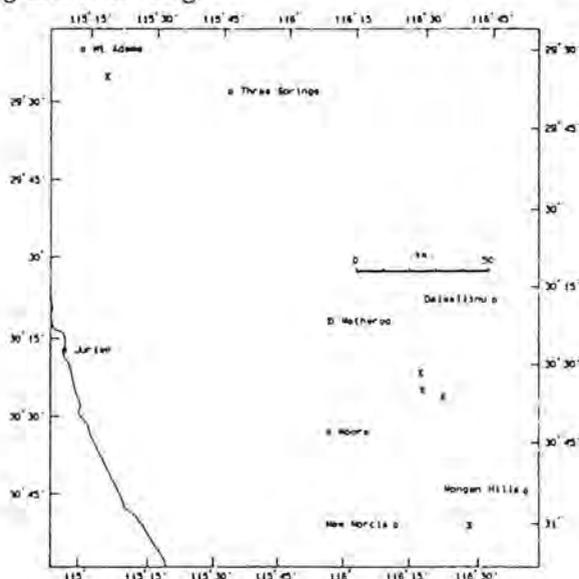


Figure 14 *Gastrolobium rigidum*

Distribution and habitat: Occurs from near Mingenew southwards to Wagin with the majority of populations between Watheroo and Calingiri. Usually associated with *Eucalyptus wandoo* (wandoo) - *Eucalyptus loxophleba* (York gum) woodland with a shrubby understorey. Recorded on clay soils and on shallow brown, sandy loams or quartzite gravels.

Flowering period: August to September

Description: An erect, dense, rigid, bushy shrub to about 30 cm high. Branches and young leaves hairy, becoming hairless with age. Leaves in pairs, dark green and hairless above, pale underneath; in the typical form usually undulate; margins recurved, broadly oblong, tapered rather shortly at the tip into a long fine point, rounded at the base into a short stalk. A narrow leafed form has been recorded between Miling and Walebing in which the leaves are longer and narrower with the edges rolled under. Flowers yellow and purple, crowded in spike-like racemes at the ends of the branches. The bracts are large, brown, concealing the buds and persisting until flowering.



Distinctive characteristics: The stipules are persistent, erect, long and pointed, united with the leaf-stalk in the lower part and with broad membranous margins towards the base. The usually undulate leaf with recurved to revolute margins and dark green, glossy upper surface is very distinctive. Also the long pungent point.

References: Aplin (1969d), Everist (1974), Gardner and Bennetts (1956), Leigh *et al.* (1984).

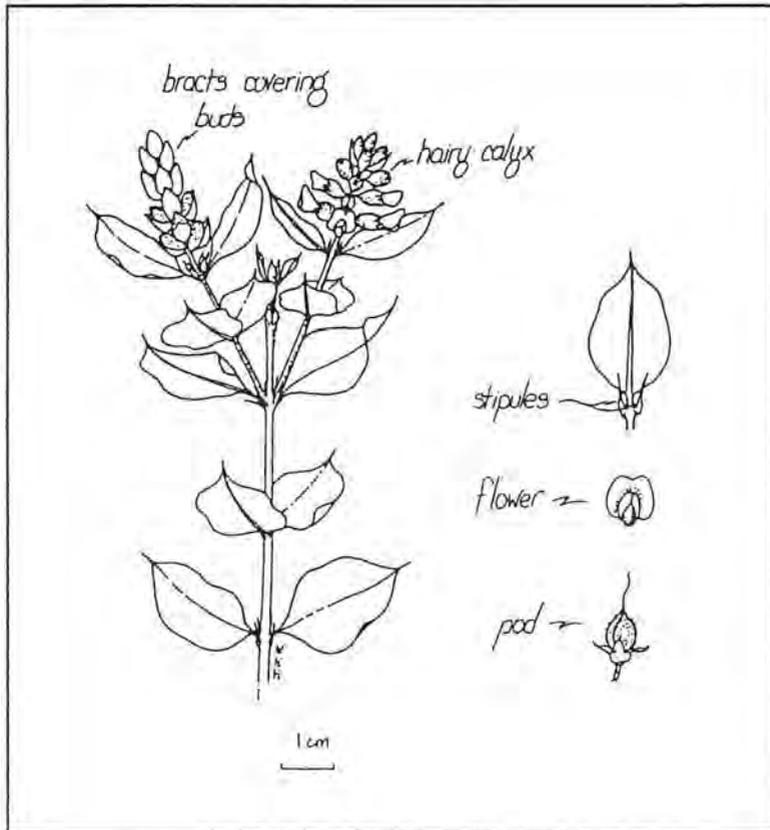


Figure 15 *Gastrolobium rotundifolium*

district), differing in size in the different forms, loosely arranged in long racemes (Fitzgerald River and Shackleton district), crowded into short racemes at the ends of branches (Phillips Range).

Distinctive characteristics: Crowded foliage and slender stipules. It is like *G. callistachys* but the leaves are more crowded and the inflorescences shorter and more condensed.

References: Everist 1974; Gardner and Bennetts 1956.

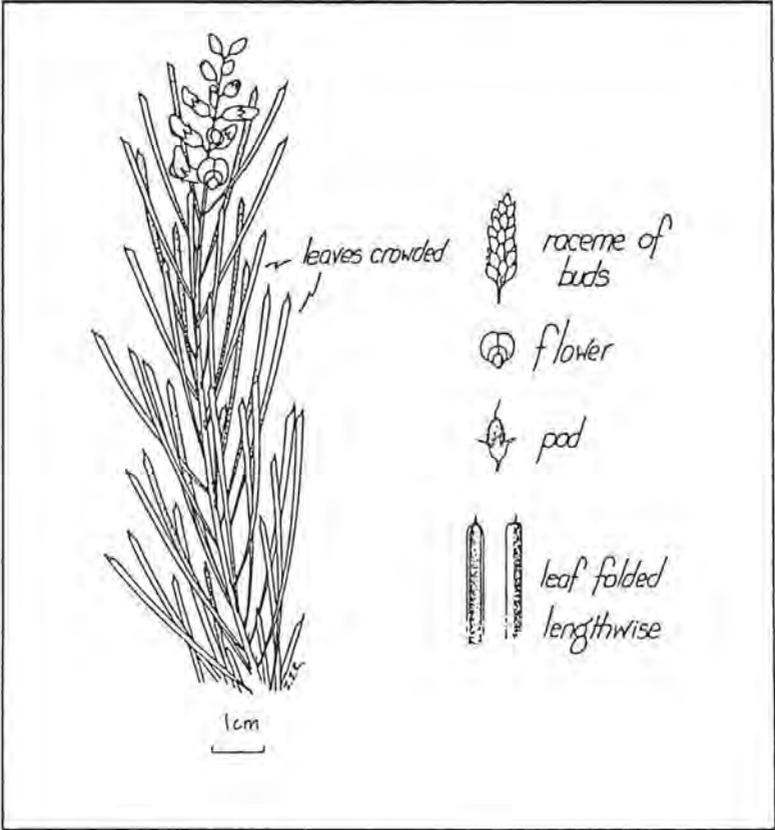


Figure 16 *Gastrolobium stenophyllum*

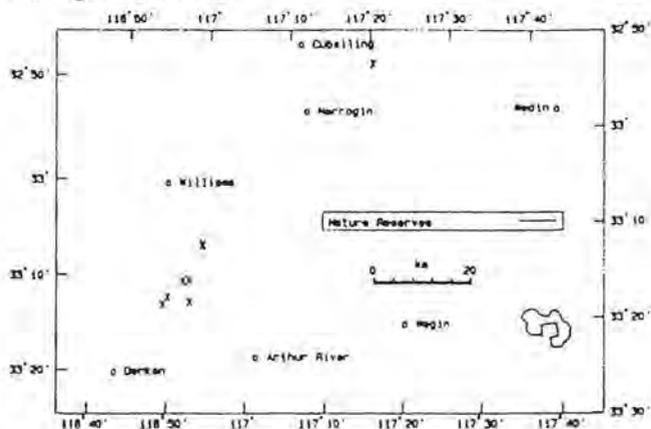
Distribution and habitat: A highly restricted species, known only from the West Arthur district, mainly from between Darkan and Williams. It occurs on gravelly clay soils associated with *Eucalyptus wandoo* woodland.

Flowering period: September to October

Description: Low, compact shrub with stiff, erect branches to 60 cm high. Leaves borne in opposite pairs, rounded, with wavy margins, dark-green above and densely covered with white felt-like hairs beneath, broadly elliptic in outline, rounded at both ends. Stipules small and fall away early. Flowers in short, narrow racemes arising at the ends of branches. Calyx with fine silky hairs and five equal or subequal lobes. Petals deep yellow and purple, only slightly longer than the calyx.

Distinctive characteristics: The rounded undulate leaves, tomentose underneath. *G. tomentosum* may be confused with *Gastrolobium ovalifolium* but the latter is distinguished by its round, flat leaves, prostrate habit, stipules and nearly glabrous leaf under-surfaces.

References: Aplin (1968b), Everist (1974), Gardner and Bennetts (1956), Leigh *et al.* (1984).



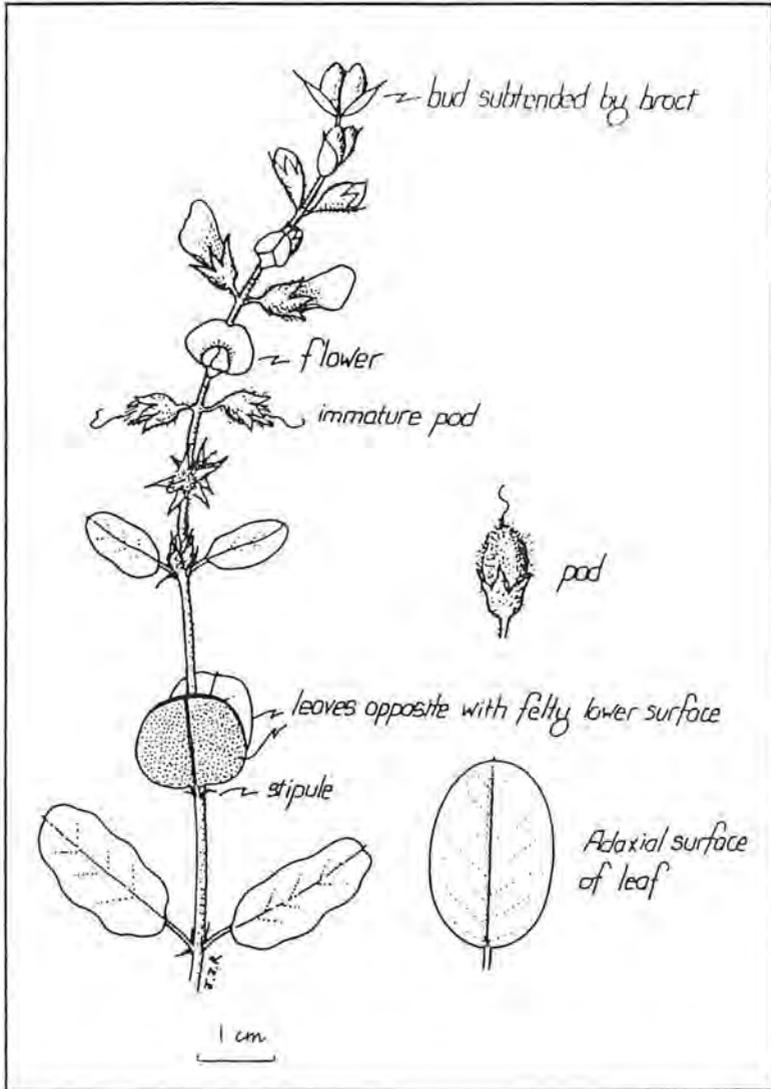


Figure 17 *Gastrolobium tomentosum*

3. GLOSSARY

abaxial	- turned away from the axis. (Of a leaf surface), facing away from the stem
adaxial	- adjacent to, or turned towards the axis. (Of a leaf surface), facing the stem.
acute	- ending in a sharp point
alternate	- where leaves (or other structures) are solitary at each point on the stem, adjacent ones occurring on opposite sides of the stem
axil	- the angle formed between the stem and the upper part of a leaf or any other organ arising from the stem
axillary bract	- in the axils - modified leaf occurring between the normal leaves and the flowers. Bracts are usually smaller and more membranous than normal leaves but they vary enormously in form
calyx	- the outer whorl of a flower, consisting of free or united sepals
campanulate carpel	- bell shaped - female reproductive organ of flowering plants, consists of ovary containing ovules, a receptive surface for pollen grains (the stigma) which is often borne on the apex of a stalk (the style)
complicate	- folded together or folded upon itself
entire	- margin free of irregularity
glabrous	- having a shining surface without hairs
glaucous	- having a pale blue-greyish appearance
inflorescence	- cluster of flowers
lanceolate	- lance-shaped, long, widening above the base and tapering to a point
midrib	- major central vein of a leaf or other organ
mucrone	- a sharp, spiny tip
obtuse	- round ended, not forming a sharp angle
opposite	- (1) borne at the same level on opposite sides of the stem. (2) the alignment of two

	structures such that one is directly in front of the other
ovary	- the basal, ovule-bearing part of a carpel, contains the seeds when mature
pedicels	- the stalk of an individual flower in an inflorescence
petiole	- leaf stalk
pod	- a dry, usually many-seeded fruit which splits down both sides to release the seeds
prostrate	- lying along the ground, trailing
pungent	- ending in a stiff, sharp point or tip
raceme	- an inflorescence of stalked flowers in which the main axis continues to grow. The terminal flower is, therefore, the last to develop
revolute	- when the edges of the leaves are rolled backwards towards the midrib
rhachis	- main axis of an inflorescence
sepals	- one of the parts of the calyx, outer whorl of a flower, usually green
stamens	- the male organ of seed-forming plants, consisting of the pollen bearing anther supported by the filament, occurring within the petal whorl
standard	- of flowers of the Papilionaceae, the uppermost petal, distinct and usually larger than the other
stipules	- a tiny appendage at the base of the petiole
stigma	- the region at the end of the style which receives the pollen
style	- the stigma and its stalk, attached to the summit of the ovary
tomentose	- densely covered with short soft matted hairs
trifid	- cut to about half way, into three parts
undulate	- wavy (up and down)
villous	- beset with long soft hairs

whorl

- a set of leaves or floral parts that arise from the same level and are arranged in a circle around the central axis

4. KEYS

The following keys are modified versions of those presented in Blackall and Grieve (1981) and are reproduced with the permission of the authors and The University of Western Australia Press. They do not contain all the species included in this survey. The species names have been updated to those of Crisp and Weston (1987) only if they have been mentioned in the text.

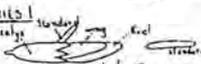
SUB-FAMILY PAPILIONACEAE (FAMILY 48C) Excerpt 1

KEY TO GENERA

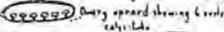
A Stamens all free (or accessory united at base)  SECT 1

A Stamens united in a sheath  SECT 2

SECT 1

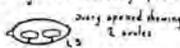
A Standard small or narrow  SECT 1

A Standard large, orbicular or reniform  SECT 1

B Ovaries 4 or more  SECT 2

C Calyx lobes shorter than tube or = as long  SECT 2

C Calyx lobes much longer than tube, calyx split almost to base  SECT 3

B Ovaries 2  SECT 4

C Calyx lobes much longer than tube (as in Sect 3)

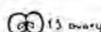
C Calyx lobes shorter than tube or = as long (as in Sect 2)

SECT 1

A Fls in head of σ surrounded by involucre of bracts  1 JANSONIA

A Fls not in heads. 2 BRACHYSEMA

SECT 2

A Ovary a pod apparently 2-celled (by a longitudinal partition)  3 MIRABELLIA

A Ovary a pod 1-celled  3 MIRABELLIA

B Leaves opposite or verticillate (usually in 3s)  SUB-SECT 1

B Leaves alternate  SUB-SECT 2
[In *Chorizanthe* or *Leavenworthia* leaves are more alternate than in a verticillate]

SECT 3

A Ovary a pod apparently 2-celled (by a longitudinal partition) 3 MIRABELLIA

A Ovary a pod 1-celled

B Leaves simple  [as absent in *Leavenworthia* spp.] SUB-SECT 1

SUB-FAM. PAPILIONACEAE

SERIES 1. COMPO

B Leaves pinnate or digitately 3- to 5-foliate



7 GOMPHOLOBIUM

SECT. 4

A Calyx divided into equal or nearly equal lobes

B Leafless shrubs (leaves very rarely present on undveloped stems)

9 JACKSONIA

B Leafy shrubs

C Leaves simple

D Leaves entire narrow linear



7 *Latrobea* 3 *Mirbelia*

8 BUXTONIA

D Leaves (leaf-like branchlets) toothed or lobed



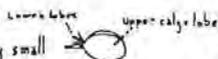
9 JACKSONIA

C Leaves pinnate or digitately 3- to 5-foliate (Vide Gompholobium above)

8 BUXTONIA

A Calyx divided into unequal lobes

B Upper calyx-lobes large orbicular, 3 lower very small



11 EUCHILOPSIS

B Upper calyx-lobes united to near top



16. PULTENAEA

SECT 5

A Ovary glabrous.

B Stipules prominent, setaceous



Gastrolobium parvifolium
Berry Dawson

B Stipules absent (or inconspicuous)

C No bracteoles on pedicels

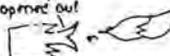
D 2 upper calyx-lobes ± united into an upper lip

E Calyx hirsute, lobes short rounded



20 ERICHSENIA

E Calyx glabrous, upper lobe falcate



10 SPHAEROLOBIMUM

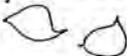
D Calyx-lobes very short ± equal; (or lower three ± equal)

E Pod ovoid-oblong, 5-10-15 ft, with long very pendulous branches



12 VIMINARIA

E Pod ± triangular

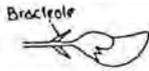


8 DAVIESIA

SUB-FAM. PAPILIONACEAE

SECT 1 SECT 5 CONT'D.

C Bracteoles present on pedicels



D Fls axillary solitary

17 LATROBES abnormis

D Fls mostly terminal in short corymbs or racemes



18 DILLWYPIA cinerascens
Grey Parrot Pea

A Ovary hirsute or pubescent, (at least when young).

B Leaves flat —, or folded lengthwise V or with revolute margins or if terete channelled underneath (Leaves shown in cross-section)

C Bracteoles none or very deciduous

D Fls 1-3 in each axil leaves without stipules



14 AOTUS

D Fls in racemes corymbs or dense axillary clusters



15 GASTROLOBIUM

C Bracteoles present, close under calyx (often leaf-like)



16 DULTENAEA

B Leaves concave or with involute margins or if terete channelled above

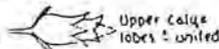
C Calyx teeth or lobes equal



17 LATROBIA

C Calyx-lobes unequal, upper lobes usually broad

D Bracteoles close under or ± adnate to calyx



16 DULTENAEA

D Bracteoles deciduous or not close under calyx

E Leaves opposite ± decussate



18 EUTAXIA

E Leaves alternate or scattered



19 DILLWYPIA

SECT 2 SUB-SECT 1

A Ovary & pod apparently 2-celled



3 MIRBELIA

A Ovary & pod 1-celled



4 OXYLOBIUM

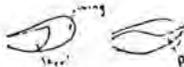
SECT 2 SUB-SECT 2

A Keel about as long as wings



4 Oxylobium lanceolatum
Narrow-leaved Oxyclobium

A Keel much shorter than wings or beaked

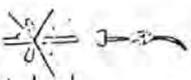
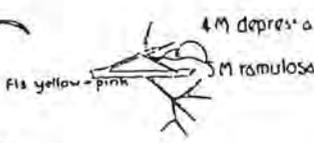
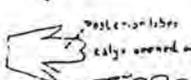
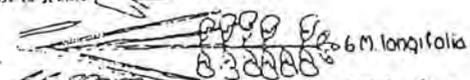
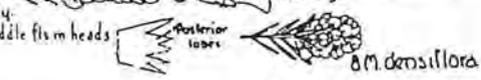
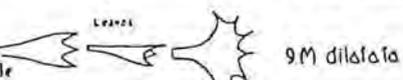
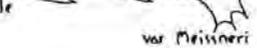


5 CHORIPETALA
Beaked Keel

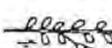
SUB-FAM PAPILIONACEAE

Excerpt 2

MIRABELLIA CONT'D

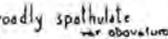
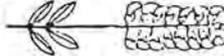
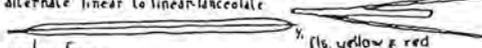
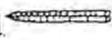
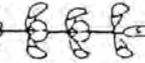
- E Ovary densely villous 
- B Branches leafless, spinescent at end.  4 M. depressa
Fls yellow-pink M. ramulosa
- A Plant not thorny
- B Ovules 2
- C Posterior lobes of calyx united almost to summit  posterior lobes calyx united at tip
- D Racemes loose leaves 3-4 cm  6 M. longifolia
Leaf from below
- D Racemes dense leaves 1-2 cm  7 M. faxifolia
calyx, pedicels, inflorescences very hairy
- C Posterior calyx lobes united only to middle fls in heads  8 M. densiflora
posterior lobes
- B Ovules 4 or more
- C Leaves dilated at end into 3-7 or more lobes;  9 M. dilatata
fls. bluish-purple
- C Leaves not lobed at end  var. Meissneri
- D Leaves ovate to elliptical
- E Keel much shorter than wings leaves 3-4 cm  10 M. racemosa
(now Oxylobium racemosum)
- E Keel as long as wings leaves usually = 1 cm  11 M. subcordata
- F Leaves ovate-lanceolate, almost pungent  12 M. ovata
- F Leaves ovate, very obtuse  13 M. floribunda
- D Leaves narrow-linear fls violet to blue

4. OXYLOBIUM

- A Fls axillary, usually also with terminal clusters but never terminal racemes  10 microphyllum
Small-leaved Oxylobium
- B Leaves alternate, = 5 mm, fls solitary 
- B Leaves mostly opposite or verticillate (visually in 3s)  Leaves verticillate in 3s
- C Leaves obtuse (sometimes with small point)
- D Leaves undulate  20 reticulatum

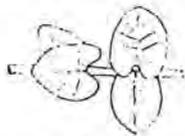
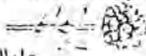
SUB-FAM PAPILIONACEAE

OXYLOBJUM CONT'D

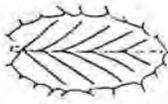
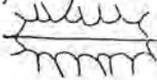
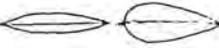
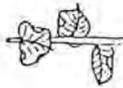
- D) Leaves flul or folded lengthwise, not undulate
- E Leaves linear to lanceolate; fls. orange & red.  Side view 50 capitatum
Bacon & Eggs
- E Leaves cuneate-oblong to broadly spatulate  var. *emarginatum* (now *O. emarginatum* cf 21)
var. *obovatum* 40 cuneatum
Wedge-leaved
Oxylobium
- F Fls. in dense axillary clusters  distal 50 tricuspidatum
- F Fls. few in upper axils; leaves truncate 
- E Leaves ovate or elliptical, 3-7cm fls. large purple-red  60 atropurpureum
- C Leaves tapering into long pungent point  70 acutum
- A Fls. in terminal racemes (often also in upper axils) 
- B Leaves 5cm or more long
- C Leaves mostly verticillate in 3's; calyx densely villous; leaves linear to elliptical
- D Pod dehiscent only at top; terminal raceme 5-15cm  Dehiscent pod fls. yellow & red 80 lanceolatum
- D Pod dehiscent to base; terminal raceme 3-5cm  90 ellipticum
- C Leaves mostly opposite; calyx ± glabrous with ciliate lobes; fls. yellow & red.  P Gastrolobium
graniticum
Granite Poison
- C Leaves alternate; linear to linear-lanceolate  fls. yellow & red 11.0 lineatifolium
Narrow-leaved
Oxylobium
- B Leaves under 5cm
- C Leaves mostly verticillate in 3's; linear to narrow-oblong
- D Ovules above 20; calyx lobes white silky; fls. orange.  red reddish 120 obusifolium
- D Ovules under 10; calyx lobes shorter than tube 
- E Calyx lobes finely pubescent; fls. orange-yellow & purple  Gastrolobium
parviflorum
Box Poison
- E Calyx lobes white villous; leaves cordate at base under 1cm; fls. yellow & red.  140 tetraconophyllum
Brother-Brother
- C Leaves alternate, under 2-5cm; calyx divided to base. 
- D Leaves oblong or lanceolate  15.0 carinatum
- D Leaves linear-cuneate with recurved apex.  16.0 spatulatum

SUB-FAM PAPILIONACEAE

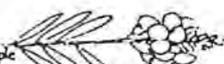
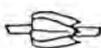
OXYLOBIUM CONT'D

- C Leaves mostly opposite
- D Leaves deeply cordate at base 
 - P 17 O spectabile
Munladgin Poison
- D Leaves not cordate at base
- E Leaves 1.5-3 cm, calyx with appressed silky hairs
Fls yellow & purple-red 
 - Gastrolobium heterophyllum
Slender Poison
- F Leaves 1.5-3 cm, calyx with appressed silky hairs
[narrower leaves, smaller stipules & fls than 18] 
 - Gastrolobium parviflorum
Box Poison
- F Leaves 3-6 cm, calyx ± glabrous with ciliate lobes;
fls yellow
fls reddish, leaves narrow, obtuse at base 
 - P Gastrolobium graniticum
Grubite Poison
 - P Gastrolobium racemosum
Net-leaved poison
- A Fls in terminal pedunculate or sessile clusters [not axillary]
- B Fls in terminal sessile cluster 
 - C Leaves narrow oblong; fls pedicellate 20 O virgatum
 - C Leaves obcordate-oblong; fls sessile 21 O emarginatum
 - B Fls in pedunculate clusters 22 O coriaceum

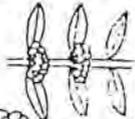
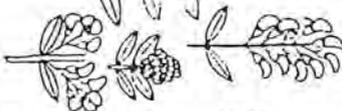
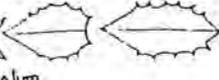
S. CHORIZEMA

- A Leaves all (or almost all) prickly toothed 
 - B Branches + underside of leaves pubescent 1 C varium
Bush Flame Pea
 - B Branches + leaves glabrous
 - C Tall S. with weak slender branches [var of C. ilicifolium] 2 C cordatum
Heart-leaf Flame Pea
 - C Low or diffuse shrub; fls orange & red. 
 - 3 C ilicifolium
Holly-leaved Chorizema or Holly flame Pea
- A Leaves entire (or a few with scattered teeth)
- B Stems slender; climbing with twining branches 
 - 4 C diversifolium
- B Plants erect
- C Leaves very undulate 
 - 5 C nervosum
- C Leaves not undulate
- D Leaves ovate to lanceolate

14. AOTUS

- A Leaves narrow with very revolute margins 
- B Fls axillary
- C Leaves narrow-linear:  Fls. yellow
- C Leaves lanceolate:  1 A villosa
- B Fls crowded in short terminal raceme:  2 A genistoides
- Fls. orange, keel purple
- 3 A phyllicoides
- A Leaves folded lengthwise, V, or broad with recurved margins: 
- B Leaves flat with recurved margins.
- C Leaves ovate-cordate margins undulate:  4 A cordifolia
- C Leaves oval-oblong to lanceolate, densely hairy above
- D Leaves glabrous underneath. diffuse Shrub:  Fls purple-yellow 5 A diffusa
- D Leaves pubescent underneath erect Shrub.
- E Style glabrous:  6 A tielkensisii
std-wings yellow
keel red
- E Style hirsute:  7 A passerinoides
- B Leaves folded lengthwise, densely silky-hairy:  8 A carinala

15. GASTROLOBIUM

- A Fls in axillary clusters:  SECT 1
- A Fls in racemes loose or dense, terminal or terminal & axillary:  SECT 2
- SECT 1
- A Leaves with lateral pungent teeth or lobes:  1 G ilicifolium
- A Leaves entire:  var lobatum

SUB-FAM. PAPILIONACEAE

GASTROLOBIUM CONT'D

B Leaves tapering into long straight pungent point



C Leaves folded lengthwise



D Margins of leaves thick nerve-like



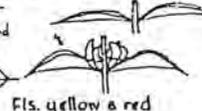
2. *G. apacridioides*

D Margins not thickened



P. 3. *G. obovatum*
Boat-leaved Poison

C Leaves flat

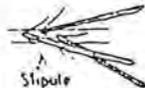


Fls. yellow & red

4. *G. pauciflorum*

B Leaves ± obtuse, with or without mucrone

L Leaves narrow-linear, stipules very long

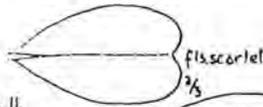


5. *G. stipulare*

C Leaves broader than narrow-linear

D Leaves mostly above 3 cm

E Leaves glabrous: calyx very villous



6. *G. pyramidale*

E Leaves tomentose underneath calyx silky

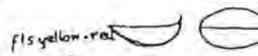


7. *G. Lehmanni*

D Leaves mostly under 2.5 cm

E Leaves oblong to ovate or elliptical

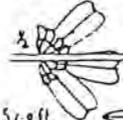
F Leaves ovate, complicate apex acute



P. 8. *G. scorisfolium*
(*Mirbelia scorisfolia*)
Yilgarn Poison

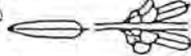
F Leaves oblong, flat.

G Leaves deeply emarginate in 3s



9. *G. pulchellum*

G Leaves with long pungent mucrone 5-8 ft



10. *G. Brownii*

F Leaves elliptical under 1cm



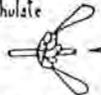
11. *G. reticulatum*

E Leaves ± cordate-orbicular, undulate

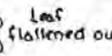


12. *G. truncatum*

E Leaves cuneate to obovate or spatulate



F Leaves spatulate, complicate



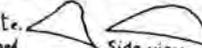
13. *G. spatulatum*

F Leaves cuneate, flat: undulate at top, 5-2 ft



14. *G. Hookeri*
(*G. Brownii*)

F Leaves obovate, with pungent mucrone, complicate.



15. *G. plicatum*

F Leaves 3-pointed at apex, complicate.



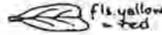
16. *G. tricuspidatum*

SUB-FAM PAPILIONACEAE

GASTROLOBIUM CONT'D.

A Leaves flat.

B Leaves elongate-cordate.



fls. yellow
- red.

P 42. *G. bilobum*
Heart-leaved Poison

B Leaves linear.

C Leaves crowded, racemes 2-3cm



fls. yellow-red

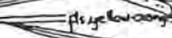
P 28. *G. stenophyllum*
Phillips River Poison

C Leaves in whorls + 5, racemes 5-6cm



P 29. *G. forrestii*
River Poison

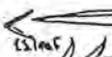
C Leaves alternate, scattered, racemes 8-10cm



P 50. *G. callistachyus*
Rock Poison

B Leaves oblong elliptical to cuneate; obtuse at apex or + acute, or with mucron.

C Leaves narrow-oblong keeled; compound, ± 6cm
fls. yellow & orange



P 51. *G. floribundum*
Wodjil Poison

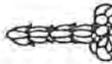
C Leaves oblanceolate, compound, pungent mucron
apex of leaf recurved



P 52. *G. Bernierisidrum*
Cluster Poison

C Leaves elliptical, flat or ± concave

D Calyx villous leaves under 1cm.

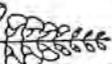


fls. orange
yellow-red

P 55. *G. hamulosum*
Hook-point Poison

D Calyx glabrous or nearly so.

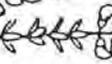
E Leaves broadly elliptical, 2-3cm



fls. pale
yellow-orange

P 54. *G. crassifolium*
Narrow-leaved Poison

E Leaves narrow-elliptical, = 0.5cm
fls. orange-red



fls. orange
yellow

P 55. *G. parvifolium*
Berry Poison

C Leaves broadly obovate, mucronate



fls. orange
yellow

P 56. *G. glaucum*
Morgan Poison

C Leaves mostly triangular at apex
fls. yellow-dark red



fls. yellow-dark red

P 57. *G. Laytonii*
Kite-leaved Poison,
or Breezys

C Leaves emarginate at apex.

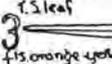
D Leaves with slightly recurved margins, ± 1cm



fls. orange
red

P 58. *G. velutinum*
Stirling Range Poison

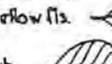
D Leaves with revolute margins, ± 3cm



fls. orange-yellow
brown

P 59. *G. bidens*
Hill River Poison

D Leaves thick, blue-green; crowded orange-yellow fls.



P 40. *G. pycnostachyum*
Mt. Rugged Poison

D Leaves obtuse at base & apex; trailing shrub.



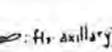
fls. yellow & orange

P 41. *G. ovalifolium*
Runner Poison

16. PULTENAEA

A Stipules absent

B Style bearded along inner side



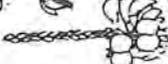
fls. axillary.

SECT. 1.

B Style glabrous



fls. in terminal heads



SECT. 2.

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