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Monograph of *Gastrolobium* (Fabaceae: Mirbelieae)

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Abstract. A taxonomic revision with full descriptions and key are presented for the 109 known species of *Gastrolobium*, including 29 new species described here for the first time. *Brachysema*, *Jansonia* and *Nemcia* are formally placed into *Gastrolobium* and new combinations have been made where necessary. Included in the revision are full taxonomic descriptions for all species, full synonymies, literature references for original publications, typification, including selection of lectotypes where necessary, distributions complete with maps, and taxonomic and nomenclatural notes. New taxa described herein are *G. acrocaroli*, *G. aculeatum*, *G. alternifolium*, *G. congestum*, *G. crispatum*, *G. cruciatum*, *G. cyanophyllum*, *G. diabolophyllum*, *G. discolor*, *G. elegans*, *G. euryphyllum*, *G. ferrugineum*, *G. glabratum*, *G. hians*, *G. humile*, *G. involutum*, *G. melanopetalum*, *G. mondurup*, *G. musaceum*, *G. nudum*, *G. nutans*, *G. reflexum*, *G. rhombifolium*, *G. semiteres*, *G. tenue*, *G. tergiversum*, *G. venulosum*, *G. whicherensis* and *G. wonganensis*.

Introduction

The tribe Mirbelieae (Fabaceae) is endemic to Australia and comprises a major component of the flora in many temperate ecosystems. The 109 species of *Gastrolobium* R.Br. belong to this tribe and are all native to the south-west of Western Australia, except for two species that occur in northern and central Australia (*G. brevipes* and *G. grandiflorum*; Fig. 1). Furthermore, it is one of the largest legume genera in the south-west of Western Australia, where it forms a major component of the understorey in many areas, such as sandplains with their accompanying vegetation, which is usually heath or mallee (shrubby eucalypt woodland).

Species of *Gastrolobium*, as circumscribed prior to this revision, are simple-leaved shrubs that have terminal, racemose inflorescences with yellow, orange and red flowers. The coloration of the flower is typical of the tribe Mirbelieae, with the standard petal generally orange or yellow, with a central red ring surrounding the yellow centre. These orange and yellow standard petals indicate insect-pollination, while a red standard (present in only one species, *G. grandiflorum*) indicates bird-pollination (e.g. Keighery 1982).

Gastrolobium accumulates monofluoroacetic acid (the sodium salt of which is also known as the commercial poison, Compound 1080; herein referred to just as fluoroacetate), which makes it highly toxic. *Gastrolobium* was first discovered to be poisonous by trials carried out in what was then the Swan River Colony (now Western Australia) by Preiss and James Drummond in the late 1830s and early 1840s, at the request of colonists suffering disastrous stock losses, and several species were identified as toxic (most notably *G. calycinum* and *G. oxylobioides*; Erickson 1969), although it was not until the 1960s that the toxin present in *Gastrolobium* was identified (Aplin 1971). Severe stock losses have occurred in the past due to fluoroacetate poisoning, which led to an eradication program, particularly in the wheat-belt region of south-western Western Australia. As a consequence, many species are now rare or threatened with extinction, making *Gastrolobium* both ecologically and economically important. Work is continuing on the toxicity of *Gastrolobium*, with more details becoming available, such as that the toxic component of the seeds of *Gastrolobium* is the endoderum, not the seed testa, perhaps as a toxic store for the

seedlings to draw on in their early, vulnerable stages (D. Peacock, unpubl. data), and the toxic compound itself could turn out to be a fluorinated fatty acid, such as is found in *Dichapetalum toxicarium* Baill. (Dichapetalaceae; Peters and Hall 1960), although this is currently speculative. However, the work is still in its early stages and further work is required before drawing any major conclusions.

As *Gastrolobium* evolved the ability to synthesise monofluoroacetic acid, native herbivores apparently co-evolved a tolerance to this toxin. This tolerance is most pronounced in species native to Western Australia, but its extent depends very much on diet (Twigg and King 1991). For example, the emu (*Dromaius novohollandica*) had the highest tolerance of any birds tested (Twigg and King 1991), as it is a seed-eater, although the seeds of *Gastrolobium* are known to have particularly high fluoroacetate levels. Likewise, seed weevils also have a high tolerance for the same reasons (Twigg and King 1991). Obviously, this varying tolerance regulates how much a particular diet can consist of *Gastrolobium*. Up to 25% of the diet of *Macropus fuliginosus* (desmarest), the western grey kangaroo, consists of *Gastrolobium*, but these animals tend to discriminate between the plants and eat more of the less-toxic species to avoid being poisoned (Twigg and King 1991).

Modern agricultural approaches, such as pest control and fertilisers, have added to the problems of *Gastrolobium*. In particular, fertilisers are toxic to these plants, which are adapted to low-nutrient soils, and herbicides such as pre-emergents, which stop the germination of weeds, also prevent the germination of native seed. A possible example of this, *G. tenue* G.Chandler & Crisp, occurs along a narrow, remnant roadside strip surrounded by wheat fields. No recruitment was noted for this species (over several years of monitoring the same population, G. T. Chandler, pers. obs) and the adult plants appeared to be in severe decline.

Despite these problems, *Gastrolobium* still flourishes in some areas, particularly in National Parks (e.g. the Stirling Range, Fitzgerald River Biosphere Reserve, Cape Arid and the Ravensthorpe Ranges), so at least some areas are currently free from the land degradation seen in many other areas of Western Australia.

Taxonomic history and problems

Throughout its taxonomic history, the circumscriptions of *Gastrolobium* and its allied genera, particularly *Oxylobium* Jackson, have changed considerably. As a result, species have been transferred from one genus to another on several occasions. A major component of the problem of the circumscription of *Gastrolobium* is due to the fact that morphological data has failed to fully resolve the relationships within the tribes Mirbelieae and Bossiaeeae (see Crisp and Weston 1987, 1995), especially the *Gastrolobium*–*Oxylobium* generic group.

Gastrolobium was described by Brown (1811) as a monotypic genus, diagnosed by a stipitate ovary with two ovules, which distinguished it from *Oxylobium* (below), although Brown (1811) did not mention this fact explicitly. De Candolle (1825) also recognised a monotypic *Gastrolobium*, along with several other genera, including *Brachysema*, *Callistachys*, *Oxylobium* and *Podolobium*. Lindley (1834) described one species and Bentham (1837a, 1837b) provided generic descriptions as part of a revision of legumes of the world. However, it was not until 1839, when Bentham (in Lindley 1839) published a number of new species of *Gastrolobium*, that the genus began to grow in numbers significantly. Subsequently, a number of authors published species of *Gastrolobium*, most notably Turczaninow (1853) who published a major work on the Australian flora, describing many new species, in many genera, including *Gastrolobium*. Bentham (1864), in *Flora Australiensis*, provided the first major treatment of *Gastrolobium*, including a number of new species. Once again, it was primarily ovule number that separated *Gastrolobium* from *Oxylobium*, with *Gastrolobium* having two ovules and *Oxylobium* four or more ovules (Bentham 1864). Both genera contained species that produced fluoroacetate and *Oxylobium* contained species from both eastern and western Australia.

Kuntze (1891) subsumed *Oxylobium* into the earlier genus, *Callistachys* Vent., although *Oxylobium* was later conserved against *Callistachys*. *Nemcia* was described by Domin (1923a), including 12 species characterised by four to six ovules, trifid bracts and condensed racemose inflorescences. This work was largely ignored and the concepts of *Gastrolobium* and *Oxylobium* remained as they had been since Bentham (1864).

Gardner and Bennetts (1956) published a guide to the toxic plants of Western Australia, which included a number of species of *Gastrolobium* and *Oxylobium*. However, this was not a revision of the group, since it did not include the non-toxic species of either genus and did not make formal taxonomic changes. Furthermore, the toxic species of both genera were interleaved in the key provided in the guide, the authors apparently being unable to distinguish easily between the genera. Again, the concept of Bentham (1864) was used as the division between *Gastrolobium* and *Oxylobium*, relying on ovule number as the main character. Sands (1975) recognised a number of informal groups within the Mirbelieae (formerly Podalyrieae *pro parte*). She proposed three groups, which roughly correspond as follows: Group I (the ‘Pultenaea’ group of Crisp and Weston 1987), Group II (the ‘Oxylobium’ group of Crisp and Weston 1987) and Group III (the ‘Gompholobium’ and ‘Daviesia’ groups of Crisp and Weston 1987). These groups were primarily based on base chromosome numbers, but also used inflorescence structure and bract morphology as secondary characters. *Gastrolobium*, as well as *Brachysema*,

Jansonia, *Mirbelia*, *Nemcia*, *Oxylobium* and *Podolobium*, are among the genera that were part of Group II (Sands 1975). It is interesting to note that the informal classification by Sands (1975) of the Australian members of the Podalyrieae corresponds to the topology of the phylogeny of the Mirbelieae produced by Crisp and Weston (1987, 1995).

Introduction to morphology in Gastrolobium

As *Gastrolobium* sens. lat. contains three other genera (*Brachysema*, *Jansonia* and *Nemcia*), a brief introduction to morphology is provided to highlight similarities and differences of taxa in these genera. Many of the characters below have been shown to be homoplastic by the analyses presented by Chandler *et al.* (2001), but are still important for identification at species level. In this section, for the purpose of comparison, taxa are often referred to under their old generic names (*Brachysema*, *Jansonia* and *Nemcia*), but it should be borne in mind that they are all transferred to *Gastrolobium* in the taxonomic section of this paper.

Habit: nearly all species of *Gastrolobium* and *Nemcia* are erect, bushy shrubs and only a few are prostrate or scrambling. Most species formerly in *Brachysema* are scrambling to tangled shrubs and the one species formerly in *Jansonia* is a twining to tangled shrub. Many of these are adventitious colonisers of disturbed sites, particularly road verges and roadside gravel pits.

Chromosome numbers: Sands (1975) counted 28 of 109 species of *Gastrolobium* sens. lat., which were all $2n = 16$.

Seedling stages: seedling leaves nearly always resemble the adult leaves, but tend to be larger and somewhat broader, grading into the adult leaf shapes.

Adult stages: *Gastrolobium* has simple leaves, in common with all but one genus in the tribe Mirbelieae. Stipules are mostly present. Leaf arrangement is generally opposite or whorled, rarely alternate or scattered.

Inflorescence structure: this is perhaps the most diverse feature, distinguishing the four genera in traditional morphological treatments. *Gastrolobium* sens. str. nearly always has a long, open raceme with conspicuous internodes and flowers in pairs or whorls of three, or rarely four. Only in the *G. bilobum* group is floral internode suppression evident. However, inflorescence structure in *Nemcia* is variable. (The *G. obovatum* group, which is apparently intermediate in morphology between *Gastrolobium* and *Nemcia*, has short racemes with minor internode suppression. Others have condensed inflorescences as a result of the combination of short internodes and large flowers (the *G. pyramidale* group). The majority of species from *Nemcia* have racemes reduced to one or few flowers in the axils. *Brachysema* has inflorescences ranging from well-developed racemes to solitary flowers in the axils (Crisp 1994), while *Jansonia* has a 4-flowered head.

Within the inflorescence, the floral bract shape is an important distinguishing character, particularly between

Gastrolobium and *Nemcia*, although this study has shown this character to be homoplastic. In nearly all species of *Gastrolobium* sens. lat., the bracts are caducous at early bud stage. Most species of *Gastrolobium* sens. str. have entire bracts, some of which are quite prominent, but these are generally lost before the flower opens (particularly in the *G. floribundum* group). All species of *Nemcia* have bracts with trifid apices, but several species of *Gastrolobium* sens. str. have entire bracts grading into trifid bracts on one inflorescence. *Brachysema* has large, trifid bracts, while *Jansonia* has an involucre of four entire bracts.

Floral structure: species of *Gastrolobium* sens. lat. have a typical papilionoid flower. Some species, notably all those from *Brachysema* and *Jansonia* and the red-flowered species of *Nemcia* and *Gastrolobium grandiflorum*, have flowers apparently modified for bird-pollination (see review in Crisp 1994), with large red flowers, often with a reduced standard and the keel enlarged. The *G. pyramidale* group (formerly in *Nemcia*) has intermediate morphology with numerous, large, deep-orange flowers, but the pollinators are unknown. The majority of species are bee-pollinated, typically with yellow, yellow-orange or orange flowers, with a central, red ring around a yellow centre. In the putatively bird-pollinated species (Crisp 1994), this central red ring on the standard petal (typical in the tribe Mirbelieae) is still present. Crisp and Weston (1987) cited recurved calyx lobes as a synapomorphy for *Gastrolobium* and *Podolobium*, but many species, especially those formerly in *Nemcia*, have erect lobes.

Gynoecium: all species in *Gastrolobium* sens. lat. have a unilocular ovary. The ovary is typically covered in long, antrorse, simple hairs, which often go partway up the style. The style mostly tapers from the base to the apex, although occasionally it is uniform in width to the apex. *Gastrolobium* sens. lat. belongs to a clade within the tribe Mirbelieae that has multiple 5-nucleate embryo sacs (Crisp and Weston 1995; Crisp *et al.* 2000).

Ovule number: this feature has often been used to separate genera in the *Oxylobium*–*Gastrolobium* complex, but has been shown to be homoplastic (Chandler *et al.* 2001). Many species of both *Gastrolobium* and *Nemcia* sensu Crisp and Weston (1987), as well as the single species of *Jansonia* and *Nemcia*, have strictly two ovules. However, a number of other species in the first two genera have more than two, as do nearly all species of *Brachysema*. Importantly, some species have two or three ovules (and another, *G. subcordatum*, has 2–6), which shows that these states overlap and hence are cladistically uninformative.

Fruit: all species of *Gastrolobium* produce dry, dehiscent legumes, mostly with two or more seeds. Some species have numerous seeds, which are arranged in two rows. The fruits are generally ovoid to ellipsoid and often stipitate, particularly in *Gastrolobium* sens. str. and a number of

species of *Nemcia*. The seeds are generally free, rarely enclosed in pith. Aril present.

Ecology of Gastrolobium

Species of *Gastrolobium* occur in a wide variety of habitats and only a very brief overview is provided here. For specific ecologies, refer to the individual species descriptions. *Gastrolobium* occurs mainly on sandy, well-drained soils, although a few species, such as *G. formosum*, *G. tomentosum* and *G. brownii* occur on heavier soils with a higher loam and/or clay content in the wetter, south-western corner of the region. Many species are found on broad sandplains or around granite outcrops and grow mostly in heath ('kwongan'), mallee (shrubby eucalypt woodland) or open woodland, with very few species occurring in forest areas.

Many species of *Gastrolobium* are colonisers of disturbed areas, with a number of species in roadside gravel pits and similarly disturbed areas. The frequency of occurrence is reduced in adjacent, less-disturbed areas, but when present, the species are relatively common. Other genera in the Mirbelieae, such as *Daviesia*, are also known to prosper in more-disturbed areas (e.g. Chandler and Crisp 1997).

Phylogenetic analysis

Crisp and Weston (1987) published the first major review of generic delimitation in *Gastrolobium* since Bentham (1864). They presented a phylogeny of the tribe Mirbelieae based on morphology and reinstated and expanded both *Nemcia* and *Podolobium* F.Muell., the latter being an eastern Australian genus closely aligned with *Oxylobium*. *Gastrolobium* fell into the 'Callistachys' group, which consisted of *Brachysema* R.Br., *Callistachys*, *Jansonia* Kipp., *Gastrolobium*, *Nemcia*, *Podolobium* and *Oxylobium lineare*. The analysis of Crisp and Weston (1987), however, was done at a higher level to resolve tribal relationships within the Mirbelieae, using mostly genera and species groups as terminal taxa. Crisp and Weston (1987) changed the circumscription of *Gastrolobium* to include all toxic species of *Gastrolobium* and *Oxylobium* (see Aplin 1971), so that for the first time, species with more than two ovules were included within *Gastrolobium*. This left only one species of *Oxylobium* occurring in Western Australia (*O. lineare*), which required further work to determine its generic affinities. Their reduced concept of *Oxylobium* comprises five species endemic to eastern Australia, mostly along the central and southern coast plain and the adjacent Great Dividing Range, as well as Tasmania. The non-toxic species of *Gastrolobium* and *Oxylobium* were mostly removed into *Nemcia*.

Nemcia, as defined by Crisp and Weston (1987), contained species with axillary racemes often reduced to one or two flowers (although some had condensed, terminal

racemes with many flowers) and included the non-toxic species transferred from *Gastrolobium* and *Oxylobium*, thereby using secondary metabolites as an aid in the resolution of this taxonomically difficult group (but see Twigg *et al.* 1996a). Other characters used to distinguish *Nemcia* included the presence of trifid bracts, although the authors acknowledged that some species of *Gastrolobium* also possess them and non-stipitate fruits.

Genera such as *Brachysema*, *Jansonia* and *Leptosema* Benth. were distinguished by floral characteristics that have been interpreted by later authors as indicative of bird-pollination (e.g. Keighery 1982). These characters include red petals, a reduced standard petal and enlarged keel petals and copious nectar. *Gastrolobium* and *Oxylobium* are primarily bee-pollinated, except *G. grandiflorum*, which has large, red flowers, but lacks the 'bird-flower' modifications of genera such as *Brachysema*, such as a reduced standard petal. However, most of the assumptions of bee- or bird-pollination are largely inference based on floral structure, which often came from empirical data, such as sightings of birds visiting flowers (e.g. Keighery 1980, 1982, 1984).

The evolution of bird-pollination in this group was discussed by Crisp (1994, 1996), using a phylogeny of *Brachysema*, *Jansonia* and *Nemcia* and *Oxylobium lineare* derived from morphology, but not including *Gastrolobium*. Crisp (1994) also tested the monophyly of these genera by using a species-level phylogeny with morphology. *Nemcia* was shown to be paraphyletic, while *Brachysema* was demonstrated to be monophyletic.

Phylogenetic basis of classification

Crisp *et al.* (2000) provided a molecular phylogeny of the genistoid legume tribes, although only two species of the 'Callistachys' group were used in this tribal phylogeny. A sound, well-resolved phylogeny of *Gastrolobium* and its close relatives was therefore derived in order to resolve the taxonomic dilemmas surrounding this group and bring stability to these genera. That study, involving two data sets and utilising a total of five molecular regions (Chandler 2001; Chandler *et al.* 2001), showed that *Gastrolobium* is paraphyletic, including within it *Brachysema*, *Nemcia*, *Jansonia* and *Oxylobium lineare*. Figure 2 reproduces the phylogenies of Chandler *et al.* (2001) and Chandler (2001), and is a result of the combination of the two molecular trees and the outgroups are condensed to a single node, so that it is a classification tree rather than a phylogeny. The overall support along the backbone of the original phylogenetic trees is poor, so the resolution of some groups and their relationships to other groups are still not clear, even though many of the individual groups have strong support (Chandler *et al.* 2001). However, the classification presented here is informal.

Gastrolobium is hereby expanded to include all of these genera, expanding the number of species to 109, including 29 new species, and making *Gastrolobium* one of the most diverse genera of pea-flowered legumes in Australia and the third largest in the tribe Mirbelieae, behind *Daviesia* (126 species) and *Pultenaea* (c. 110–120 species).

The taxonomy is presented here in phylogenetic order (where possible), starting with groups towards the base of the tree [which include species from *Gastrolobium* sensu Crisp and Weston (1987)] and ending with the putatively bird-pollinated lineage, which includes species formerly in *Brachysema*, *Jansonia* and *Nemcia*. Each group is numbered in the text and on the classification tree (Fig. 2), although not all groups are present on the tree because the phylogenies on which the tree is based do not include all species. Also, some groups are still not clearly defined, so only informal groups are presented here. The groups not present are the *G. ilicifolium* group (Group IX) and the *G. cruciatum* group (Group X). Species not included in the analysis are placed into their most likely groups, or if relationships are unclear, they are presented at the end in an artificial group (Group XIII).

A key to all species is provided, along with descriptions for all species. This treatment should enable the correct identification and nomenclature of any species of *Gastrolobium* and is the first complete, descriptive account of the genus since Bentham (1864).

Materials and methods

Specimens from the Australian National Herbarium (CANB), the State Herbarium of Western Australia (PERTH), together with a small number from the Royal Botanic Gardens, Melbourne (MEL) were measured and scored for the descriptions. All length by breadth measurements are given with the length from base to apex (not necessarily the longest axis) first, followed by the breadth at the widest point. Vernacular names are given immediately following the description where available. Floral measurements were taken from fully opened flowers preserved in an ethanol–water–glycerol mix (70:20:10) where available and for about 20 species, flowers were reconstituted from dried material. Branchlet descriptions refer to young, terminal branchlets and all leaf measurements and features are taken from mature leaves only, unless otherwise stated. The inflorescence peduncle and rachis measurements were taken only from mature inflorescences.

Type specimens are annotated in the following way. Where actual type specimens were examined, an exclamation mark (!) is placed immediately following the institution acronym. If a type specimen was not seen, n.v. immediately follows. If a photograph of the type was seen, which is the case for most of types, then no symbol follows. All photographs of types seen are in a collection belonging to the second author, at the Australian National University.

Conservation status has only been provided where relevant and up to three conservation codes are given, depending on availability. One follows the IUCN criteria, an international convention of the World Conservation Monitoring Centre. The second follows the Rare or Threatened Australian Plants (ROTAP) listings of Briggs and Leigh (1995), which provides a comprehensive listing of all rare and endangered plants in Australia. The third and final code follows the Department of Conservation and Land Management (CALM), Western

Australia, and lists taxa currently on their Declared Rare and Priority Flora list. The codes for the IUCN criteria can be found on the following website: <http://www.wcmc.org.uk/species/plants/categories.htm> and both the ROTAP and CALM codes are listed in Briggs and Leigh (1995).

Taxonomy

Gastrolobium R.Br., in W. T. Aiton, *Hortus Kew.* 3: 16 (1811). Type: *G. bilobum* R.Br.

Brachysema R.Br., in W.T. Aiton, *Hortus Kew.* 3: 10 (1811). Type: *B. latifolium* R.Br. (= *G. latifolium* (R.Br.) G.Chandler & Crisp).

Jansonia Kippist ex Lindl., *Gard. Chron.* 7: 307 (1847). Type: *J. formosa* Kippist ex Lindl. (= *G. formosum* (Kippist ex Lindl.) G.Chandler & Crisp).

Nemcia Domin, *Preslia* 2: 27 (1923a). Type: *Oxylobium atropurpureum* Turcz. (= *G. leakeanum* Drumm.).

Slender, erect to prostrate, bushy to open *shrubs*. *Leaves* simple, erect, ascending, spreading to retorse, opposite, alternate, scattered or in whorls of 3 or 4, venation generally prominently reticulate. *Stipules* usually present (except *G. cruciatum*, *G. epacridoides*, *G. ferrugineum* and *G. punctatum*). *Inflorescences* terminal or axillary racemes or more rarely umbels, rarely branched or 1 or 2 flowers in the axils or a capitulum, 1 to more than 30-flowered; *subtending bracts* generally caducous, occasionally somewhat persistent, nearly always scale-like, rarely leaf-like, entire, bilobed or prominently trilobed; margins may be lacerate. *Flowers*: generally upright, occasionally resupinate or nutant; papilionaceous, sometimes with the standard reduced; usually pedicellate, sometimes shortly so, rarely sessile; *bracteoles* absent. *Calyx* nearly always campanulate, upper 2 lobes usually united higher than the lower 3, occasionally \pm equal to the lower 3 lobes, rarely united lower; upper two lobes valvate in bud, lower 3 lobes imbricate, with the upper two often folded across the apices of the lower 3, rarely all imbricate. *Corolla*: clawed, mostly yellow or orange, sometimes red, cream, pale green or almost black, usually with a red central ring surrounding a yellow centre; *standard* lamina usually broader than long, apex usually emarginate, occasionally entire or acute; *wings* auriculate on the upper margin, sometimes also auriculate (if slightly so) on the lower margin, rarely auriculate on the lower margin only, often slightly saccate; *keel* petals lightly to strongly united, base auriculate, saccate. *Stamens* 10, free to base; *filaments* subequal to strongly different in length; *anthers* generally uniform, sometimes differing in size and shape, versatile. *Style* filiform to compressed, terete to compressed in the vertical plane, usually incurved to slightly hooked, rarely \pm straight, often with some hairs present in the lower third; *ovary* stipitate to sessile, densely pubescent; *ovules* 2–20, rarely more. *Pod* usually not or sometimes almost wholly enclosed in the calyx, stipitate to \pm sessile, dehiscent, usually \pm ovoid, pubescent. *Seed* reniform to ellipsoid, arillate.

Key to species of *Gastrolobium*

1. Standard petal reduced to less than 1/3 the length of the keel petal2
Standard petal at least as long or longer than the keel petal, or rarely slightly shorter13
2. Flowers sessile in a 4-flowered head sheathed by an involucre of large bracts; petals obscured by the lower calyx lobes 98. *G. formosum*
Flowers in racemes, umbels or solitary, pedicellate; petals not obscured by the calyx lobes3
3. Leaves strictly opposite and decussate4
Leaves all alternate, or some opposite and some alternate7
4. Leaf base always cordate; keel petal <14 mm long; petals burgundy96. *G. subcordatum*
Leaf base not or slightly cordate; keel petal >18 mm long; petals red or pale greenish5
5. Leaves ovate to linear; lower three calyx lobes \pm equal to the tube 97. *G. celsianum*
Leaves obcordate, obtriangular, obovate or obrescentic; lower three calyx lobes 2–4 times longer than the tube6
6. Leaves obcordate, obtriangular or obovate, herbaceous, not pungent-pointed; flowers resupinate or erect; keel petal *c.* 30 mm long
..... 100. *G. praemorsum*
Leaves consistently obrescentic, coriaceous, semi-pungent with mucro; flowers pendulous; keel petal *c.* 20 mm long 99. *G. papilio*
7. Leaves linear-elliptic, except at base of stem; bracts 5–7 mm long, with 2 round lobes, cupped around calyx base 95. *G. bracteolusum*
Leaves almost always broader than linear; bracts <1 mm long, trifid or leaf-like8
8. Flowers pendulous; calyx base inflated; standard lamina much narrower than the auricular base, apex acute, entire9
Flowers not pendulous; calyx base not inflated; standard lamina broader than the auricular base or slightly tapered, apex emarginate10
9. Leaves all alternate, not narrow (length: breadth <2:1), mostly elliptic to orbicular; flowers pale yellow-green 92. *G. sericeum*
At least some leaves opposite, narrow (length: breadth >3:1), ovate to oblong; flowers purple-black 91. *G. melanopetalum*
10. At least some leaves opposite; stems procumbent or ascending up to 1 m or more; wings half the length of the keel 92. *G. sericeum*
Leaves all alternate; stems prostrate or <0.5 m high; wings \pm equal to the keel11
11. Keel petal >35 mm long; calyx lobes long-acute; margins of standard incurved at apex; stipules \pm terete, entire 54. *G. latifolium*
Keel petal <25 mm long; calyx lobes subobtusate; margins of standard petal recurved at apex; stipules \pm angular, minutely denticulate12
12. Prostrate, not stoloniferous; inflorescences 1-flowered, axillary; petals bright red with a yellow marking on the standard 93. *G. minus*
Prostrate, stoloniferous and with aerial stems; inflorescences paniculate, borne on the stolons, with only the flowers visible above the litter;
petals pale green with pink infusion 94. *G. modestum*
13. Leaves in whorls of 3 or more, or crowded along the stem such that it is difficult to distinguish phyllotaxis14
Leaves opposite, alternate or scattered along the stem, not crowded along the stem66
14. Inflorescence strictly axillary15
Inflorescences terminal, or with both terminal and axillary inflorescences present36
15. Flowers solitary or in pairs in the axils16
Flowers aggregated into condensed racemes or umbels21
16. Stipules entirely absent17
Stipules present (may be minute)19
17. Leaves patent to retrorse80. *G. epacridoides*
Leaves erect and appressed to the branchlet18
18. Leaves ovate, 8–10 mm long; petioles present (*c.* 1 mm long) 81. *G. punctatum*
Leaves elliptic, 4–6(–8) mm long; petioles absent 82. *G. reticulatum*
19. Leaves pungent-pointed20
Leaves unarmed71. *G. linearifolium*
20. Leaves recurved, 12–22 \times 4–6 mm; standard 8–9 mm long; ovules 2 68. *G. acutum*
Leaves straight or incurved, 20–50 \times 8–20 mm; standard 10–12 mm long; ovules 4 107. *G. dilatatum*
21. Leaves pungent-pointed22
Leaves unarmed (may be mucronate, but not pungent)27
22. Leaves with 3 or more pungent points (at least some leaves per specimen)23
Leaves with 1 pungent point24
23. Leaf margins recurved; lamina tending to undulate between depressed main veins 76. *G. ilicifolium*
Leaf margins not recurved; lamina somewhat folded up lengthwise but otherwise flat 78. *G. tricuspidatum*
24. Inflorescence rachis elongate (30–160 mm long) 31. *G. propinquum*
Inflorescence rachis not elongate (0–18 mm long)25
25. Leaves crowded along stem, linear, 1–3 mm broad 75. *G. stipulare*
Leaves not crowded, oblong, cuneate, rhombic or strongly obovate, 4–24 mm broad26
26. Young branchlets angular; leaf apex acute; stipules 3–5 mm long 47. *G. obovatum*
Young branchlets terete; leaf apex rounded, obtuse or truncate; stipules <1.5 mm long 45. *G. brownii*
27. Flowers large (calyx >8 mm long); petals red 89. *G. rubrum*
Flowers smaller (calyx <8 mm long); petals yellow to orange with red markings28
28. Calyx indumentum 2-toned, with silver hairs at the base and golden or rust-coloured hairs towards the apex29
Calyx indumentum uniform in colour, usually silvery but sometimes buff-coloured31
29. Leaves cuneate, obovate or obtriangular to narrowly so 64. *G. dorrieni*
Leaves orbicular, ovate, elliptic, oblong or narrowly so30
30. Inflorescences, young stems and sometimes young leaves densely hirsute with rust-coloured hairs 85. *G. pyramidale*
Inflorescences and young stems sericeous to villous with silvery hairs 84. *G. crenulatum*
31. Leaf margins longitudinally folded up (plicate)32
Leaf margins flat, incurved or recurved but not longitudinally folded up34

32. Leaves recurved 33
 Leaves straight 71. *G. linearifolium*
33. Leaves generally opposite (rarely whorled or alternate), obovate or rhombic; standard 8–11 × 8–12 mm 7. *G. obovatum*
 Leaves in whorls of 3, spatulate; standard 7.5–10 × 7–7.5 mm 49. *G. spathulatum*
34. Venation on lower leaf surface very thick, with areoles reduced to pin-pricks; flowers mostly in summer 74. *G. effusum*
 Venation on lower leaf surface openly reticulate; flowers in spring 35
35. Mature leaves sericeous beneath 109. *G. lehmannii*
 Mature leaves glabrate 52. *G. pulchellum*
36. Calyx indumentum 2-toned (silver hairs at the base, with golden or rust-coloured hairs towards the apex) 37
 Calyx indumentum uniform in colour 44
37. Leaves cuneate or obovate, or narrowly so 38
 Leaves orbicular, ovate, elliptic, oblong, or narrowly so 42
38. Leaves with margins recurved, especially towards the bilobed apex; upper leaf surface rugose with obscure venation; lower leaf surface sericeous and scarcely glabrescent 64. *G. dorrieni*
 Leaves with margins not recurved, sometimes undulate or crisped, apex not bilobed (may be slightly emarginate); upper surface venation conspicuously, finely reticulate; lower surface glabrous or soon glabrescent 39
39. Leaves obovate, trilobed, with the middle lobe equal to or longer than the lateral lobes; leaves pungent-pointed 77. *G. rhombifolium*
 Leaves obovate or cuneate, usually narrow, never obovate; apex rounded to bilobed; leaves may be mucronate, but are never pungent-pointed 40
40. Leaf margins crisped 73. *G. crispatum*
 Leaf margins not crisped 41
41. Leaves ± spatulate; stipules lacking a thickened, grey-tomentose base; peduncle 2–10 mm long 65. *G. retusum*
 Leaves ± oblong, but may be slightly ovate or slightly obovate; stipules with a thickened, grey-tomentose base; peduncle 10–25 mm long 66. *G. whicherensis*
42. Inflorescences, young stems and sometimes young leaves densely hirsute with rust-coloured hairs 85. *G. pyramidale*
 Inflorescences and young stems sericeous to villous, hairs silvery 43
43. Leaves silvery sericeous below, very tardily glabrescent; peduncle 10–40 mm long; subtending bracts entire 83. *G. coriaceum*
 Leaves glabrate below; peduncle 2–10 mm long; subtending bracts trifid 65. *G. retusum*
44. Leaf apex emarginate, sometimes bilobed 45
 Leaf apex entire 51
45. Base of peduncle with an involucre of scale-like bracts 103. *G. venulosum*
 Base of peduncle lacking an involucre of bracts, though some apparently aborted buds may be scattered along the peduncle 46
46. Inflorescence rachis <10 mm long; floral internodes <3 mm long 47
 Inflorescence rachis >15 mm long; floral internodes generally >4 mm long 48
47. Keel petal scarcely auriculate, not saccate, c. 9–10 × 1.5 mm; style barely incurved; leaves light green and concolorous; flowers orange 15. *G. tergiversum*
 Keel petal strongly auriculate and saccate, c. 6.5–8.5 × 2 mm; style strongly incurved to hooked; leaves dark green above and often below; flowers typically yellow with red markings, almost never orange 14. *G. bilobum*
48. Leaves >15 mm broad, not recurved; flowers predominantly red; occurs in the northern parts of WA, plus NT, Qld, ?SA 16. *G. grandiflorum*
 Leaves <10 mm broad, rarely flat, usually recurved to revolute; flowers yellow to orange with red markings; occurs in the SW corner of WA 49
49. Inflorescence rachis >70 mm long; leaves >20 mm long 9. *G. cuneatum*
 Inflorescence rachis <50 mm long; leaves <20 mm long 50
50. Leaves widely spreading to deflexed, often incurved longitudinally, oblong to linear or almost square; margins strongly recurved to revolute; ovules 4; stipules 1.5–3 mm long 23. *G. tetragonophyllum*
 Leaves spreading to ascending, not incurved longitudinally, cuneiform to oblong; margins flat to recurved, never revolute; ovules strictly 2; stipules 0.5–1.5 mm long 41. *G. velutinum*
51. Leaves erect and ± appressed to the branchlet, crowded along the stem 52
 Leaves spreading to erect, but never appressed to the branchlet, not crowded 53
52. Leaves ovate; leaf apex acute; leaves 4–7.5 × 1.5–2.5 mm 55. *G. appressum*
 Leaves obovate to narrowly so; leaf apex ± truncate; leaves 4–15 × 2–5 mm 40. *G. parvifolium*
53. Leaves strongly incurved to involute 54
 Leaves flat, recurved, revolute, slightly incurved (appearing concave) or longitudinally folded up 55
54. Leaves canaliculate, not crowded along the stems, upper surface visible; calyx 7–9 mm long; standard c. 12 mm broad; ovules 4 or 5 7. *G. semiteres*
 Leaves involute, crowded along the stems, upper surface not visible; calyx 4.5–5.5 mm long; standard 8–9 mm broad; ovules 2 8. *G. stenophyllum*
55. Leaves longitudinally folded up (conduplicate) 56
 Leaves flat, recurved or revolute, or rarely concave 59
56. Leaves obovate 51. *G. bennettsianum*
 Leaves ovate to elliptic 57
57. Calyx 6–7.5 mm long; inflorescence 5–10-flowered 58. *G. oxylobioides*
 Calyx <5 mm long; inflorescence >15-flowered 58

58. Petiole decurrent with the branchlet; stipules 3–5 mm long; peduncle 5–10 mm long; standard 5–6 mm long; occurs north of Geraldton, around Northampton, WA 31. *G. propinquum*
 Petioles continuous but not decurrent with the branchlet; stipules 1–2.5 mm long; peduncle 2–4 mm long; standard *c.* 8 mm long; occurs in the Darling escarpment around Perth, WA 36. *G. microcarpum*
59. Leaves linear; standard >11 mm long 10. *G. callistachys*
 Leaves not linear; standard <10 mm long (or if longer, leaves are not linear) 60
60. Leaf apex recurved 61
 Leaf apex not recurved 62
61. Leaves <5 mm broad; petiole articulate with the branchlet; young branchlets angular and somewhat pubescent; pedicels very short (0.5–1 mm long) 57. *G. hamulosum*
 Leaves >6 mm broad; petiole continuous with the branchlet; young branchlets \pm terete and glabrous; pedicels 2–2.5 mm long 34. *G. glaucum*
62. Leaves strongly recurved to revolute, often longitudinally incurved 43. *G. nutans*
 Leaves flat to slightly incurved 63
63. Leaves concave, unarmed 37. *G. crassifolium*
 Leaves flat, usually pungent-pointed 64
64. Inflorescences <12-flowered; standard *c.* 14 mm broad 58. *G. oxylobioides*
 Inflorescences >15-flowered; standard 7–8 mm broad 65
65. Leaf margins not recurved, often crenulate or undulate; lower leaf surface glabrous; leaves >7 mm broad 36. *G. microcarpum*
 Leaf margins recurved, not crenulate or undulate; lower leaf surface moderately pubescent; leaves <7 mm broad 103. *G. venulosum*
66. Leaves pungent-pointed 67
 Leaves unarmed but may be mucronate to stiffly mucronate 96
67. Leaves with 3 or more pungent angles 68
 Leaves with only 1 pungent angle 76
68. Inflorescences in terminal, 2- or 3-flowered umbels 6. *G. aculeatum*
 Inflorescences in terminal or axillary racemes 69
69. Leaves obtriangular, margins recurved to revolute, apex strongly recurved 32. *G. diabolophyllum*
 Leaves ovate to triangular or obtrullate, margins flat, never recurved, apex not recurved 70
70. Leaves with 4 or more spines 71
 Leaves with 3 spines 73
71. Spines per leaf 7–10; inflorescence rachis 35–50 mm long and moderately to densely pubescent; calyx 4.5–5.5 mm long; standard 5.5–6.5 mm broad 3. *G. wonganensis*
 Spines per leaf 4–7 (rarely up to 9), inflorescence rachis 5–25 mm long and glabrous; calyx 6–9 mm long; standard 9–13 mm broad 72
72. Flower-subtending bracts about twice as long as the bud, *c.* 6 mm long; inflorescences strictly terminal 2. *G. euryphyllum*
 Flower-subtending bracts shorter than the bud, 2–4.5 mm long; inflorescences terminal and/or axillary 1. *G. spinosum*
73. Leaves obtrullate 35. *G. laytonii*
 Leaves ovate to triangular 74
74. Leaves very broadly to depressed triangular, not trilobed, all 3 pungent angles pointing in different directions 4. *G. triangulare*
 Leaves ovate (rarely appearing slightly triangular), trilobed, all 3 pungent angles pointing upwards 75
75. Inflorescence 2–7-flowered, generally axillary (rarely terminal); calyx 4–5 mm long; standard 6.5–8.5 mm broad; pod *c.* 5 mm long 5. *G. trilobum*
 Inflorescence 6- to more than 30-flowered, axillary and/or terminal; calyx 6–7 mm long; standard 9.5–13 mm broad; pod 6–10 mm long 1. *G. spinosum*
76. At least some leaves becoming trilobed (which is often indicated by a slight bulge to either side of the apex) 5. *G. trilobum*
 No leaves becoming trilobed 77
77. Inflorescences in terminal, 2- or 3-flowered umbels 6. *G. aculeatum*
 Inflorescences in terminal or axillary racemes 78
78. Leaves upwardly canaliculate or involute 79
 Leaves flat, recurved or longitudinally folded up, never canaliculate 80
79. Leaves strongly involute, appearing almost terete; never glaucous; flowers quite small (calyx *c.* 6 mm long, standard 11 mm broad) 63. *G. tenue*
 Leaves canaliculate, never appearing terete; usually glaucous; flowers quite large (calyx 8–14 mm long, standard 14–21 mm broad) 56. *G. calycinum*
80. Inflorescences strictly terminal 87
 Inflorescences axillary or both axillary and terminal 81
81. Leaves strictly alternate; flowers solitary or paired in the axils 70. *G. alternifolium*
 Leaves opposite (rarely appearing alternate); inflorescences with more than 2 flowers 82
82. Leaves longitudinally recurved, conduplicate (folded up longitudinally) 83
 Leaves straight, not conduplicate 84
83. Leaves not glaucous, obovate to rhombic, apex acute 47. *G. obovatum*
 Leaves glaucous, obtrullate to obtriangular, apex truncate 106. *G. cyanophyllum*
84. Young branchlets terete; leaf shape obovate to rarely oblong 45. *G. brownii*
 Young branchlets angular; leaf shape ovate, triangular, elliptic or orbicular 85
85. Leaf shape elliptic to orbicular; leaf margins somewhat undulate 104. *G. axillare*
 Leaf shape ovate to triangular; leaf margins flat 86

86. Stipules absent or minute (<0.3 mm long); leaf shape triangular; inflorescence rachis pubescent with rust-coloured hairs 101. *G. ferrugineum*
 Stipules prominent (1–3.5 mm long); leaf shape ovate; inflorescence rachis glabrous 1. *G. spinosum*
87. Stipules strongly recurved to reflexed 88
 Stipules ascending to erect 89
88. Leaves glaucous, fiercely pungent-pointed; ovules 2 60. *G. reflexum*
 Leaves not glaucous, semi-pungent; ovules 10–12 62. *G. spectabile*
89. Leaves canaliculate 33. *G. floribundum*
 Leaves flat or conduplicate, never canaliculate 90
90. Leaf shape trullate, obtusulate or rhombic 35. *G. laytonii*
 Leaf shape ovate, elliptic, obovate or linear 91
91. Stipules scarious, very long (>6 mm), sometimes fused at the base 92
 Stipules rigid to hyaline, <5 mm long, never fused 93
92. Stipules somewhat fused behind the leaf; leaves 10–16 × 3–4 mm; leaf base cuneate; leaves longitudinally recurved 25. *G. densifolium*
 Stipules free; leaves 18–32 × 8–18 mm; leaf base rounded; leaves straight 29. *G. rotundifolium*
93. Leaf apex recurved; leaves <17 mm long 34. *G. glaucum*
 Leaf apex straight; leaves >20 mm long 94
94. Ovules 4–5; peduncle >15 mm long; rachis <20 mm long; inflorescence axes glabrous; stipules rigid 61. *G. rigidum*
 Ovules 2; peduncle <10 mm long; rachis >25 mm long; inflorescence axes pubescent; stipules hyaline 95
95. Petiole decurrent with the branchlet; leaves not crenulate; stipules >2.5 mm long; wing petals equal in length to the keel petals 35. *G. laytonii*
 Petiole not decurrent with the branchlet; leaves crenulate; stipules <2.5 mm long; wing petals longer than the keel petals 36. *G. microcarpum*
96. Inflorescences axillary, or both axillary and terminal 97
 Inflorescences strictly terminal 121
97. Calyx >8 mm long; petals all predominantly red 98
 Calyx <8 mm long (or if >8 mm, then petals predominantly yellow to orange); standard yellow to orange with red markings 103
98. Leaf margins recurved 89. *G. vestitum*
 Leaf margins not or very scarcely recurved 99
99. Calyx prominently zygomorphic; calyx hairs unicoloured; petiole not decurrent with the branchlet; wing petals auriculate on both margins; occurs in northern WA, NT, Qld and ?SA 16. *G. grandiflorum*
 Calyx apparently actinomorphic; calyx hairs bicoloured (rarely unicoloured); petiole decurrent with the branchlet; wing petals auriculate only on the upper margin; occurs in south-western WA, specifically in the Stirling Range 100
100. Flowers not resupinate, nutant; leaves narrowly oblong 90. *G. rubrum*
 Flowers resupinate, spreading to erect; leaves elliptic, rarely obovate or somewhat oblong 101
101. Stipules <4 mm long; leaf apex truncate, rarely very slightly emarginate; subtending bracts >12 mm long 88. *G. luteifolium*
 Stipules >7 mm long; leaf apex prominently emarginate; subtending bracts <7 mm long 102
102. Wing petals <16 mm long; inflorescence umbellate; leaves 50–65 × 20–40 mm; standard petal fully reflexed 86. *G. leakeanum*
 Wing petals >20 mm long; inflorescence usually racemose, rarely umbellate; leaves 25–58 × 11–24 mm; standard petal not fully reflexed 87. *G. mondurup*
103. Leaves canaliculate 104
 Leaves flat, recurved or longitudinally folded up, never canaliculate 105
104. Calyx moderately pubescent; standard petal *c.* 9 × 11 mm 33. *G. floribundum*
 Calyx glabrous; standard petal *c.* 7 × 10 mm 38. *G. hians*
105. Leaf margins recurved to revolute 106
 Leaf margins flat to incurved or longitudinally folded up 111
106. Leaf apex strongly emarginate to bilobed, or ± tricuspidate, generally strongly recurved 107
 Leaf apex entire, without any lateral axes, not recurved 109
107. Rachis >15 mm long; petiole not decurrent with the branchlet 30. *G. polystachyum*
 Rachis <4 mm long; petiole decurrent with the branchlet 108
108. Leaves recurved, not undulate, oblong to cuneiform 50. *G. stowardii*
 Leaves flat, undulate, elliptic 52. *G. pulchellum*
109. Leaves >10 mm broad; ovules 2 109. *G. lehmannii*
 Leaves <7 mm broad; ovules 4–8 110
110. Leaves <5 mm broad; petiole not decurrent with the branchlet; rachis >8 mm long (generally >20 mm long); usually with leaves of different sizes present along one branchlet 42. *G. heterophyllum*
 Leaves >5 mm broad; petiole decurrent with the branchlet; rachis <5 mm long; leaves uniform in size along one branchlet 108. *G. elegans*
111. Stipules absent or rarely minute (<0.3 mm long) 112
 Stipules prominent 113
112. Leaves erect and appressed to the branchlet; leaf shape elliptic 79. *G. cruciatum*
 Leaves patent to broadly spreading; leaf shape triangular or ovate 101. *G. ferrugineum*
113. Leaves glaucous; leaf shape ovate to orbicular 105. *G. nudum*
 Leaves not glaucous; leaf shape elliptic, oblong or obovate 114
114. Rachis >5 mm long 115
 Rachis <1 mm long 117

115. Leaves oblong; leaf margins undulate; standard petal *c.* 7 mm broad 53. *G. truncatum*
 Leaves elliptic to obovate; leaf margins flat; standard petal >9 mm broad 116
116. Leaf apex acute; ovules 4–8; floral bracts trifid; petiole decurrent with the branchlet; occurs in the south-west of WA only . . . 69. *G. capitatum*
 Leaf apex rounded to emarginate; ovules 2; floral bracts entire; petiole not decurrent with the branchlet; occurs in central Australia (WA, NT, rarely Qld) 17. *G. brevipes*
117. Leaves strictly alternate 70. *G. alternifolium*
 Leaves opposite 118
118. Leaf shape oblong, apex recurved; young branchlets terete 46. *G. hookeri*
 Leaf shape obovate, apex straight; young branchlets angular 119
119. Leaves longitudinally folded up, apex acute; ovules 2 48. *G. plicatum*
 Leaves flat, apex rounded to tricuspidate; ovules 4–10 120
120. Leaves <13 mm long, apex tricuspidate; plants prostrate and mat-forming 44. *G. pusillum*
 Leaves >20 mm long, apex emarginate; plants small, bushy shrubs 72. *G. nervosum*
121. Leaves orbicular 122
 Leaves otherwise 126
122. Mature leaves densely tomentose or sericeous beneath 123
 Mature leaves glabrous beneath 124
123. Mature leaves tomentose beneath; inflorescence rachis elongate, with floral internodes >5 mm long; prostrate or forming bushy clumps 26. *G. tomentosum*
 Mature leaves sericeous beneath; inflorescence rachis condensed, with floral internodes <2 mm long; erect, bushy shrubs . . . 18. *G. congestum*
124. Inflorescence rachis condensed, with floral internodes <2 mm long; erect, bushy shrubs 18. *G. congestum*
 Inflorescence rachis elongate, with floral internodes >5 mm long; prostrate, rarely forming bushy clumps 125
125. Leaves flat; venation very thick and dense, so that the areoles on the lower surface are reduced to pin pricks (punctate) . . . 28. *G. ovalifolium*
 Leaves undulate; venation openly reticulate and not at all punctate on the lower surface 27. *G. glabratum*
126. Inflorescence rachis condensed, with floral internodes <2 mm long 127
 Inflorescence rachis elongate, with floral internodes >5 mm long 128
127. Calyx hairs uniform in colour; leaf margins not recurved; standard petal >12 mm broad 18. *G. congestum*
 Calyx hairs bicoloured (silvery and golden brown); leaf margins recurved; standard petal <10 mm broad 64. *G. dorrieni*
128. Leaves canaliculate or involute 129
 Leaves recurved, flat or slightly incurved 132
129. Leaves strongly involute, with the upper surface \pm not visible 12. *G. involutum*
 Leaves canaliculate, upper surface visible 130
130. Standard petal 14–21 mm broad; calyx lobes not recurved 56. *G. calycinum*
 Standard petal 10–11 mm broad; upper calyx lobes not recurved, lower calyx lobes recurved 131
131. Calyx moderately pubescent; standard petal *c.* 9 \times 11 mm 33. *G. floribundum*
 Calyx glabrous; standard petal *c.* 7 \times 10 mm 38. *G. hians*
132. Leaf margins not recurved leaves flat to undulate 133
 Leaf margins recurved; leaves not undulate 143
133. Leaf margins undulate to strongly so; prostrate to weakly ascending shrubs 24. *G. villosum*
 Leaf margins flat; bushy, erect shrubs 134
134. Leaves linear to linear-obovate; leaves <3 mm broad 10. *G. callistachys*
 Leaves not linear; leaves >5 mm broad 135
135. Standard petal >17 mm long; standard petals red 16. *G. grandiflorum*
 Standard petal <15 mm long; standard petals yellow to orange with red markings 136
136. Ovules 2 137
 Ovules 3 or more 139
137. Calyx >5 mm long; standard petal >10 mm broad; occurs in central-eastern WA, NT, QLD 17. *G. brevipes*
 Calyx <5 mm long; standard petal <7 mm broad; occurs only in south-western WA 138
138. Leaf base obtuse, rounded or slightly cordate; leaves <22 mm long; rachis <15 mm long; leaf length: breadth ratio 1–1.6 39. *G. pycnostachyum*
 Leaf base narrowly cuneate; leaves >29 mm long; rachis >25 mm long; leaf length: breadth ratio 2–3 35. *G. laytonii*
139. Stipules recurved to reflexed; leaf base cordate 62. *G. spectabile*
 Stipules ascending to erect; leaf base truncate to cuneate 140
140. Rachis <20 mm long; plants glaucous 61. *G. rigidum*
 Rachis >25 mm long; plants not glaucous 141
141. Standard petal <10 mm broad 19. *G. parviflorum*
 Standard petal >15 mm broad 142
142. Leaf base cuneate; wing petals >13 mm long 13. *G. graniticum*
 Leaf base rounded to truncate; wing petals <10 mm long 59. *G. racemosum*
143. Mature leaves glabrous beneath 144
 Mature leaves at least partly pubescent beneath 147
144. Subtending floral bracts entire 145
 Subtending floral bracts trifid 67. *G. ebracteololum*
145. Standard petal <8 mm long 19. *G. parviflorum*
 Standard petal >10 mm long 146

146. Leaves linear (length: breadth ratio >15) 11. *G. acrocaroli*
 Leaves not linear (length: breadth ratio <4) 59. *G. racemosum*
147. Leaves cuneiform and not linear; plants prostrate 102. *G. humile*
 Leaves not cuneiform (or if so, then they are linear); plants not prostrate (except *G. heterophyllum*, which has ovate to elliptic leaves) . . . 148
148. Leaf apex tricuspidate, or rarely truncate 30. *G. polystachyum*
 Leaf apex entire, emarginate or bilobed 149
149. Young branchlets terete; leaves broadly spreading to deflexed; floral internodes <3 mm long; leaves strictly oblong to linear
 23. *G. tetragonophyllum*
 Young branchlets angular; leaves spreading to ascending; floral internodes >5 mm long; leaves oblong, elliptic, ovate, obovate or linear . 150
150. Leaves linear-obovate; ovules 2 10. *G. callistachys*
 Leaves either not linear, or linear-oblong to -elliptic 151
151. Wing petals auriculate on the upper margin only 152
 Wing petals auriculate on both margins 154
152. Standard petal >11 mm broad; wing petals >10 mm long 20. *G. musaceum*
 Standard petal <10 mm broad; wing petals <8 mm long 153
153. Wing petals shorter than the keel petals; leaves ovate to elliptic; leaf margins not strongly recurved; <20 flowers per inflorescence
 42. *G. heterophyllum*
 Wing petals longer than the keel petals; leaves oblong; leaf margins strongly recurved; generally >20 flowers per inflorescence (rarely fewer)
 19. *G. parviflorum*
154. Leaf margins strongly revolute, such that only the midrib on the lower surface is visible; leaves strictly linear-oblong . . 22. *G. melanocarpum*
 Leaf margins recurved to revolute, but at least part of the lower surface is visible; leaves ovate, elliptic, oblong or linear-oblong 155
155. Leaves linear-elliptic to -ovate; subtending floral bracts trifid; ovules >15 67. *G. ebracteolusum*
 Leaves ovate, elliptic, oblong or linear-oblong; subtending floral bracts entire; ovules <8 156
156. Leaves linear-oblong, paler above to ± concolorous; lower surface glabrous to sparsely pubescent; standard petal >13 mm broad
 11. *G. acrocaroli*
 Leaves ovate, elliptic or oblong, but not linear, strongly discolorous; lower surface densely sericeous with white hairs; standard petal <11 mm
 broad 21. *G. discolor*

I. The *G. spinosum* group

This group of *Gastrolobium* species all have spinose, often dentate leaves with three or more pungent points per leaf and have terminal and/or axillary racemes, often with relatively large flowers.

1. *Gastrolobium spinosum* Benth. in Lindley, Edwards' Bot. Reg. Append.: xiii (1839). Type citation: none cited. Type specimens: lectotype (here chosen): 'Swan River, Drummond 1st coll. 1839.' (CGE); isolecto: BM

Gastrolobium preissii Meisn., in Lehm., *Pl. Preiss.* 1: 68 (1844). Type citation: 'In solo sublimoso district Hay, d. 8 Nov. 1840. *Herb. Preiss.* No. 1131. Et in region interior. Australiae merid-occid. No. 1133'. Type specimens: lectotype (here chosen): LD (Preiss 1131); isolecto: NY.

Gastrolobium spinosum Benth. var. *angustum* E.Pritz. in Diels & Pritzel, *Bot. Jahrb. Syst.* 35: 254 (1904). *Gastrolobium spinosum* Benth. forma *angustum* (E.Pritz.) D.A.Herb., *J. Proc. R. Soc. W. Austral.* 8: 39 (1922). Type citation: 'ex distr. Eyre occidentali pr. West River flor. m. Oct. (D. 4904)'. Type specimens: lectotype (here chosen): the plate (fig. 32 F & G, p. 255).

Gastrolobium spinosum Benth. forma *crassifolium* D.A.Herb., *J. Proc. R. Soc. W. Austral.* 8: 40 (1922). Type citation: 'Pingelly, Geo. Walton, 1899; Lomos, Dyer, 1916; Yoting, Herbert & Wilson, 1920.' Type specimen: lectotype (here chosen): PERTH; isolecto: CBG, K.

Gastrolobium spinosum Benth. forma *parvifolium* D.A.Herb., *J. Proc. R. Soc. W. Austral.* 8: 39 (1922). Base name: *Gastrolobium spinosum* Benth. var. *microphyllum* S.Moore, *J. Linn. Soc. London, Bot.* 45: 170 (1920). Type citation: 'Kauring; G.W. Brown (Hb. Stoward, 554). Type specimen: holo: BM.

Gastrolobium spinosum Benth. var. *inermis* S.Moore, *J. Linn. Soc. London, Bot.* 45: 170 (1920). Type citation: 'Woodanilling; Stoward 721.' Type specimen: holo: BM.

Gastrolobium spinosum Benth. var. *subinermis* Domin, *Vestník Královské České Společnosti Nauk Trida Matematicko-Prírodovedecké* 1921–22, 2 (1923b, p. 36). Type citation: 'Bridgetown to Kojonup and Slab Hut Gully, A.A. Dorrien-Smith.' Type specimen: holo: K.

Gastrolobium spinosum Benth. forma *oliganthum* Domin, *Vestník Královské České Společnosti Nauk Trida Matematicko-Prírodovedecké* 1921–22, 2 (1923b, p. 36). Type citation: 'Victoria Desert, Elder Exploring Expedition, R. Helms IX. 1891.' Type specimens: lectotype (here chosen): K; isolecto: MEL.

Gastrolobium spinosum Benth. forma *typicum* D.A.Herb., *J. Proc. R. Soc. W. Austral.* 8: 39 (1922). nom. illeg.

Low and bushy to erect and open *shrubs*, 0.3–3.5 m high. *Branchlets* spreading to ascending, angular, glabrous, often glaucous. *Petioles* <2 mm long, somewhat swollen, continuous and slightly decurrent with the branchlet. *Leaves* patent to spreading, very robust, opposite, narrowly to very broadly ovate, 6–40 × 7–32(–45) mm, glabrous, often glaucous, venation prominently reticulate; apex usually acute, rarely obtuse, often long and tapering, fiercely pungent-pointed; margins flat to rarely incurved, dentate, with numerous spines particularly towards the base (commonly 4–9); base truncate to cordate. *Stipules* erect, triangular, hyaline, 1–3.5 mm long. *Inflorescences* terminal or axillary racemes, often with both on one plant, 1–3 per terminus or axil, 6- to more than 30-flowered; *peduncle* (0–)8–15 mm long; *rachis* 5–25 mm long; *subtending bracts* caducous, scale-like, ovate, lacerate, shorter than bud, 2–4.5 mm long. *Pedicels* terete, 1–1.5 mm long. *Calyx* campanulate, 6–7 mm long including the 1–1.5-mm receptacle, glabrous, lobes all recurved; upper 2 lobes united higher than the lower 3, rounded, 2–3.5 mm long; lower 3

lobes triangular, acute, 2–3 mm long. *Corolla*: standard transversely elliptic, 9–13 × 9.5–13 mm including the 2–5.5-mm claw, yellow to orange with a red ring surrounding the yellow centre, apex emarginate, base truncate; *wings* ovate to obovate, 8–12 × 2.5–3.5 mm including the 2–4.5-mm claws, yellow to orange and red, apex rounded, not incurved to somewhat incurved, not enclosing keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, margins not incurved, 8.5–11 × 3.5 mm including the 2.5–4-mm claws, pink and maroon, apex broadly rounded to subacute, base auriculate, saccate. *Style* long, incurved to slightly hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, 6–10 × 4–6 mm, glabrous. *Seed* reniform to ellipsoid, *c.* 3 mm long, arillate.

Notes on variation: *Gastrolobium spinosum* is an extremely variable species, in both leaf shape and size and flower size and has had several forms and varieties named in the past. However, these all intergrade at all stages, such that it is very difficult to identify any specimen falling into the middle of this morphological range. Also, some of these 'forms' were found to exist on one specimen (e.g. a specimen from Tarin Rock, west of Lake Grace, *G.T. Chandler 281*, contained *G. spinosum* forma *inermis*, forma *angustum* as well as forma *spinosum*). None of these subspecific taxa are being recognised in this treatment.

Vernacular name: prickly poison.

Flowering period: September–December. *Fruiting period*: from October in the north of its range to January in the south.

Distribution: south-western Western Australia. Occurs throughout the south-western region. (Fig. 31)

Habitat: grows in a wide range of habitats, from sandplains to mountain escarpment, on sandy soils to clay-loam soils in forest, woodland, mallee and heathland.

Selected specimens (330 examined): WESTERN AUSTRALIA, Avon District: Wongan Hills Experimental Farm, 6.5 km N of Wongan Hills, 30°51'S, 116°43'E, *K.J. Knight 323*, 23.x.1984 (MEL, PERTH); 2 miles [3 km] E of Tammin, 31°38'S, 117°31'E, *T.E.H. Aplin 1984*, 13.ix.1962 (PERTH). Coolgardie District: 52 km along Hyden–Norseman track, towards Norseman from Southern Cross Rd, 32°16'06"S, 120°16'19"E, *G.T. Chandler 897 et al.*, 16.ix.1999 (BRI, CANB). Darling District: 12.5 km toward Collie from intersection with Williams to Pinjarra Rd, 33°10'16"S, 116°36'43"E, *G.T. Chandler 759 & S. Donaldson*, 3.xi.1998 (CANB, MEL), Roleystone, 32°06'S, 116°05'E, *R.A. Saffrey 152*, 11.xi.1964 (PERTH); Gingin Cemetery, 31°21'S, 115°54'E, *G.J. Keighery 714*, 8.vii.1975 (PERTH). Irwin District: 12 km N of Green Head Rd along Eneabba South Rd, 13 km NW of Warradarge Hill, 29°58'S, 115°13'E, *M.D. Crisp 5439*, 24.i.1979 (CANB, NSW, PERTH); 15 km from Three Springs towards Eneabba, 29°45'26"S, 115°24'02"E, *G.T. Chandler 219 & W. Keys*, 11.ix.1997 (CANB). Eyre District: 500 m E of the Oldfield River crossing on the South Coast Hwy, 33°40'22"S, 120°40'20"E, *G.T. Chandler 263 & W. Keys*, 17.ix.1997 (CANB, NSW). Roe District: Dragon Rocks Nature Reserve, *c.* 37 km N of Newdegate, 32°49'S, 119°01'E, *T.F. Houston 921-6*, 24.xi.1996 (PERTH); 20 km from

Newdegate towards Hyden, 35°54'42"S, 119°02'44"E, *G.T. Chandler 949 et al.*, 19.ix.1999 (CANB); Tarin Rock siding, 33°06'34"S, 118°13'56"E, *G.T. Chandler 281 & W. Keys*, 18.ix.1997 (CANB, UNE).

Toxicity: fluoroacetate 0–400 µg g⁻¹ (McKewen 1964; Twigg *et al.* 1996b).

Affinity: this species resembles *G. aculeatum*, *G. euryphyllum*, *G. triangulare*, *G. trilobum* and *G. wonganensis*. *Gastrolobium aculeatum* differs by having light green leaves with 1 or 3 spines and umbellate inflorescences with 2 or 3 flowers. *Gastrolobium euryphyllum* can be distinguished by the large, glaucous leaves (although this character is shared by some specimens of *G. spinosum*), but mostly by the subtending bracts, which are longer than the bud that they subtend. *Gastrolobium triangulare* can be distinguished by the leaves, which have a strict triangular shape with 3 angles pointing at about 120° from each other and by the generally smaller flowers and fruits (e.g. calyx 4–6 mm long, standard 8.5–10 × 9–11.5 mm, pod 5–6 mm long). *Gastrolobium trilobum* differs by having 1 or 3 spines only (although some specimens of *G. spinosum* also have this feature), but the inflorescence can then distinguish these variants, as they are fewer-flowered (2–7-flowered) and have smaller flowers and fruits (e.g. calyx 4.5–5 mm long, standard 7–10 × 6.5–8.5 mm, pod *c.* 5 mm long). *Gastrolobium wonganensis* differs by having long, open, pubescent racemes with smaller flowers (rachis 35–50 mm long, calyx 4.5–5.5 mm long, standard 6.5–7.5 × 5.5–6.5 mm).

2. *Gastrolobium euryphyllum* G.Chandler & Crisp, sp. nov. Type: Western Australia: Roe District: 20 km N of Newdegate towards Hyden, 32°54'42"S, 119°02'44"E, *G.T. Chandler 948*, *A. Monro & S. Donaldson*, 19 Sep. 1999 (*holo*: CANB!; *iso*: PERTH!)

Frutices tenui erecti glauci, bracteis flores subtenentibus quam alabastris duplo longioribus; species ceterae spinosae *Gastrolobii* bracteis alabastris brevioribus.

Slender, erect, glaucous shrubs. The subtending floral bracts distinguish *G. euryphyllum* from all other spinose species of *Gastrolobium*, as they are about twice as long as the buds that they subtend.

Etymology: the specific epithet comes from the Greek (*eurys* = broad and *phyllon* = leaf), referring to the particularly broad leaves of this species.

Slender, erect, glaucous shrubs, up to 2.5 m high. *Branchlets* ascending to erect, angular, glabrous, glaucous. *Petioles* terete, continuous and scarcely decurrent with the branchlet, *c.* 0.5 mm long. *Leaves* spreading, very robust, opposite, very broadly to transversely ovate, 14–28 × 19–41 mm, glabrous, glaucous, venation somewhat obscured, pinnate; apex acute, fiercely pungent-pointed; margins not recurved, dentate, with 5 or 6 fiercely spinose angles; base

cordate. *Stipules* erect, rigid, triangular, 2–2.5 mm long. *Inflorescences* terminal racemes, 6–20-flowered; *peduncle* 4–6 mm long, glabrous; *rachis* 2–15 mm long; *subtending bracts* caducous, scale-like, entire, linear-lanceolate, longer than bud, *c.* 6 mm long, glabrous to sparsely pubescent. *Pedicels* terete, *c.* 1.5 mm long. *Calyx* campanulate, 8–9 mm long including the 1–1.5-mm receptacle, glabrous, lobes all recurved; upper 2 lobes united higher than the lower 3, rounded, 3–4 mm long; lower 3 lobes triangular, acute, 2.5–3.5 mm long. *Corolla: standard* transversely elliptic, 8.5–9 × 9–9.5 mm including the *c.* 2-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex slightly emarginate, base truncate; *wings* oblong, 8.5–9 × 2.5–3 mm including the 2–2.5-mm claws, orange-yellow, red towards the base, apex rounded, not incurved, not enclosing keel, base auriculate on both margins, saccate; *keel* half very broadly obovate, very robust, margins not incurved, *c.* 9 × 3.5 mm including the 2.5-mm claws, deep maroon, apex rounded, base auriculate saccate. *Style* long, slightly hooked, lower third slightly pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, 7–8 × 4–5 mm, glabrous. *Seed* ellipsoid, *c.* 4 mm long, arillate. (Fig. 3)

Flowering period: September–January. *Fruiting period:* November–January.

Distribution (Fig. 32): south-western Western Australia. Occurs around the Newdegate area.

Habitat: grows on rolling sand dunes in sand over laterite, in mallee or *Allocasuarina* shrubland.

Specimens examined: WESTERN AUSTRALIA, Roe District: near Lake Bidy, between Lake Grace and Newdegate, *c.* 33°00'S, 118°56'E, *W.E. Blackall* 1388, 19.xi.1931 (PERTH); 46 km E of Pingaring along road to Varley, 32°44'S, 119°05'E, *B. Barnsley* 982, 29.i.1979 (CANB, PERTH).

Toxicity: unknown, but as it is related to *G. spinosum*, it is probably toxic.

Affinity: similar to the broader-leaved forms of *G. spinosum*, except that *G. spinosum* is not always glaucous, has much smaller bracts and most specimens have some axillary inflorescences, whereas in *G. euryphyllum* the inflorescence is always terminal. It is also somewhat similar to *G. wonganensis*, except that this is a much smaller and bushier shrub (<1 m high), has smaller leaves (7–16(–20) × 13–21(–28) mm) with more spines (*c.* 10), the stipules are hyaline, the subtending bracts are trifid and smaller (3–4 mm long), the flowers are smaller (calyx 4.5–5.5 mm long, standard 6.5–7.5 × 5.5–6.5 mm) and the inflorescence is longer (rachis 35–50 mm long) and pubescent.

3. *Gastrolobium wonganensis* G.Chandler & Crisp, sp. nov.

Type: Western Australia: Avon District: Wongan Hills Nature Reserve, near carpark, *c.* 11 km NW of Wongan Hills township, 30°49'21"S, 116°38'11"E, *G.T. Chandler* 844, *A. Monro* & *S. Donaldson*, 10 Sep. 1999 (*holo:* CANB!; *iso:* BRI!, HO!, PERTH!)

A specimenibus *G. spinosi* foliis parvis rotundis distincta foliorum spinis plus (7–10), inflorescentiae rachidibus pubescentibus et floribus parvioribus (e.g. vexillum 6.5–7.5 × 5.5–6.5 mm).

The greater number of spines (7–10), the pubescent inflorescence axes and the smaller flowers (e.g. standard 6.5–7.5 × 5.5–6.5 mm) distinguish *G. wonganensis* from the specimens of *G. spinosum* with small, round leaves.

Etymology: this species is named after the area where it occurs, Wongan Hills.

Low, dense, spreading *shrubs*, up to 0.7 m high. *Branchlets* spreading to ascending, somewhat angular, densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, <0.5 mm long. *Leaves* spreading, opposite, with bases overlapping, transversely ovate, almost appearing semi-circular, 7–16(–20) × 13–21(–28) mm, glabrous, venation prominently reticulate; apex broadly rounded, fiercely pungent-pointed; margins not recurved, dentate, with 7–10 angles, each fiercely pungent-pointed; base slightly cordate. *Stipules* erect, hyaline, 1.5–2.5 mm long. *Inflorescences* terminal racemes, 14–21-flowered, peduncle and rachis moderately to densely pubescent; *peduncle* 9–15 mm long; *rachis* 35–50 mm long; *subtending bracts* caducous, scale-like, trifid, narrowly rhombic, 3–4 mm long, pubescent. *Pedicels* terete, 1–2.5 mm long. *Calyx* campanulate, 4.5–5.5 mm long including the 1-mm receptacle, moderately to densely pubescent, lobes all recurved to reflexed; upper 2 lobes united higher than the lower 3, acute, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla: standard* very broadly ovate, 6.5–7.5 × 5.5–6.5 mm including the 1.5–2-mm claw, yellow to yellow-orange with a red ring surrounding the yellow centre, apex emarginate, base truncate; *wings* obliquely elliptic, *c.* 7 × 2 mm including the 2-mm claws, yellow, apex rounded, not incurved, not enclosing keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, margins not incurved, *c.* 7 × 3 mm including the 2-mm claws, maroon, apex rounded, base auriculate, saccate. *Style* long, incurved, lower third slightly pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, 5.5–7.5 × 3–4 mm, glabrous. *Seed* not seen. (Fig. 4)

Flowering period: September and October. *Fruiting period:* unknown.

Distribution (Fig. 33): south-western Western Australia. Occurs only around the Wongan Hills area.

Habitat: grows on lateritic rises on clay-loam over laterite in open mallee woodland.

Specimens examined: WESTERN AUSTRALIA, Avon District: 0.5 km from the summit of Mt O'Brien, NW of Wongan Hills on Piawaning Rd, 30°51'S, 116°33'E, *J.H. Ross* 3589, 7.x.1992 (MEL); summit of Mt O'Brien, W of Wongan Hills, 30°50'16"S, 116°38'16"E, *G.T. Chandler* 548 *et al.*, 21.ii.1998 (CANB); Wongan Hills, *c.* 1.5 km N of Wongan Hills (township) to Piawaning Rd and *c.* 13 km (by road) NW of the

former town, 30°49'S, 116°37'E, *B.J. Conn* 2247, 19.ix.1985 (B, CHR, MEL, MO, NSW, PERTH); Wongan Hills, 30°49'S, 116°38'E, *K.F. Kenneally* 2355, 6.x.1974 (PERTH).

Toxicity: unknown, but given its relationship to *G. spinosum*, it is likely to be toxic.

Affinity: very similar to the more typical forms of *G. spinosum*, which can be distinguished from *G. wonganensis* by the fewer spines on the leaf (1–9), the glabrous inflorescence and the larger flowers (calyx 6–7 mm long, standard 9–13 × 9.5–13 mm). It is also similar to *G. euryphyllum*, which is a much larger and more-spindly shrub (up to 2.5 m high), has much larger leaves (14–28 × 19–41 mm) with fewer spines (5 or 6), the stipules are triangular and rigid, the subtending bracts are entire and larger (*c.* 6 mm long), the flowers are larger (calyx 8–9 mm long, standard 8.5–9 × 9–9.5 mm) and the inflorescence is shorter (rachis 2–15 mm long) and glabrous.

4. *Gastrolobium triangulare* (Benth.) Domin, *Vestnik Kralovske Ceske Spolecnost Nauk* 2: 35 (1923b). *G. spinosum* var. *triangulare* Benth., *Fl. Austral.* 2: 103 (1864). *Type citation*: 'Stony places, Port Gregory, Oldfield'. *Type specimens*: *lectotype* (here chosen): K (Port Gregory, Oldfield); *iso*: MEL, P

Low, spreading, dense, glabrous *shrubs*, 0.3–1.5 m high. *Branchlets* spreading to ascending, mostly terete, sometimes slightly angular, glabrous. *Petiole* very short, somewhat swollen at the base of the leaf, continuous but not decurrent with the branchlet, *c.* 0.5 mm long. *Leaves* broadly spreading, opposite, very broadly to depressed-triangular, 8–25 × 12–28 mm, older leaves sometimes glaucous, otherwise a light green colour, venation prominently reticulate, raised, intramarginal vein usually present; apex obtuse, all 3 angles with pungent points; margins entire or minutely crenulate; base cordate. *Stipules* erect, linear-triangular, 2-lobed, inner margins slightly fimbriate, *c.* 1.25 mm long. *Inflorescences* mostly terminal racemes, occasionally on short lateral shoots, 6–12-flowered; *peduncle* 8–22 mm long; *rachis* 5–17 mm long; *subtending bracts* caducous, scale-like, entire, triangular, 1.5–2 mm long. *Pedicels* terete, 1 mm long; sometimes abruptly curved at 90° to the rachis (more commonly as flower ages), causing a number of flowers to appear nodding. *Calyx* campanulate, 4–6 mm long including the 0.75–1-mm receptacle, glabrous; upper 2 lobes united higher than the lower 3, broadly triangular, spreading to slightly recurved, 1.5–2.5 mm long; lower 3 lobes triangular, strongly spreading to reflexed, 1.5–2.25 mm long. *Corolla*: *standard* elliptical to slightly ovate, 8.5–10 × 9–11.5 mm, including the *c.* 3-mm claw, orange-yellow with a red ring around the pale yellow centre, apex emarginate, base cordate, occasionally slightly auriculate; *wings* obovate to oblong-obovate, 9–9.5 × 2.5–3 mm including the *c.* 2.5-mm claw, orange-yellow, red towards the base, apex obtuse, incurved and overlapping to

enclose the keel, base auriculate on both margins, slightly saccate; *keel* half obliquely broadly elliptic, turgid, margins not incurved, 8–8.5 × 2.5–3 mm including the *c.* 3-mm claw, maroon, apex obtuse, base auriculate. *Style* long, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, obliquely ellipsoid to ellipsoid, nutant, 5–6 × 3–4 mm. *Seed* ellipsoid or rhomboid, 2.75 mm long, arillate.

Flowering period: July–November. *Fruiting period*: some fruit in August, but mostly in September–December.

Distribution (Fig. 34): this species occurs in an area north of Geraldton, from White Peak to around Northampton and Port Gregory and inland to Howatharra Hill.

Habitat: grows in sandy or sandy clay soils on rocky slopes and ridges, in low shrubland or heathland.

Selected specimens (19 examined): WESTERN AUSTRALIA, Irwin District: 36 km along the North West Coastal Hwy from Geraldton towards Northampton, 28°28'58"S, 114°38'04"E, *G.T. Chandler* 222 & *W. Keys*, 11.ix.1997 (CANB, MEL, PERTH); Howatharra Nature Reserve, 3.5 km towards Nanson from the turnoff on the North West Coastal Hwy (*c.* 30 km N of Geraldton), 28°32'52"S, 114°39'45"E, *G.T. Chandler* 224 & *W. Keys*, 11.ix.1997 (CANB, K); 36 km along the North West Coastal Hwy from Geraldton towards Northampton, 28°28'58"S, 114°38'04"E, *G.T. Chandler* 655 & *S. Donaldson*, 24.x.1998 (CANB, MEL); Woggrakine, *H.W. Hawthorne s.n.*, 19.xi.1953 (PERTH); low sandstone hill close to North West Coastal Hwy, 10 mls [16 km] S of Northampton and 21 mls [33.5 km] N of Geraldton, 28°28'S, 114°38'E, *R.V. Smith* 66/391, 9.ix.1966 (CANB, MEL, PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium triangulare* is similar to both *G. spinosum* and *G. trilobum*. *Gastrolobium spinosum* differs by having ovate leaves generally with numerous spines and the flowers and fruits are generally larger (e.g. calyx 6–7 mm long, standard 9–13 × 9.5–13 mm, pod 6–10 mm long). *Gastrolobium trilobum* differs in having ovate to triangular leaves and although it has three spines, they all generally point upwards, rather than having the lower two spines pointing either downwards or straight out.

5. *Gastrolobium trilobum* Benth. in Lindley, *Edwards' Bot. Reg. Append.*: xiii (1839). *Type*: none cited. *Type specimens*: *lectotype* (here chosen): K (Swan River, Drummond, 1839); *isolecto*: CGE (2 sheets)

Gastrolobium spinosum Benth. var. *trilobum* S.Moore, *J. Linn. Soc. London, Bot.* 45: 170 (1920). *Type citation*: 'Kauring, *G. W. Brown* (Hb. Stoward, 551, 632). *Type specimens*: *lectotype* (here chosen): BM (Stoward 551); *isolecto*: PERTH.

Rigid, bushy, spreading *shrubs*, occasionally more slender and erect, 0.6–1.8 m high, glabrous, occasionally glaucous. *Branchlets* spreading to ascending, terete, sometimes with a decurrent rib from the petiole, glabrous. *Petiole* terete, continuous but not decurrent with the branchlet, 1–2 mm long. *Leaves* patent to spreading, opposite, ovate to subtriangular, rarely trullate, trilobed (rarely not and if not, at

least some leaves becoming trilobed on the plant), 11–36 × 10–20 mm, glabrous, often glaucous, venation reticulate, with a major vein going from the prominent midrib to the lateral lobes, light to olive green; apex broadly triangular to quite long and lanceolate, pungent-pointed, lateral lobes broad and short or lanceolate, pungent-pointed; margins often somewhat conduplicate; base obtusely rounded to cuneate, rarely cordate (mostly in the Wongan Hills–Wyalkatchem area). *Stipules* erect, linear-triangular, *c.* 3 mm long. *Inflorescences* axillary, occasionally terminal, racemes (terminal particularly in the Wongan Hills–Wyalkatchem area), 2–7-flowered; *peduncle* 3–12 mm long; *rachis* 1–13 mm long; *subtending bracts* caducous, scale-like, trifid with somewhat fimbriate margins, triangular, *c.* 1.5 mm long, pubescent to glabrous. *Pedicels* terete, straight to curved to 90°, 2–3 mm long. *Calyx* tapered to the base, *c.* 4.5–5 mm long including the 0.75–1.5-mm receptacle, pubescent to glabrous; lobes slightly recurved to reflexed; upper 2 lobes more or less united into an emarginate, truncate lip, *c.* 2 mm long; lower 3 lobes triangular, sometimes rounded, *c.* 1.5 mm long. *Corolla: standard* very broadly ovate to transversely broadly elliptic, 7–10 × 6.5–8.5 including the 2–3-mm claw, orange or yellow, with a central red ring surrounding the orange or yellow centre, apex emarginate, base cordate; *wings* obovate to nearly oblong, 6.5–10 × 2–2.5 mm including the 2–3-mm claw, orange or yellow, red towards the base, apex rounded, not incurved, not enclosing the keel, auriculate on both margins, slightly saccate; *keel* half obliquely elliptical, 7–10 × 2.5–3.5 mm including the 3–4-mm claw, deep maroon, apex almost black or rarely yellow, apex obtuse, base auriculate, saccate. *Style* long, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, *c.* 5 × 3 mm. *Seed* ellipsoid, *c.* 2 mm long, arillate.

Vernacular name: bullock poison.

Chromosome number: $2n = 16$ (Sands 1975).

Flowering period: July–November. *Fruiting period:* from October.

Distribution (Fig. 35): occurs in the central to mid-western wheatbelt of Western Australia, from Brookton and Narrogin in the west, to Marvel Loch in the east and from Bindi Bindi in the north to Katanning in the south.

Habitat: grows on sandy soils in open woodland and mallee woodland.

Selected specimens (53 examined): WESTERN AUSTRALIA, Avon district: 1.5 km N along the Great Southern Hwy, from the Narrogin turnoff at Wagin, 33°17'56"S, 117°19'26"E, *G.T. Chandler 283–285 & W. Keys*, 19.ix.1997 (CANB, PERTH); 14 km from Bindi Bindi towards Ballidu, 30°35'17"S, 116°29'09"E, *G.T. Chandler 680 & S. Donaldson*, 26.x.1998 (CANB); 2 km E of Woodanilling, 33°34'S, 117°57'E, *R.J. Cranfield 275*, 3.xi.1978 (CANB, PERTH); entrance to Fowlers Gully, Wongan Hills, 30°49'S, 116°38', *K.F. Kenneally 1383*, 20.vii.1974 (PERTH); 74 mls [135 km] from Perth to Brookton, *c.* 32°23'S, 116°55'E, *J.R. Knox 65x001*, x.1965 (PERTH); 31 km ESE

of Highbury, 33°06'S, 117°35'E, *R.J. Cranfield 4599*, 22.x.1983 (PERTH); 12 km NW of Quairading, 3 km NW of Woolaring Well, 31°57'S, 117°18'E, *M.D. Crisp 6187 et al.*, 27.ix.1979 (CANB, PERTH). Coolgardie district: along State Vermin Fence no. 7, 1.5 km SE of Southern Cross, 80 km S of Great Eastern Hwy, 31°51'S, 120°01'E, *J. Dodd 207*, 4.xi.1985 (CANB, K, PERTH).

Toxicity: purported to be toxic, but does not appear to have been tested. According to Gardner and Bennetts (1956), it has only rarely been implicated in stock loss.

Notes on variation: *Gastrolobium trilobum* generally has three pungent points per leaf, but occasionally has only one. These leaves are often found on plants that have mostly three spines, but for some reason a particular branchlet produces leaves with only one spine, so it is important to examine the whole plant for the purposes of identification. Also, the leaves of *G. trilobum* with only one spine often show signs of bulging out to either side of the apex, indicating an affinity to becoming trilobed.

Affinity: *Gastrolobium trilobum* is similar in appearance to *G. triangulare* and *G. spinosum*. *Gastrolobium triangulare* is easily distinguished by the strictly triangular leaves with the lower two spines pointing downwards or straight out, where *G. trilobum* has a more ovate leaf with the lower two spines pointing upwards. *Gastrolobium spinosum* can be distinguished by usually having a greater number of spines (typically four to nine) per leaf, though some specimens have one or three spines, however, *G. spinosum* also has a greater number of flowers per inflorescence (6- to more than 30-flowered) and larger flowers and fruits (e.g. calyx 6–7 mm long, standard 9–13 × 9.5–13 mm, pod 6–10 mm long).

6. *Gastrolobium aculeatum* G.Chandler, Crisp & R.J. Bayer, sp. nov. *Type:* Western Australia: Coolgardie District: 61 km on Mt Day–Marvel Loch road from Hyden–Norseman track, towards Marvel Loch, near Barrier Fence, 31°50'45"S, 119°59'44"E, *G.T. Chandler 903, A. Monro & S. Donaldson*, 16 Sep. 1999 (*holo:* CANB!; *iso:* AD!, BRI!, K!, MEL!, NSW!, NY!, PERTH!)

A speciebis *Gastrolobii* foliis apicibus 1–3 pungentibus distincta foliis glaucis, foliorum apicibus maxime pungentibus, umbellis terminalibus 2–3-floribus.

The glaucous leaves and particularly sharp pungent apices of this species, together with the terminal, 2–3-flowered umbels, distinguish this species from the other spinose-leaved species of *Gastrolobium* that have 1–3 pungent apices.

Etymology: this specific epithet comes from Latin (*aculeus* = a prickle or very sharp point) and is named after the particularly needle-like apices of the leaves.

Erect, bushy *shrubs*, 1–2.5 m high. *Branchlets* ascending, terete to slightly angular, glabrous. *Petioles* terete, continuous but not decurrent with the branchlet, 1–1.5 mm

long. *Leaves* spreading, opposite, ovate, 10–20 × 6–13 mm, somewhat glaucous, venation prominently reticulate; apex acute, fiercely pungent-pointed, all three angles pungent-pointed when trilobed; margins slightly dupliculate, entire or trilobed (often both present on one specimen); base cordate to rarely truncate. *Stipules* erect, hyaline, 0.5–1 mm long. *Inflorescences* terminal umbels, 2-flowered (rarely 3-flowered); *peduncle* angular, 5–9 mm long; *rachis* absent; *subtending bracts* caducous, entire, obovate, *c.* 1 mm long. *Pedicels* tapering to the base, 3–4 mm long. *Calyx* campanulate, 6–7 mm long including the *c.* 0.5-mm receptacle, glabrous to sparsely pubescent, lobes all recurved; upper 2 lobes united higher than the lower 3, rounded, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla: standard* transversely elliptic, *c.* 11 × 11 mm including the 3-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex entire, base truncate; *wings* significantly smaller than the keel, oblong, *c.* 11 × 3 mm including the 2-mm claw, orange-yellow, apex rounded, not enclosing the keel, base auriculate on both margins, saccate; *keel* half very broadly elliptic, 12–13 × 4 mm including the 3-mm claw, light yellow, apex obtuse, slightly spout-like, base auriculate, saccate. *Style* long, hooked, pubescent towards the base; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* prominently stipitate, ellipsoid, 8 × 4.5 mm, glabrous. *Seed* not seen. (Fig. 5)

Flowering period: September–November. *Fruiting period:* unknown.

Distribution (Fig. 36): south-western Western Australia. Occurs SE of Southern Cross, near Marvel Loch and Moorine Rock and east to Streich Mound, which is on the western edge of the Great Victoria Desert.

Habitat: grows on deep white or grey sand dunes, in mallee woodland or shrubland.

Specimens examined: WESTERN AUSTRALIA, Coolgardie District: along State Vermin Fence no. 7, 105 km SE of Southern Cross, 80 km S of Great Eastern Hwy, 31°51'S, 120°01'E, *J. Dodd 207*, 4.xi.1985 (CANB, PERTH); 29.4 miles [47 km] from Marvel Loch on Mt Day Rd, 31°44'S, 119°51'E, *B.H. Smith 1011*, 3.xi.1987 (CANB, MEL, PERTH); 46 km on Mt Day–Marvel Loch road from Hyden–Norseman track, towards Marvel Loch, 31°58'29"S, 120°09'07"E, *G.T. Chandler 901 et al.*, 16.ix.1999 (CANB, PERTH); *ibid.*, *G.T. Chandler 902 et al.*, 16.ix.1999 (CANB, PERTH); 6 km W of Moorine Rock Railway Bridge on Great Eastern Hwy, 31°20'S, 119°02'E, *R.A. McKenzie 93/17*, 7.ix.1993 (PERTH); 13 km SE of PNC Officer Basin camp, 53 km NNE Streich Mound, 30°01'S, 123°52'E, *D.J. Pearson 570*, 23.i.1989 (PERTH).

Toxicity: unknown.

Affinity: this species resembles *G. spinosum* and *G. trilobum*. It can be distinguished from these two species, as *G. trilobum* has mostly axillary racemes that are 2–7-flowered and generally a darker leaf, compared with the 2- or 3-flowered umbels and the light green leaves of *G. aculeatum*. *Gastrolobium spinosum* is easily distinguished, having generally darker leaves with more

spines per leaf (typically 4–9) and racemose inflorescences with a greater numbers of flowers (6- to more than 30-flowered).

II. The *G. bilobum* group

This group of *Gastrolobium* species are often found on or around granite outcrops, or on sandy soils over granite. This group includes the type of the genus *Gastrolobium*, *G. bilobum* and also contains the *G. parviflorum* group, a common suite of species found throughout the central and southern wheatbelt of south-western Western Australia.

7. *Gastrolobium semiteres* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: Coolgardie District: Boorabbin Rock, 300 m to the NE (Boorabbin Rock is between Southern Cross and Coolgardie), 31°11'48"S, 120°17'16"E, *G.T. Chandler 694* & *S. Donaldson*, 27 Oct. 1998 (*holo:* CANB!; *iso* K!, MEL!, NSW!, PERTH!)

Frutices glaucis foliis semi-teretibus et floribus magnis dense pubescentibus. *G. involutum* a hac species foliis non-glaucis, folii pagina omnino occulta, floribus parvioribus (e.g. calyx 7 mm longus, vexillum *c.* 11 mm longum), aliiis carinam excedentibus lobo solum in margine adaxiali et inflorescentia minime pubescenti superna differt.

Bushy, glaucous shrubs with semi-terete leaves and large, densely pubescent flowers. *Gastrolobium involutum* differs by the non-glaucous leaves, the upper leaf surface is completely obscured, the flowers are smaller (e.g. calyx 7 mm long, standard *c.* 11 mm long), the wings overlap the keel and are auriculate on the upper margin only and the inflorescence is much less pubescent.

Etymology: named after the semi-terete leaf shape of this species.

Open, multi-stemmed *shrubs*, 0.5–1.5 m high. *Branchlets* ascending, angular to almost terete, moderately pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 1.5–2.5 mm long. *Leaves* ascending, in whorls of 3, linear-oblong, 20–40 × 1–2 mm, sparsely pubescent along mid-vein, glabrous, often glaucous, venation prominently reticulate; apex obtuse to rounded, slightly mucronate; margins thickened and canaliculate, forming a groove along the leaf such that the upper margin is barely visible; base tapering to the petiole. *Stipules* erect, vestigial, *c.* 0.2 mm long. *Inflorescences* terminal racemes, 7–20-flowered; *peduncle* angular, with or without apparently aborted buds at the base, 10–20 mm long; *rachis* angular, 25–50 mm long; *subtending bracts* caducous, scale-like, entire, narrowly triangular, 4–5 mm long, densely pubescent, especially at the base. *Pedicels* terete, 3–4.5 mm long. *Calyx* campanulate, 7–9 mm long including the *c.* 1-mm receptacle, densely pubescent, lobes may be slightly recurved; upper 2 lobes united higher than the lower 3, obtuse, sometimes united into an emarginate truncate lip, 2.5–3 mm long; lower 3 lobes

triangular, acute, 2–2.5 mm long. *Corolla: standard* transversely elliptic, *c.* 13 × 12 mm including the 4-mm claw, yellow-orange with a red ring surrounding the yellow centre, apex emarginate, base truncate, slightly auriculate; *wings* oblong, *c.* 12 × 3.5 mm including the 4-mm claw, orange to orange-red, apex rounded, not incurved, not enclosing the keel, base auriculate on both margins, not saccate; *keel* half transversely broadly obovate, margins not incurved, *c.* 12 × 4 mm including the 4-mm claws, maroon, apex rounded, base auriculate, saccate. *Style* long, incurved to slightly hooked, lower half pubescent along inner margin; *ovary* shortly stipitate, densely pubescent; *ovules* 4 or 5. *Pod* stipitate, obliquely elliptic, 7–9 × 3–4.5 mm, densely villous. *Seed* not seen. (Fig. 6)

Flowering period: August–October. *Fruiting period:* November and December.

Distribution (Fig. 37): has a narrow distribution in the sandplains around Boorabbin Rock (E of Southern Cross) and south to Disappointment Rock (SE of Southern Cross).

Habitat: grows on broad sand dunes or deep yellow sand over granite in open mallee and *Acacia* heath.

Specimens examined: WESTERN AUSTRALIA, Coolgardie District: Koorarawalyee, 0.5 km along Yilgarn Barrier Fence, *c.* 35 km E of Yellowdine, 31°16'44"S, 120°00'08"E, *G.T. Chandler 880 et al.*, 15.ix.1999 (CANB, MEL, PERTH); Boorabbin, 31°12'39"S, 120°15'36"E, *G.T. Chandler 878 et al.*, 15.ix.1999 (CANB, PERTH); Disappointment Rock, 32°07'53"S, 120°53'37"E, *R. Davis 8969*, 22.ix.1999 (CANB, PERTH); 300 m NE of Boorabbin Rock, 31°11'48"S, 120°17'16"E, *G.T. Chandler 695 & S. Donaldson*, 27.x.1998 (CANB); *ibid.*, *G.T. Chandler 696 & S. Donaldson*, 27.x.1998 (CANB, MEL); Boorabbin, 31°11'S, 120°17'E, *C.A. Gardner 13870*, 15.xii.1961 (CANB, PERTH); Boorabbin Rock and near vicinity, 31°12'S, 120°17'E, *T. Houston 408-32*, 4–9.x.1981 (PERTH); 67 miles [109 km] E of Southern Cross, 31°11'S, 120°17'E, *J.R. Knox 65x087*, viii.1965 (PERTH); 24 km W of Boorabbin, 31°17'S, 120°00'E, *K. Newbey 8385*, 28.vii.1981 (PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium semiteres* is similar in appearance to *G. involutum*, but *G. involutum* does not have glaucous leaves, the upper leaf surface is completely obscured, the flowers are smaller (e.g. calyx 7 mm long, standard *c.* 11 mm long), the wings overlap the keel and are auriculate on the upper margin only and the inflorescence is not very hairy.

8. *Gastrolobium stenophyllum* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 275 (1853). *Type citation:* 'Drum. V. n. 52'. *Type specimens:* *holo:* KW; *iso:* BM, K (3 sheets), W

Bushy, erect *shrubs*, up to 3 m high. *Branchlets* ascending, angular to almost terete, moderately pubescent. *Petioles* terete, continuous and partly decurrent with the branchlet, 1.5–3 mm long. *Leaves* broadly spreading, crowded along stem, internodes very short, generally opposite, but may be scattered, whorled or alternate, linear or linear-obovate, 14–45 × 2–4 mm, glabrous, venation prominently reticulate; apex subacute to broadly rounded, unarmed, slightly recurved,

may have a tiny, blunt mucro; margins conduplicate so that upper surface is often not visible; base cuneate. *Stipules* inconspicuous, erect, hyaline, <1 mm long. *Inflorescences* terminal racemes, 10- to more than 30-flowered, flowers very crowded along rachis; *peduncle* 1–4 mm long; *rachis* 10–50 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, keeled, *c.* 2 mm long, moderately pubescent. *Pedicels* 2–3 mm long. *Calyx* campanulate, 4.5–5.5 mm long including the *c.* 1-mm receptacle, moderately to densely sericeous, lobes not or scarcely recurved; upper 2 lobes united higher into an almost truncate lip, rounded, *c.* 2 mm long; lower 3 lobes triangular, acute, 1.5–2 mm long. *Corolla: standard* transversely ovate, *c.* 8.5 × 8.5 mm including the 3-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, slightly auriculate; *wings* obovate, *c.* 9 × 3 mm including the 3-mm claws, orange, apex rounded, incurved and slightly overlapping to partly enclose the keel, base auriculate on both margins, saccate; *keel* half very broadly elliptic, margins incurved, *c.* 8.5 × 2.5 mm including the 3-mm claw, pink and maroon, apex rounded, slightly spout-like, base auriculate, saccate. *Style* long, incurved to slightly hooked, lower third pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, ovoid, 6–7 × 2.5–3 mm, moderately pubescent. *Seed* ellipsoid, *c.* 2.5 mm long, arillate.

Vernacular names: Phillips River poison; narrow-leaved poison.

Flowering period: September–February. *Fruiting period:* mid-December–February.

Distribution (Fig. 38): south-western Western Australia. Occurs along the rivers of Fitzgerald River National Park, extending north to near Ravensthorpe and west to near Jerramungup, where it grows around granite outcrops away from rivers.

Habitat: this species prefers sandy soils over granite, often found at the base of granite outcrops or along rivers with granite rocks, in woodland, shrubland or heath.

Conservation status: ROTAP: 3KC-. CALM: P3. This species is poorly known and may in fact occur quite widely throughout the south coast of SW Western Australia on small granite outcrops on farm properties. Further survey work is needed to determine its conservation status.

Selected specimens (25 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Eyre District: between Jerramungup and Ravensthorpe, *J.M. Fox 86/235*, 1.ii.1986 (CANB); Phillips River, Fitzgerald River NP, *B.J. Lepschi 3779 & B.A. Fuhrer*, 28.x.1997 (AD, BRI, CANB, MEL, NSW, PERTH); SSW of Jerramungup, private property, *G.T. Chandler 735 & S. Donaldson*, 31.x.1998 (CANB, MEL, MO, PERTH); Fitzgerald River, *C.A. Gardner 9235*, 22.ix.1948 (CANB, PERTH).

Toxicity: fluoroacetate 90 µg g⁻¹ (Aplin 1971).

Affinity: the crowded leaves make this species difficult to confuse with any other *Gastrolobium*, especially when combined with the crowded racemes. The inflorescence and

fruits are somewhat similar to those of *G. bilobum*, but the leaves of *G. bilobum* are not linear and do not have recurved margins and the rachis is much shorter (2–10 mm long). The foliage of *G. stenophyllum* is similar to that of *G. tenue*, but *G. tenue* is finely pungent-pointed, the inflorescence is not crowded and has fewer flowers (4–10-flowered) and the subtending bracts are persistent and trifid.

9. *Gastrolobium cuneatum* Henfrey, *Gard. Companion Florists' Guide* 1: 49 (1852). *Type citation*: '... exhibited by the Messrs. Henderson of Pine Apple Place ... It was raised from seeds sent by Mr. Drummond, collected in Australia'. *Type*: the plate

Gastrolobium forrestii Ewart in Ewart, White & Tovey, *J. Proc. R. Soc. New South Wales* 42: 188 (1908). *Type citation*: 'Blackwood River, W.A., Sir John Forrest; W. Aust. 1889; Gordon River in forest land 1877'. *Type specimens*: lectotype (here chosen): MEL (624683); isotype: BM, K (2 sheets), MEL (624682), PERTH

Erect shrubs, 1–2 m high. *Branchlets* ascending, angular, sparsely to moderately pubescent. *Petioles* terete, continuous and sometimes decurrent with the branchlet, 1.5–3 mm long. *Leaves* spreading to ascending, whorled or rarely opposite, elliptic or linear to cuneate (juvenile leaves in particular are often cuneate), 20–33(–61) × (2.5–)5–10 mm, upper surface glabrous, lower surface sparsely to densely pubescent, venation prominently reticulate, raised on the upper surface; apex usually retuse, rarely truncate, mucronate, recurved or straight; margins entire, recurved, revolute or occasionally flat; base rounded. *Stipules* erect, hyaline, 2–3.5 mm long. *Inflorescences* terminal racemes, 20–40-flowered; *peduncle* (5–)11–58 mm long; *rachis* 75–116 mm long; *subtending bracts* caducous, scale-like, entire, subulate, 2–4 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 4–6 mm long including the c. 1-mm receptacle, sparsely to moderately pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, triangular, acute, c. 2.5 mm long; lower 3 lobes triangular, acute, c. 2 mm long. *Corolla*: standard transversely obovate, c. 9 × 10 mm including the c. 4-mm claw, yellow to yellow-orange, apex emarginate, base cordate, auriculate; *wings* obovate, lower margin reflexed to expose the keel, c. 8.5 × 2.5 mm including the c. 2-mm claw, yellow to orange, apex rounded, not incurved, not enclosing the keel, base auriculate on the upper margin only; *keel* half transversely elliptic, turgid, margins not incurved, c. 4 × 2 mm including the c. 2-mm claws, orange-red, red or pink, apex with an acicular beak, base auriculate, saccate, with a circular opening near the claws to expose the stamens from below. *Style* short, straight but at 45 degrees to the ovary, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, 6.5–8 × 3.5–4 mm, moderately pubescent. *Seed* reniform, c. 2.5 mm long, arillate.

Vernacular name: river poison.

Flowering period: September–February. *Fruiting period*: November–February.

Distribution (Fig. 39): south-western Western Australia. Distributed throughout the Darling escarpment, from Pinjarra south to Margaret River, east to Albany and the Porongurup Range.

Habitat: grows in fairly moist areas usually on loam or clay soils in eucalypt forest or woodland, or swampy areas.

Selected specimens (37 examined): WESTERN AUSTRALIA, Darling District: Wilson Inlet near Hay River mouth, 10 km E of Denmark, 34°58'33"S, 118°27'33"E, *A.R. Annels* 1073, 16.xii.1991 (PERTH); Margaret River, 33°57'S, 115°04'E, *A. Lea s.n.*, x.1898 (PERTH); Picton, along Preston River, 33°21'S, 115°41'E, *F.G. Davies s.n.*, x.1966 (CANB, PERTH); Sappers Bridge, Gully Rd, Walpole Nornalup NP, Frankland River, 34°57'40"S, 116°49'20"E, *A.R. Annels* 5075 & *R.W. Hearn*, 30.xi.1994 (CANB, K, MEL, PERTH); Blackwood River Bridge, Warner Glen Rd, 34°05'33"S, 115°12'57"E, *M.D. Crisp* 8937 & *W. Keys*, 12.x.1996 (CANB, PERTH); Kent River, c. 34°45'S, 117°05'E, *C.A. Gardner s.n.*, 22.i.1936 (CANB, PERTH). Eyre District: E of Porongurups, *G.I. Gauntlett* 3, ix.1963 (PERTH).

Notes on nomenclature: the name commonly used for this species is *Gastrolobium forrestii*. However, a search of the literature uncovered the earlier name *G. cuneatum* that matches the description of *G. forrestii*. The type is a plate, which is unambiguously the same as *G. forrestii*.

Toxicity: highly toxic; fluoroacetate 1200 µg g⁻¹ (Aplin 1971, as *G. forrestii*).

Affinity: some specimens seen have foliage superficially similar to *G. bilobum*, but the inflorescence structure of *G. bilobum* is different, having quite a short rachis (2–10 mm long) with the flowers crowded along its length (internodes 1–2 mm long), compared with *G. cuneatum* (>5, often >10 mm long).

10. *Gastrolobium callistachys* Meisn., in Lehm., *Pl. Preiss* 2: 216 (1848). *Type citation*: 'Swan River, Drummond coll. III. no. 90'. *Type specimens*: *holo*: BM; *iso*: CGE, G, K (2 sheets), NY, W

Gastrolobium lineare Meisn., *Bot. Zeit.* (Berlin) 13: 30 (1855b). *Type citation*: 'Drumm. Coll. VI. n. 25'. *Type specimens*: *holo*: NY; *iso*: CGE (2 sheets), E, BM, K (2 sheets), LD.

Open, often weeping shrubs, 1–3 m high. *Branchlets* ascending, angular, moderately sericeous. *Petioles* terete, continuous and sometimes decurrent with the branchlet, 2–3 mm long. *Leaves* spreading to ascending, opposite or whorled, linear-elliptic or linear-obovate (30–)38–56 × 2–2.5 mm, upper surface glabrous but with raised venation, lower surface sparsely to moderately sericeous, venation prominently reticulate; apex rounded, unarmed; margins entire, usually recurved; base cuneate. *Stipules* erect, hyaline, 0.5–1.5 mm long. *Inflorescences* terminal racemes, 6–24(–32)-flowered; *peduncle* (5–)17–35 mm long; *rachis* 33–80(–200) mm long; *subtending bracts* caducous, scale-like, entire, linear-lanceolate, 3–4 mm long. *Pedicels* terete, 2.5–4 mm long. *Calyx* campanulate, 6–8 mm long including the 1–1.5-mm receptacle, moderately sericeous, lower 3 lobes sometimes recurved; upper 2 lobes united

higher than the lower 3, broadly triangular, apex rounded, 3–3.5 mm long; lower 3 lobes triangular, acute, 2–3 mm long. *Corolla: standard* transversely elliptic, 11–12.5 × 11–12 mm including the 3.5–4-mm claw, yellow or orange, with a red ring surrounding the yellow centre, apex emarginate, base obtuse; *wings* obovate, *c.* 11 × 3–3.5 mm including the *c.* 3-mm claw, yellow or orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, slightly saccate; *keel* half circular, margins slightly incurved, *c.* 11 × 3.5–4 mm including the 3–3.5-mm claw, pink or maroon, sometimes appearing brown when old, apex rounded, base auriculate, saccate. *Style* long, incurved or hooked, glabrous or with hairs in the lower third; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, 8–9 × 4–6 mm, sparsely to moderately pubescent. *Seed* reniform, *c.* 2.5 mm long, arillate.

Vernacular name: rock poison.

Flowering period: September–November. *Fruiting period:* from late October to December.

Distribution (Fig. 40): south-western Western Australia. Occurs on the northern sandplains and mallee regions, from Jurien Bay and Moora in the north to Wongan Hills and Goomalling in the south.

Habitat: usually found on the margins of granite outcrops, more rarely on siltstone, on sandy soils, in woodland dominated by *Eucalyptus* or *Allocasuarina*.

Conservation status: IUCN: R (rare). ROTAP: 3RCi. CALM: P4. This species is rare, though it is well surveyed and not considered to be at risk.

Selected specimens (36 examined): due to the conservaton status of this species, detailed localities are not given. WESTERN AUSTRALIA, Avon District: Dingo Rock, *B.H. Smith 991*, 2.x.1987 (CANB, DAV, HO, LEN, MEL, NSM); Mt Caroline Granite area, *F.H. & M.P. Mollemans 3523*, 3.x.1990 (PERTH); Wongan Hills area, *M.J. Fitzgerald 11*, 12.ix.1993 (PERTH); Mt Stirling, *K. Newbey 1568*, 22.x.1964 (PERTH); Irwin District: N of Watheroo, *M.G. Corrick 10689*, 24.ix.1991 (MEL, PERTH); Dandaragan, *R.D. Royce 5126*, 20.ix.1955 (PERTH); Carnamah, *A. Morrison 16347*, 7.xi.1906 (CANB, K); SE of Jurien Bay, *F.C. Vasek 681008-83*, 8.x.1968 (CANB).

Toxicity: very toxic; fluoroacetate 100–1000 µg g⁻¹ (Aplin 1971).

Affinity: the weeping habit and flat leaves of *G. callistachys*, combined with the long racemes, make this species difficult to confuse with any other species of *Gastrolobium*. The irregularly grouped leaves, which are evident upon close inspection, distinguish it from *G. bilobum* and *G. stenophyllum*, which also differ by having a raceme with very short internodes (<1.5 mm long), whereas *G. callistachys* has long, open racemes (up to 10 mm long).

11. *Gastrolobium acrocaroli* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: Roe District: Peak Charles, 32°53'S, 121°09'E, *G.T. Chandler 778 & S. Donaldson*, 9.xi.1998 (*holo:* CANB!; *iso:* K!, MEL!, NSW!, PERTH!)

Haec species non nisi in collibus duobus graniticis habitat, speciei ulla altera difficili confundere, foliis magnis oblongis [45–80(–110) × (2–)3–6(–8) mm] et floribus magnis (e.g. vexillum 10–12.5 × 13.5–14 mm) distinguenda.

The large, oblong leaves [45–80(–110) × (2–)3–6(–8) mm] and the large flowers (e.g. vexillum 10–12.5 × 13.5–14 mm) of this narrowly endemic granite outcrop species make it difficult to confuse with any other.

Etymology: this specific epithet comes from the Greek (*acro* = hill or peak and *Carolus* = Charles) is named after Peak Charles, where it is endemic.

Erect, open *shrubs*, 1–2.7 m high. *Branchlets* ascending, angular, glabrous to sparsely pubescent. *Petiole* terete, slightly swollen at base, continuous and sometimes slightly decurrent with the branchlet, 5–7 mm long. *Leaves* ascending, opposite, linear-oblong to linear-elliptic, 45–80(–110) × (2–)3–6(–8) mm, glabrous or very slightly pubescent on the abaxial surface, venation prominently reticulate; apex rounded to truncate, usually mucronate, occasionally emarginate; margins entire, recurved to slightly so; base cuneate or slightly rounded. *Stipules* erect, narrowly triangular, 0.5–1.5 mm long. *Inflorescences* terminal racemes (5–)7–16-flowered; *peduncle* (5–)8–15(–23) mm long; *rachis* 17–30(–45) mm long; *subtending bracts* caducous, scale-like, minutely trilobed (often appearing entire), *c.* 2 mm long, slightly pubescent. *Pedicels* terete, 3–5 mm long. *Calyx* campanulate, 7–9 mm long including the 1–1.25-mm receptacle, glabrous to sparsely pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, triangular, obtuse, 3–3.5 mm long; lower 3 lobes triangular, acute or slightly obtuse, 2.5–2.75 mm long. *Corolla: standard* transversely elliptic, 10–12.5 × 13.5–14 mm including the 3–4-mm claw, orange, rarely yellow, with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* oblong, 10.5–12 × 3.5–4 mm including the 3–3.5-mm claw, orange, rarely yellow, apex rounded, incurved and touching, not overlapping, mostly enclosing the keel, base auriculate on both, slightly saccate; *keel* half very broadly elliptic, margins rolled inwards, 10–12 × *c.* 4 mm including the 3–4-mm claw, white with a pink apex, very rarely yellow, apex obtuse, base auriculate, saccate. *Style* long, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 5 or 6. *Pod* stipitate, fusiform or ellipsoid, 12–15 × 22–30(–35) mm, glabrous. *Seed* not seen. (Fig. 7)

Flowering period: September–November, with some flowers present on one collection made in April. *Fruiting period:* from November.

Distribution (Fig. 41): south-western Western Australia. This species has a very narrow distribution, being endemic to Peak Charles and a nearby granite outcrop.

Habitat: grows on granite outcrops in well-drained areas with skeletal soils, in open shrubland or dense heath with *Acacia*, *Calothamnus* and *Labiichea*.

Selected specimens (10 examined): WESTERN AUSTRALIA, Roe District: Peak Charles, 32°53'S, 121°10'E, *A.S. Weston* 8992, 28.xi.1975 (PERTH); Peak Charles, 32°53'05"S, 121°09'44"E, *S. Barrett* 395, 19.iv.1995 (PERTH); Peak Charles, Peak Charles NP, c. 45 km W of Salmon Gums, 32°52'54"S, 121°09'29"E, *K.R. Newbey* 6438, 10.xi.1979 (CANB, PERTH); Peak Charles, 32°53'12"S, 121°09'53"E, *G.T. Chandler* 779 & *S. Donaldson*, 9.xi.1998 (CANB); large granite outcrop, c. 1 km NW of Peak Charles, 32°52'28"S, 121°08'21"E, *G.T. Chandler* 784 & *S. Donaldson*, 9.xi.1998 (CANB, PERTH).

Toxicity: unknown.

Affinity: it is difficult to confuse *G. acrocaroli* with any other species of *Gastrolobium*, due to the size and shape of the leaves and the large flowers, although some specimens have been identified as *G. parviflorum* in the past. It is easy to tell the difference between these species, as *G. parviflorum* has shorter leaves (10–35 × 3–11 mm) and much smaller flowers (e.g. calyx 4–6 mm long, standard 6.5–8 × 8–10 mm).

12. ***Gastrolobium involutum*** G.Chandler & Crisp, sp. nov. **Type:** Western Australia: Roe District: NW slope of Mt Buraminy, right at the base of the outcrop, 33°13'31"S, 123°07'16"E, *G.T. Chandler* 805 & *S. Donaldson*, 11 Nov. 1998 (*holo:* CANB!; *iso:* AD!, BRI!, K!, MEL!, NSW!, NY!, PERTH!)

Ob folia linearia valde involuta et habitationem circa colles graniticos facile distinguenda. *G. semitereti* similis, quae foliis glaucis, folii superficie superna omnino vel partim visibile, floribus majoribus (calyx ad 9 mm longus, vexillum c. 13 mm latum), aliis carinam non excedentibus et lobis in ambo marginibus, inflorescentia valde villosa differt.

This species is distinctive by its strongly involute, linear leaves and its occurrence around granite outcrops in the far east of south-western Western Australia. It is similar in appearance to *G. semiteres*, which differs in having glaucous leaves, with the upper leaf surface wholly or partially visible, larger flowers (calyx up to 9 mm long, standard c. 13 mm broad), the wings not overlapping the keel and auriculate on both margins and the inflorescence strongly villous.

Etymology: this species is named after the involute leaves.

Erect, spreading *shrubs*, 1.2–3 m high. *Branchlets* ascending, angular, sparsely pubescent. *Petioles* terete, continuous and decurrent with the branchlet, c. 1 mm long. *Leaves* ascending, opposite to scattered, linear, 18–40 × 0.5–1 mm, ± glabrous, venation reticulate; apex truncate, slightly mucronate, slightly recurved; margins involute, with upper surface completely obscured making the leaves appear terete; base tapering into the petiole. *Stipules* erect, minute, <0.5 mm long. *Inflorescences* terminal racemes, 6–14-flowered; *peduncle* angular, 10–20 mm long; *rachis*

angular, 13–45 mm long; *subtending bracts* caducous, somewhat trifid, narrowly triangular, <1 mm long. *Pedicels* terete, 1–1.5 mm long. *Calyx* campanulate, 6–7 mm long, ± glabrous, lobes not recurved; upper 2 lobes united into an almost truncate lip, rounded, c. 2 mm long; lower 3 lobes triangular, obtuse, c. 1.5 mm long. *Corolla: standard* transversely ovate, c. 12 × 11 mm including the 4-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obovate, c. 8 × 3 mm including the 3-mm claw, orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on upper margin only, saccate; *keel* half transversely elliptic, turgid, margins not incurved, c. 6 × 2 mm including the 3-mm claw, pink to maroon, apex rounded, base auriculate, saccate. *Style* long, straight, only the apex is incurved to hooked, scarcely sericeous at base; *ovary* shortly stipitate, shortly sericeous; *ovules* 4–6. *Pod and seed* not seen. (Fig. 8)

Flowering period: June–November. **Fruiting period:** unknown.

Distribution (Fig. 42): south-western Western Australia. Grows in a restricted region on granite outcrops in the area around Mt Buraminy, SE of Norseman.

Habitat: grows at the base of granite outcrops on sandy soils, in woodland or tall shrubland.

Specimens examined: WESTERN AUSTRALIA, Roe District: Mt Andrew, c. 118 km SE of Norseman, 32°40'S, 122°56'E, *K. Newbey* 7784, 23.ix.1980 (CANB, PERTH); 33.5 km N of Mt Buraminy, c. 28 km WNW of Mt Coobaninya, 32°55'S, 123°06'E, *W. Archer* 22099014, 22.ix.1990 (CANB, NSW, PERTH); c. 40 km NW of Mt Ragged, lower slopes of Mt Buraminy, 33°14'S, 123°07'E, *W. Archer* 809908, 8.ix.1990 (CANB, MEL, NSW); *ibid*, *W. Archer* 1606906, 16.vi.1990 (CANB, HO, PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium involutum* is similar in appearance to *G. semiteres*, which differs in having glaucous leaves, the upper leaf surface wholly or partially visible, larger flowers (e.g. calyx up to 9 mm long, standard c. 13 mm broad), the wings not overlapping the keel and auriculate on both margins and the plant is generally more pubescent, particularly the villous inflorescence.

13. ***Gastrolobium graniticum*** (S.Moore) Crisp in Crisp & Weston, *Adv. Legume Syst.* 3: 130 (1987). *Oxylobium graniticum* S.Moore, *J. Linn. Soc. London, Bot.* 34:185 (1899). **Type citation:** 'Viget apud petras graniticas ad Bullabulling, mens. Sept. florescens'. **Type specimens:** *holo:* BM; *iso:* K, NY (part)

Oxylobium kelsoi W.Fitzg., *J. Western Austral. Nat. Hist. Soc.* 1: 4 (1904). **Type citation:** 'The new plant is named after the original discoverer, Mr. E. Kelso, forest officer, stationed at Coolgardie'. **Type specimens:** *lectotype* (here chosen): PERTH (E. Kelso 1902).

Erect, open, *shrubs*, 1–2.5 m high. *Branchlets* ascending, angular, sparsely to moderately pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 5–7 mm

long. *Leaves* spreading, opposite, elliptic to rarely obovate, 48–62 × 19–32 mm, glabrous to sparsely pubescent, venation prominently reticulate, raised; apex rounded, unarmed or slightly mucronate; margins slightly undulate, not recurved; base cuneate. *Stipules* erect, narrowly triangular to hyaline, 2–3 mm long. *Inflorescences* terminal racemes, more than 30-flowered; *peduncle* 5–12 mm long; *rachis* 30–75 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, 2–3 mm long. *Pedicels* terete, 2.5–4 mm long. *Calyx* campanulate, 6–8 mm long, lobes usually recurved, upper lobes sometimes straight, sparsely to densely pubescent; upper 2 lobes united higher than the lower 3, acute to rounded, 2–4 mm long; lower 3 lobes triangular, acute, *c.* 3 mm long. *Corolla: standard* transversely ovate, reflexed, 13–15 × 15.5–16.5 mm including the 4–5-mm claw, yellow-orange with a red ring surrounding the yellow centre, apex shallowly emarginate, base slightly cordate, auriculate; *wings* ovate to obovate, 13–14 × 3.5–5 mm including the 4–5-mm claw, yellow-orange to red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, slightly saccate; *keel* half circular or very broadly elliptic, margins not incurved, 12–13.5 × 4–4.5 mm including the 4–5-mm claw, pink or red, apex obtuse, base auriculate, saccate. *Style* long, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 6 or 7. *Pod* stipitate, ovate to elliptic, 9–14 × 4.5–7 mm, glabrous. *Seed* reniform, 4–4.5 mm long, arillate.

Vernacular name: granite poison.

Flowering period: August and September. *Fruiting period:* from October.

Distribution (Fig. 43): south-western Western Australia. Restricted in distribution, occurring only around the Coolgardie area, with an outlier in a little-explored region south of Merredin.

Habitat: grows around the margins of granite outcrops, particularly along the drainage lines, on sandy soils in open woodland.

Conservation status: IUCN: E. ROTAP: 2ECi. CALM: R. This species is quite rare, though fairly widespread and is considered to be endangered. Two populations were observed during this study that were in reserves, of which one was recovering after what appeared to be a disease affecting the population.

Selected specimens (18 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Coolgardie District: Queen Victoria Rocks, S of Coolgardie, *G.T. Chandler 874 et al.*, 14.ix.1999 (CANB, NSW, UWA); Bullabulling, *C.A. Gardner s.n.*, xi.1948 (CANB, PERTH); Gnamma Hill, *S.D. Hopper 4582*, 14.ix.1985 (PERTH).

Toxicity: highly toxic; fluoroacetate 1240 µg g⁻¹ (Aplin 1971). Gardner and Bennetts (1956) reported that *G. graniticum* is highly toxic at all growth stages.

Affinity: similar to *G. racemosum*, which differs in having a relatively narrower leaf and shorter petiole {leaf size

[(20–)25–46(–60) × (5–)8–13(–35) mm], petiole 4–6 mm long}, a shorter inflorescence with fewer flowers (rachis 25–50 mm long, which is 15–30-flowered), a glabrous inflorescence, standard petal with a distinctive apricot colour and the style equal in length to the ovary, whereas in *G. graniticum* it is longer than the ovary.

14. *Gastrolobium bilobum* R.Br., in W. T. Aiton, *Hortus Kew.* 3: 16 (1811). *Type citation* ‘Nat. of the south-west coast of New Holland. Robert Brown, *Esq. Introd.* 1803, by Mr. Peter Good.’ *Type specimen: lectotype* (here chosen): BM (R. Brown, King Georges Sound, 1801)

Gastrolobium corymbosum Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 249 (1853). *Gastrolobium bilobum* R.Br. var. *angustifolium* Benth., *Fl. Austral.* 2: 107 (1864). *Type citation:* ‘Drumm. V. n. 58’. *Type specimens: holo:* KW; *iso:* BM, K (3 sheets), W.

Bushy, erect shrubs or rarely a small tree, up to 4 m high. *Branchlets* ascending, angular with decurrent ribs, moderately to densely sericeous. *Petioles* terete, continuous and decurrent with the branchlet, 1–5 mm long. *Leaves* spreading to ascending, in whorls of 3 or 4, rarely opposite, cuneiform, obovate or elliptic, sometimes narrowly so (particularly the Stirling Range form), 10–40(–50) × 5–15(–20) mm, upper surface glabrous, lower surface glabrous to sparsely sericeous, venation prominently reticulate; apex emarginate, often appearing bilobed, occasionally almost truncate, unarmed or with a tiny mucro; margins not or scarcely recurved; base cuneate, obtuse or slightly rounded. *Stipules* erect or slightly recurved, hyaline, 2–6 mm long. *Inflorescences* terminal racemes, sometimes terminal on short axillary shoots, flowers very crowded with floral internodes very short (<1.5 mm long), >20-flowered; *peduncle* angular, 1–15 mm long; *rachis* angular, crowded with pedicels, 2–10 mm long; *subtending bracts* caducous, scale-like, entire, linear-lanceolate, 2–3.5 mm long, margins lacerate. *Pedicels* longer than calyx, terete, 5–7 mm long. *Calyx* campanulate, 4–5 mm long including the 0.75–1-mm receptacle, glabrous to sparsely pubescent, upper 2 lobes straight or recurved, lower 3 lobes recurved; upper 2 lobes united higher than the lower 3, triangular, acute, 2–3 mm long; lower 3 lobes triangular, acute, 1.5–2.5 mm long. *Corolla: standard* transversely elliptic to transversely ovate, 6–7 × 7–9.5 mm including the 2–2.5-mm claw, yellow or yellow-orange with a red ring surrounding the yellow centre, apex emarginate, base truncate to slightly cordate; *wings* obovate, 6.5–9 × 2–3 mm including the *c.* 2-mm claws, yellow and orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on upper margin only, rarely auriculate on both, saccate; *keel* half elliptic to transversely elliptic, boat-shaped, margins not incurved, 6.5–8.5 × *c.* 2 mm including the 2–3-mm claw, maroon, apex rounded, base auriculate, saccate. *Style* long, strongly incurved to slightly hooked, pubescent in the lower third; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate,

ovoid, often obliquely so, apex beaked, 7–8 × 3–4 mm, glabrous to moderately pubescent. *Seed* ellipsoid, *c.* 3–3.5 mm long, arillate.

Vernacular name: heart-leaved poison.

Flowering period: August (in the north) to December in the far south. *Fruiting period:* October–January.

Distribution (Fig. 44): south-western Western Australia. This species is found in the Darling Escarpment, east of Perth, south to the Bunbury and Margaret River districts and east through the Albany region and Cape Riche; then there is a curious disjunction to the east, where no collections have been made, until the Esperance area, where it then extends to Cape Arid and inland as far as Mt Beaumont, Mt Heywood and Mt Ridley (all granite outcrops).

Habitat: grows around granite peaks and outcrops and along rivers. Occurs on a variety of soils, but mostly over granite. Vegetation types include karri and marri forest, mallee and heath.

Selected specimens (144 examined): WESTERN AUSTRALIA, Avon District: 4 miles [6.5 km] W of Wagin, 33°19'S, 117°17'E, *T.E.H. Aplin 2831*, 8.xi.1964 (PERTH). Darling District: Upper Helena Valley, 31°56'S, 116°04'E, *J. Seabrook 419*, 23.x.1977 (PERTH); 2 km W of Waterloo to Bunbury, 33°20'S, 115°48'E, *G.J. Keighery 13388*, 24.x.1993 (PERTH); Walpole–Nornalup NP, Pt 235, 35°01'50"S, 116°35'30"E, *A.R. Annels 564*, 14.xii.1988 (PERTH); 13 km W of Kojonup towards Boyup Brook, 33°50'26"S, 117°01'12"E, *G.T. Chandler 738 & S. Donaldson*, 2.xi.1998 (CANB, MO). Eyre District: SE base of Mt Arid, 33°58'53"S, 123°13'40"E, *G.T. Chandler 815 & S. Donaldson*, 13.xi.1998 (CANB, K, MEL, NY, PERTH); High I., Duke of Orleans Bay, 33°54'S, 122°36'E, *P.G. Wilson 8178*, 2.x.1968 (PERTH); Bald I., off Albany, 34°55'S, 118°28'E, *A.R. Main s.n.*, xii.1963 (PERTH); Bakers Spring, eastern Stirling Range, 34°26'S, 118°20'E, *G.J. Keighery 5453*, 19.x.1982 (CANB, PERTH); 3.2 km N of Ellen Peak, Stirling Range, 34°20'S, 118°20'E, *M.D. Crisp 5295*, 19.i.1979 (CANB, PERTH). Roe District: Mt Ridley, 33°18'S, 122°07'E, *H. Demarz D7970*, 13.xii.1979 (PERTH); Mt Beaumont, 33°22'S, 122°41'E, *M.A. Burgman 2401 & S. McNee*, 29.ix.1983 (PERTH).

Toxicity: highly toxic; fluoroacetate 730–2650 (seeds up to 6200) µg g⁻¹ (Aplin 1971; Twigg *et al.* 1996b), probably making *G. bilobum* the most toxic of all species of *Gastrolobium*, although seeds for many species have not been tested.

Affinity: this species bears a close resemblance to *G. tergiversum* and the narrow-leaved Stirling Range form is vegetatively similar to *G. cuneatum*, though the long, open racemes of *G. cuneatum* (75–116 mm long) immediately identify this species, as do the narrower leaves (2.5–10 mm broad) and relatively shorter pedicels (which are shorter than the calyx). *Gastrolobium tergiversum* has light green leaves and orange flowers, as opposed to the dark green leaves and yellow flowers of *G. bilobum*. The most-striking differences, however, occur in the floral structures. *Gastrolobium tergiversum* has an unusual keel, which is barely auriculate and not at all saccate at the base and is long and tapering (*c.* 9.5 × 1.5 mm), the wings do not enclose the keel and the style is not or barely incurved.

15. *Gastrolobium tergiversum* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: Roe District: Base of Mt Ragged, NW side, along track to summit, 33°26'45"S, 123°27'56"E, *G.T. Chandler 812 & S. Donaldson*, 12 Nov. 1998 (*holo:* CANB!; *iso:* AD!, BRI!, K!, MEL!, NSW!, PERTH!)

G. bilobi similis sed foliis dilutis viridibus, floribus aurantiacis, carina vix auriculata non saccata et stylo fere recto differt.

Similar to *G. bilobum*, but differing in the light green foliage, orange flowers, the keel petal, scarcely auriculate and not saccate and the almost straight style.

Etymology: the specific epithet comes from the Latin (*tergi* = back and *versum* = turned about) and refers to the fact that the leaf is concave and paler above, the reverse to most leaves, especially by comparison with the closely related *G. bilobum*, which is paler below and flat to slightly convex.

Slender to open, erect *shrubs*, 1.5–2 m high. *Branchlets* ascending, angular, moderately to densely pubescent. *Petioles* terete, continuous and decurrent with the branchlet, 2–3 mm long. *Leaves* ascending, generally in whorls of 3, occasionally appearing opposite with the third leaf slightly further along the stem and appearing as a separate node, obovate or rarely elliptic, 15–24 × 5–7 mm, glabrous, venation thick on the upper surface and difficult to see, prominently reticulate on the lower surface; apex deeply emarginate, often almost bilobed, unarmed; margins slightly conduplicate or almost flat; base cuneate. *Stipules* inconspicuous, erect, <0.5 mm long. *Inflorescences* terminal racemes, 10–25-flowered, flowers crowded along rachis; *peduncle* angular, 1–3 mm long; *rachis* angular, 5–8 mm long; *subtending bracts* caducous, scale-like, entire, ± ovate, keeled, <1 mm long, moderately pubescent. *Pedicels* terete, 2–3 mm long. *Calyx* tapering to the base, 7–8 mm long including the *c.* 1.5-mm receptacle, moderately sericeous, lobes not recurved; upper 2 lobes united higher than the lower 3, rounded, 2.5–3 mm long; lower 3 lobes triangular, acute, 2–2.5 mm long. *Corolla:* *standard* transversely ovate, *c.* 11 × 9.5 mm including the 3-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obliquely obovate, 11 × 3 mm including the 2.5-mm claws, orange-yellow, red towards the base, apex rounded, not incurved, keel exposed, base barely auriculate on upper surface only, not saccate; *keel* half elliptic, boat-shaped, margins not incurved, 9.5 × 1.5 mm including the 2-mm claws, pink and red, apex acute, base barely auriculate, not saccate. *Style* long, barely incurved, base slightly pubescent; *ovary* stipitate, moderately pubescent; *ovules* 2. *Pod* and *seed* not seen. (Fig. 9)

Flowering period: October–February. *Fruiting period:* unknown.

Distribution (Fig. 45): south-western Western Australia. This species is restricted to Mt Ragged and nearby Gora Hill, in Cape Arid National Park.

Habitat: grows towards the base of outcrops, on sandy soils over granite and quartzite, in mallee heath.

Specimens examined: WESTERN AUSTRALIA, Roe District: Mt Ragged, Cape Arid NP, 33°27'S, 123°28'E, *R.D. Royce 10106*, 5.xii.1971 (PERTH); Mt Ragged, 33°27'S, 123°28'E, *R.A. Kilgour 490*, 31.xii.1984 (MEL, PERTH); *ibid.*, *M. Hislop 1955*, 15.xii.1999 (CANB, PERTH); *ibid.*, *S. Barrett 463*, 26.ix.1995 (PERTH); *ibid.*, *L. Sweedman 3093*, 20.xi.1993 (PERTH); *ibid.*, *A.S. George 2108*, 7.xii.1960 (PERTH); *ibid.*, *L. Cayzer 437 et al.*, 10.ii.1998 (CANB); *ibid.*, *G.T. Chandler 344 et al.*, 10.ii.1998 (CANB, UWA); 10 miles [16 km] SW of Mt Ragged, 33°33'S, 123°22'E, *A.S. George 2051*, 6.xii.1960 (PERTH).

Toxicity: unknown, but as it is related to *G. bilobum*, it is likely to be toxic.

Affinity: *Gastrolobium tergiversum* is similar to *G. bilobum*, but *G. bilobum* has dark green foliage and yellow flowers, as opposed to the light green leaves and orange flowers of *G. tergiversum*. The most obvious differences are in the flower, however, particularly the keel petal, which is relatively much broader in *G. bilobum* (6.5–8.5 × 2–3 mm) and is strongly auriculate and saccate at the base, the wings do not enclose the keel and the style is strongly incurved to slightly hooked, whereas in *G. tergiversum* it is ± straight.

16. *Gastrolobium grandiflorum* F.Muell., *Frag. Phyt. Austral.* 3: 17 (1862). **Type citation:** 'In tractu montano Whithrington Range Australiae borealis. J Macd. Stuart'. **Type specimens:** *holo:* MEL 88464

Gastrolobium grandiflorum F.Muell. var. *luteum* L.R.Kerr, in Ewart, Kerr & Derrick, *Proc. R. Soc. Victoria* 38: 81 (1926). **Type citation:** 'Bonny Well, N.T., 30 m. N. of Wycliffe Well, June, 1924. Not common, F.A.C. Bishop'. **Type specimens:** *lectotype* (here chosen): MEL 566028.

Erect *shrubs*, 0.5–3 m high. *Branchlets* ascending, angular, moderately to densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 3–8 mm long. *Leaves* spreading to ascending, usually opposite, sometimes alternate or whorled, ovate, elliptic or obovate, occasionally narrowly so (34–)49–74 × (15–)23–32 mm, glabrous to moderately sericeous on both surfaces, venation prominently reticulate, raised; apex retuse, rounded or truncate; margins entire, not recurved; base cuneate. *Stipules* erect, hyaline, somewhat rigid, 2–4 mm long. *Inflorescences* terminal racemes, occasionally axillary or on short axillary shoots, 8–20-flowered; *peduncle* (1–)7–10 mm long; *rachis* 14–30 mm long; *subtending bracts* caducous, scale-like, entire, narrowly triangular, c. 5 mm long. *Pedicels* terete, 6–8 mm long. *Calyx* tapering gradually to the base (5–)8–12 mm long, moderately to densely pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, triangular, obtuse to rounded, 3–4 mm long; lower 3 lobes

triangular, acute, 2–3 mm long. *Corolla:* standard transversely broadly elliptic, may be longitudinally folded up, 18–19.5 × 17–18 mm including the c. 4.5-mm claw, red, rarely orange, apex emarginate, base cordate; *wings* obliquely narrowly elliptic, 18.5–19.5 × 4.5–5 mm including the 4–5-mm claw, red, rarely orange, apex rounded, incurved and overlapping to enclose keel, base auriculate on both margins, not saccate; *keel* half broadly elliptic, 17–19 × c. 5 mm including the 4.5–5-mm claw, red, apex obtuse, base auriculate, slightly saccate. *Style* long, slightly incurved, bent at 45° to the ovary, hairs present sparsely at the base, tapering to the apex; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, c. 10 × 5.5–6 mm, sparsely to densely pubescent. *Seed* ellipsoid, 4–5 mm long, arillate.

Vernacular name: wallflower poison.

Flowering period: February–August. **Fruiting period:** April–September.

Distribution (Fig. 46): occurs throughout northern and central Australia, in Western Australia, Northern Territory and Queensland.

Habitat: sandy or gravelly soils, sometimes loamy, in open eucalypt or *Acacia* woodland. Often found along drainage lines in the drier parts of its range.

Selected specimens (80 examined): WESTERN AUSTRALIA, Fortescue District: Pilbara Region, 5 km NW of Munjina Claypan, on Munjina Gorge Ck, 22°34'20"S, 118°45'15"E, *F.H. Mollemans 2332*, 16.ii.1987 (CANB); 20 km S of Mt Brockman Homestead, 22°30'S, 117°15'E, *A.A. Mitchell 365*, 7.vi.1977 (CANB, PERTH). Fitzgerald District: Mt Bell, King Leopold Range, 17°09'S, 125°18'E, *A.S. George 15150*, 18.vi.1978 (CANB, PERTH); Upper plateau on Mt Leake, Kimberly Region, 17°34'S, 126°02'E, *T. Willing 467*, 10.viii.1991 (CANB, PERTH). Keartland District: Little Sandy Desert, 15.5 km ESE of Moffettah Well, 24.5 km S of Cooma Well, 20 km NW of Yanneri Lake, 24°18'25"S, 120°21'22"E, *S. van Leeuwen 1261*, 25.v.1992 (CANB, PERTH). Mueller District: 30 miles [48 km] east of Balgo Mission, Ereman Province, 20°17'S, 128°24'E, *A.R. Peile 19*, 25.iv.1975 (CANB); Gardner Range, 190 km SE of Halls Ck, SE Kimberley, 19°13'24"S, 128°51'10"E, *K. Coate 377*, 6.vii.1995 (BRI, CANB, DNA, PERTH). NORTHERN TERRITORY, Barkly Tableland: Stuart Hwy, c. 2 km from Newcastle Waters turnoff, *G.W. Carr 2654* & *A.C. Beaughole*, 1.vii.1974 (CANB, MEL). Central Australia North: Tanami Gorge, c. 5 km W of Tanami, 19°59'S, 129°40'E, *B.C. Crisp 604*, 8.v.1983 (CANB, MEL); 50 km NE of Curlew Waterhole, 20°16'S, 132°29'E, *P.K. Latz 11516*, 20.vii.1989 (CANB, DNA, MEL, MO, NSW, NT). Victoria Rivers: Beside Stuart Hwy, 70 km N of Tennant Ck, c. 18°45'S, 134°10'E, *N.G. Walsh 1723*, 21.vi.1987 (CANB, MEL, NT). QUEENSLAND, Burke District: 111 miles [177 km] N of Hughenden towards Lynd, c. 19°40'S, 144°15'E, *J. Birbeck 187*, v.1972 (CANB). Cook District: c. 5 km N of Spencer Ck crossing on road to Windsor Tableland, 27°26'S, 153°02'E, *D.L. Jones 4424* & *M.A. Clements*, 27.v.1989 (BRI, CANB, MEL); Watsonville, 17°23'S, 145°19'E, *P.I. Forster 6255*, 24.ii.1990 (BRI, CANB, MEL, MEXU); Davies Ck, 750 m E of falls, 17°00'06"S, 145°35'03"E, *BSW 721*, 12.iv.1998 (BSW, BRI, CANB, NSW). North Kennedy District: about 5 miles [8 km] S of Mt Garnet, 17°55'S, 145°15'E, *S.L. Everist 5483*, 9.v.1954 (BRI, CANB). Mitchell District: Corinda, 27°32'S, 152°59'E, *S.L. Everist 3865*, 4.vi.1949 (BRI, CANB).

Toxicity: fluoroacetate 0–185 µg g⁻¹ (McEwan 1964).

Affinity: *Gastrolobium grandiflorum* is similar in appearance to *G. brevipes*. There is a clear difference between the two, as *G. brevipes* has smaller flowers (standard *c.* 9–14 × 10–15 mm) and deep orange flowers versus the larger, red flowers of *G. grandiflorum*. The gynophore of *G. brevipes* is shorter than the ovary and enclosed within the calyx tube (2–2.5 mm long), whereas *G. grandiflorum* has a gynophore that is longer than the ovary (7–10 mm long) and is exerted from the calyx tube.

17. *Gastrolobium brevipes* Crisp, *Kew Bull.* 38: 11 (1983). *Type citation:* 'Western Australia, Entrance to Glen Cumming, Rawlinson Range, 25°00'S, 128°24'E, A.S. George 12150, 24 July 1974.' *Type specimens:* *holo:* K; *iso:* CANB, NSW, PERTH

Erect *shrubs* up to 2.5 m high. *Branchlets* ascending, angular, moderately to densely sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–5 mm long. *Leaves* alternate, opposite or rarely subternate, obovate to elliptic, usually narrowly so, 20–60 × 6–20 mm, sericeous to glabrous, venation prominently reticulate; apex obtuse to retuse, unarmed; margins flat; base obtuse. *Stipules* erect, hyaline, 2–5 mm long. *Inflorescences* usually terminal racemes, occasionally axillary or on short axillary shoots, 2- to more than 30-flowered; *peduncle* (0–)10–34 mm long; *rachis* (10–)30–70(–210) mm long; *subtending bracts* caducous, mostly scale-like, rarely herbaceous, entire, ovate, *c.* 5 mm long unless herbaceous, in which case they resemble small leaves. *Pedicels* terete, 3–6 mm long. *Calyx* campanulate, 5–7 mm long including the *c.* 1.5-mm receptacle, moderately to densely pubescent; upper 2 lobes united higher than the lower 3, triangular, subacute, *c.* 3 mm long; lower 3 lobes triangular, acute, *c.* 3 mm long. *Corolla:* *standard* very broadly obovate, 9–14 × 10–15 mm, deep orange face with a red ring surrounding the yellow centre, deep red on the back, apex emarginate, base truncate; *wings* narrowly obovate, 10–12 × 2–3 mm including the 3–4-mm claw, dark red, apex rounded, not incurved, not enclosing the keel, base auriculate on the upper margin, rarely auriculate on both, not saccate; *keel* half transversely elliptic, 10–12 × 2–3 mm including the 3–4-mm claw, dark red, apex acute, base auriculate, saccate. *Style* long, incurved, lower half sparsely pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, slightly obliquely ovoid, 7–10 × 4–6 mm, densely pubescent, base enclosed by calyx tube. *Seed* ellipsoid, 3–4 mm long, arillate.

Flowering period: April–August, occasionally into September. *Fruiting period:* August–November.

Distribution (Fig. 47): occurs in central Australia in the state of Western Australia and the Northern Territory, chiefly in the George Gill and MacDonnell Ranges and around Uluru. There is also one old record from Port Hedland, Western Australia, which is quite out of the range of the rest of the specimens.

Habitat: dunefields, dry watercourses and mountain slopes, in sandy gravelly or rocky soils.

Selected specimens (23 examined): WESTERN AUSTRALIA, Giles District: Giles Ck, south of Rawlinson Range, *c.* 25°00'S, 128°25'E, J.B. Cleland *s.n.*, 22.vi.1960 (PERTH); 7 miles [11 km] NE Giles (? Glen Cummins), 24°58'S, 128°25'E, *leg. ign. s.n.* (CANB). NORTHERN TERRITORY, Central Australia South: ± 1 mile [1.5 km] NE of Reedy Rockhole, George Gill Range, 24°18'S, 131°36'E, A.C. Beaglehole 26535, 11.vii.1968 (CANB, MEL); Kings Canyon, George Gill Range, 24°16'S, 131°39'E, J.R. Maconochie 2484, 27.viii.1980 (AD, B, BRI, CANB, K, M, MEL, MO, NSW, NT, PAUH, PERTH); Standley Chasm, MacDonnell Range, 23°43'S, 133°28'E, N.T. Burbidge 4161 & M. Gray, 18.xi.1955 (CANB); Uluru NP, Kata Tjuta (The Olgas), 46.6 km WNW of Range Station, 25°17'S, 131°43'E, M. Lazarides & J. Palmer 454, 14.viii.1988 (CANB).

Toxicity: fluoroacetate 17–99 µg g⁻¹ in the leaves and 56–301 µg g⁻¹ in the pods (Twiggy *et al.* 1999).

Affinity: *Gastrolobium brevipes* is similar in appearance to *G. grandiflorum*. There is a clear difference between the two by the larger (standard *c.* 20 × 18 mm), bright red flowers of *G. grandiflorum* versus the smaller, deep orange of *G. brevipes*. The gynophore in *G. brevipes* is shorter than the ovary and enclosed within the calyx tube, whereas *G. grandiflorum* has a gynophore that is longer than the ovary (7–10 mm long) and is exerted from the calyx tube.

18. *Gastrolobium congestum* G.Chandler & Crisp, *sp. nov.* *Type:* Western Australia: Eyre District: SW slope of East Mount Barren, Hamersley Drive, Fitzgerald River National Park, 33°53'58"S, 119°56'46"E, G.T. Chandler 765 & S. Donaldson, 5 Nov. 1998 (*holo:* CANB!; *iso:* AD!, B!, BRI!, K!, MEL!, MO!, NSW!, NY!, PERTH!)

Oxylobium retusum R.Br. var. *minus* Benth., *Fl. Austral.* 2: 22 (1864). *Nemcia coriacea* (Sm.) Domin var. *minor* (Benth.) Domin, *Preslia* 2: 29 (1923a). *Type citation:* 'Drummond, n. 95 and 4th Coll. n. 20.' *Type specimens:* *lectotype* (here chosen): K (Drummond, 4th Coll. n. 20); *isolecto:* BM, K (2 sheets), W.

A *G. pyramidalis* indumento villosio albo differt. *G. coriaceum* vegetative similis est sed rhachide brevior (usque ad 10 mm longa) et inflorescentia floribus tantum 10–20 differt.

The foliage of *G. congestum* is similar to that of *G. pyramidale*, but has villous white hairs, where *G. pyramidale* has villous, rust-coloured hairs on the stems, underside of the leaves and inflorescence axes. *Gastrolobium coriaceum* is also vegetatively similar to *G. congestum*, but differs in having a shorter rachis (up to 10 mm long) and only 10–20 flowers per inflorescence.

Etymology: this species is named after the densely clustered inflorescence.

Erect *shrubs*, 0.5–2.5 m high. *Branchlets* ascending, angular, moderately to densely villous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–4 mm long. *Leaves* spreading to ascending, opposite, ovate to elliptic or

transversely so to orbicular (14–)18–41 × 20–48 mm, upper surface glabrous or sparsely pubescent, lower surface glabrous to densely sericeous, venation prominently reticulate; apex retuse or rounded, unarmed; margins entire, not recurved; base cordate to rounded. *Stipules* erect, very narrowly triangular to hyaline, 4–7 mm long. *Inflorescences* terminal racemes, somewhat condensed with the flowers crowded to give a head-like appearance, 30- to more than 50-flowered; *peduncle* 4–11(–23) mm long; *rachis* (5–)13–80 mm long; *subtending bracts* caducous, entire, linear-lanceolate, 4–5 mm long. *Pedicels* angular, 4–5 mm long. *Calyx* campanulate, 6–8 mm long including the 1–1.5-mm receptacle, moderately to densely villous, lobes not recurved; upper 2 lobes united higher than the lower 3, triangular, acute to rounded, 2.5–3 mm long; lower 3 lobes triangular, acute, 2–2.5 mm long. *Corolla: standard* transversely elliptic, 10–12 × 12–14 mm including the *c.* 4-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cuneate to truncate; *wings* obovate, 9–10 × 2.5–3.5 mm including the *c.* 3-mm claw, orange to orange-red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins or on the upper margin only, not saccate; *keel* half transversely broadly elliptic, margins incurved, 8–9.5 × *c.* 3 mm including the 3–3.5-mm claw, orange-red to red, apex rounded, base auriculate, saccate. *Style* long, incurved, hairs present in the lower third, tapering to the apex; *ovary* shortly stipitate, densely pubescent; *ovules* 3–5. *Pod* stipitate, ellipsoid to ovoid, 8–11 × 5–9 mm, moderately to densely pubescent. *Seed* reniform to ellipsoid, *c.* 4 mm long, arillate. (Fig. 10)

Flowering period: September–February. *Fruiting period:* October–March.

Distribution (Fig. 48): south-western Western Australia. Occurs along the south coast from Cape Riche to Hopetoun.

Habitat: undulating plains, hillsides or mountain slopes in gravelly sand or sandy loam over laterite, quartz or limestone. Shrubland or heath, with the associated species including *Allocasuarina* spp., *Eucalyptus lehmannii*, *E. preissiana*, *E. tetragona*, *Daviesia*, *Dryandra*, *Hakea*, *Lambertia*, *Lomatia*.

Conservation status: CALM: P2. This taxon is regarded as being poorly known, with further surveys required. It is doubtful that this species is rare and is probably to be found throughout the south coast of SW Western Australia.

Selected specimens (32 examined): WESTERN AUSTRALIA, Eyre District: Cape Riche, 34°37'S, 118°47'E, *D.J. Moir s.n.*, 2.xi.1967 (CANB, PERTH); 1.7 km from Cape Riche towards Wellstead, on Sandalwood Rd, 34°35'29"S, 118°43'46"E, *G.T. Chandler 463 et al.*, 16.ii.1998 (CANB, NSW); Fitzgerald River NP, northern slope of No Tree Hill, *c.* 23.5 km due S of Ravensthorpe, 33°48'S, 120°01'E, *J.M. Fox 86/150 & K. Bradby*, 1.ii.1986 (CANB, PERTH); 4 km N of Hopetoun, 33°55'S, 120°07'E, *M. Blewitt s.n.*, i.1988 (PERTH); road into Cape Riche, 2.6 km from Cape Riche, 34°34'51"S, 118°43'00"E, *R. Davis 2890*, 18.iii.1997 (PERTH); Fitzgerald River NP, Hamersley Drive, 5 km N of track to Hamersley Beach, 33°56'S, 119°56'E,

J. Taylor 1732 & P. Ollerenshaw, 12.ix.1983 (AD, CANB, MEL, PERTH); ravine leading from east into Fitzgerald Inlet, just south of widest part, Fitzgerald River NP, 34°05'S, 119°36'E, *A.S. Weston 6397*, 22.vii.1971 (CANB, PERTH).

Toxicity: unknown.

Affinity: the inflorescence structure of *G. congestum* is very similar to *G. bilobum*, but *G. bilobum* has much smaller leaves, which even when long, are narrow (10–50 × 5–20 mm) and smaller flowers (calyx 4–5 mm long, standard 6–7 × 7–9.5 mm) and strictly two ovules. *Gastrolobium pyramidale* and *G. coriaceum* also look superficially like *G. congestum*, particularly in the vegetative stage. However, *G. pyramidale* has long, rust-coloured hairs on the stems, underside of the leaves and inflorescence axes, whereas *G. congestum* has shorter, white hairs. *Gastrolobium coriaceum* differs in having a shorter rachis (up to 10 mm long) and fewer flowers per inflorescence (10–20).

The *G. parviflorum* subgroup

This group of *Gastrolobium* species belongs with the '*G. bilobum* group', but forms quite a strong clade within this group and is worthy of recognition as it is a very common and distinctive group. This group is characterised by the opposite, usually oblong leaves with recurved to revolute margins and long, terminal racemes with many flowers.

19. *Gastrolobium parviflorum* (Benth.) Crisp, in Crisp & Weston, *Adv. Legume Syst.* 3: 130 (1987). *Oxylobium parviflorum* Benth., in Lindley, *Edwards' Bot. Reg. Append.*: xii (1839), *Callistachys parviflora* (Benth.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891), *Nemcia parviflora* (Turcz.) Domin, *Preslia* 2: 31 (1923). *Type citation:* none cited. *Type specimens:* *lecto* (here chosen): CGE (Swan River, Drummond, 1839); *isolecto:* K (3 sheets)

Erect, bushy *shrubs*, 0.5–2.5 m high. *Branchlets* ascending, angular, moderately sericeous. *Petioles* terete, continuous and slightly decurrent with the branchlet, 2–3 mm long. *Leaves* opposite to subopposite, spreading to ascending, oblong, elliptic or obovate to narrowly or linear, 10–35 × 3–11 mm, upper surface glabrous, lower surface glabrous to densely sericeous, venation openly to thickly reticulate; apex rounded to truncate, emarginate, may be recurved; margins ± flat to slightly undulate, often recurved; base cuneate to rounded. *Stipules* erect, narrowly triangular, 1.5–3 mm long. *Inflorescences* terminal racemes (13–) generally more than 25-flowered; *peduncle* (4–)8–22 mm long; *rachis* 30–65 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, 2–3 mm long, densely pubescent. *Pedicels* terete, 1.5–2.5 mm long. *Calyx* campanulate, 4–6 mm long including the 1–1.5-mm receptacle, glabrous to moderately pubescent, lobes not or slightly recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 2 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla: standard*

transversely ovate, 6.5–8 × 8–10 mm including the 2–2.5-mm claws, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* obovate, 6–7.5 × 2–2.5 mm including the 2–2.5-mm claws, orange and red, apex rounded, incurved and overlapping the keel, base auriculate on the upper margin only, saccate; *keel* half transversely elliptic, margins not incurved, 5.5–6.5 × 2–2.5 mm including the 2–2.5-mm claws, maroon, apex rounded to slightly spout-like, base auriculate, saccate. *Style* about as long as the ovary, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 3 or 4. *Pod* stipitate, obliquely ellipsoid, 7–10 × 3–4.5 mm, glabrous to sparsely pubescent. *Seed* reniform, 2–3 mm long, arillate.

Vernacular name: box poison.

Flowering period: August–October. *Fruiting period*: October–December.

Distribution (Fig. 49): south-western Western Australia. Occurs very commonly throughout the central wheatbelt districts of this region, from around Kalannie in the north to near Hopetoun in the south, with an outlier near Mt Ragged, Cape Arid.

Habitat: grows in a variety of habitats, generally on sandy soils, in heathland, shrubland, mallee woodland or woodland.

Selected specimens (300 examined): WESTERN AUSTRALIA, Avon District: 11 km W of Narrogin towards Williams, 32°58'36"S, 117°04'25"E, *G.T. Chandler 301 & W. Keys*, 22.ix.1997 (CANB, MEL, M); NE corner of Narrogin Agricultural College, 32°58'S, 117°07'E, *T. Higgs s.n.*, 30.xi.1987 (CANB, PERTH); 0.5 km S of Broomehill on Great Southern Hwy, 33°51'00"S, 117°38'37"E, *G.T. Chandler 289 & W. Keys*, 19.ix.1997 (CANB, PERTH); 6.5 km W of Kellerberrin PO on Great Eastern Hwy, 31°37'38"S, 117°39'06"E, *G.T. Chandler 245 & W. Keys*, 15.ix.1997 (AD, CANB, PERTH). Coolgardie District: 0.9 km N on track 18.5 km E of Yellowdine on Great Eastern Hwy, 31°16'40"S, 119°50'28"E, *G.T. Chandler 255 & W. Keys*, 16.ix.1997 (CANB, US). Darling District: Toodyay Rd, 5 km towards Toodyay from intersection with Fernie Rd, 31°38'26"S, 116°23'41"E, *G.T. Chandler 823 & S. Donaldson*, 16.xi.1998 (CANB, NSW, PERTH). Eyre District: 300 m W of Elverdton Rd turnoff on the South Coast Hwy, 33°35'59"S, 120°10'38"E, *G.T. Chandler 269 & W. Keys*, 17.ix.1997 (CANB, PERTH); near Mt Short, c. 15 km N of Ravensthorpe, 33°30'57"S, 120°02'17"E, *G.T. Chandler 921 et al.*, 18.ix.1999 (CANB, NSW, PERTH).

Toxicity: highly toxic; fluoroacetate 150–2500 µg g⁻¹ (Aplin 1971; Twigg *et al.* 1996b; herb specimen *T. Higgs s.n.*, 30 Nov. 1987, CANB 495609 & PERTH), making *G. parviflorum* one of the most toxic species of *Gastrolobium*.

Affinity: similar to *G. discolor*, *G. melanocarpum* and *G. musaceum*. *Gastrolobium discolor* differs by the generally larger leaves (25–50 × 5–10 mm), the longer inflorescence (peduncle 15–45 mm long, rachis 70–110 mm long) and the larger flowers (e.g. standard 10–11 mm broad), as well as the highly discolorous leaves that often have the margins recurved at different levels along the leaf, often causing the basal half to be much broader than the apical half. *Gastrolobium melanocarpum* differs in the highly revolute leaf margins that

leave only the mid-rib visible on the lower surface, the strictly linear leaves (only 1–2 mm broad) and the ovoid pods which are often black in colour. *Gastrolobium musaceum* differs by the generally fewer number of flowers (10–25-flowered) and the much larger flowers (e.g. calyx 6–7 mm long, standard 10–13.5 × 11–13 mm).

20. *Gastrolobium musaceum* G.Chandler & Crisp, sp. nov. *Type*: Western Australia: Eyre District: Cascades Road, 23 km towards Lake King from West Point Road, 33°13'03"S, 120°41'28"E, *G.T. Chandler 937, A. Monro & S. Donaldson*, 19 Sep. 1999 (*holo*: CANB!; *iso*: AD!, NSW!, PERTH!)

Oxylobium parviflorum Benth. var. *stenocarpum* C.A.Gardner in Gardner & Bennetts (1956, p. 54), nom. nud.

G. parvifloro affinis sed inflorescentia floribus paucioribus (10–25), floribus multo majoribus (calyx 6–7 mm longus, vexillum 10–13.5 × 11–13 mm) differt.

Bushy shrubs related to *G. parviflorum*, but differing by having fewer flowers per inflorescence (10–25) and much larger flowers (calyx 6–7 mm long, standard 10–13.5 × 11–13 mm).

Etymology: from the Latin, *Musa*, which is banana. This species is named after the distinctive fruits, which are banana-shaped.

Erect, bushy *shrubs*, 0.5–2 m high. *Branchlets* ascending, ± angular, moderately sericeous. *Petioles* terete, continuous and slightly decurrent with the branchlet, 2–3 mm long. *Leaves* opposite or subopposite, spreading to ascending, linear-oblong to ± narrowly elliptic, 20–45 × 2–4.5 mm, upper surface glabrous, lower surface moderately to densely sericeous, venation openly reticulate; apex unarmed or slightly mucronate, recurved, rounded, ± emarginate; margins recurved; base rounded to truncate. *Stipules* erect, narrowly triangular, *c.* 2 mm long. *Inflorescences* terminal racemes, 10–25-flowered; *peduncle* 7–20 mm long; *rachis* 25–60 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, 1–2 mm long, densely pubescent. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 6–7 mm long including the 1–1.5-mm receptacle, lobes not or scarcely recurved, sparsely to moderately pubescent; upper 2 lobes united higher than the lower 3, acute, *c.* 2 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla*: standard transversely ovate, 10–13.5 × 11–13 mm including the 3–4.5-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* obovate, 10–12.5 × 3–4 mm including the 2.5–4-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half transversely elliptic, margins not incurved, 9–12 × 3–3.5 mm including the 3–4-mm claws, maroon, apex rounded, base auriculate, saccate. *Style* about as long as the ovary, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 4–9. *Pod* stipitate, obliquely

ellipsoid, 7–11 × 3–4 mm, moderately pubescent. *Seed* reniform, *c.* 3 mm long, arillate. (Fig. 11)

Flowering period: August–October. *Fruiting period:* October–December.

Distribution (Fig. 50): south-western Western Australia. Occurs along the south coast of this region, from Jerramungup east to Cape Arid, with a few collections inland around Peak Charles and Moorine Rock.

Habitat: grows on the southern sandplains on undulating dunes and around rivers on sandy soils in shrubland or mallee woodland.

Selected specimens (47 examined): WESTERN AUSTRALIA, Roe District: 4 km along Kumarl Rd from Lake King–Norseman road, *c.* 80 km from Norseman to Lake King, 32°45'09"S, 121°21'54"E, *G.T. Chandler 913 et al.*, 17.ix.1999 (CANB, PERTH). Eyre District: 0.5 km on Elverdton Rd from Hopetoun Rd, 33°37'20"S, 120°08'47"E, *G.T. Chandler 772 & S. Donaldson*, 6.xi.1998 (CANB, MEL); 12 km E of Jerramungup, 33°54'29"S, 119°02'54"E, *M. Hislop 1139*, 27.ix.1998 (CANB, PERTH); 29 km N of Hopetoun towards Ravensthorpe, at intersection with Jerdacuttup Rd, 33°42'09"S, 120°11'18"E, *G.T. Chandler 273 & W. Keys*, 18.ix.1997 (CANB, NSW); *c.* 5–10 km inland from Point Malcolm, 33°47'S, 123°45'E, *R.J. Hnatiuk 761135*, 20.ix.1976 (PERTH).

Toxicity: unknown, but given its affinity to *G. parviflorum*, it is presumed to be toxic.

Affinity: similar to *G. discolor*, *G. melanocarpum* and *G. parviflorum*. *Gastrolobium discolor* differs in the highly discoloured leaves which are much broader (5–10 mm broad), the greater number of flowers per inflorescence (>25-flowered), the longer racemes (peduncle 15–45 mm long, rachis 70–110 mm long) and the smaller flowers (e.g. calyx 4.5–5.5 mm long, standard 7–9 × 10–11 mm). *Gastrolobium melanocarpum* is easily distinguished, as it has highly revolute, linear leaves (1–2 mm broad) and much smaller flowers (e.g. calyx 4.5–5.5 mm long, standard 7–8 × 9.5–10.5 mm). *Gastrolobium parviflorum* generally has broader leaves (3–11 mm broad), more flowers per inflorescence (generally >25-flowered) and much smaller flowers (e.g. calyx 4–6 mm long, standard 6.5–8 × 8–10 mm).

21. *Gastrolobium discolor* G.Chandler, Crisp & R.J.Bayer, sp. nov. *Type:* Western Australia: Roe District: 16.5 km S of Grass Patch on Coolgardie–Esperance Highway, 33°22'21"S, 121°41'20"E, *G.T. Chandler 258 & W. Keys*, 17 Sep. 1997 (*holo:* CANB!; *iso:* MEL!, PERTH!)

Frutices foliis valde discoloribus, saepe super medium angustatis marginibus abrupte recurvis plus quam in dimidio inferno folii, racemis terminalibus longissimis (pedunculus 15–45 mm longus, rhachis 70–110 mm longa). *G. musaceo* et *G. parvifloro* arte affinis sed indumento villosa albo conspicuo distinguenda.

Bushy shrubs with highly discoloured leaves that are often constricted midway along the lamina by the margins suddenly becoming more recurved than the basal half and

very long terminal racemes of flowers (peduncle 15–45 mm long, rachis 70–110 mm long) that have prominent bright white villous hairs, serving to distinguish it from its close relatives *G. musaceum* and *G. parviflorum*.

Etymology: this species is named after the discoloured leaves, with the glabrous upper surface olive green and the densely sericeous lower surface white.

Low, bushy *shrubs*, 0.4–1.5 m high. *Branchlets* ascending, terete to somewhat angular, densely sericeous. *Petioles* terete, continuous and slightly decurrent with the branchlet, 2–3 mm long. *Leaves* spreading to ascending, opposite to subopposite, narrowly oblong, elliptic to narrowly so, or somewhat ovate (when the upper margins are more revolute than the lower margins), 25–50 × 5–10 mm, upper surface glabrous, lower surface densely sericeous, venation prominently reticulate; apex emarginate, occasionally almost bilobed, unarmed or slightly mucronate, recurved to revolute; margins recurved to strongly revolute; base rounded to truncate. *Stipules* ± erect to strongly recurved, linear-triangular, 2–3 mm long. *Inflorescences* terminal racemes, more than 25-flowered; *peduncle* 15–45 mm long; *rachis* 70–110 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, 2–3 mm long, densely pubescent. *Pedicels* terete, 1–3 mm long, densely pubescent. *Calyx* campanulate, 4.5–5.5 mm long including the 0.75–1.25-mm receptacle, moderately to densely pubescent, lobes not or scarcely recurved; upper 2 lobes united higher than the lower 3, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla:* standard transversely ovate, 7–9 × 10–11 mm including the *c.* 2.5-mm claw, deep orange, sometimes with a pinkish tinge, with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* obovate, 7–7.5 × 2.5–3.5 mm including the *c.* 2.5-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, margins incurved, 5.5–6 × 2.5–3 mm including the *c.* 2.5-mm claws, pink and maroon, apex acute, base auriculate, saccate. *Style* long, strongly incurved, base pubescent; *ovary* stipitate, densely pubescent; *ovules* 4. *Pod* stipitate, obliquely ovoid to obliquely ellipsoid, rarely broadly so, 5–8 × 3–3.5 mm, moderately pubescent. *Seed* barely reniform, 2.5–3 mm long, arillate. (Fig. 12)

Flowering period: August–October. *Fruiting period:* November and December.

Distribution (Fig. 51): south-western Western Australia. Occurs mainly in the far east of this region, from the Oldfield River, W of Esperance, east to Mt Buraminya and north to near Norseman, with one outlier near Two Peoples Bay, in the Albany region. This is an old collection and the reliability of the data is unknown.

Habitat: grows near rivers, on undulating dunes or around granite outcrops on sandy or sandy-loam soils, in mallee woodland or mallee heathland.

Selected specimens (27 examined): WESTERN AUSTRALIA, Roe District: near NW base of Mt Buraminia, 33°13'25"S, 123°07'19"E, *G.T. Chandler 806 & S. Donaldson*, 11.xi.1998 (CANB, PERTH); Wittenoom Hills, c. 3 km west of Mt Burdett, 33°27'S, 122°06'E, *A.E. Orchard 1360*, 4.x.1968 (AD, CANB); base of Mt Heywood, 82 km NE of Esperance, 33°19'54"S, 122°32'01"E, *W.R. Archer 210953*, 2.x.1995 (MEL, PERTH). Eyre District: between Two Peoples Bay and Nananup, 34°57'S, 118°05'E, *W. Dennis 864/64*, viii.1964 (PERTH); Lort River area, c. 33°40'S, 121°15'E, *O.I.C. Esperance (R.A. Rose) s.n.*, v.1963 (PERTH); 27 km E of the Oldfield River crossing on the South Coast Hwy, towards Esperance, *G.T. Chandler 265 & W Keys*, 17.ix.1997 (CANB, MO, PERTH).

Toxicity: unknown, but given the relationship to *G. parviflorum*, presumed to be toxic.

Affinity: very similar to *G. musaceum* and *G. parviflorum*. *Gastrolobium musaceum* has narrower leaves (2–4.5 mm broad) that are not strongly discolorous, shorter inflorescence axes (peduncle 7–20 mm long, rachis 25–60 mm long) and larger flowers (e.g. calyx 6–7 mm long, standard 10–13.5 × 11–13 mm). *Gastrolobium parviflorum* generally does not have strongly discolorous leaves (although occasionally there are collections that are strongly discolorous, but these lack other features common to *G. discolor*), shorter inflorescence axes (peduncle 4–22 mm long, rachis 30–65 mm long), a slightly smaller flower (e.g. standard 6.5–8 × 10–11 mm) and lacks the prominent bright white villous hairs on the inflorescence axis that *G. discolor* possesses.

22. *Gastrolobium melanocarpum* G.Chandler & Crisp, sp. nov. *Type*: Western Australia: Roe District: Peak Charles, first saddle on main track, 32°53'15"S, 121°10'05"E, *G.T. Chandler 911, S. Donaldson & A. Monroe*, 17 Sep. 1999 (*holo*: CANB!; *iso*: BRI!, MEL!, PERTH!)

Oxylobium parviflorum Benth. var. *revolutum* C.A.Gardner, in Gardner and Bennetts (1956, p. 54), nom. nud.

Frutices foliis valde revolutis linearibus, solum costa in superficie adaxiali visibili, racemis longis multifloris (>20 floribus, rhachidi 40–100 mm longa). *G. discolori*, *G. musaceo* et *G. parvifloro* arte affinis sed floribus minoribus (calyx 4–5.5 mm longus, vexillum 7–8 × 9.5–10.5 mm longum) differt.

Bushy shrubs with strongly revolute linear leaves with only the midrib visible on the abaxial surface, with long, many-flowered racemes (>20-flowered, rachis 40–100 mm long) and quite small flowers (e.g. calyx 4–5.5 mm long, standard 7–8 × 9.5–10.5 mm), which serves to distinguish it from its close relatives *G. discolor*, *G. musaceum* and *G. parviflorum*.

Etymology: from the Greek, *melano* = black and *carpos* = fruit. This species is named after the fruits, which are often black.

Bushy, erect shrubs, 0.4–1.8 m high. Branchlets ascending, angular, densely sericeous. Petioles terete,

continuous but not decurrent with the branchlet, 2–3 mm long. Leaves spreading to ascending, opposite, linear-oblong, 15–60 × 1–2 mm, upper surface glabrous, lower surface densely sericeous, venation openly reticulate; apex truncate, slightly emarginate, strongly recurved, unarmed or slightly mucronate; margins revolute so that only the midrib is visible on the lower surface; base tapering to petiole. Stipules erect, triangular, 1–2 mm long. Inflorescences terminal racemes, more than 20-flowered; peduncle 11–25 mm long; rachis 40–100 mm long; subtending bracts caducous, scale-like, entire, lanceolate, c. 2 mm long, densely sericeous. Pedicels terete, 1–4 mm long. Calyx campanulate, 4–5.5 mm long including the c. 1-mm receptacle, moderately to densely pubescent, lobes not to slightly recurved; upper 2 lobes united higher than the lower 3, acute, c. 2 mm long; lower 3 lobes triangular, acute, c. 1.5 mm long. Corolla: standard transversely ovate, 7–8 × 9.5–10.5 mm including the 2.5–3-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; wings obovate, 6–7.5 × 2–3 mm including the c. 2.5-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; keel half elliptic, margins not incurved, c. 5.5 × 2.5 mm including the 2–2.5-mm claws, pink and maroon, apex somewhat rounded, base auriculate, saccate. Style about the same length as the ovary, strongly incurved, lower half pubescent; ovary stipitate, densely pubescent; ovules 4. Pod stipitate, ovoid, 6–7 × 3–4 mm, moderately pubescent. Seed slightly reniform, c. 2 mm long, arillate. (Fig. 13)

Flowering period: August–October. *Fruiting period*: October–December.

Distribution (Fig. 52): south-western Western Australia. Occurs in the eastern portion of the southern sandplains, from around Newdegate east to the Norseman area. There are also populations at Moorine Rock and around Bodallin, slightly north of the main range.

Habitat: grows on undulating dunes or around granite outcrops on sand over laterite or granite in open shrubland, dense heathland or mallee woodland.

Selected specimens (40 examined): WESTERN AUSTRALIA, Avon District: 3.8 km S along Stephen Rd from the intersection of a track paralleling the Great Eastern Hwy 5.5 km W of Bodallin, 31°25'04"S, 118°48'08"E, *G.T. Chandler 254 & W. Keys*, 16.ix.1997 (CANB, DNA); 3 km along Ivey Rd from Dulyabin Rd, S of Bodallin, 31°36'01"S, 118°51'11"E, *G.T. Chandler 859 et al.*, 12.ix.1999 (AD, CANB, MEL, NSW, PERTH). Roe District: 6 km NW of Annie Peak, Eyre Range, 33°49'50"S, 119°55'37"E, *K.R. Newbey 11350*, 2.xi.1986 (PERTH); 25 km from Newdegate towards Hyden, 32°50'55"S, 119°03'10"E, *G.T. Chandler 947 et al.*, 19.ix.1999 (CANB, PERTH); 31 km W of main crossroads at Lake King towards Newdegate, 33°05'40"S, 119°21'04"E, *G.T. Chandler 279 & W. Keys*, 18.ix.1997 (CANB, MEL, PERTH); Lake King area, 63 km towards Norseman, 32°58'46"S, 120°16'35"E, *G.T. Chandler 908 et al.*, 17.ix.1999 (AD, CANB, PERTH); Salmon Gums, 32°59'S, 121°39'E, *C.A. Gardner s.n.*, 15.ix.1934 (AD, BRI, CANB, MEL, NSW, PERTH).

Toxicity: unknown, but given its affinity to *G. parviflorum*, it is presumed to be quite toxic.

Affinity: similar to *G. musaceum* and *G. parviflorum*. *Gastrolobium musaceum* has broader leaves (2.5–4 mm broad) that are not highly revolute, with at least half of the lower surface visible at all times, shorter inflorescence axes (peduncle 7–20 mm long, rachis 25–60 mm long) with fewer flowers (10–25-flowered) and much larger flowers (e.g. calyx 6–7 mm long, standard 10–13.5 × 11–13 mm). *Gastrolobium parviflorum* has broader leaves (3–11 mm broad) that are generally only slightly recurved rather than revolute, the rachis is often shorter (30–65 mm long) and the pod is relatively narrower (7–10 × 3–4.5 mm).

23. *Gastrolobium tetragonophyllum* (E.Pritz.) Crisp, in Crisp & Weston, *Adv. Legume Syst.* 3: 130 (1987). *Oxylobium tetragonophyllum* E.Pritz. in Diels & Pritzel, *Bot. Jahrb. Syst.* 35: 226 (1904). *Type citation*: 'In distr. Eyre inter West—et Phillips River in fruticetis praecipue Melaleucis compositis in solo lutoso-arenoso flor. et fruct. m. Oct. (D. 4828)'. *Type specimens*: unknown. The type may have been destroyed when Berlin herbarium was bombed in World War II. *Neotype* (here chosen): Western Australia: Eyre District: N slopes of Mt Short, c. 20 km N of Ravensthorpe, 32°27'32"S, 120°00'04"E, *G.T. Chandler 919 et al.*, 18 Sep. 1999 (CANB!); *isoneo* AD!, NSW!, PERTH!

Bushy, often rounded *shrubs*, 0.3–1.5 m high. *Branchlets* ascending, terete, moderately to densely pubescent. *Petioles* very short, continuous but not decurrent with the branchlet, <0.5 mm long. *Leaves* broadly spreading to strongly deflexed, opposite or in whorls of 3, narrowly oblong to almost square, sometimes slightly incurved, 8–15(–20) × 2–9 mm, upper surface glabrous, lower surface densely pubescent, venation prominently reticulate; apex emarginate, unarmed; margins strongly recurved to reflexed; base truncate to slightly cordate. *Stipules* erect, hyaline, 1.5–3 mm long. *Inflorescences* terminal racemes, 18- to more than 30-flowered, floral internodes 1–2.5 mm; *peduncle* 0.5–8(–25) mm long; *rachis* 15–40 mm long; *subtending bracts* caducous, scale-like, entire to slightly trilobed, lanceolate, 1.5–2 mm long, densely pubescent. *Pedicels* terete, 1.5–2.5 mm long. *Calyx* campanulate, 4.5–5.5 mm long including the 0.5–1-mm receptacle, densely pubescent, lobes all slightly recurved, all lobes with a small, globose tubercle at the apex; upper 2 lobes united higher than the lower 3, obtuse, 1.5–2 mm long; lower 3 lobes triangular, acute, 1.5–2 mm long. *Corolla*: standard transversely elliptic, 7–9 × 7–10 mm including the 2–2.5-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base truncate, may be slightly auriculate; *wings* obovate, 5–7 × 2–3 mm including the 2–2.5-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base

auriculate on both margins, saccate; *keel* half transversely elliptic, 5–5.5 × 2–2.5 mm including the c. 2-mm claws, red or pink and maroon, apex subacute, base auriculate, saccate. *Style* about as long as the ovary, slightly hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 4. *Pod* stipitate, ellipsoid to almost spheroid, 5–6 × 3.5–5 mm, moderately pubescent. *Seed* not seen.

Vernacular name: brother-brother.

Flowering period: August–October. *Fruiting period*: October–November.

Distribution (Fig. 53): south-western Western Australia. Occurs mainly from the Lake King area south to the Ravensthorpe Ranges, with one old collection from Esperance.

Habitat: grows on sandplains or hillslopes, in sand or gravelly laterite in heathland or mallee shrubland.

Selected specimens (28 examined): WESTERN AUSTRALIA, Eyre District: Esperance, 33°50'S, 121°53'E, *O.I.C. Esperance s.n.*, iii.1963 (PERTH); Young River crossing on West Point Rd, 8 km SW of intersection with Cascades Rd, 33°09'S, 120°13'23"E, *G.T. Chandler 943 et al.*, 19.ix.1999 (AD, CANB, MEL, PERTH). Roe District: Lake King area, corner of Norseman Rd and Hogans Rd, 14 km E of Lake King, 33°05'09"S, 119°50'15"E, *G.T. Chandler 904 et al.*, 17.ix.1999 (CANB, MEL, NSW, PERTH); just E of Lake King caravan park, 33°04'59"S, 119°41'24"E, *G.T. Chandler 700 & S. Donaldson*, 28.x.1998 (CANB, MEL).

Toxicity: highly toxic; fluoroacetate 750 µg g⁻¹ (Aplin 1971).

Affinity: this species is similar to *G. parviflorum* and *G. nutans*. *Gastrolobium parviflorum* differs by not having deflexed leaves, the overall leaf shape is generally narrower (10–35 × 3–11 mm) and the racemes have a longer internode between flowers (up to 15 mm). *Gastrolobium nutans* differs in having recurved leaves and strictly two ovules.

III. The *G. villosum* group

Most species within this group have more or less round leaves (except *G. densifolium*, which shares other features with this group), a more or less tomentose inflorescence and large, often membranous stipules (up to 15 mm long).

24. *Gastrolobium villosum* Benth., in Lindley, *Edwards' Bot. Reg. Append.*: xiii (1839). *Type*: none cited. *Type specimens*: *lectotype* (here chosen): K (Swan River, Drummond, 1839); *isolecto*: BM, CGE, E

Low, spreading, rarely trailing *shrubs*, up to 0.3–0.6(–1) m high. *Branchlets* ascending, terete, densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 3–6 mm long, densely pubescent. *Leaves* spreading, opposite, broadly ovate, ovate or ± oblong, 20–45(–60) × 7–25(–35) mm, mature leaf upper surface glabrous, lower surface moderately to densely pubescent, venation openly reticulate; apex broadly rounded, slightly emarginate, often with a small, blunt mucro; margins strongly

undulate; base truncate or slightly cordate. *Stipules* erect, entire, narrowly triangular, membranous, 8–15 mm long, glabrous to sparsely pubescent. *Inflorescences* terminal racemes, more than 30-flowered, sparsely to densely pubescent; *peduncle* usually with a sheath of persistent barren bracts at the base, 15–90 mm long; *rachis* 80–150 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, keeled, 8–10 mm long, moderately pubescent. *Pedicels* terete, 1–2 mm long, pubescent. *Calyx* campanulate, 6–7 mm long including the *c.* 1.5-mm receptacle, moderately pubescent, lobes all reflexed; upper 2 lobes united higher than the lower 3, triangular, acute, *c.* 3 mm long; lower 3 lobes triangular, acute, *c.* 3 mm long. *Corolla: standard* transversely ovate, 11–12 × 13–14 mm including the 3–4-mm claw, deep orange to pale red with a red to pink ring around the yellow centre, apex emarginate, base cordate; *wings* obovate, *c.* 8 × 3 mm including the 2-mm claws, deep orange to pale red, apex rounded, incurved and overlapping to ± enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, *c.* 5 × 2 mm including the 2-mm claw, pink, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* very short, incurved, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, obliquely ellipsoid, 8–9 × 6–6.5 mm, sparsely to moderately pubescent. *Seed* reniform, 4–5 mm long, arillate.

Vernacular name: crinkle-leaved poison.

Flowering period: August–October. *Fruiting period:* October to early December.

Distribution (Fig. 54): south-western Western Australia. Occurs in the Darling escarpment around Perth, north as far as the New Norcia area and inland as far as the area near Dandaragan.

Habitat: grows in the Darling escarpment on gravelly clay, soils, sometimes with a loam component, in woodland or forest.

Selected specimens (80 examined): WESTERN AUSTRALIA, Darling District: 4.8 km NW of Mount Yetar, 31°56'S, 116°27'E, *M.G. Allen* 42, 5.xi.1996 (PERTH); 13 km S of New Norcia, Great Northern Hwy, 31°04'29"S, 116°12'09"E, *G.T. Chandler* 681 & *S. Donaldson*, 25.x.1998 (CANB); 3.8 km towards Calingiri from turnoff on the Great Northern Hwy, 31°10'10"S, 116°11'37"E, *G.T. Chandler* 190 & *W. Keys*, 9.ix.1997 (CANB, MEL, NSW); Jane Brook, Swan View, 31°53'S, 116°03'E, *C.A. Gardner s.n.*, 27.ix.1933 (PERTH); vicinity of Red Hill, near Toodyay, *R. Spjut* 7169 *et al.*, 23.ix.1981 (PERTH); Darling Range, Gleneagle Forest, Kinsella Rd, near Canning Rd, 32°17'S, 116°13'E, *M.D. Corrick* 7848, 21.x.1981 (CANB, MEL, PERTH); 41.8 miles [67 km] NE along Geraldton Hwy, 31°30'S, 116°11'E, *R.J. Garraty* 145, 26.viii.1973 (CANB, PERTH); 8 miles [13 km] E of Karragullen, 32°05'S, 116°15'E, *R.D. Royce* 3853, 6.x.1952 (CANB, PERTH).

Toxicity: fluoroacetate 10–50 µg g⁻¹ (Aplin 1971; Twigg *et al.* 1996b).

Affinity: this species is most closely related to *G. tomentosum*, sharing an undulate leaf with a densely

tomentose lower surface when mature, but *G. tomentosum* can easily be distinguished by the short racemes (peduncle up to 10 mm long; rachis 25–45 mm long) which have smaller flowers (e.g. standard 7.5 × 8 mm) lacking the distinctive keel of *G. villosum* (shared with the *G. floribundum* group). Additionally the leaf shape of *G. tomentosum* is circular or nearly so, whereas *G. villosum* has leaves that are prominently longer than broad.

25. *Gastrolobium densifolium* C.A. Gardner, *J. Proc. R. Soc. Western Austral.* 12: 69 (1926). *Type citation:* 'In the Dudinin district, flowering m. October, 1925 (Gottsch Bros.). Gravelly rises in the Kukerin district, in thickets of *Eucalyptus redunca* var. *elata*, fl. m. Sept.–October (W.E. Blackall and C.A. Gardner, No. 1910). The Type'. *Type specimens:* *holo:* PERTH; *iso:* PERTH (2 sheets)

Low, dense *shrubs* up to 0.7 m high. *Branchlets* ascending to erect, angular, glabrous. *Petiole* extremely short, continuous and decurrent with the branchlet, *c.* 0.5 mm long. *Leaves* ascending, opposite, recurved towards the apex, ovate, elliptic or rarely obovate, 10–16 × 3–4 mm, glabrous, venation prominent or slightly obscured with only the secondary venation showing; apex acute, recurved to hooked, pungent-pointed; margins usually recurved, sometimes flat; base cuneate. *Stipules* erect, prominent, very narrowly triangular to hyaline, partly fused behind the axillary bud, 6–10 mm long, red or sometimes black in colour. *Inflorescences* terminal racemes, 10–15-flowered; *peduncle* 4–7 mm long; *rachis* 12–20 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, margins strongly recurved to reflexed, moderately pubescent, 7–9 mm long. *Pedicels* terete, 1.5–2.5 mm long. *Calyx* campanulate, 6–7 mm long including the 1–1.5-mm receptacle, densely villous, lobes not recurved; upper 2 lobes united scarcely higher than the lower 3, 2–3 mm long, triangular, acute; lower 3 lobes triangular, acute, 2.5–3 mm long. *Corolla: standard* transversely elliptic, 8–9 × 10–11 mm including the 3–3.5-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obovate or oblong, 8–9 × *c.* 3 mm including the *c.* 3-mm claw, orange, apex rounded, not incurved, not enclosing the keel, base auriculate on both margins, not saccate; *keel* half transversely broadly elliptic, *c.* 8 × 3 mm including the *c.* 3-mm claw, maroon, apex obtuse, base auriculate, saccate. *Style* long, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, broadly ellipsoid to almost spherical, 4–5.5 × 3–3.5 mm, moderately to densely pubescent. *Seed* ellipsoid, 2–2.5 mm long, arillate.

Vernacular name: mallet poison.

Flowering period: September and October. *Fruiting period:* November and December.

Distribution (Fig. 55): south-western Western Australia. A rare species, occurring around the Kukerin, Dudinin, Tarin Rock and Dragon Rocks areas.

Habitat: grows on undulating dune areas or sandy soils in mallee heath or mixed shrubland.

Conservation status: ROTAP: 2KC-. CALM: P4. This species is rare and poorly known in its distribution, but is not considered to be at risk.

Specimens examined: WESTERN AUSTRALIA, Roe District: Dudinin, 32°52'S, 117°54'E, C.A. Gardner s.n., 4.xi.1934 (CANB, PERTH); Dragon Rocks Nature Reserve, 2 km S of Mouritz Rd on Buettners Rd, 32°39'S, 118°59'E, R.M. Buehrig 93.12.9(9A), 9.xii.1993 (PERTH); Kukerin, 33°11'S, 118°05'E, A.K. Joyce s.n., 3.ix.1952 (PERTH); E from Kukerin, C.A. Gardner s.n., 3.x.1959 (PERTH); Dragon Rocks Nature Reserve, S of Mouritz Rd, 32°38'S, 119°02'E, A.M. Coates 3366, 26.x.1991 (CANB, PERTH); opposite Tarin Rock siding, 33°06'27"S, 118°13'53"E, G.T. Chandler 532 et al., 19.ii.1998 (CANB, NSW); Tarin Rock, 33°06'29"S, 118°13'56"E, G.T. Chandler 716 & S. Donaldson, 29.x.1998 (CANB).

Toxicity: fluoroacetate not detected (Aplin 1971).

Affinity: this species is very difficult to confuse with any other *Gastrolobium* because of the distinctive recurved leaves with a ± triangular apex and large stipules, which leave a persistent base when the hyaline apex is worn away. The only other species sharing this stipule character is *G. rotundifolium*, which has broader (8–18 mm) undulate leaves.

26. ***Gastrolobium tomentosum*** C.A.Gardner, *Western Austral. Nat.* 4: 186 (1955). **Type citation:** 'In distr. Darling ad Dardadine prope Williams, in collibus glareosis, fl. m. Oct. M.W.H. Moore (Typus)'. **Type specimens:** lecto (here chosen): 'Dardadine, M.W.H. Moore, 23 Sept. 1953' (PERTH); **isolecto:** PERTH

Weak, decumbent, often clumped *shrubs*, up to 1 m high. **Branchlets** trailing, angular, densely villous. **Petioles** terete, continuous but not decurrent with the branchlet, 2–4 mm long, densely villous. **Leaves** spreading, opposite, circular to elliptic, 13–30 × 8–20 mm, mature upper surface glabrous, lower surface densely tomentose, venation reticulate; apex broadly rounded, rarely slightly emarginate, unarmed or with a small, blunt mucro; margins undulate; base obtuse to broadly rounded. **Stipules** erect, membranous, entire, narrowly triangular, 5–8 mm long, more prominent on younger leaves. **Inflorescences** terminal racemes, 10–18-flowered, densely tomentose; **peduncle** often with a sheath of persistent barren bracts at the base, up to 10 mm long; **rachis** 25–45 mm long; **subtending bracts** caducous, scale-like, entire, lanceolate, densely pubescent, 7–8 mm long. **Pedicels** terete, densely pubescent, 1–2 mm long. **Calyx** campanulate, c. 5 mm long including the c. 0.75-mm receptacle, densely tomentose, lobes all reflexed; lobes subequal, upper 2 lobes united scarcely higher than the lower 3, all triangular, acute, c. 3 mm long. **Corolla:** standard transversely ovate, c. 7.5 × 8 mm including the 2-mm claw,

deep orange-maroon on the back, orange-yellow on the front with a red ring surrounding the yellow centre, apex emarginate, base auriculate; **wings** oblong, c. 7.5 × 2.5 mm including the 2-mm claws, orange-yellow and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; **keel** half transversely broadly elliptic, margins not incurved, c. 7 × 3 mm including the 2.5-mm claws, deep maroon to almost black, apex rounded, base auriculate, saccate. **Style** long, strongly incurved, lower half densely pubescent; **ovary** shortly stipitate, densely pubescent; **ovules** 2. **Pod** stipitate, ellipsoid, 6–7 × 4–5 mm, moderately to densely villous. **Seed** reniform, c. 2.5–3 mm long, arillate.

Vernacular name: woolly poison.

Flowering period: August–November. **Fruiting period:** October–December.

Distribution (Fig. 56): south-western Western Australia. Occurs in the areas around Williams and Narrogin, south-east of Perth.

Habitat: grows in woodland or forest, preferring the heavier clay and loam soils of this region, though it sometimes occurs on sandier substrates.

Conservation status: IUCN: V. ROTAP: 2V. CALM: P4. This species is rare and considered to be vulnerable. Much of the region that *G. tomentosum* occurs in has been cleared for logging and farming, leaving little of the native habitat undisturbed. All populations observed in this study were along roadsides, with the populations in some danger of becoming extinct.

Selected specimens (15 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Darling District: between Williams and the Albany Hwy, G.T. Chandler 756 & S. Donaldson, 2.xi.1998 (CANB, MEL, NSW, PERTH); Williams towards Culbin, T.D. Macfarlane 1235, 27.ix.1983 (PERTH); Dardadine towards Williams, G.T. Chandler 755 & S. Donaldson, 2.xi.1998 (CANB, PERTH); NW of Kojonup, C. Lewis s.n., viii.1993 (PERTH).

Toxicity: unknown, but according to Gardner and Bennetts (1956), *G. tomentosum* has been reported to cause some stock losses.

Affinity: this species is similar to *G. villosum*, but the stipules are much larger in the latter (8–15 mm long), as is the raceme (peduncle 15–90 mm long and rachis 80–150 mm long). *Gastrolobium ovalifolium* and *G. glabratum* also resemble *G. tomentosum*, but the mature leaves of both species are glabrous and those of *G. ovalifolium* are not undulate and have thick venation, such that the areoles are reduced to pin pricks.

27. ***Gastrolobium glabratum*** G.Chandler & Crisp, sp. nov. **Type:** Western Australia: Qualen Road, West York, 1.52 km E of Catchment Road at Ref Tree BA 93/1, 32°05'39"S, 116°36'08"E, F. Hort 235, 16 Sep. 1998 (**holo:** PERTH!; **iso:** CANB!)

G. tomentosum similissima sed foliis maturis glabris, rachis paulo longiori differt. *G. ovalifolium* nonnihil similis sed foliis multo tenuioribus venatione aperte reticulata differt.

Very similar to *G. tomentosum*, but *G. tomentosum* has mature leaves that are densely tomentose on the lower surface and a slightly shorter rachis (25–45 mm long). There is also some resemblance to *G. ovalifolium*, but this species has thick, flat leaves with dense venation, such that the areoles are reduced to pin-pricks.

Etymology: named after the nearly glabrous mature leaves.

Weak, decumbent, often clumped shrubs, up to 0.8 m high. *Branchlets* trailing, angular, densely villous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–4 mm long, densely villous. *Leaves* spreading, opposite, circular to elliptic, 10–27(–42) × 12–24(–28) mm, mature leaf glabrous, venation openly reticulate; apex broadly rounded, rarely slightly emarginate, unarmed or with a small, blunt mucro; margins undulate or sometimes almost flat, not recurved; base obtuse to broadly rounded. *Stipules* erect, membranous, triangular, 5–8(–11) mm long, more prevalent on younger leaves. *Inflorescences* terminal racemes, 10–18-flowered, densely tomentose; *peduncle* often with a sheath of persistent barren bracts at the base, up to 5–25 mm long; *rachis* 35–70 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, 7–9 mm long, glabrous. *Pedicels* terete, densely pubescent, 1–2 mm long. *Calyx* campanulate, 5–6 mm long including the 0.75–1-mm receptacle, densely tomentose; lobes all reflexed, subequal, upper 2 united scarcely higher than the lower 3, all triangular, acute, *c.* 3 mm long. *Corolla*: *standard* transversely ovate, *c.* 7–9 × 8–10 mm including the 2-mm claw, deep orange-maroon on the back, orange-yellow on the front with a red ring surrounding the yellow centre, apex emarginate, base auriculate; *wings* oblong, *c.* 7.5–8 × 2.5 mm including the 2-mm claws, orange-yellow and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely broadly elliptic, margins not incurved, 7–8 × 3–4 mm including the 2.5-mm claws, deep maroon to almost black, apex rounded, base auriculate, saccate. *Style* very long, strongly incurved, lower half pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, 6–7 × 4–5 mm, moderately to densely villous. *Seed* reniform, *c.* 2.5–3 mm long, arillate. (Fig. 14)

Flowering period: August–October. *Fruiting period*: from October.

Distribution (Fig. 57): south-western Western Australia. Occurs south of Perth, from West York south to the Williams district and further south to Bridgetown and Manjimup.

Habitat: prefers the heavier clay and loam soils of this region. Occurs in woodland or forest.

Conservation status: IUCN: R. ROTAP: 3R. This species is rare, though it is not considered to be at risk.

Selected specimens (28 examined): WESTERN AUSTRALIA, Darling District: near Quindaning, 33°02'S, 116°34'E, *M.E. Phillips s.n.*, 16.x.1962 (CANB); 39.4 miles [63 km] from Collie towards Williams, *E.M. Canning w.n.*, 1.x.1968 (CANB); Manjimup, 34°15'S, 116°09'E, *R.D. Royce 2730*, 28.ix.1948 (PERTH); 30 km SW of Williams towards Collie, 33°12'S, 116°36'E, *K.J. Atkins 89010*, 25.x.1989 (PERTH); 12 miles [19 km] from Williams towards Perth, *J.W. Wrigley s.n.*, 8.x.1968 (CANB); North Muradup Rd, 30 km W of Kojonup, 33°49'S, 116°57'E, *C. Lewis CML 128*, 8.ix.1995 (PERTH); 88.5 mile peg, Albany Hwy, *T.E.H. Aplin 2822*, 16.x.1964 (PERTH).

Toxicity: unknown.

Affinity: this species is very similar to *G. tomentosum*, but *G. tomentosum* has mature leaves that are densely tomentose on the lower surface and a slightly shorter rachis (25–45 mm long). There is also some resemblance to *G. ovalifolium*, but this species has thick, flat leaves with dense venation, such that the areoles are reduced to pin-pricks.

28. *Gastrolobium ovalifolium* Henfrey, *Gard. Companion Florists' Guide* 1: 41 (1852). *Type citation*: 'New Holland shrub was bloomed ... by Messrs. Henderson, of the Pine Apple Nursery.' *Type*: the plate

Prostrate, spreading shrubs, 0.1 m high. *Branchlets* spreading, terete, densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 2–4 mm long, densely pubescent. *Leaves* spreading, opposite, obovate to ± circular, rarely transversely elliptic, 12–32 × 13–20 mm, mature leaves glabrous, venation reticulate, punctate, much paler on the lower surface; apex usually emarginate, sometimes strongly so, occasionally broadly rounded with a short, blunt mucro; margins entire, not recurved; base obtuse to broadly rounded. *Stipules* erect, triangular, membranous, keeled, 5–8 mm long, moderately villous, more prevalent on younger leaves. *Inflorescences* terminal racemes, 6–18-flowered, densely pubescent; *peduncle* often with a sheath of persistent barren bracts at the base, 10–20 mm long; *rachis* 40–70 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, densely pubescent, 7–8 mm long. *Pedicels* terete, densely pubescent, 1–2 mm long. *Calyx* campanulate, 5–6 mm long including the *c.* 1-mm receptacle, densely pubescent, lobes all reflexed; upper 2 lobes united slightly higher than the lower 3, triangular, acute, *c.* 3 mm long; lower 3 lobes triangular, acute, *c.* 3 mm long. *Corolla*: *standard* transversely ovate, *c.* 7.5 × 8 mm including the 2-mm claw, deep orange-purple on the back, orange-yellow on the front with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* oblong, *c.* 7.5 × 2.5 mm including the 2-mm claws, orange-yellow and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely broadly elliptic, margins not incurved, *c.* 7 × 3 mm including the

2.5-mm claws, deep maroon to almost black, apex rounded, base auriculate, saccate. *Style* very long, strongly incurved, lower half densely pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, broadly ellipsoid, 6–7 × 4–5 mm, moderately to densely villous. *Seed* reniform, c. 3 mm long, arillate.

Vernacular name: runner poison.

Flowering period: August and probably September.

Fruiting period: October.

Distribution (Fig. 58): south-western Western Australia. Occurs mainly in the Narrogin and Williams districts, but there is one record from Kojonup, further to the south.

Habitat: grows on sandy clay soils in wandoo woodland.

Conservation status: IUCN: R. ROTAP: 2RCa. CALM: P4. This species is rare, but is not considered to be at risk.

Specimens examined: due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Darling District: E of Williams, R.D. Royce s.n., x.1958 (PERTH); Narrogin, C.A. Gardner s.n., 31.viii.1934 (CANB, PERTH); Dryandra NP, T.R. Lally 938 & B.J. Lepschi, 15.i.1996 (PERTH); Narrogin area, P. Batt PRB 5-8-93/2, 4.viii.1993 (PERTH); Kojonup, J.M. Flanagan s.n. (PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium ovalifolium* is similar to *G. glabratum* and *G. tomentosum*. *Gastrolobium glabratum* differs in having generally undulate leaves with open reticulate venation on the lower surface, while *G. tomentosum* has densely tomentose mature leaves on the lower surface and has ± glabrous stipules.

29. *Gastrolobium rotundifolium* Meisn., in Lehm., *Pl. Preiss* 2: 216 (1848). *Type citation*: ‘Swan River, Drummond coll: II. No. 99’. *Type specimens*: *holotype* (here chosen): BM; *iso*: G, K × 2, LD

Gastrolobium rotundifolium var. *angustifolium* C.A. Gardner in Gardner & Bennetts, *Toxic Pl. Western Austral.*: 57 (1956). nom. nud. & inval.

Erect, bushy *shrubs*, up to 0.8 m high. *Branchlets* ascending, angular to almost terete, moderately to densely pubescent. *Petiole* terete, continuous and may be slightly decurrent with the branchlet, 1–3 mm long. *Leaves* spreading to ascending, opposite, broadly elliptic, rarely elliptic or linear, 18–26(–32) × 8–18 mm, moderately to densely pubescent when young, moderately pubescent to ± glabrous when older, much paler on the lower surface, venation prominently reticulate; apex obtuse to acute, with a very long and needle-like pungent point; margins crinkled, rarely recurved or reflexed; base obtuse, rarely acute. *Stipules* erect, fused for at least part of their length, membranous, somewhat lacerate, narrowly triangular, 10–15 mm long. *Inflorescences* axillary or terminal racemes, 10–20-flowered, inflorescence axis densely pubescent; *peduncle* 3–7 mm long; *rachis* 10–25 mm long; *subtending bracts* caducous, but persisting until after anthesis,

scale-like, lanceolate, 7–8 mm long, moderately pubescent. *Pedicels* terete, 1–2 mm long, densely pubescent. *Calyx* campanulate, c. 5 mm long including the 0.75-mm receptacle, densely villous, lobes not or slightly recurved; upper 2 lobes united higher than the lower 3, triangular, acute, c. 2 mm long; lower 3 lobes narrowly triangular, acute, c. 2 mm long. *Corolla*: *standard* transversely elliptic, c. 9 × 8 mm including the 3-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base slightly cordate, slightly auriculate; *wings* obovate to oblong, c. 8 × 3 mm including the 3-mm claws, orange-yellow to orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely broadly elliptic, c. 8 × 3 mm including the 3-mm claw, deep maroon, apex obtuse, base auriculate, saccate. *Style* long, hooked, lower half slightly pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, obliquely ellipsoid, 6–7 × 3–4 mm, moderately to densely villous. *Seed* reniform, c. 3 mm long, arillate.

Vernacular name: gilbernine poison.

Flowering period: August and September. *Fruiting period*: from October.

Distribution (Fig. 59): south-western Western Australia. Occurs around Mingenew in the north, south through Watheroo and Calingiri to the areas around Wagin and Narrogin.

Habitat: grows in more open positions on heavier clay or loam soils in wandoo woodland.

Conservation status: ROTAP: 3K. CALM: P1. This species is rare and considered to be at some risk. The population examined in this study was along a local farm access track, in somewhat disturbed woodland surrounded by farms and is probably at some risk in the future.

Selected specimens (16 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Irwin District: E of Watheroo towards Miling, G.T. Chandler 830 et al., 8.ix.1999 (CANB, PERTH, UWA); *ibid*, G.T. Chandler 658 & S. Donaldson, 25.x.1998 (CANB, PERTH); E of Carani, T.E.H. Aplin 2801, 16.ix.1964 (PERTH); NE of Watheroo, J.F. Sampson 425, 14.viii.1989 (PERTH); Tootra, Agric. Adviser Moora, 1.x.1945 (PERTH). Avon District: Highbury, near Wagin, C.A. Gardner s.n., 29.viii.1934 (PERTH).

Notes on variation: there is a form of this species, which Gardner, in Gardner and Bennetts (1956), called *G. rotundifolium* var. *angustifolium* (although this is an invalid name), which has very narrow leaves with revolute margins, so that only the midrib and a very small portion of the abaxial surface is visible (e.g. the cited collection above, from Tootra, near Moora). There is an intermediate specimen (Aplin, 2801, cited above), which has somewhat narrow leaves with a slightly recurved margin that is not as undulate as the more typical form. Further work is required on this species, as it could not be located in the field for this study, to determine whether there are one or two species present.

Toxicity: fluoroacetate 150 µg g⁻¹ (Aplin 1971).

Affinity: this species is difficult to confuse with any other of *Gastrolobium* due to the particularly large stipules, which only *G. densifolium* shares. These two are easily separated, because *G. densifolium* has narrow, non-undulate, non-recurved leaves that are glabrous and are recurved along their length, whereas those of *G. rotundifolium* are straight.

IV. The *G. floribundum* group

This is a group of species with generally broad distributions throughout the central sandplains of south-western Western Australia. They share a distinctive keel shape (found in only two other species related to this group), in which the apex is quite acute and slightly beaked and the lower margin is not entire, having a large hole towards the base through which the stamens are visible and exposed. Also, they have strictly two ovules.

30. *Gastrolobium polystachyum* Meisn., in Lehm., *Pl. Preiss* 2: 217 (1848). *Type citation*: 'Swan River, Drummond coll. II. no. 97'. *Type specimens*: *holo*: NY; *iso*: BM, E, K (2 sheets), LD, W

Oxylobium batillum Hook., *Icones Pl.* 7: t. 612 (1844). *Type citation*: Swan River settlement. Jas. Drummond (suppl. coll. n. 32)'. *Type specimen*: *holo*: K.

Gastrolobium bidens Meisn., *Bot. Zeit.* (Berlin) 13: 29 (1855b). *Type citation*: 'Drumm. Coll. VI. n. 23'. *Type specimens*: *holo*: BM; *iso*: CGE, K, W.

G. polystachyum Meisn. var. *revolutum* C.A. Gardner in Gardner and Bennetts, *Toxic Pl. Western Austral.*: 70 (1956). nom. nud. & inval.

Erect, spreading *shrubs*, up to 1 m high. *Branchlets* spreading to ascending, angular to almost terete, densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, *c.* 0.5–1 mm long. *Leaves* spreading, opposite, oblong to linear, cuneiform, elliptic, or obovate, 5–35 × 7–25 mm, upper surface glabrous, lower surface moderately to densely pubescent, venation prominently reticulate; apex mucronate, recurved, often bilobed, the other angles usually mucronate; margins recurved to reflexed, may or may not be undulate; base obtuse, rounded or almost truncate. *Stipules* erect, hyaline, 3–5 mm long. *Inflorescences* terminal or axillary racemes, 10–30-flowered, flowers closely spaced along rachis; *peduncle* 2–5(–10) mm long; *rachis* 15–50 mm long; *subtending bracts* caducous, scale-like, entire, ovate, 4–6 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 3–3.5 mm long, lobes all reflexed, moderately pubescent; upper 2 lobes united slightly higher than the lower 3, triangular, acute, *c.* 1.5 mm long; lower 3 lobes triangular, acute, *c.* 1.5 mm long. *Corolla*: *standard* transversely elliptic, 5–6 × 7–8.5 mm including the *c.* 2-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obovate, 5–5.5 × 1.5–2 mm including the *c.* 1.5-mm claws, orange and red, apex rounded, incurved and overlapping to

enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, 3.5–4 × 1.5–2 mm including the *c.* 1.5-mm claws, pink and maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* very short, incurved to slightly hooked, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid to ovoid, 5–7 × 4–5 mm, moderately pubescent. *Seed* not seen.

Vernacular names: horned poison; Hill River poison.

Flowering period: July–September. *Fruiting period*: October–December.

Distribution (Fig. 60): south-western Western Australia. Occurs in the northern sandplains to the north of Perth, from Eneabba south through Jurien Bay and Badgingarra to Mogumber and inland as far as Dandaragan.

Habitat: grows on undulating white sand dunes over laterite, or on sandy or gravelly clay over granite, in wandoo woodland, shrubland or heath.

Selected specimens (70 examined): WESTERN AUSTRALIA, Irwin District: 12 km from Three Springs along road to Eneabba, 29°35'S, 115°40'E, *M.D. Crisp 6318 et al.*, 2.x.1979 (CANB, PERTH); Moore River, Mogumber, 31°02'S, 116°02'E, *C.A. Gardner s.n.*, vii.1936 (CANB, PERTH); 6 miles [9.5 km] from Three Springs towards Arrino, *M.E. Phillips WA/68 942*, 14.ix.1968 (CANB); 10.7 km along Badgingarra Rd from North West Rd, towards Dandaragan, 30°29'45"S, 115°36'35"E, *G.T. Chandler 239 & W. Keys*, 13.ix.1997 (BRI, CANB, NSW); 14.5 km on Tootbardie Rd from Brand Hwy, S of Eneabba, 30°07'14"S, 115°30'04"E, *G.T. Chandler 829 et al.*, 8.ix.1999 (CANB); 2.5 km along Tootbardie Rd, N of Badgingarra, 30°08'59"S, 115°23'40"E, *G.T. Chandler 629 & S. Donaldson*, 23.x.1998 (CANB, MEL, PERTH); *ibid*, *G.T. Chandler 635 & S. Donaldson*, 23.x.1998 (CANB). Avon District: 2 km S of New Norcia, 31°00'S, 116°14'E, *M. Fagg 1041*, 26.viii.1979 (CANB).

Notes on variation: the leaves of this species vary considerably and in the past has led to the recognition of two varieties (var. *revolutum* and var. *polystachyum*), with notes made on intermediates in Gardner and Bennetts (1956). The two varieties appear distinct in their extremes, with var. *revolutum* being linear-oblong with a bilobed apex and var. *polystachyum* having more broadly oblong to cuneiform leaves with a somewhat less bilobed apex, often appearing truncate. However, there are a number of intermediates that grade from one form into the other and in fact may be found in one population, even on one plant (e.g. collections made by the senior author along Tootbardie Road, S of Eneabba). Hence, these varieties are not being recognised here.

Toxicity: fluoroacetate 0–10 µg g⁻¹ (Aplin 1971).

Affinity: this species is difficult to confuse with any other *Gastrolobium*, due to the almost unique shape of the leaf combined with the often prominently bilobed apex. However, a population of a particularly long-leaved form of *G. stowardii* (Chandler 828 *et al.*) was found to occur sympatrically with a population of *G. polystachyum* along Tootbardie Road, between Eneabba and Badgingarra. This

population has plants resembling *G. polystachyum* in leaf shape, but the leaves are small. However, *G. stowardii* is easily distinguished from *G. polystachyum*, with inflorescences that are paired in the axils and the flowers have bracts with enlarged middle lobes.

Some specimens with what appear to be juvenile foliage (broadly cuneiform leaves) vaguely resemble the more juvenile forms of *G. diabolophyllum*. However, *G. diabolophyllum* has more robust leaves and has pungent-pointed apices and angles, whereas these juvenile forms of *G. polystachyum* are unarmed. The foliage of *G. polystachyum* also somewhat resembles that of *G. stowardii*, particularly the more narrowly leaved form, but *G. stowardii* is easily distinguished by the smaller leaves and clustered, axillary inflorescences as opposed to the long racemes of *G. polystachyum*.

31. ***Gastrolobium propinquum*** C.A.Gardner, *Western Austral. Nat.* 4: 185 (1955). *Type citation*: 'In distr. Irwin in lutosus glareosis subhumidis, fl. M. Septem. Gardner 12233 (Typus)'. *Type specimens*: *holo*: PERTH; *iso*: PERTH

Low, bushy *shrubs*, 0.5–1(–1.8) m high. *Branchlets* ascending, angular, glabrous. *Petiole* terete, continuous and slightly decurrent with the branchlet, 3–4 mm long. *Leaves* spreading to ascending, in whorls of 3, ovate to elliptic, 17–40(–65) × 6–11(–14) mm, glabrous to slightly glaucous, venation prominently reticulate; apex acute, pungent-pointed or more rarely mucronate; margins conduplicate or rarely ± flat, recurved, margins entire or minutely crenulate; base cuneate. *Stipules* erect, narrowly triangular, 3–5 mm long. *Inflorescences* racemes, terminal or in the upper axils, 1–3 per terminus or axil, 15- to more than 30-flowered; *peduncle* 5–10 mm long; *rachis* 20–120 mm long; *subtending bracts* caducous, scale-like, entire or slightly lacerate, ovate, 4–5 mm long. *Pedicels* terete, 2–3 mm long, becoming nutant at the onset of fruiting. *Calyx* campanulate, 3.5–4.5 mm long including the *c.* 1-mm receptacle, glabrous to sparsely pubescent, upper 2 lobes straight, lower 3 lobes recurved; upper two lobes united into an almost truncate lip, obtuse, *c.* 1.5 mm long; lower 3 lobes triangular, acute, 1–1.5 mm long. *Corolla*: *standard* transversely elliptic, *c.* 5–6 × 6 mm including the 2-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, *c.* 5–5.5 × 2 mm including the 2-mm claw, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, *c.* 4.5 × 2 mm including the 1.5-mm claws, maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* very short, incurved, pubescent in the lower half; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, nutant, obliquely ellipsoid, 5–7 × 3–3.5 mm, sparsely to moderately pubescent. *Seed* ellipsoid or somewhat cuboid, *c.* 3 mm long, arillate.

Vernacular name: Hutt River poison.

Flowering period: June–September. *Fruiting period*: October and November.

Distribution (Fig. 61): south-western Western Australia. Grows mainly in the Northampton and Port Gregory districts, with occasional collections around Mullewa and Isseka.

Habitat: grows on clay, clay-loam or sandy clay soils in mixed shrubland.

Conservation status: ROTAP: 3K. CALM: P1. This species is rare and considered to be in danger. The population examined in this study was found on a highly disturbed roadside.

Selected specimens (24 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Irwin District: between Port Gregory and Northampton, *G.T. Chandler 652* & *S. Donaldson*, 24.x.1998 (CANB, PERTH); Mullewa, *R.D. Royce 7511*, 11.ix.1962 (CANB, PERTH); Yerina Springs Rd, from Port Gregory Rd, *S. Patrick 1975*, 9.viii.1994 (PERTH); Northampton area, *J. Dodd s.n.*, 12.viii.1994 (PERTH); Isseka, *H.W. Jones s.n.*, 20.vi.1953 (PERTH); NW of Northampton, *H.P. Dolling 2*, 9.viii.1989 (CANB, PERTH); NW of Northampton, *Dr Bellairs DRB1*, 29.vii.1989 (PERTH).

Toxicity: unknown.

Affinity: this species has been confused with *G. oxylobioides* in the past, but *G. oxylobioides* has fewer flowers per inflorescence (5–10), the flowers are much larger (e.g. standard *c.* 10 × 14 mm), the keel shape is different, most noticeably lacking a spout-like apex and the lower margin is entire, lacking the hole where the stamens are visible and the calyx is generally more pubescent.

32. ***Gastrolobium diabolophyllum*** G.Chandler, Crisp & R.J.Bayer, sp. nov. *Type*: Western Australia: Avon District: Bodallin, 21 km along Hocking Road, at corner of Dulyabin Road and road to Bodallin, 31°37'29"S, 118°51'12"E, *G.T. Chandler 856*, *A. Monro* & *S. Donaldson*, 12 Sep. 1999 (*holo*: CANB!; *iso*: AD!, BRI!, CANB!, K!, MEL!, NSW!, NY!, PERTH!)

A *Gastrolobii* specibus ceteris foliis obtriangularibus robustis, apice recurvo spinis 3 ferocibus, marginibus recurvis vel revolutis, raceme floribus magnitudine moderata (e.g. rhachis 3–7 mm longa, vexillum 7–8 × 10.5–12 mm) distinguenda.

The robust, obtriangular leaves with 3 fiercely pungent points, recurved to revolute margins and a recurved apex distinguishes this species from all others.

Etymology: from the Greek, *diabolos* = devil and *phyllon* = leaf. Named after the leaves, which have three fiercely pungent-pointed apices.

Erect, open, robust *shrubs*, 0.5–1.5 m high. *Branchlets* ascending, terete, moderately to densely sericeous. *Petioles* terete, continuous but not decurrent with the branchlet,

2–3 mm long. *Leaves* spreading to ascending, opposite, obtriangular to broadly so, rarely shallowly obtriangular, 12–26 × 10–32 mm, glabrous, occasionally somewhat glaucous; venation prominently reticulate, particularly on the upper surface; apex acute, rarely obtuse, recurved, all three angles with pungent points; margins entire, recurved to revolute; base rounded to cuneate. *Stipules* erect, triangular to hyaline, 1.5–2 mm long. *Inflorescences* terminal racemes, 5–10-flowered; *peduncle* 2–11 mm long; *rachis* 3–7 mm long; *subtending bracts* caducous, scale-like, entire to slightly trilobed, ovate, keeled, 3.5–4 mm long, moderately pubescent. *Pedicels* densely pubescent, 1.5–2 mm long. *Calyx* slightly campanulate, *c.* 5 mm long including the 0.75–1-mm receptacle, moderately to densely pubescent, lobes all reflexed; upper 2 lobes united higher than the lower 3 into an almost truncate lip, broadly triangular, 1.5–2 mm long; lower 3 lobes triangular, acute, *c.* 1.5 mm long. *Corolla: standard* transversely ovate, 7–8 × 10.5–12 mm including the 2.5–3-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, 7–7.5 × 2.5–3 mm including the 2.5–3-mm claw, orange, becoming darker towards the base, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely broadly elliptic, turgid, margins incurved, 5.5–6 × 2–2.5 mm including the 2–2.5-mm claw, pink, apex obtuse, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* short, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ovoid, 5–6 × *c.* 3.5 mm, moderately to densely pubescent. *Seed* ellipsoid, *c.* 3 mm long, arillate. (Fig. 15)

Flowering period: September. *Fruiting period:* October.

Distribution (Fig. 62): south-western Western Australia. Known only from one population near Bodallin, along the Great Eastern Highway.

Habitat: Grows on broadly undulating dunes in yellow-brown sand over laterite in open mallee shrubland.

Conservation status: CALM: P1. This taxon is rare, being known only from the type locality, which is located on a roadside reserve in a farming area and is considered to be at risk.

Specimens examined: WESTERN AUSTRALIA, Avon District: 26 km due SW of Bodallin, 31°34'S, 118°43'E, *R.J. Cranfield* 2363, 16.ix.1982 (PERTH); *c.* 24 km SSE of Carrabin (NNE of Noombanderry Rock), 31°35'S, 118°50'E, *A. Strid* 20334, 15–17.ix.1982 (PERTH); 27 km directly S of Bodallin, at intersection of Dulyabin Rd and road to Bodallin, 31°37'30"S, 118°51'13"E, *G.T. Chandler* 559–561 *et al.*, 23.ii.1998 (AD, CANB, MEL, NSW, NY, PERTH); 21 km along Hocking Rd, at intersection of Dulyabin Rd and road to Bodallin, 31°37'30"S, 118°51'13"E, *G.T. Chandler* 691 & *S. Donaldson*, 26.x.1998 (CANB); 21 km along Hocking Rd, at intersection of Dulyabin Rd and road to Bodallin, 31°37'29"S, 118°51'12"E, *G.T. Chandler* 858 *et al.*, 12.ix.1999 (CANB, MEL, PERTH).

Toxicity: unknown.

Affinity: it is almost impossible to confuse this species with any other species of *Gastrolobium*. Superficially, it vegetatively resembles some juvenile forms of *G. polystachyum*, but *G. diabolophyllum* is distinguished by the more robust leaves that are strongly recurved and have three pungent points, whereas the juvenile forms of *G. polystachyum* have weak leaves that are not recurved and are unarmed.

33. *Gastrolobium floribundum* S.Moore, *J. Linn. Soc. London, Bot.* 45: 170 (1920). *Type citation:* 'Nungarin; Stoward, 730'. *Type specimen: holo:* BM

Erect *shrubs*, 0.5–2 m high. *Branchlets* ascending, terete or angular, sparsely to densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 0.5–1.5 mm long. *Leaves* ascending, opposite, elliptic to obovate, may be straight, incurved or recurved, canaliculate (20–)28–41(–83) × 5–10 mm, glabrous, sometimes glaucous, venation prominently reticulate; apex rounded to acute, occasionally retuse, slightly mucronate; margins occasionally recurved; base cuneate. *Stipules* erect, hyaline, 3–4 mm long. *Inflorescences* terminal racemes, rarely axillary, 8–20-flowered; *peduncle* may have what appear to be aborted buds towards the base (3–)9–20(–33) mm long; *rachis* (22–)60–82 mm long; *subtending bracts* caducous, scale-like, entire, triangular, 3–4 mm long. *Pedicels* terete, 1.5–2 mm long. *Calyx* campanulate, 3.5–6 mm long including the *c.* 0.5-mm receptacle, moderately to densely pubescent, lower lobes only recurved; upper 2 lobes united higher than the lower 3, triangular, rounded, *c.* 2 mm long; lower 3 lobes triangular, acute, 1.5 mm long. *Corolla: standard* transversely obovate, 9–9.5 × 11 mm including the 3-mm claw, yellow to orange with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obovate, 6.5–7.5 × 3–3.5 mm including the 2–2.5-mm claw, orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely obovate, turgid, upper margin may be incurved, 5.5–6 × 2.5 mm including the 2-mm claw, maroon, apex spout-like, base auriculate, saccate, with a circular opening near the claws to expose the stamens from below. *Style* short, strongly incurved, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, elliptic to ovate, 4–4.5 × 3.5–4 mm, moderately to densely pubescent. *Seed* not seen.

Vernacular name: wodjil poison.

Flowering period: August–November. *Fruiting period:* from late October.

Distribution (Fig. 63): south-western Western Australia. Widespread in the central sandplain regions, from Caron in the west to Hyden and Marvel Loch in the east.

Habitat: grows on undulating dunes on sandy soils in mallee woodland, shrubland or heath.

Selected specimens (90 examined): WESTERN AUSTRALIA, Avon District: near rabbit-proof fence, E of Bodallin, *T.E.H. Aplin* 5977, 29.viii.1974 (CANB, PERTH); Koorda, 30°50'S, 117°29'E, *W.E. Blackall s.n.*, x.1924 (PERTH); Caron siding, 29°38'S, 116°19'E, *C.A. Gardner* 2692, 20.ix.1931 (CANB, PERTH); 1 mile [1.5 km] N of Bunjil, 29°38'S, 116°22'E, *K. Newbey* 2086, 25.viii.1965 (PERTH); 1.7 km E of Caron, 29°38'S, 116°20'E, *H. Demarz* 8983, 16.ix.1981 (PERTH). Coolgardie District: E of Southern Cross, *F.G. Smith* 1521, 11.ix.1962 (PERTH); 26 km SW of Marvel Loch, *K. Newbey* 9272, 5.x.1981 (PERTH); 45 km N along Southern Cross Rd towards Marvel Loch, from Hyden–Norseman Track, 32°02'14"S, 119°39'02"E, *G.T. Chandler* 893 *et al.*, 16.ix.1999 (CANB, NY); 17 km E of Southern Cross on Great Eastern Hwy, 31°16'30"S, 119°30'07"E, *G.T. Chandler* 882 *et al.*, 15.ix.1999 (CANB, PERTH). Roe District: Middle Ironcap, SE of Hyden, 32°35'S, 119°40'E, *G.J. Keighery* 892, 12.x.1976 (PERTH); c. 1 km SW on Woodcutty Soak Rd, from intersection with Williamson Rd, towards Hyden, 32°11'30"S, 119°05'48"E, *G.T. Chandler* 698 & *S. Donaldson*, 28.x.1998 (CANB).

Toxicity: highly toxic; fluoroacetate 1350 µg g⁻¹ (Aplin 1971).

Affinity: *Gastrolobium floribundum* is very similar to *G. hians*. The flowers of *G. hians* are smaller (standard 7 × 10 mm) and have a glabrous calyx, which in *G. floribundum* is pubescent. Overall, *G. hians* is less hairy than *G. floribundum*.

34. *Gastrolobium glaucum* C.A. Gardner, *J. Proc. R. Soc. Western Austral.* 27: 180 (1942). *Type citation*: 'In distr. Avon prope Wongan Hills, in arenoso lutoso apertis, flor. m. August–Septem. Gardner Sept. 1924'. *Type specimens*: *holo*: PERTH; *iso*: PERTH

Low shrubs, 0.2–1.2 m high. *Branchlets* ascending, terete, densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 1–3 mm long. *Leaves* ascending, opposite or whorled, elliptic to obovate (10–)13–17 × (6–)8–11(–13) mm, glaucous, venation prominently reticulate, raised on both surfaces; apex rounded, recurved, with or without a pungent point; margins entire, not recurved; base rounded to broadly cuneate. *Stipules* erect, hyaline, 3–4 mm long. *Inflorescences* terminal racemes, 8–16-flowered; *peduncle* with a number of apparently aborted buds (5–)8–10 mm long; *rachis* 25–35(–40) mm long; *subtending bracts* caducous, scale-like, entire, ovate 5–7 mm long. *Pedicels* terete, 2–2.5 mm long. *Calyx* campanulate, c. 6 mm long including the 1-mm receptacle, moderately to densely villous, lobes all recurved to reflexed, rarely not recurved; upper 2 lobes united higher than the lower 3, rounded, 2–3 mm long; lower 3 lobes triangular, acute, 1.5–3 mm long. *Corolla*: standard transversely elliptic, 10–11 × 13–14 mm including the c. 3-mm claw, yellow-orange to orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* broadly obovate, 6.5–8 × c. 3.5 mm including the 2–3-mm claw, orange-yellow to red at the

base, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, not saccate; *keel* half transversely ovate, 6–6.5 × c. 3 mm including the c. 2-mm claw, red to maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* very short, incurved, hairs present in the lower half; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, very broadly transversely elliptic to circular, 4–4.5 × 4.5 mm, moderately to densely villous. *Seed* not seen.

Vernacular name: spike poison.

Flowering period: August and September, possibly into October. *Fruiting period*: October and November.

Distribution (Fig. 64): south-western Western Australia. Very rare, occurring only in the Wongan Hills area.

Habitat: grows in sandy, often gravelly soils over laterite in mixed low heath dominated by Proteaceae and *Acacia*.

Conservation status: IUCN: E. ROTAP: 2E. CALM: R. This species is rare and is considered to be endangered, although at least one population that was surveyed in this study is well reserved.

Specimens examined: due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Avon District: near Wongan Hills agricultural farm, *P.H. Brown* 10, 6.x.1989 (PERTH); N of Wongan Hills, *T.E.H. Aplin* 2805, 5.x.1964 (PERTH); Wongan Hills, *C.A. Gardner* 12120, 8.ix.1959 (PERTH); N of Wongan Hills towards Ballidu, *R. Davis* 2004, 14.i.1997 (PERTH); Wongan Hills, *P. Roberts* 162, 7.ix.1983 (PERTH); Wongan Hills to Manmanning, *B.H. Smith* 624, 23.viii.1985 (CANB, HO, MEL, NSW); N of Wongan Hills, near agricultural farm, *J.D. Briggs* 635, 25.ix.1980 (CANB, K, MEL, PERTH); Manmanning towards Wongan Hills, *B.H. Smith* 1355, 21.ix.1990 (CANB, MEL, PERTH); N of Wongan Hills towards Ballidu, *G.T. Chandler* 842 *et al.*, 10.ix.1999 (CANB, PERTH, UWA); *ibid.*, *G.T. Chandler* 543 *et al.*, 21.ii.1998 (CANB); N of Wongan Hills, near Elphin, *B.H. Smith* 1354, 21.ix.1990 (CANB, MEL, S, WAG).

Toxicity: fluoroacetate 200 µg g⁻¹ (Aplin 1971).

Affinity: this species may be confused with *G. hamulosum* and *G. rotundifolium*, although these are easily distinguished, as the leaves of *G. hamulosum* are smaller (6–11.5 × 3–4.5 mm) and have a hooked point, which *G. glaucum* lacks and *G. rotundifolium* has a very long, needle-like, pungent point on the leaf (c. 5 mm long) and much larger stipules (10–15 mm long).

35. *Gastrolobium laytonii* J. White in Ewart, White and Rees, *Proc. R. Soc. Victoria* 23: 111 (1910). *Type citation*: 'Watheroo rabbit-fence, Max Koch, 1905 No. 1337'. *Type specimens*: *holo*: MEL 627584; *iso*: AD, E, PERTH (2 sheets), W

Erect shrubs, up to 3 m high. *Branchlets* ascending, angular to almost terete, moderately pubescent. *Petioles* terete, continuous and slightly decurrent with the branchlet, 2–5 mm long. *Leaves* (note that there is considerable variation in leaf size and shape according to developmental

stages; see notes on variation below; only adult leaves are described here) spreading to ascending, opposite, trullate to rarely obtrullate or rhombic to broadly so or rarely elliptic or obovate, often conduplicate, 29–50 × 10–22 mm, glabrous, rarely glaucous, venation prominently reticulate; apex obtuse to acute, rarely retuse, rounded or truncate, often trilobed, pungent-pointed, mucronate or unarmed; margins flat; base cuneate. *Stipules* erect to recurved, hyaline, 2–8 mm long. *Inflorescences* terminal racemes, 1–3 per terminus, 10–30-flowered; *peduncle* angular, 3–10 mm long; *rachis* 25–55 mm long; *subtending bracts* caducous, scale-like, entire, lacerate or prominently trilobed, narrowly lanceolate, 1.5–3 mm long. *Pedicels* terete, 1.5–3 mm long. *Calyx* campanulate, 3–4 mm long including the *c.* 0.5-mm receptacle, moderately pubescent, upper 2 lobes straight to slightly recurved, united higher than the lower 3, rounded, *c.* 1.25 mm long; lower 3 lobes recurved to reflexed, acute, *c.* 1 mm long. *Corolla: standard* transversely elliptic, 6–7 × *c.* 8 mm including the 2.5-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, 5–6 × 2 mm including the 2-mm claw, orange and maroon, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, *c.* 5.5 × 2 mm including the 2-mm claw, maroon, lighter towards the base, apex acute, spout-like, base auriculate, saccate, with a circular opening at the base to expose the stamens from below. *Style* short, incurved to slightly hooked, ± glabrous; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid to globose, 4.5–8 × 3–4 mm, moderately sericeous. *Seed* scarcely reniform to ellipsoid, *c.* 3 mm long, arillate.

Notes on variation: the leaves of *G. laytonii* show considerable variation between different developmental stages. The juvenile leaves are mainly rhombic or obtrullate, with three prominent angles and are generally quite large, with a dimensional range of 50–75 × 25–30 mm, plus a 5–10-mm petiole. The bracts on adult specimen are also quite variable, with entire and prominently trilobed bracts found on one inflorescence.

Vernacular names: breelya; kite-leaved poison.

Flowering period: June–September. *Fruiting period:* from October.

Distribution (Fig. 65): south-western Western Australia. Occurs throughout the northern sandplains and the goldfields and is often associated with ironstone, from the Wubin area east to the goldfield region around Kalgoorlie.

Habitat: occurs on sand over granite or ironstone in mallee woodland or scrub, or shrubland.

Selected specimens (58 examined). WESTERN AUSTRALIA, Avon District: 30 km W of Cue on W side of Big Bill slime dump, *A.A. Mitchell* 1458, 12.ix.1985 (PERTH); Mt Gibson, 29°34'38"S, 117°09'32"E, *G.T. Chandler* 831 *et al.*, 9.ix.1999 (CANB, MEL, PERTH, UWA); 8 km W of Great Northern Hwy on Paynes Find–Fields Find road, 29°12'S, 117°40'E, *J.W. Green* 5248, 10.ix.1987 (CANB,

PERTH); 6.4 km ENE of Anniversary Bore, Jingemarra Station, 27°48'S, 116°44'E, *R.J. Cranfield* 6079, 15.ix.1987 (PERTH); Latham, 29°45'S, 116°27'E, *D.A. Herbert s.n.*, x.1919, juvenile foliage only (PERTH); 3 m [5 km] N of Latham, 29°42'S, 116°27'E, *J.S. Beard* 7372, 5.xi.1974 (PERTH); 3.5 km along Wanarra East Rd from Mt Gibson towards Perenjori, *G.T. Chandler* 838 *et al.*, 9.ix.1999, with adult and juvenile foliage (CANB, NSW, PERTH). Coolgardie District: Boulder, 30°47'S, 121°29'E, *W.D. Campbell s.n.*, viii.1900 (PERTH); Kathleen Valley, *F. Lullfitz* 2379, 7.ix.1963 (PERTH).

Toxicity: fluoroacetate 500 µg g⁻¹ (Aplin 1971).

Affinity: the distinctive kite-shaped leaves of *G. laytonii* makes it difficult to confuse with any other *Gastrolobium*, although some entire-leaved specimens of *G. laytonii* have been misidentified as *G. graniticum*. However, the leaves of *G. graniticum* are much larger (48–62 × 19–32 mm), as are the flowers (e.g. standard 11–13 mm long).

36. *Gastrolobium microcarpum* (Meisn.) Benth., *Fl. Austral.* 2: 104 (1864). *Gastrolobium oxylobioides* Benth. var. *microcarpum* Meisn., in Lehm., *Pl. Preiss.* 1: 70 (1844). *Type citation:* 'In region interior Australiae meridiona occidentalis, m. Febr. 1841. Herb. Preiss No. 816, 817. (Drummond n. 205.)'. *Type specimens:* lecto (here chosen): BM (Drummond 205); *isolecto:* BM, K (2 sheets), W (2 sheets)

Erect, bushy *shrubs*, 1–2.5 m high. *Branchlets* ascending, angular, moderately to densely pubescent. *Petioles* grooved on the upper surface, continuous but not decurrent with the branchlet, 2–4 mm long. *Leaves* spreading to ascending, in whorls of 3 or 4, elliptic, occasionally conduplicate, occasionally recurved (16–)25–36 × 7–16 mm, glabrous to slightly glaucous, venation prominently reticulate; apex acute, pungent-pointed, rarely mucronate; margins entire, often crenulate, not recurved; base obtuse to cuneate. *Stipules* erect, hyaline, 1–3.5 mm long. *Inflorescences* terminal racemes, rarely branched, 15- to more than 30-flowered; *peduncle* 2–5 mm long; *rachis* 25–60 mm long; *subtending bracts* caducous, scale-like, entire or minutely lacerate, linear-lanceolate, 4–5 mm long, moderately pubescent. *Pedicels* 1–2 mm long. *Calyx* campanulate, 3.5–4.5 mm long including the *c.* 1-mm receptacle, sparsely to moderately pubescent, lobes all straight or lower 3 lobes recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 1.5 mm long; lower 3 lobes triangular, acute, *c.* 1 mm long. *Corolla: standard* transversely elliptic, 8 × 7–8 mm including the 3–3.5-mm claw; orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, occasionally auriculate; *wings* obovate, 6–7 × 2–2.5 mm including the *c.* 2.5-mm claw, red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, 4–5 × 2–2.5 mm including the 1.5–2.5-mm claws, deep red to almost pale white, apex acute, spout-like, base auriculate, saccate, with a circular opening at the base near the claws to expose the stamens from below. *Style* very short, incurved to hooked, pubescent in the lower half; *ovary* stipitate, densely

pubescent; *ovules* 2. *Pod* stipitate, obliquely ellipsoid, 5–7 × 3–4 mm, sparsely to moderately pubescent. *Seed* reniform, c. 3–4 mm long, arillate.

Vernacular name: sandplain poison.

Flowering period: August–October. *Fruiting period*: from November.

Distribution (Fig. 66): south-western Western Australia. Occurs throughout the Darling escarpment, from Bindoon and Clackline south to Dryandra and Narrogin.

Habitat: often found in moist areas on well-drained sandy loam or on sand over granite or laterite, in eucalypt forest, woodland or mallee.

Selected specimens (40 examined): WESTERN AUSTRALIA, Darling District: 59 km from Collie towards Williams, from Williams turnoff, 33°08'45"S, 116°40'19"E, *G.T. Chandler 300 & W. Keys*, 22.ix.1997 (CANB, PERTH); Toodyay, 31°33'S, 116°28'E, *R.D. Royce 4312*, 7.ix.1953 (CANB, PERTH); Wanamal, 31°10'S, 116°03'E, *F. Dewar s.n.*, 15.xi.1950 (CANB, PERTH); Clackline Nature Reserve, 15 km W of Northam, 31°42'S, 116°29'E, *G.J. Keighery 10920*, 20.ix.1988 (PERTH); Dryandra State Forest, NE of Congelin, c. 32°45'S, 117°00'E, *W. Greuter 23189*, 24.x.1991 (PERTH); S of Walebing, c. 30°42'S, 116°13'E, *R.D. Royce 6026*, 14.ix.1959 (PERTH); Clackline, property of H. L. Adams, c. 31°42'S, 116°29'E, *M.E. Carslake s.n.*, 12.ix.1969 (K, MEL, PERTH).

Toxicity: fluoroacetate 0–600 µg g⁻¹ (Aplin 1971).

Affinity: this species has been confused with *G. oxylobioides*, which has fewer flowers per inflorescence (5–10-flowered), larger flowers (calyx 6–7.5 mm long, standard c. 10 × 14 mm) and lacks the distinctive keel-petal of *G. microcarpum*, which has a spout-like apex and a hole towards the base of the lower margin, through which the stamens are visible.

37. *Gastrolobium crassifolium* Benth., *Fl. Austral.* 2: 105 (1864). *Type citation*: 'W. Australia. Drummond, n. 32'. *Type specimens*: *holo*: K; *iso*: K, MEL

Erect, bushy *shrubs*, 0.3–1.5 m high. *Branchlets* ascending, angular, moderately sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 1–2 mm long. *Leaves* ascending, in whorls of 3, occasionally 4, rarely opposite, elliptic, occasionally narrowly obovate, concave, 12–25 × 4–14 mm, glabrous, often glaucous, venation partially obscured, pinnate; apex acute, usually mucronate; margins entire, not recurved; base cuneate or rounded. *Stipules* erect, hyaline, 1–4 mm long. *Inflorescences* terminal racemes, sometimes on short, axillary shoots, 8–30-flowered; *peduncle* 2–10 mm long; *rachis* 20–50 mm long; *subtending bracts* caducous, scale-like, entire, elliptic, 5–6 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 4–6 mm long including the c. 1-mm receptacle, glabrous to sparsely pubescent, lobes not or scarcely recurved; upper 2 lobes united into an almost truncate lip, c. 2 mm long; lower 3 lobes triangular, acute, 1–1.5 mm long. *Corolla*: standard transversely ovate, 7–9 ×

9–11 mm including the 3–4-mm claw, orange-yellow to yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, 5–8 × 2–3 mm including the 2–3-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, 4.5–7 × 1.5–2.5 mm including the 2–3-mm claws, maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* short, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ± spherical, 4–5 × 4–5 mm, sparsely to moderately pubescent. *Seed* ellipsoid to reniform, c. 3 mm long, arillate.

Vernacular name: thick-leaved poison.

Flowering period: July–December. *Fruiting period*: from late October to December.

Distribution (Fig. 67): south-western Western Australia. Common in the southern-central sandplain and salt-lake areas, from Lake Grace south to Ongerup and Pingrup and east to Frank Hann National Park and Cascade.

Habitat: grows on undulating dunes or flat plains on brown or yellow sand, sandy clay or sandy loam, in *Eucalyptus* or *Allocasuarina* shrubland or heath.

Selected specimens (59 examined): WESTERN AUSTRALIA, Coolgardie District: 17.5 km on Mt Day–Marvel Loch road from Hyden–Norseman track, towards Marvel Loch, 32°06'58"S, 12°19'30"E, *G.T. Chandler 898 et al.*, 16.ix.1999 (CANB, K, NSW, PERTH). Eyre District: Cascades Rd, intersection with Lake King–Norseman Rd, 33°04'45"S, 120°05'27"E, *G.T. Chandler 944 et al.*, 19.ix.1999 (CANB, PERTH); Fitzgerald River NP, Colletts Rd near Fitzgerald River, 34°05', 119°31'E, *P.E. Conrick 1680*, 29.ix.1983 (AD, PERTH). Roe District: Wishbone Railway siding, 100 m N of railway line, 33°12'S, 117°51'E, *J.D. Briggs 676*, 28.vii.1980 (CANB, MEL, PERTH); 8 km from Lake King towards Norseman, 33°05'13"S, 119°46'12"E, *G.T. Chandler 945 et al.*, 19.ix.1999 (CANB, K, NSW, NY, PERTH); 1 mile [1.5 km] W of Ongerup, 33°58'S, 118°28'E, *T.E.H. Aplin 2819*, 16.x.1964 (CANB, PERTH); Tambellup, 34°01'S, 117°38'E, *G.K.B. Hay s.n.*, 19.ix.1923 (CANB, PERTH); Tieline Rd, between Moore Dam and Parker Rds, Gnowangerup, 33°56'S, 119°59'E, *E.J. Croxford 4830*, 17.ix.1986 (PERTH).

Toxicity: fluoroacetate 150 µg g⁻¹ (Aplin 1971).

Affinity: this species resembles *G. velutinum* and *G. floribundum*. *G. floribundum* can easily be distinguished by the leaf size [(20–)28–41(–83) × 5–10 mm], while *G. velutinum* generally has a notch in the leaf apex, which *G. crassifolium* lacks. Also, *G. floribundum* is distinguished by the open, coarse venation, whereas *G. crassifolium* has fine and obscure venation. *Gastrolobium venulosum* can also be confused with *G. crassifolium*, but *G. venulosum* has a relatively broader leaf (20–27 × 4–7 mm) with prominently open, reticulate venation, whereas *G. crassifolium* has somewhat obscured venation. Also, *G. venulosum* lacks the distinctive keel shape of *G. crassifolium* and the rest of the *G. floribundum* group, because its spout-like apex is not as acute and the lower margin is entire.

38. *Gastrolobium hians* G.Chandler & Crisp, sp. nov. *Type*: Western Australia: Roe District: 25.5 km along New Norseman–Hyden Road (turn 10 km N of Norseman), 32°11'06"S, 121°27'57"E, G.T. Chandler 868, A. Monro & S. Donaldson, 14 Sep. 1999 (*holo*: CANB!; *iso*: AD!, B!, BRI!, K!, MEL!, NSW!, NY!, PERTH!)

G. floribundo similissima sed facie glabrata, calyce glabro et floribus minoribus (vexillum 7 × 10 mm) differt.

Very similar to *G. floribundum*, but differing in the generally less pubescent appearance, glabrous calyx and smaller flowers (standard 7 × 10 mm).

Etymology: this specific epithet means open-mouthed or gaping and refers to the fruits of this species, which appear to be gaping when fully open.

Erect, ± glaucous *shrubs*, 0.7–1.7 m high. *Branchlets* ascending, angular, glabrous. *Petioles* terete, continuous and sometimes decurrent with the branchlet, 3–5 mm long. *Leaves* ascending, opposite, linear very narrowly elliptic to obovate, canaliculate, 32–60 × 5–8 mm, glabrous, ± glaucous, venation somewhat obscured; apex rounded, mucronate; margins may be slightly recurved; base cuneate. *Stipules* erect, hyaline, 1.5–4.5 mm long. *Inflorescences* terminal racemes, rarely axillary, with 28 or more flowers; *peduncle* with a series of apparently aborted buds towards the base, 4–10 mm long; *rachis* (20–)35–65 mm long; *subtending bracts* caducous, scale-like, entire, triangular, 3–4 mm long. *Pedicels* terete, 2–3 mm long. *Calyx* campanulate, 4.5–5 mm long including the c. 1-mm receptacle, glabrous; upper 2 lobes not recurved, united higher than the lower 3, triangular, acute, c. 2 mm long; lower lobes recurved, triangular, acute, c. 1.5 mm long. *Corolla*: *standard* transversely elliptic, c. 7 × 10 mm including the 3-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obovate, 6.5–7 × c. 3 mm including the 2-mm claw, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, slightly saccate; *keel* half transversely broadly elliptic to circular, upper margins slightly incurved, 6–6.5 × c. 2 mm including the 2-mm claw, maroon, apex rounded, lipped, base auriculate, saccate, with a circular opening at the base to expose the stamens. *Style* short, incurved, glabrous or slightly pubescent in the lower quarter; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, elliptic, 5–7 × 3.4 mm, glabrous. *Seed* not seen. (Fig. 16)

Flowering period: September. *Fruiting period*: October and November.

Distribution (Fig. 68): south-western Western Australia. Little is known about this species and it is only known from just west of Norseman, along the New Norseman–Hyden track.

Habitat: grows on sandplains on sandy loam or clay soils in *Acacia* or *Allocasuarina* shrubland.

Specimens examined: WESTERN AUSTRALIA, Coolgardie District: 25.5 km along New Norseman–Hyden road (turn 10 km N of Norseman), 32°11'06"S, 121°27'57"E, G.T. Chandler 869–871 *et al.*, 14.ix.1999 (CANB, MEL, MO, NSW, PERTH, UWA); 31 km W of Norseman, K. Newbey 6301, 6.xi.1979 (PERTH).

Toxicity: unknown, but as it is closely related to *G. floribundum*, it is probably toxic.

Affinity: this species is very similar to *G. floribundum*, which has larger flowers (standard 9 × 11 mm) and a pubescent calyx, whereas the calyx of *G. hians* is glabrous. The general lack of hairs on *G. hians* compared with *G. floribundum*, helps to distinguish these two species.

39. *Gastrolobium pycnostachyum* Benth., *Fl. Austral.* 2: 103 (1864). *Type citation*: 'W. Australia. East Mount Barren, Maxwell'. *Type specimens*: *holo*: K; *iso*: K, MEL (2 sheets)

Low *shrubs*, up to 1 m high. *Branchlets* ascending, angular, moderately sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–3 mm long. *Leaves* spreading to ascending, opposite to rarely scattered, obovate, elliptic to almost oblong to broadly so, partially conduplicate, 11–22 × 11–14 mm, glabrous, venation prominently reticulate; apex rounded to truncate, emarginate; margins entire, not recurved; base obtuse, truncate, or slightly cordate. *Stipules* erect, narrowly triangular to hyaline, 2–3 mm long. *Inflorescences* terminal racemes, 15–30-flowered; *peduncle* 3–7 mm long; *rachis* 7–12 mm long; *subtending bracts* caducous, scale-like, entire or minutely lacerate, ovate, 5–6 mm long. *Pedicels* terete, 2–3 mm long. *Calyx* campanulate, 3.5–4 mm long including the c. 1-mm receptacle, moderately pubescent, all lobes recurved; upper 2 lobes united higher than the lower 3, acute, c. 1.5 mm long; lower 3 lobes triangular, acute, 1–1.5 mm long. *Corolla*: *standard* transversely elliptic, 6 × 7 mm including the 2-mm claw, orange or orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, 6 × 2.5 mm including the 2-mm claw; orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, 6 × 2.5 mm including the 2-mm claws, maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* very short, incurved, pubescent in the lower half; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ovoid to ellipsoid, 6–7 × 3–4 mm, moderately to densely pubescent. *Seed* reniform, 2–3 mm long, arillate.

Vernacular name: mount ragged poison; round-leaved poison.

Flowering period: August–October, with a rare, probably opportunistic, flowering event in January. *Fruiting period*: from late October.

Distribution (Fig. 69): south-western Western Australia. Restricted to the area around Mount Ragged, in Cape Arid National Park, east of Esperance.

Habitat: grows on rocky outcrops or the sandplain immediately around them, on shallow sand over sandstone or red clay in mallee woodland or mixed low heath.

Selected specimens (13 examined): WESTERN AUSTRALIA, Roe District: base of Mt Ragged, NW side, along track to summit, 33°26'45"S, 123°27'56"E, *G.T. Chandler 811 & S. Donaldson*, 12.xi.1998 (CANB); base of Mt Ragged, *T.E.H. Aplin 4310*, 19.x.1970 (CANB, PERTH); Cape Arid NP, near Tower Peak, 33°27'S, 123°26'E, *R. Borough 2*, 1.ix.1978 (CANB, PERTH); Mt Ragged NP, 33°27'S, 123°27'E, *J. Taylor 1544 & P. Ollerenshaw*, 8.ix.1983 (AD, CANB, MEL, MO, PERTH); Mt Ragged Range, 2.5 km S of Tower Peak, 33°28'S, 123°28'E, *M.D. Crisp 4811*, 6.i.1979 (CANB).

Toxicity: fluoroacetate 175 µg g⁻¹ (Aplin 1971).

Affinity: the low habit and restricted distribution of this species makes it difficult to confuse with any other species of *Gastrolobium*. The leaves resemble those of *G. crassifolium*, as they are somewhat conduplicate, but those of *G. crassifolium* are generally narrower (4–14 mm broad) and glaucous and the rachis is longer (20–50 mm long).

40. *Gastrolobium parvifolium* Benth. in Lindley, *Edwards' Bot. Reg. Append.*: xiii (1839). *Type citation*: none cited. *Type specimens*: lectotype (here chosen,): K (Swan River, 5th Coll., Drummond, 1839); *isolecto*: BM, CGE

Low, bushy to spreading *shrubs*, 0.4–0.8 m high. *Branchlets* ascending, ± terete, moderately pubescent. *Petioles* very small, continuous and slightly decurrent with the branchlet, <0.5 mm long. *Leaves* ascending to erect, in whorls of 3, crowded along stems such that the leaf base is obscured by the apex of the leaf below, obovate to narrowly so, 4–15 × 2–5 mm, glabrous, glaucous, venation reticulate; apex ± truncate, may be slightly recurved, mucronate; margins not recurved, flat or slightly conduplicate; base rounded. *Stipules* erect or slightly recurved, hyaline, 1–2.5 mm long. *Inflorescences* terminal racemes, 21–33-flowered; *peduncle* 2–10 mm long; *rachis* 20–45 mm long; *subtending bracts* caducous, scale-like, entire, boat-shaped, 6–10 mm long, glabrous, except the margin which has curly hairs. *Pedicels* terete, nutant as flower ages, 1–2 mm long. *Calyx* campanulate, 4.5–5.5 mm long including the 0.5–0.75-mm receptacle, glabrous; upper 2 lobes not recurved, united into an emarginate, truncate lip, obtuse, *c.* 2 mm long; lower 3 lobes strongly recurved, triangular, acute, *c.* 1.5 mm long. *Corolla*: standard transversely ovate, *c.* 8.5 × 10.5 mm including the 3-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, slightly auriculate; *wings* obovate, *c.* 7 × 3 mm including the 2.5-mm claws, orange to pink, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, *c.* 5.5 × 2.5 mm including the 2-mm claws, pink or maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* short, incurved, lower half pubescent; *ovary* shortly stipitate,

densely pubescent; *ovules* 2. *Pod* shortly stipitate, globose, *c.* 5 × 5 mm, glabrous. *Seed* reniform, *c.* 4 mm long, arillate.

Vernacular name: berry poison.

Flowering period: August–October. *Fruiting period*: October and November.

Distribution (Fig. 70): south-western Western Australia. Occurs from Tammin and Kellerberrin in the west, to Hyden in the east and south to the Brookton area.

Habitat: grows on sand or gravel in mallee shrubland and heathland.

Selected specimens (55 examined): WESTERN AUSTRALIA, Roe District: 19.7 km ENE of East Hyden Bin Rd on Hyden–Lake King road, *c.* 20 km ENE of Hyden, 32°31'14"S, 119°02'12"E, *T.R. Lally 1143 & B.J. Lepschi*, 11.viii.1996 (CANB, PERTH). Avon District: 1.2 km SW Mount Billy, 31°57'S, 116°26'E, *M.G. Allen 899*, 13.xi.1996 (PERTH); W section of Tammin Reserve, 31°40'S, 117°32'E, *R.A. Saffrey 209*, 17.x.1967 (PERTH); 30 km NW of Corrigin, 32°25'S, 118°03'E, *P.E. Conrick 1557*, 19.ix.1983 (AD, PERTH); 69 mile peg, Kelmscott–Brookton road, *T.E.H. Aplin 2812*, 12.x.1964 (PERTH); 21.5 km NNE of Quairading along road to Cunderdin, 31°50'S, 117°19'E, *M.D. Crisp 6616*, 20.vii.1980 (CANB, MEL).

Toxicity: fluoroacetate 300 µg g⁻¹ (Aplin 1971).

Affinity: this species most closely resembles *G. hamulosum*, but can be distinguished by *G. hamulosum* having a pungent, hooked apex on the leaf and the leaves not crowded along the stem.

41. *Gastrolobium velutinum* Lindl. in Lindley & Paxton, *Paxtons Flower Gard.* 3: 76 (1852). *Type citation*: 'A handsome Swan River greenhouse shrub ... Introduced by Messrs. I. and A. Henderson'. *Type specimen*: *holo*: CGE

Gastrolobium emarginatum Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 273 (1853). *Type citation*: 'Drum. V. n. 51'. *Type specimens*: *holo*: KW; *iso*: BM, E, K (3 sheets).

Low, bushy *shrubs*, up to *c.* 1 m high. *Branchlets* ascending, angular, moderately pubescent. *Petioles* terete, continuous and somewhat decurrent with the branchlet, 1–2 mm long. *Leaves* spreading to ascending, in whorls of 3, cuneate to oblong, 7–18 × 2.5–8 mm, upper surface ± glabrous, lower surface glabrous to densely pubescent, venation prominently reticulate; apex emarginate, unarmed, may be scarcely recurved; margins scarcely to strongly recurved; base rounded to truncate. *Stipules* erect, hyaline, 0.5–1.5 mm long. *Inflorescences* terminal racemes, 15–30-flowered; *peduncle* with or without apparently aborted buds, 5–20 mm long; *rachis* 15–25 mm long; *subtending bracts* caducous, scale-like, entire, boat-shaped, 6–7 mm long, moderately pubescent. *Pedicels* terete, 1.5–2 mm long. *Calyx* campanulate, 4–4.5 mm long including the *c.* 0.75-mm receptacle, moderately to densely pubescent; upper 2 lobes scarcely to strongly recurved, united higher than the lower 3, rounded, *c.* 2.5 mm long; lower 3 lobes reflexed, triangular, acute, *c.* 2 mm long. *Corolla*: standard transversely ovate, 7.5–9 × 9–11 mm

including the 2.5–3-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, may be auriculate; *wings* obliquely elliptic, *c.* 6 × 2.5 mm including the 2-mm claws, pink, apex rounded, incurved and overlapping to enclose the keel, base strongly auriculate on both margins, saccate; *keel* half very broadly elliptic, 4.5–5 × 2 mm including the 1.5-mm claws, pink to maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* very short, hooked, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ovoid, 5.5–6.5 × 3.5–4 mm, moderately pubescent. *Seed* not seen.

Vernacular name: white gum poison; Stirling Range poison.

Flowering period: August–October. *Fruiting period:* October and November.

Distribution (Fig. 71): south-western Western Australia. Occurs mainly in and around the Stirling Range, extending south and west to the Albany region.

Habitat: grows on slight mountain slopes, flats or periodically inundated depressions on clay-loam or sandy clay, in marri woodland or mallee woodland.

Selected specimens (50 examined): WESTERN AUSTRALIA, Eyre District: SW edge of Stirling Range, E of Tenterden, 34°22'S, 117°35'E, *T.E.H. Aplin* 2825, 22.x.1964 (CANB, PERTH); 10.5 km from Mt Barker towards Porongurup, 34°38'40"S, 117°46'41"E, *G.T. Chandler* 293 & *W. Keys*, 20.ix.1997 (BRI, CANB); intersection of Red Gum Pass Rd and Salt River Rd, Stirling Range, 34°18'53"S, 117°47'30"E, *G.T. Chandler* 295 & *W. Keys*, 21.ix.1997 (CANB, NSW); the Pass, 27 km NE of Denmark, 34°17'39"S, 117°34'30"E, *A.R. Annels* 1933, 13.xi.1991 (PERTH); 11.2 km along Stirling Range Drive from Red Gum Pass turnoff, 34°24'S, 117°53'E, *M.D. Crisp* 8502 & *W. Keys*, 25.ix.1993 (CANB, GAUBA, PERTH, UWA).

Toxicity: fluoroacetate 300 µg g⁻¹ (Aplin 1971).

Affinity: this species may be confused with *G. cuneatum*, which has a similar leaf shape to the form of *G. velutinum* that has oblong leaves with strongly recurved margins. They are easily distinguished by *G. cuneatum* having a longer leaf [20–33(–61) mm long] and the inflorescence is longer [peduncle (5–)11–58 mm long, rachis 75–116 mm long], mainly due to the longer internodes between flowers (>10 mm), where *G. velutinum* has relatively short internodes (3–8 mm). This species has occasionally been confused with *G. parviflorum* in the past, but *G. parviflorum* has elliptic leaves and much longer racemes (rachis >50 mm long).

V. The *G. heterophyllum* group

This group of three morphologically disparate species share little in common with each other, but form a strongly supported group. *Gastrolobium heterophyllum* has both entire and trifid subtending floral bracts, *G. nutans* has entire bracts and *G. pusillum* has trifid bracts only. Ovule number ranges from two in *G. nutans* to 4–10 in *G. heterophyllum* and *G. pusillum*. It could be that this small group of species

are simply well differentiated from each other, yet quite closely related.

42. *Gastrolobium heterophyllum* (Turcz.) Crisp, in Crisp & Weston, *Adv. Legume Syst.* 3: 130 (1987). *Chorizema heterophyllum* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 255 (1853). *Oxylobium heterophyllum* (Turcz.) Benth., *Fl. Austral.* 2: 25 (1864). *Callistachys heterophylla* (Turcz.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891), *Nemcia heterophylla* (Turcz.) Domin, *Preslia* 2: 31 (1923). *Type citation:* 'Nova Hollandia, Drummond coll. V. no. 27 (ex parte)'. *Type specimens:* *holo:* KW; *iso:* G (2 sheets), K (3 sheets), W

Weak, almost prostrate *shrubs*, 0.05–0.3(–1.8) m high. *Branchlets* ascending or trailing, angular, moderately pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 0.5–1.5 mm long. *Leaves* spreading, opposite, ovate to elliptic (8–)16–29 × (1.5–)3–5 mm, glabrous to moderately pubescent, venation prominently reticulate; apex rounded, recurved, unarmed; margins entire, recurved; base rounded; leaves of different sizes present on each specimen. *Stipules* erect, hyaline, linear-triangular, 2–4 mm long. *Inflorescences* terminal racemes, occasionally terminal on a short axillary shoot, 4–18-flowered; *peduncle* (0–)4–8 mm long; *rachis* (8–)21–58 mm long; *subtending bracts* caducous or persistent, scale-like, entire or trifid, narrowly triangular, 3–5 mm long. *Pedicels* terete, 1.5–2 mm long. *Calyx* campanulate, 4–5 mm long including the 0.5–1-mm receptacle, moderately to densely villous, lobes not recurved or lower lobes only recurved; upper 2 lobes united higher than the lower 3, triangular, acute, 2.5–3 mm long; lower 3 lobes triangular, acute, 2.5–3 mm long. *Corolla:* standard transversely elliptic, *c.* 7 × 7 mm including the 2.5-mm claw, golden yellow with a red ring surrounding the yellow centre, apex emarginate, base truncate; *wings* oblong, *c.* 6 × 1.5–2 mm including the 2-mm claw, golden yellow, apex rounded, incurved but not enclosing the keel, base auriculate on the upper margin only, slightly saccate; *keel* half transversely broadly obovate, *c.* 7 × 3 mm including the 2-mm claw, black or deep maroon, apex almost truncate, sometimes with a small spout, base auriculate, saccate. *Style* long, incurved to hooked, lower half pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 8. *Pod* stipitate, oblong to elliptic, 6.5–9 × 3–4 mm, moderately to densely pubescent. *Seed* not seen.

Vernacular name: slender poison.

Flowering period: August–October. *Fruiting period:* October and November.

Distribution (Fig. 72): south-western Western Australia. Occurs along the south coast between Hopetoun and Esperance.

Habitat: generally grows beside or near rivers or drainage lines, on white sand to heavy red clay soils in mixed shrubland to mallee woodland.

Conservation status: ROTAP: 3KC-. This species is rare and poorly known, but this is possibly due to the habit of this species, which is often prostrate or climbing through other plants, making it difficult to see and therefore difficult to collect and it may in fact be quite common throughout the rivers along the south coast of SW Western Australia.

Selected specimens (11 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Eyre District: Fitzgerald River NP, *K. Newbey 11300*, 24.x.1986 (CANB, PERTH); Young River, *G.F. Craig 2872*, 9.ix.1993 (PERTH); Munglinup, *N.S. Lander 1064*, 22.x.1979 (PERTH); Esperance, *E.N. Fitzpatrick s.n.*, 5.ix.1969 (PERTH).

Toxicity: unknown.

Affinity: the unusual growth habit of this plant combined with the ovate leaves of different sides along the stem make this plant difficult to confuse with other species of *Gastrolobium*. *Gastrolobium parviflorum* most closely resembles *G. heterophyllum* vegetatively, though *G. parviflorum* is an erect, bushy shrub, generally has oblong or elliptic leaves that are broader (3–11 mm broad), the inflorescence axis is generally longer (peduncle 4–22 mm long, rachis 30–65 mm long) and there are fewer ovules per ovary (three or four).

43. *Gastrolobium nutans* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: Roe District: Lake King area, 46 km towards Norseman from Lake King, 33°04'37"S, 120°10'08"E, *G.T. Chandler 906*, *S. Donaldson & A. Monro*, 17 Sep. 1999 (*holo:* CANB!; *iso:* AD!, B!, BRI!, CANB!, K!, MEL!, NSW!, NY!, PERTH!)

G. tetragonophyllo vegetative simili sed foliis longitudinaliter recurvis et ovulis duobus differt.

Gastrolobium nutans has longitudinally recurved leaves and strictly two ovules, which serves to distinguish this species from the vegetatively similar *G. tetragonophyllum*.

Etymology: from Latin, *nuto* = to nod with the head; refers to the nodding flowers and fruits of this species.

Erect, bushy *shrubs*, 0.5–1.5 m high. *Branchlets* ascending, terete, moderately to densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, c. 1–1.5 mm long, densely pubescent. *Leaves* ascending, in whorls of 3, rarely opposite, ± oblong, though juvenile leaves are somewhat elliptic, recurved longitudinally, 12–25 × 2–3.5(-5) mm, upper surface glabrous, lower surface densely pubescent, venation prominently reticulate; apex broadly rounded to almost truncate, slightly mucronate; margins recurved to revolute (less so in juvenile foliage), often only the midrib and a small portion of the abaxial surface is visible; base rounded to truncate. *Stipules* erect, hyaline, 1.5–2 mm long. *Inflorescences* terminal racemes, 15–30-flowered; *peduncle* often with a sheath of persistent barren bracts at the base, 3–6 mm long; *rachis* 15–40 mm long; *subtending bracts* caducous, scale-like, entire, triangular, c. 2 mm long. *Pedicels*

terete, c. 1–1.5 mm long, pubescent. *Calyx* campanulate, c. 4 mm long including the 1-mm receptacle, moderately pubescent, lobes all strongly recurved; upper 2 lobes united higher than the lower 3, rounded, 1.5 mm long; lower 3 lobes triangular, acute, 1.5 mm long. *Corolla:* standard transversely elliptic, c. 5 × 6 mm including the 2-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, slightly auriculate; *wings* obliquely obovate, c. 6 × 2.5 mm including the 2-mm claws, orange-yellow, red towards the base, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, c. 4.5 × 1.5 mm including the 1.5-mm claws, pink and maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* long, strongly incurved, pubescent in the lower third; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, nutant, obliquely ellipsoid, 4.5–6 × 2.5–3 mm, moderately pubescent. *Seed* ellipsoid, c. 2 mm long, arillate. (Fig. 17)

Flowering period: August–October. **Fruiting period:** October and November.

Distribution (Fig. 73): south-western Western Australia. Occurs in the central-eastern sandplains, from Bullfinch south to Lake King and east to the Peak Charles area.

Habitat: grows on undulating dunes in deep white or grey sand in mallee shrubland or heathland.

Selected specimens (25 examined): WESTERN AUSTRALIA, Roe District: Mt Hampton, S of Southern Cross, 31°46'S, 119°04'E, *R.D. Royce 9056*, 6.x.1970 (CANB, PERTH); Pallarup, 33°13'S, 119°44'E, *C.A. Gardner 13645*, 20.x.1961 (PERTH); Mt Sturt, *C.A. Gardner 14839*, 17.x.1964 (PERTH); Burkett Rocks, Lake King, 33°04'S, 119°49'E, *Mrs Edwards s.n.*, ix.1934 (PERTH); c. 300 m SE of Hatter Hill trig, 32°49'24"S, 119°59'08"E, *G.F. Craig 2391*, 27.x.1992 (PERTH); Cascades Rd, 11.3 km towards Lake King from West Point Rd, 33°16'22"S, 120°47'58"E, *G.T. Chandler 930 et al.*, 19.ix.1999 (CANB, NSW, PERTH); 11.5 km WSW along track just N of God Rock (from turnoff to Lake Sharpe), 33°00'15"S, 120°56'34"E, *G.T. Chandler 789 & S. Donaldson*, 10.xi.1998 (CANB, NSW).

Toxicity: unknown.

Affinity: superficially, this species is somewhat similar in leaf shape to the *G. parviflorum* group (*G. parviflorum*, *G. revolutum* and *G. stenocarpum*) and *G. tetragonophyllum*, but the leaves of the *G. parviflorum* group and *G. tetragonophyllum* are not recurved longitudinally and these species have more than two ovules, where *G. nutans* has strictly two ovules.

44. *Gastrolobium pusillum* Crisp & P.H. Weston, *Adv. Legume Syst.* 7: 282 (1995). *Oxylobium tricuspidatum* Meisn. in *Lehm., Pl. Preiss.* 1: 30 (1844). *Type citation:* 'In sublimoso-glareosis districtus Hay, m. Oct. 1840. specim. florifera. Herb. Preiss. No. 1064. (fructifera. Drummond n. 266)'. *Type specimens:* *lecto:* LD 82/70–2150 (Preiss 1064); *isolecto:* NY. *Syn:* BM (Drummond 266); *isosyn:* K (2 sheets), W

Prostrate, mat-forming *shrubs*. *Branchlets* spreading, angular, glabrous. *Petioles* terete, continuous and slightly decurrent with the branchlet, 1–1.5 mm long. *Leaves* spreading, opposite, cuneate to obovate, 7–12 × 5.5–8 mm, glabrous, venation prominently reticulate; apex tricuspidate, each angle with a long, weak mucro; margins not recurved; base rounded to almost truncate. *Stipules* erect, hyaline, *c.* 2 mm long. *Inflorescences* short axillary racemes, 2–4-flowered; *peduncle* very short, up to 2 mm long; *rachis* almost non-existent, up to 0.25 mm long; *subtending bracts* caducous, scale-like, trifid, *c.* 1.5 mm long. *Pedicels* terete, *c.* 2 mm long. *Calyx* campanulate, *c.* 6 mm long including the 1-mm receptacle, sparsely pubescent, lobes scarcely recurved; upper 2 lobes united higher than the lower 3, triangular, acute, 2.5–3 mm long; lower 3 lobes triangular, acuminate, 2.5–3 mm long. *Corolla: standard* transversely elliptic, *c.* 6.5 × 7 mm including the 2.5-mm claw, orange to yellow with a red ring surrounding the yellow centre, apex emarginate, base truncate; *wings* obliquely oblong, *c.* 7.5 × 2 mm including the 2.5-mm claws, orange to yellow, red towards base, apex rounded, not incurved, not enclosing the keel, base auriculate on both margins, saccate; *keel* half transversely obovate, margins not incurved, *c.* 7 × 3 mm including the 2.5-mm claws, deep maroon, apex rounded, base auriculate, saccate. *Style* long, slightly hooked, lower third pubescent on the inner margin; *ovary* shortly stipitate, densely pubescent; *ovules* 4–10. *Pod* shortly stipitate, ovoid, 5–5.5 × 3–3.5 mm, moderately pubescent. *Seed* not seen.

Flowering period: August–October. *Fruiting period:* from November.

Distribution (Fig. 74): south-western Western Australia. Occurs south of Perth around Mount Barker and east to Ongerup.

Habitat: grows in wetter areas, including floodplains and swamp margins, in generally loamy soils or in sand along rivers, in shrubland and heathland, often in clearings amongst eucalypt woodland.

Selected specimens (18 examined): WESTERN AUSTRALIA, Darling District: Wambellup Nature Reserve, *c.* 20 km NW of Mt Barker, 34°31'08"S, 117°27'28"E, *M.D. Crisp 8921 & W. Keys*, 20.x.1996 (CANB, PERTH); Wamballup Nature Reserve, 34°31'11"S, 117°27'27"E, *A.R. Annels 4567*, 11.x.1994 (CANB, PERTH). Eyre District: Fitzgerald River Crossing, main road between Ravensthorpe and Jerramungup, 33°50'S, 119°16'E, *M.D. Tindale 3831*, viii.1973 (CANB, NSW, PERTH); Ongerup, 33°57'S, 118°29'E, *H. Wilkins 3529/65*, Oct./Nov. 1965 (PERTH).

Toxicity: unknown.

Affinity: this species is difficult to confuse with any other species of *Gastrolobium* because of its diminutive size, the cuneate leaves that bear three slender cusps at the apices and reduced, axillary racemes of 2–4 flowers.

VI. The *G. obovatum* group

This group of species includes a number of taxa formerly included in *Nemcia*. Many of these species share a number of characters intermediate between those of *Gastrolobium* sens. str. and *Nemcia* as defined by Crisp and Weston (1987), such as short, axillary racemes, trifid bracts (except *G. bennettsianum*, which has entire bracts and *G. brownii* and *G. truncatum* which have both entire and trifid bracts) and strictly two ovules, except for *G. latifolium*, which has 18–21.

45. *Gastrolobium brownii* Meisn. in Lehm., *Pl. Preiss.* 1: 71 (1844). *Nemcia brownii* (Meisn.) Crisp, in Crisp & Weston, *Adv. Legume Syst.* 3: 124 (1987). *Type citation:* 'In rupestribus summitatis montis Wuljenup (Plantaganet) d. 13. Oct. 1840. Herb. Preiss. No. 802'. *Type specimens: lecto:* LD 82/73-2209; *isolecto:* MO, NY, W (2 sheets)

Tall, bushy *shrubs*, 1.5–3 m high. *Branchlets* ascending, terete, moderately to densely pubescent. *Petioles* terete, continuous and slightly decurrent with the branchlet, 1–2 mm long. *Leaves* ascending, opposite or rarely whorled, oblong, obovate or cuneate, 8–30 × 4–9 mm, glabrous or very sparsely pubescent on the lower surface around the venation, venation prominently reticulate; apex rounded, obtuse or truncate, generally pungent-pointed; margins entire, flat or recurved; base rounded. *Stipules* free, hyaline, 0.5–1.5 mm long. *Inflorescences* axillary racemes, sometimes on short axillary shoots (2–)4–9-flowered; *peduncle* (1–)3–6 mm long; *rachis* 2–8(–20) mm long; *subtending bracts* scale-like or herbaceous; if scale-like: caducous, entire, lobed or trifid, generally lanceolate, *c.* 4 mm long; if herbaceous: 4–7 mm long, obovate, mostly caducous, occasionally persistent. *Pedicels* terete, 1–2.5 mm long. *Calyx* campanulate, 3.5–4.5 mm long including the 0.5–1-mm receptacle, two-toned, green at base, very dark brown above, sparsely to moderately sericeous; upper 2 lobes not recurved, united higher than the lower 3, sometimes into a truncate lip, obtuse, 1.5–2 mm long; lower 3 lobes may be recurved, triangular, acute, 1.5–2 mm long. *Corolla: standard* transversely broadly elliptic, 8–8.5 × *c.* 8.5 mm including the *c.* 2.5-mm claw, yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, 8–8.5 × *c.* 2.5 mm including the *c.* 2-mm claw, yellow, apex rounded, incurved and partially enclosing the keel, base auriculate on the upper margin only, slightly saccate; *keel* half circular to transversely very broadly elliptic, margins not incurved, 7.5–8 × *c.* 2.5 mm including the *c.* 2.5-mm claw, red, apex rounded, base auriculate, saccate. *Style* long, incurved to slightly hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid, 5–7 × 2–3.5 mm, sparsely to moderately pubescent. *Seed* reniform, 2–2.5 mm long, arillate.

Flowering period: September–November. *Fruiting period*: from late November onwards.

Distribution (Fig. 75): south-western Western Australia. Occurs along the western portion of the south coast, from Denmark east to the Albany region and north to the Porongurup Range.

Habitat: usually grows in moister areas, which is unusual for *Gastrolobium*, on loamy, occasionally sandy soils, in forest, open woodland or more rarely shrubland usually dominated by *Eucalyptus calophylla*, *E. diversicolor*, *E. marginata* or *E. megacarpa*.

Conservation status: ROTAP: 2K. This species is fairly rare and poorly known, with further survey work required to determine its conservation status.

Selected specimens (26 examined): WESTERN AUSTRALIA, Eyre District: Mt Wilyung, 34°57'S, 117°51'E, T.E.H. *Aplin* 6038, 26.ix.1974 (CANB, PERTH); 35 km W of Denmark, 0.2 km km along Tindale Rd from South Coast Hwy, 34°57'15"S, 117°01'02"E, G.T. *Chandler* 726 & S. *Donaldson*, 31.x.1998 (CANB, PERTH); Porongurup Range, Castle Rock, 34°42'S, 117°55'E, M.D. *Crisp* 8509 & W. *Keys*, 26.ix.1993 (CANB, PERTH); Albany, c. 35°00'S, 117°53'E, C.E. *Lane-Poole* 326, 21.i.1919 (PERTH); Darling District: intersection Mountain and Boronia roads, 34°20'12"S, 115°35'29"E, A.R. *Annels* 4618 & R.W. *Hearn*, 13.x.1994 (CANB, MJP, PERTH).

Toxicity: fluoroacetate 80–260 µg g⁻¹ (Aplin 1971).

Affinity: the distinctive leaf shape and short, axillary racemes of this species make *G. brownii* difficult to confuse with any other species of *Gastrolobium*.

46. *Gastrolobium hookeri* Meisn. in Lehm., *Pl. Preiss.* 1: 71 (1844). *Nemcia hookeri* (Meisn.) Crisp, in Crisp & Weston, *Adv. Legume Syst.* 3: 126 (1987). *Type citation*: 'Swan River. James Drummond, n. 209.' *Type specimens*: *holo*: BM; *iso*: G, K, W (2 sheets)

Gastrolobium tricuspidatum Meisn. var. *subinerme* Meisn. in Lehm., *Pl. Preiss.* 1: 66 (1844). *Type citation*: 'In planitie arenosa Quangen (Victoria) d. 20. Mart. 1840. Sterile. Herb. Preiss. No. 830.' *Type specimens*: *holo*: LD; *iso*: G (2 sheets), NY (rh specimen only).

Bushy shrubs up to 0.5 m high. *Branchlets* ascending, terete, moderately villous. *Petioles* terete, continuous but not decurrent with the branchlet, 1–2 mm long. *Leaves* spreading, ± opposite, stem clasping, oblong, elliptic or obovate, c. 13–15 × 5–7 mm, sparsely to moderately pubescent, venation prominently reticulate; apex semi-pungent, unevenly recurved; margins slightly crenulate; base rounded. *Stipules* erect, hyaline, 3–4 mm long. *Inflorescences* solitary or paired flowers in the axils; *peduncle* nil; *rachis* nil; *subtending bracts* trifid with the middle lobe elongated. *Pedicels* 2–4 mm long. *Calyx* campanulate, 4–5 mm long including the c. 1-mm receptacle, moderately villous, lobes not recurved; upper 2 lobes united higher than the lower 3, acute, c. 2 mm long; lower 3 lobes triangular, acuminate, c. 2 mm long. *Corolla*: *standard* very broadly elliptic, c. 7–8 × 6–7.5 mm including the 3-mm claw, orange and maroon with a small yellow centre, apex emarginate, base ± truncate,

slightly auriculate; *wings* obovate, c. 6.5–7 × 2 mm including the 2-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half transversely elliptic, margins slightly incurved, c. 6 × 4 mm including the 2.5-mm claws, maroon, apex rounded, base auriculate, saccate. *Style* slightly longer than the ovary, hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* ovoid, 5–6 × 2–3 mm long. *Seed* not seen.

Flowering period: October. *Fruiting period*: November.

Distribution (Fig. 76): south-western Western Australia. Occurs on the eastern edge of the Darling escarpment and into the wheatbelt, from Toodyay south to Pingelly.

Habitat: grows on sand, sandy loam or gravelly clay in open forest and woodland.

Selected specimens (10 examined). WESTERN AUSTRALIA, Darling district: between Toodyay and Bindoon, 31°33'S, 116°27'E, C.E. & D.T. *Woolcock* W638, 24.viii.1982 (CANB); 3 km WSW of Quairading, 32°01'S, 117°22'E, M.D. *Crisp* 6183 et al. 27.ix.1979 (CANB, PERTH); 0.2 km E along Helena Rd from West Talbot Rd towards York, 31°57'45"S, 116°32'14"E, M.D. *Crisp* 8907 & W. *Keys*, 8.x.1996 (CANB, PERTH); Beverley 32°07'S, 116°56'E, R.D. *Royce* 3852, 6.x.1952 (CANB, PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium hookeri* has been confused with a number of morphologically similar species in the past, but is fairly easily distinguished by the terete branchlets, the non-decurrent petioles and the distinctive trilobed subtending bracts, with the middle lobe being much longer than the other two.

47. *Gastrolobium obovatum* Benth. in Lindley, *Edwards' Bot. Reg. Append.*: xiv (1839). *Nemcia obovata* (Benth.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 127 (1987). *Type citation*: none cited. *Type specimens*: *lectotype* (here chosen): K (Swan River. Drummond, 1839); *isolecto*: CGE (2 sheets), K, W

Gastrolobium obovatum Benth. var. *verticillatum* Meisn. in Lehm., *Pl. Preiss.* 1: 71 (1844). *Type citation*: 'Swan River. Drummond n. 206.' *Type specimens*: G (2 sheets).

Gastrolobium obovatum Benth. var. *subverticillatum* Meisn. ex Regel, *Gartenflora* 6: 156 (1857). *Notes*: ?error for *G. obovatum* var. *verticillatum*.

Bushy, erect shrubs 0.3–0.6 m high. *Branchlets* spreading to ascending, angular, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, <1 mm long. *Leaves* spreading, scattered to ternate, ± rhombic or slightly trullate to narrowly so, 18–30 × 12–24 mm, glabrous, venation prominently reticulate; apex acute, pungent-pointed; margins conduplicate; base truncate. *Stipules* erect, hyaline, 3–5 mm long. *Inflorescences* short axillary racemes or umbels (when 2-flowered), 2–4-flowered; *peduncles* 2–18 mm long; *rachis* 0–2 mm long; *subtending bracts* trilobed with lobes much longer than trunk, about equal

in length, rusty brown tomentose. *Pedicels* terete, 1–3 mm long. *Calyx* 4–6 mm long including the c. 0.5-mm receptacle, moderately to densely pubescent, lobes all recurved; upper 2 lobes united higher than the lower 3, acute, 2–2.5 mm long; lower 3 lobes triangular, acute, 1.5–2 mm long. *Corolla: standard* transversely elliptic, 8–11 × 8–12 mm including the 2.5–4-mm claw, orange yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* ± oblong to obovate, 7.5–10 × 2–3 mm including the 2–3-mm claws, orange becoming red at base, apex rounded, incurved but not overlapping, not enclosing the keel, base auriculate on both margins, saccate; *keel* half very broadly elliptic, margins not incurved, 7–10.5 × 3–3.5 mm including the 2.54-mm claws, red, apex broadly rounded to obtuse, base auriculate, saccate. *Style* long, incurved to hooked, lower third pubescent; *ovary* prominently stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ovoid to ellipsoid, 6–7 × 2–3 mm, moderately pubescent. *Seed* ellipsoid, 2–3 mm long, covered in blunt ridges, arillate.

Flowering period: August–October. *Fruiting period:* from October.

Distribution (Fig. 77): south-western Western Australia. This species is widely distributed, occurring from Eneabba south to Wagin and inland as far as Doodlakine.

Habitat: grows on undulating hills in sandy soils in heath and open woodland.

Selected specimens (38 examined): WESTERN AUSTRALIA, Avon district: 19 km from Goomalling towards Wongan Hills, 31°08'S, 116°48'E, *J. Taylor 2144 & P. Ollerenshaw* (CANB, MEL, PERTH); c. 100 m N of the northerly entrance to the Wongan Hills Research Station, 30°50'49"S, 116°44'35"E, *G.T. Chandler 192 & W. Keys*, 9.ix.1997 (CANB, PERTH); Mount Hardy, 11 km from York on road to Quairading, 31°54'S, 116°52'E, *J.H. Ross 2775*, 5.ix.1982 (AD, CANB, MEL, PERTH); 1 km W of Karrellocking on Wyalkatchem–Merredin road, 9 km E of Wyalkatchem, 31°12'S, 117°28'E, *S.J. Forbes 1814*, 25.x.1983 (CANB, MEL, PERTH); Yilminning, 300 m W of siding, 32°54'10"S, 117°22'00"E, *G.T. Chandler 763 S. Donaldson*, 3.xi.1998 (CANB, PERTH); 2.3 km along Belka Rd West from Doodlakine–Bruce Rock road, 31°45'00"S, 118°04'55"E, *G.T. Chandler 689 & S. Donaldson*, 26.x.1998 (CANB, PERTH). Darling District, Jurien Bay Rd, from Brand Hwy, *C.E. & D.T. Woolcock W619*, 19.viii.1982 (CANB). Irwin District: 10 km WSW of Eneabba, 29°52'S, 115°11'E, *A. Kanis 1539*, 7.viii.1973 (CANB); 2.5 km on Old Geraldton Rd, from Merewara Rd, E of Watheroo on Miling Rd, 30°17'59"S, 116°05'55"E, *G.T. Chandler 656 & S. Donaldson*, 25.x.1998 (CANB, MEL).

Notes: there is a somewhat narrower-leaved form of *G. obovatum* in the Wongan Hills area that needs further study. The leaves of this form tend to be broadest above the middle and blue-green in colour.

Toxicity: unknown.

Affinity: *Gastrolobium obovatum* is very similar to *G. spatulatum*, which differs in having leaves that tend to be ± flat with an unarmed apex, prominently spatulate and yellow-green, whereas *G. obovatum* has leaves that are broadest towards the middle.

48. *Gastrolobium plicatum* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 274 (1853). *Nemcia plicata* (Turcz.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 127 (1987). *Type citation:* 'Drum. V. n. 50.' *Type specimens:* holo: K; iso: BM, K (2 sheets), W

Gastrolobium pauciflorum C.A.Gardner, *J. Proc. R. Soc. Western Austral.* 27: 179 (1942), *Nemcia pauciflora* (C.A.Gardner) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 127 (1987). *Type citation:* 'Hab, in distr. Irwin, c. 9 km. a Three Springs occidentalem versus, in fruticetis apertis arenosis, fl. m. Septem. W.E. Blackall 4895.' *Type specimen:* holo: PERTH.

Semi-prostrate to erect *shrubs* up to 1.5 m high. *Branchlets* ascending, compressed to angular, glabrous. *Petioles* terete, continuous and slightly decurrent with the branchlet, c. 3 mm long. *Leaves* spreading, opposite, obovate to cuneate, 25–40 × 10–12 mm, glabrous, venation prominently reticulate, yellow-green; apex recurved, strongly mucronate; margins often slightly undulate, mostly conduplicate or becoming so; base cuneate. *Stipules* erect, hyaline, 3–4 mm long. *Inflorescences* loose axillary clusters, 2–4-flowered; *peduncle* 0–2 mm long; *rachis* nil; *subtending bracts* trilobed with lobes about the same length as tube, except for the elongated middle lobe. *Pedicels* terete, <2 mm long. *Calyx* campanulate, c. 6 mm long, densely villous, lobes all recurved to slightly reflexed; upper 2 lobes united higher than the lower 3, acute, c. 2 mm long; lower 3 lobes triangular, acute, c. 2 mm long. *Corolla: standard* very broadly elliptic, c. 8–10 × 8 mm including the 2-mm claw, yellow with a red centre apex emarginate, base cordate, not auriculate; *wings* obovate, c. 8–8.5 × 2.5 mm including the 2.5-mm claws, yellow but red at base, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, slightly saccate; *keel* half very broadly ovate, c. 7.5–8 × 2.5 mm including the 3-mm claws, red, apex obtuse, base auriculate, saccate. *Style* long, strongly incurved to hooked, lower third pubescent; *ovary* very shortly stipitate, densely pubescent; *ovules* 2. *Pod* very shortly stipitate, broadly ovoid, c. 6 × 3 mm, densely villous. *Seed* with blunt ridges, c. 2 mm long, arillate.

Flowering period: September and October. *Fruiting period:* November and December.

Distribution (Fig. 78): south-western Western Australia. Occurs north of Perth, around the Eneabba and Three Springs area, including Tathra National Park.

Habitat: grows on the northern sandplains on sandy soil in heath and open woodland.

Selected specimens (15 examined): WESTERN AUSTRALIA, Irwin district: 10 km N of Three Springs towards Arrino, 29°28'43"S, 115°40'38"E, *G.T. Chandler 209 & W. Keys*, 11.ix.1997 (CANB, MEL, PERTH); between Coorow and Arrino, 29°39'S, 115°50'E, *W.E. Blackall 2605*, ix.1932 (CANB, PERTH); Tathra NP, 25.4 km E of Eneabba along road to Carnamah, 29°48'06"S, 115°30'42"E, *M.D. Crisp 9014 & W. Keys*, 25.x.1996 (CANB).

Toxicity: unknown.

Affinity: this species slightly resembles *G. obovatum*, but the latter species is easily distinguished, as the leaves are longer and significantly narrower (18–30 × 12–24 mm), the peduncle is longer (2–18 mm long) and there is often a rachis (0–2 mm long).

49. *Gastrolobium spathulatum* Benth. in Lindley, *Edwards' Bot. Reg. Append.*: xiv (1839). *Nemcia spathulata* (Benth.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 128 (1987). *Type citation*: none cited. *Type specimens*: FI-W, G (2 sheets). *Lectotype* (here chosen): K (Swan River, Drummond, 1839); *isolecto*: CGE (2 sheets), G, K

Gastrolobium spathulatum Benth. var. *latifolium* Benth., *Fl. Austral.* 2: 100 (1864). *Type citation*: 'W. Australia, Drummond; Phillips Ranges, Maxwell.' *Type specimen*: *lectotype* (here chosen): MEL 625087.

Erect, bushy, *shrubs* up to 1.5 m high. *Branchlets* ascending, densely pubescent. *Petioles* terete, continuous and decurrent with the branchlet, <1 mm long. *Leaves* spreading to ascending, mostly ternate, spathulate, 8–22 × 4–10 mm, glabrous, venation prominently reticulate; apex truncate, emarginate or sometimes almost bilobed, mucronate; margins slightly crenulate, becoming conduplicate; base rounded to cuneate. *Stipules* erect to recurved, triangular to hyaline, 1–2 mm long. *Inflorescences* axillary, solitary or paired to 3–5-flowered, condensed racemes; *peduncle* 0–1.5 mm long; *rachis* 0–4 mm long; *subtending bracts* caducous, scale-like, trilobed with lobes much longer than the tube, *c.* 1–3 mm long. *Pedicels* terete, 2–3 mm long. *Calyx* campanulate, up to 6 mm long including the *c.* 1-mm receptacle, moderately pubescent, lobes recurved to slightly reflexed; upper 2 lobes united, much higher than the lower 3, acute, *c.* 2 mm long; lower 3 lobes triangular, acute, *c.* 1.5 mm long. *Corolla*: *standard* very broadly elliptic, *c.* 7.5–10 × 7–7.5 mm including the 3-mm claw, orange with a dark red centre, apex emarginate, base cordate; *wings* obovate, *c.* 7 × 2 mm including the 2.5-mm claws, orange, apex rounded, incurved, may or may not enclose the keel, base auriculate on the upper margin only, slightly saccate; *keel* half very broadly elliptic, *c.* 7 × 2–2.5 mm including the 3-mm claws, dark red, apex subacute, base auriculate, saccate. *Style* long, strongly incurved to hooked, lower third pubescent; *ovary* prominently stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, obliquely ovoid, *c.* 5–6 × 3 mm, moderately pubescent. *Seed* ellipsoid, *c.* 3 mm long, arillate.

Flowering period: August–October, but also recorded for March. *Fruiting period*: from October.

Distribution (Fig. 79): south-western Western Australia. Occurs throughout the Darling escarpment near Perth, from Bindoon south to Dwellingup.

Habitat: grows on granite outcrops or ridges on clay-loam soils, in open forest and heathland.

Selected specimens (12 examined): WESTERN AUSTRALIA, Darling District: Flat Rocks Rd, *c.* 4 km SE of Bindoon, Red Hill, 31°25'S, 116°08'E, *M.D. Crisp 8448 & W. Keys* (CANB, GAUBA, PERTH, UWA); Toodyay Rd, *c.* 10 km from Midland, on the Darling scarp, 31°51'S, 116°04'E, *T.R. Lally 57* (AD, BRI, CANB, PERTH); Kalamunda, 19 km E of Perth. 31°58'S, 116°03'E, *R. & M. Hamilton 160* (CANB, CHR, MEL, NSW).

Toxicity: this species is not known to be toxic, but trace levels (40–80 µg g⁻¹) have been recorded (Twiggy *et al.* 1996a).

Affinity: this species is often confused with relatives with plicate leaves, but *G. spathulatum* has spathulate leaves with narrow bases that gradually increase in width until the upper third of the leaf, where the breadth increases considerably and often abruptly. The leaf apices are basically obtuse with a small mucro, recurving slightly and the leaves are noticeably yellow-green, particularly when fresh.

50. *Gastrolobium stowardii* S. Moore, *J. Linn. Soc. London, Bot.* 45: 169 (1920). *Type citation*: 'Dumbleyung; Stoward, 106.' *Type specimens*: *holo*: BM; *iso*: K

Small, twiggy *shrubs*, up to 0.5 m high. *Branchlets* spreading to ascending, angular, moderately pubescent. *Petioles* almost nil, continuous and partly decurrent with the branchlet, <0.5 mm long. *Leaves* often restricted to the upper part of the branchlets, spreading to ascending, opposite, oblong to cuneiform, 10–18 × 5–7 mm, upper surface glabrous with thickened venation, lower surface moderately pubescent with appressed hairs; apex obtuse to almost truncate, often almost horned, strongly recurved, pungent-pointed or strongly mucronate; margins recurved; base rounded. *Stipules* hyaline, 3–4 mm long. *Inflorescences* single or paired flowers in the axils or small axillary racemes with up to 4 flowers; *peduncle* 0–3 mm long; *rachis* 0–3 mm long; *subtending bracts* caducous, scale-like, trilobed, with lobes shorter than tube, the middle lobe longest, up to 3 mm long. *Pedicels* 2–3 mm long. *Calyx* campanulate, 4–5 mm long including the <1-mm receptacle, densely sericeous, lobes recurved to strongly so; upper 2 lobes united higher than the lower 3, rounded to acute, *c.* 2–2.5 mm long; lower 3 lobes triangular, acute, *c.* 2–2.5 mm long. *Corolla*: *standard* transversely to very broadly ovate, 6–9 × 6–8 mm including the 3-mm claw, orange with maroon markings, with a yellow centre, apex emarginate, base obtuse to slightly cordate; *wings* obovate, 5–7 × 2–3 mm including the 2-mm claws, orange and red, apex rounded, incurved and partly overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half broadly elliptic, margins not incurved, *c.* 6–7 × 2–2.5 mm including the 2-mm claws, maroon, apex obtuse, base auriculate, saccate. *Style* long, strongly incurved, base pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* reddish, 5–6 mm long, softly pubescent.

Flowering period: September and October. *Fruiting period:* November.

Distribution (Fig. 80): south-western Western Australia. Occurs from Eneabba south to Susetta Creek (south-east of Lake Grace) and is particularly common in the Wongan Hills area.

Habitat: grows mainly on sandy soils in heath and mallee woodland.

Selected specimens (30 examined): WESTERN AUSTRALIA, Avon District: 8–10 miles [13–16 km] East of Calingiri on Wongan Hills Rd, 31°00'S, 116°32'E, *T.E.H. Aplin 129*, 10.ix.1958 (CANB, PERTH); 8.2 km E of Carani, 31°00'S, 116°30'E, *J.D. Briggs 637*, 25.ix.1980 (CANB, MEL, PERTH). Irwin District: 14.5 km on Tootbardi Rd from Brand Hwy, turnoff S of Eneabba, 30°07'14"S, 115°30'04"E, *G.T. Chandler 828 et al.* 8.ix.1999 (CANB, MEL, PERTH). Roe District: 3 km from Lake Grace towards Newdegate, 33°06'17"S, 118°29'08"E, *G.T. Chandler 950 et al.*, 20.ix.1999 (CANB, MEL); Tarin Rock, opposite siding, 33°07'S, 118°14'E, *T.E.H. Aplin 6011*, 24.ix.1974 (CANB, PERTH); Old Ongerup Rd east of Susetta Ck 33°48'S, 119°26'E, *M.G. Corrick 8822*, 19.x.1983 (AD, CANB, HO, MEL, NSW, PERTH).

Notes: specimens have been previously identified as *Nemcia* sp. A. Crisp, ined. and *Gastrolobium* sp. F (aff. *hookeri*).

Toxicity: unknown.

Affinity: previously in synonymy and confused with *Gastrolobium hookeri*, *G. stowardii* actually shows greater morphological similarity to *G. dorrienii*, with which it shares a twiggy habit and bilobed leaves which tend to recurve both apically and at the margins. *Gastrolobium stowardii*, with opposite leaves, is fairly readily distinguished from *G. dorrienii*, which has thicker, patent leaves in whorls of three. *Gastrolobium stowardii* differs from *G. hookeri* in the flattened or angular stems, the noticeably decurrent petiole bases, the median lobe in the floral bracts being scarcely longer than the other lobes, rather than noticeably longer and the general habit differs with most leaves in the upper branches. A population located in the Irwin district between Eneabba and Badgingarra (Chandler 828 *et al.*) may extend the known range. This population was growing with *Gastrolobium polystachyum* and these two species may also have been confused previously, because both have a narrow, bilobed leaf. However, the leaves of *G. polystachyum* are much larger (5–35 mm long and the leaves in this population were all above 25 mm long) and the inflorescence is a long, open raceme.

51. *Gastrolobium bennettsianum* C.A. Gardner, *J. Proc. R. Soc. Western Austral.* 27: 179 (1942). *Type citation:* 'In collibus glareosis regionis Eucalypti reducae distr. Avon proprium. Adest ad Yorkrakine prop Tammin meridiem versus ad usque Wagin, fl. m. Septem. Typus est North Bungulla, Gardner Sept. 1936.' *Type specimens:* holo: PERTH; iso: PERTH

Erect, bushy *shrubs*, up to 2 m high. *Branchlets* ascending, angular to almost terete, often a pale yellow in

colour, moderately to densely pubescent. *Petioles* terete, swollen at base, continuous and slightly decurrent with the branchlet, 1–3 mm long. *Leaves* spreading to ascending, in whorls of 3, obovate to narrowly so, 6–30 × 4–12 mm, glabrous to rarely glaucous, venation prominently reticulate; apex obtuse to broadly rounded, recurved, usually pungent-pointed, rarely mucronate; margins conduplicate, often strongly so, entire, recurved; base cuneate. *Stipules* erect, bristle-like, 2–3 mm long. *Inflorescences* terminal racemes, very rarely branched, 10–30-flowered; *peduncle* scattered with what appear to be aborted buds, 5–10 mm long; *rachis* 15–45 mm long; *subtending bracts* caducous, scale-like, minutely fimbriate, ovate, keeled, 3–4 mm long. *Pedicels* terete, 2–3 mm long. *Calyx* campanulate, c. 5 mm long including the 1-mm receptacle, glabrous to sparsely pubescent, upper 2 lobes straight, united into an almost truncate lip, rounded, c. 2 mm long; lower 3 lobes recurved to reflexed, triangular acute, c. 1.5 mm long. *Corolla:* standard transversely ovate to elliptic, 7.5–8.5 × 8–10 mm including the 3–4-mm claws, orange-yellow to orange with a red ring surrounding the yellow centre, apex emarginate, base strongly cordate; *wings* obovate, 5.5–7 × 2.5–3 mm including the 1.5–2.5-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, usually saccate; *keel* half transversely elliptic, c. 5.5 × 2–2.5 mm including the 2.5-mm claws, maroon, apex acute, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* short, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, obliquely ellipsoid, 6–7 × 3–4 mm, moderately pubescent. *Seed* reniform, c. 3 mm long, arillate.

Vernacular name: cluster poison.

Flowering period: August–October. *Fruiting period:* October–December.

Distribution (Fig. 81): south-western Western Australia. Occurs in a band from the Gutha and Wubin areas in the north almost directly south-east through the central wheat-belt area to the Peak Charles area (near Norseman).

Habitat: grows on the broader sandplain regions of the central wheatbelt on sand or gravelly sand, sometimes with a clay content, in mallee woodland and *Allocasuarina* heath and shrubland.

Selected specimens (85 examined): WESTERN AUSTRALIA, Avon District: 14 km from Bindi Bindi towards Ballidu, 30°35'17"S, 116°29'09"E, *G.T. Chandler 679 & S. Donaldson*, 25.x.1998 (AD, CANB); North Bungulla Bungulla, 31°38'S, 117°35'E, *C.A. Gardner s.n.*, ix.1936 (PERTH); 1 mile [1.5 km] SW of Manmanning, 30°52'S, 117°05'E, *B.H. Smith 1315*, 28.viii.1990 (CANB, MEL, WAG); SSE of Corrigin, 32°31'S, 117°56'E, *A.S. George 14370*, 7.ix.1976 (PERTH); 9 km from Cadoux towards Koorda, 30°48'12"S, 117°11'51"E, *G.T. Chandler 846 et al.*, 11.ix.1999 (CANB, UWA); 1 km from Wubin towards Perenjori, on Mullewa–Wubin road, 30°05'55"S, 116°37'13"E, *G.T. Chandler 839 et al.*, 10.ix.1999 (CANB, MEL, NSW, NY, PERTH); Ballidu, 30°36'S, 116°46'E, *C.A. Gardner 12119*, 7.ix.1959

(PERTH); 13 miles [21 km] W of Gutha, 29°00'S, 115°45'E, *A. Cox s.n.*, viii.1958 (PERTH). Roe District: South Yilgarn, Skeleton Rock area, 31°51'S, 119°28'E, *J.F. Brennard & M.M. Brennard s.n.*, 5.xi.1989 (PERTH); Tarin Rock, on Tarin Rock Rd North, 33°06'29"S, 118°13'56", *G.T. Chandler 714 & S. Donaldson*, 29.x.1998 (BRI, CANB, MEL); 4 km along Kumarl Rd from Lake King–Norseman road, c. 80 km from Norseman to Lake King, 32°45'09"S, 121°21'54"E, *G.T. Chandler 914 et al.*, 17.ix.1999 (CANB, NSW, PERTH).

Notes on variation: this species has an extremely variable leaf shape and size, from quite small (around the Corrigin, Tarin Rock and Lake Grace areas), through a long narrow-leaved form around Bungulla, Cadoux and Manmanning, to a long broad-leaved form in the north, from around Wubin, Ballidu and Gutha to the far-east around Norseman. However, there are intergrading specimens between all forms. In particular, two specimens (Ballidu, *C.A. Gardner s.n.*, PERTH 2798689 and 13 miles [21 km] west of Gutha, *A. Cox s.n.*, PERTH 2798085) show two of these forms on one specimen. The Cox specimen has the long narrow-leaved form and the long broad-leaved form together on one specimen and the Gardner specimen has the long broad-leaved form with the short-leaved form. Therefore, no infraspecific taxa are here recognised within this species.

Toxicity: highly toxic; fluoroacetate 1300 µg g⁻¹ (Aplin 1971).

Affinity: the smaller-leaved forms of *G. bennettsianum* may resemble the smaller leaved forms of *G. crassifolium*, though the leaves of *G. crassifolium* are not recurved, are glaucous and lack a pungent-point, having only a very small (if present at all), blunt mucro.

52. *Gastrolobium pulchellum* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 274 (1853). *Nemcia pulchella* (Turcz.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 127 (1987). *Type citation:* 'Drum. V. n. 57.' *Type specimens:* *holo:* KW; *iso:* BM, K (2 sheets), W

Bushy *shrubs* up to 1.5 m high. *Branchlets* ascending, angular, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, c. 1 mm long. *Leaves* spreading to ascending, ternate, elliptic, 8–25 × 4–12 mm, glabrous, venation prominently reticulate; apex bilobed to emarginate; margins undulate; base rounded. *Stipules* erect to recurved, hyaline, 4–5 mm long. *Inflorescences* short axillary umbels or paired flowers in the axils; *peduncle* 0–10 mm long; *rachis* nil; *subtending bracts* caducous, scale-like, trilobed, lobes as long as tube, outer lobes hyaline, 3–4 mm long. *Pedicels* 1–2 mm long. *Calyx* campanulate, c. 5 mm long including the c. 0.5-mm receptacle, densely pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, acute, c. 2.5 mm long; lower 3 lobes triangular, acuminate, c. 2.5 mm long. *Corolla:* standard transversely ovate, 9–10 × 8–9 mm including the 3.5-mm claw, yellow apricot, with a

red ring surrounding the yellow centre, apex emarginate, base strongly cordate; *wings* obovate, c. 8 × 3 mm including the 3-mm claws, orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on upper margin only or also very slightly auriculate on the lower margin; *keel* half circular, margins slightly incurved in the lower half, c. 7 × 2 mm including the 3-mm claws, reddish, apex acute, slightly incurved, base auriculate, saccate. *Style* long, strongly incurved, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, globose, c. 5 × 5 mm, red. *Seed* ellipsoid, 1–2 mm long, arillate.

Flowering period: September and October. *Fruiting period:* November.

Distribution (Fig. 82). south-western Western Australia. Endemic in the Stirling Range.

Habitat: grows on mountain slopes on skeletal soils in Proteaceae-dominated heath.

Specimens examined: WESTERN AUSTRALIA, Eyre District: Stirling Range, 1.8 km due N of Ellen Peak, 34°20'14"S, 118°19'49"E, *M.D. Crisp 8945 & W. Keys*, 15.x.1996 (CANB, MEL, PERTH); Stirling Range, Bluff Knoll, 34°22'S, 118°15'E, *N. Ollerenshaw 271 & N. Carriage*, 13.x.1975 (CANB); Stirling Range, base of path to Bluff Knoll, near carpark, 34°22'S, 118°14'E, *M.D. Crisp 8480 & W. Keys*, 24.ix.1993 (CANB, GAUBA, PERTH); Stirling Range NP, Stirling Range Drive, 24 km from Chester Pass Rd, 34°25'S, 117°56'E, *J. Taylor 1842 & P. Ollerenshaw*, 15.ix.1983 (CANB); Stirling Range NP, track to Bluff Knoll, 34°22'S, 118°15'E, *J. Taylor 1855 & P. Ollerenshaw*, 16.ix.1983 (CANB, PERTH).

Toxicity: unknown.

Affinity: the leaves of *G. pulchellum* looks similar to the smaller-leaved specimens of *G. crenulatum*, but *G. crenulatum* has a more pronounced peduncle, the inflorescence parts are covered in rust-coloured hairs and the flowers are more orange, whereas the hairs of *G. pulchellum* are a very bright silver in colour and the flowers are more yellow.

53. *Gastrolobium truncatum* Benth., *Fl. Austral.* 2: 99 (1864). *Nemcia truncata* (Benth.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 128 (1987). *Type citation:* 'W. Australia, Drummond (5th Coll.?), n. 30'. *Type specimens:* *holo:* K; *iso:* MEL 625089

Gastrolobium crispifolium Domin, *Vestnik Kralovske Ceske Spolecnosti Nauk* 2: 35 (1923b). *Type citation:* 'W.A.: Mallet, leg. Capt. A. A. Dorrien-Smith'. *Type specimen:* *holo:* K.

Prostrate to weak, bushy *shrubs*, up to 0.5 m high. *Branchlets* spreading, angular to almost terete, moderately pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 1–3 mm long. *Leaves* spreading, opposite, broadly oblong, 5–12 × 5–9 mm, sparsely to moderately villous, venation prominently reticulate; apex truncate to slightly bilobed, unarmed or with a weak mucro; margins undulate, recurved; base truncate, rarely slightly cordate. *Stipules* erect, narrowly triangular, 4–6 mm long.

Inflorescences axillary racemes, 4–8-flowered; *peduncle* 0.5–2 mm long; *rachis* 5–15 mm long; *subtending bracts* caducous, scale-like, trifid to entire, 1.5–2 mm long. *Pedicels* terete, 2–3 mm long. *Calyx* campanulate, *c.* 4 mm long including the 0.5-mm receptacle, moderately pubescent, upper 2 lobes slightly recurved, lower 3 lobes reflexed; upper 2 lobes united higher than the lower 3, triangular, acute, *c.* 2 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla: standard* transversely elliptic, *c.* 6 × 7 mm including the 2-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obovate, *c.* 6.5 × 2 mm including the 2-mm claws, orange-yellow, apex rounded, not incurved, not enclosing the keel, base auriculate on the upper margin only, slightly saccate; *keel* half transversely elliptic, upper margins incurved, *c.* 6.5 × 2.5 mm including the 2-mm claws, maroon, apex rounded, base auriculate, saccate. *Style* long, hooked, lower third pubescent on the inner margin; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, obliquely obovate, *c.* 4 × 3 mm, moderately pubescent. *Seed* not seen.

Flowering period: May–October. *Fruiting period:* unknown (only old fruits seen).

Distribution (Fig. 83): south-western Western Australia. Occurs in a narrow range in the Bokal and Wagin areas.

Habitat: grows in the escarpment region south-east of Perth in the heavy loam and clay soils, in eucalypt woodland.

Selected specimens (8 examined): WESTERN AUSTRALIA, Darling District: Bokal, Beaufort River, 21 km along Boyup Brook Rd from Albany Hwy at Arthur River, 33°29'38"S, 116°53'50"E, *M.D. Crisp 8918 & W. Keys*, 10.x.1996 (CANB, MEL, PERTH); Bokal District, *P.W. Draper s.n.*, ix.1962 (PERTH); Kojonup–Boyup Brook road, *L. Dodd (J) s.n.*, v.1972 (PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium truncatum* is difficult to confuse with any other species of *Gastrolobium* because of its unusual leaf shape. Some juvenile forms of *G. polystachyum* have truncate, horned leaves, though these are much larger and are strongly bilobed and the inflorescences are terminal racemes.

54. *Gastrolobium latifolium* (R.Br.) G.Chandler & Crisp, comb. nov. *Base name:* *Brachysema latifolium* R.Br. In W. T. Aiton, *Hortus Kew.* 3: 10 (1811). *Type citation:* 'Nat. of the South-west coast of New Holland. Robert Brown, Esq. Introduct. 1803, by Mr. Peter Good.' *Type specimens:* *neo:* DBN, cult. at Kew, W.R. McNab s.n.; *isoneo* DBN (Crisp 1990)

Prostrate, trailing *shrubs*, 0.05 m high. *Branchlets* spreading, trailing, terete, densely sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–8 mm long. *Leaves* ascending, alternate, ovate, elliptic or orbicular, 15–65 × 10–55 mm, upper surface glabrous, lower surface densely sericeous, venation prominently reticulate; apex

obtuse or rounded, mucronate; margins ± undulate, not recurved; base rounded or slightly cordate. *Stipules* erect, filiform, 3–8 mm long. *Inflorescences* reduced axillary or lateral racemes, 1–2-flowered with an aborted, terminal bud, rarely subpaniculate with several flowers; *peduncle* 2–6(–11) mm long; *rachis* 0–5(–33) mm long; *subtending bracts* caducous, scale-like, trifid, 4–6 mm long. *Flowers:* not resupinate; *pedicels* terete, 2–4 mm long. *Calyx* campanulate, slightly ventricose, 10–12 mm long including the 2–3-mm receptacle, densely sericeous, lobes not recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 6 mm long; lower 3 lobes triangular, acuminate, *c.* 6 mm long. *Corolla: standard* broadly spatulate, 7–14 × 8–10 mm including the *c.* 10-mm claw, yellow infused with red towards the margins, with red veins and a rich greenish-yellow marking at the centre, apex emarginate, base rounded, not auriculate; *wings* narrowly oblong, *c.* 38–42 × 4–5 mm including the *c.* 8-mm claws, red, apex semi-acute, not incurved, not enclosing the keel, base auriculate, saccate; *keel* half obliquely narrowly elliptic, 41–43 × 8–9 mm including the 7-mm claws, red, apex acute, broadly beaked, base auriculate, saccate. *Style* long, incurved, base pubescent; *ovary* stipitate, with a disc at the base, densely pubescent; *ovules* 18–21. *Pod* exerted from the persistent calyx, obloid, 10–13 × 6–8 mm, moderately villous. *Seed* ellipsoid, *c.* 2.5 mm long, arillate.

Chromosome number: $2n = 16$ (Sands 1975).

Flowering period: August–October, rarely into November. *Fruiting period:* October and November.

Distribution (Fig. 84): south-western Western Australia. Occurs mainly near the south coast, from Cape Arid west to Kalgan River, near Albany, with an outlier between Boyup Brook and Kojonup.

Habitat: often found growing at or near watercourses or wetter areas, on white or grey sand with a clay or gravel component, in mallee or mallee-heath.

Selected specimens (35 examined): WESTERN AUSTRALIA, Eyre District: Hwy 1, between Esperance and Ravensthorpe, 1 km W of the Young River, 33°45'S, 121°09'E, *M.G. Corrick 9552*, 26.ix.1985 (CANB, MEL); along No. 2 Rabbit Fence, *c.* 35 km SSE of the Jerramungup–Ravensthorpe road, *c.* 30 km N of Bremer Bay, *P.G. Wilson 4388*, 2.x.1966 (CANB, PERTH); Jerramungup–Ravensthorpe road, 14 km E of the Gairdner River bridge, 33°53'S, 119°06'E, *M.D. Crisp 6073 et al.*, 22.ix.1979 (CANB, NSW, PERTH); 94 km E of Esperance towards Cape Arid, 33°49'S, 122°53'E, *J.M. Taylor 2329 & P. Ollerenshaw*, 27.ix.1983 (AD, CANB, MEL, PERTH); E side of the Lort River crossing, South Coast Hwy, 62.5 km from Esperance towards Ravensthorpe, 33°44'40"S, 121°16'02"E, *G.T. Chandler 365 et al.*, 12.ii.1998 (CANB, MEL); 20 km SW of Chillinup, 34°27'S, 118°28'E, *T.R. Lally 862*, 2.xi.1995 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is not easily confused with any other species of *Gastrolobium*, except for *G. minus*, which is very similar in the vegetative stage. However, *G. minus* has non-terete stipules that are distinctly concave on the lower surface, smaller flowers (*c.* 15 mm long), the calyx lobes are

subobtuse and have a broader zone of overlap (0.8–1 mm as opposed to the 0.3-mm overlap in *G. latifolium*) and a sericeous pod.

VII. The *G. calycinum* group

This group of core *Gastrolobium* species share glaucous leaves with strongly reticulate venation and a prominent intramarginal vein and occur on the central to northern sandplains of south-western Western Australia, with some species being quite widespread (e.g. *G. calycinum* and *G. rigidum*).

55. *Gastrolobium appressum* C.A.Gardner, *J. Proc. R. Soc. Western Austral.* 47: 59 (1964). *Type citation*: 'Hab. in distr. Irwin prope Gonyidi, in arenosis glareosis in fruticetis, fl. m. Septem. Gardner 12745 (TYPUS)'. *Type specimen*: *holo*: PERTH

Low *shrubs*, 0.2–0.3 m high. *Branchlets* ascending, terete, moderately to densely pubescent. *Petiole* almost non-existent, continuous and sometimes decurrent with the branchlet, 0.5 mm long. *Leaves* erect and appressed to the branchlet, in whorls of 3, ovate, 4–7.5 × 1.5–2.5 mm, glabrous or occasionally with scattered hairs along the veins of the abaxial surface, venation prominently reticulate; apex acute, unarmed; margins entire, not recurved; base obtuse. *Stipules* absent. *Inflorescences* terminal racemes, 5–15-flowered; *peduncle* (4–)8–14 mm long; *rachis* (10–)12–19(–45) mm long; *subtending bracts* caducous, entire, linear-lanceolate, *c.* 3 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* strongly campanulate, 5–6 mm long including the *c.* 1-mm receptacle, glabrous, lobes not recurved; upper 2 lobes united higher than the lower 3, triangular, acute to obtuse, *c.* 4 mm long; lower 3 lobes triangular, acute, *c.* 4 mm long. *Corolla*: *standard* transversely elliptic, 10–10.5 × *c.* 10 mm including the *c.* 3-mm claw, deep orange with a red ring surrounding the orange-yellow centre, apex emarginate, base obtuse, slightly auriculate; *wings* oblong, *c.* 9.5 × 2.5 mm including the *c.* 3.5-mm claw, orange-red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both sides, not saccate; *keel* half transversely broadly ovate, margins inrolled, *c.* 9.5 × 3.5 mm including the *c.* 3.5-mm claw, maroon, darker at apex, apex barely acute to rounded, base auriculate, saccate. *Style* long, incurved to hooked, lower half pubescent on the inner margin; *ovary* stipitate, densely pubescent; *ovules* 2 or 3. *Pod* stipitate, very broadly ellipsoid, almost spherical, 4.5–5 × 5–5.5 mm, moderately to densely pubescent. *Seed* ellipsoid, *c.* 3 mm long.

Flowering period: September–November, sometimes into December. *Fruiting period*: late October–December.

Distribution (Fig. 85): south-western Western Australia. This species has a narrow distribution north of Perth in the Gonyidi, Watheroo and Miling areas.

Habitat: grows on the northern sandplains on deep sand in dense heath or shrubland.

Conservation status: IUCN: V. ROTAP: 2V. CALM: R. This species is very rare and is considered to be vulnerable and is at risk of becoming endangered.

Selected specimens (20 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Irwin District: Gonyidi, *B. Carlin s.n.*, x.1957 (PERTH); Miling, *A. Cameron s.n.*, 21.xi.1973 (PERTH); Marchagee, *M. Burgman 102*, 12.xi.1982 (PERTH); N of Watheroo, *C.A. Gardner s.n.*, ix.1957 (PERTH); N of Watheroo, *J.D. Briggs 584*, 21.ix.1980 (CANB, K, MEL, PERTH); near Gonyidi, *G.T. Chandler 208 & W. Keys*, 10.ix.1997 (CANB, UWA).

Toxicity: unknown.

Affinity: it is difficult to confuse this with any other species of *Gastrolobium*, although vegetatively it could resemble *Pultenaea reticulata*. However, *G. appressum* has many-flowered, terminal racemes and grows on the northern sandplains, whereas *Pultenaea reticulata* has 1- or 2-flowered, axillary inflorescences and occurs on the southern sandplains.

56. *Gastrolobium calycinum* Benth. in Lindley, *Edwards' Bot. Reg. Append.*: xiii (1839). *Type citation*: none cited. *Type specimens*: *lectotype* (here chosen): K (Swan River. Drummond, 1839); *isolecto*: BM, CGE

Gastrolobium sagittatum S.Moore, *J. Linn. Soc. London, Bot.* 45: 170 (1920). *Type citation*: 'Kauring; G.W. Brown (Hb. Stoward, 562)'. *Type specimen*: *holo*: BM.

Erect, bushy *shrubs*, 0.5–1.5 m high. *Branchlets* ascending, angular, moderately sericeous. *Petioles* terete, continuous with and sometimes decurrent with the branchlet, 3–4 mm long. *Leaves* spreading to ascending, opposite, ovate to elliptic, conduplicate or rarely flat, straight or recurved, 17–40(–70) × 12–24 mm, glabrous, often glaucous, venation prominently reticulate, sometimes raised on the lower surface; apex acute or rarely rounded, pungent-pointed or rarely unarmed; margins entire, not recurved; base rounded. *Stipules* erect, narrowly triangular to hyaline, 3–6 mm long. *Inflorescences* terminal racemes, 4–14-flowered; *peduncle* 12–50(–78) mm long; *rachis* 25–40 mm long; *subtending bracts* caducous or rarely persistent, scale-like, entire or lacerate, 3–5 mm long. *Pedicels* terete (1.5–)3–4 mm long. *Calyx* campanulate, 8–14 mm long including the 1–2-mm receptacle, usually glabrous, occasionally sparsely pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, diverging, broadly triangular, rounded to acuminate, 5–7.5 mm long; lower 3 lobes triangular, acuminate to acute, 4.5–8 mm long. *Corolla*: *standard* transversely ovate, 11–16 × 14–21 mm including the 3.5–5.5-mm claw, deep orange, apex emarginate, base cordate to truncate; *wings* obovate, 12–15 × 3.5–5 mm including the 3.5–4-mm claw, orange to red, apex rounded, not incurved, not enclosing the keel, base auriculate on both

margins; *keel* half circular to transversely broadly elliptic, margins not incurved, 11.5–15 × 4–5 mm including the 3.5–4.5-mm claw, pink to red, apex rounded, base auriculate, saccate. *Style* long, hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ellipsoid to spherical, 5–8 × 5–6 mm, sparsely to moderately pubescent. *Seed* ellipsoid, 3–5 mm long, arillate.

Vernacular name: York Road poison.

Flowering period: late August–November. *Fruiting period*: from December.

Distribution (Fig. 86): south-western Western Australia. A common species distributed throughout the Darling Range around Perth north to Moora and south to the Collie area.

Habitat: this species grows in a wide range of habitats, on low hills, slopes or flats on clay, loam or sand soils over ironstone or laterite in *Eucalyptus* forest, woodland or mallee, or shrubland or heath dominated by *Allocasuarina*, often with a mixed understorey of Fabaceae and Proteaceae.

Selected specimens (127 examined): WESTERN AUSTRALIA, Darling District: 24.5 km from Kojonup to Boyup Brook, 33°51'49"S, 116°54'36"E, G.T. Chandler 742 & S. Donaldson, 2.xi.1998 (CANB); 54 km from Collie towards Williams, from Williams turnoff, 33°10'09"S, 116°37'44"E, G.T. Chandler 299 & W. Keys, 22.ix.1997 (CANB, K, NY). Avon District: Moora, 30°38'S, 116°01'E, L. Chrystal s.n., 9.vii.1953 (PERTH); 1.2 km W of Wongan Hills–Calingiri road towards Carani, 31°00'S, 116°31'E, J.D. Briggs 640, 25.ix.1980 (CANB, PERTH); 4.1 km N on Forestry Rd from Yornaning Rd, c. 10 km directly SW of Popanyinning, 32°42'50"S, 117°02'39"E, T.L. Lally 1461 & B. Fuhrer, 15.x.1997 (CANB, PERTH).

Toxicity: highly toxic; fluoroacetate 400–1400 µg g⁻¹ (Aplin 1971; Twigg *et al.* 1996b).

Affinity: *Gastrolobium calycinum* somewhat resembles *G. oxylobioides* and *G. propinquum* vegetatively. It can easily be distinguished from *G. propinquum* when in flower, because the flowers of *G. propinquum* are much smaller (standard 5–6 × 6 mm), the rachis is much larger (20–120 mm long) and there are more flowers per inflorescence (15 to more than 30 flowers) and the leaves of *G. propinquum* are narrower [6–11(–14) mm broad], with a cuneate base. The leaves of *G. oxylobioides* are much narrower (5–10 mm broad) and are not usually glaucous and the flowers are smaller (calyx 6–7.5 mm long, standard c. 10 × 14 mm).

57. *Gastrolobium hamulosum* Meisn. in Lehm., *Pl. Preiss* 2: 218 (1848). *Type citation*: 'Swan River. James Drummond, n. 209'. *Type specimens*: *holo*: BM; *iso*: CGE, K (2 sheets), W

Low shrubs, 0.2–0.4 m high. *Branchlets* ascending, angular, moderately to densely pubescent. *Petioles* terete, articulate with the branchlet, c. 0.5 mm long. *Leaves* ascending, in whorls of 3, occasionally opposite, obovate to elliptic, 6–11.5 × 3–4.5 mm, sparsely to moderately pubescent, venation prominently reticulate; apex rounded, mucronate; margins entire, may be recurved; base rounded.

Stipules erect, hyaline, 1.5–3 mm long. *Inflorescences* terminal racemes (3–)6–15-flowered; *peduncle* 8–16 mm long; *rachis* (0–)8–25(–60) mm long; *subtending bracts* caducous, scale-like, entire, narrowly triangular, 3–4 mm long. *Pedicels* terete, 0.5–1 mm long. *Calyx* campanulate, c. 6 mm long including the 0.75-mm receptacle, densely villous, lobes not recurved, not strongly zygomorphic; upper 2 lobes united slightly higher than the lower 3, triangular, acute, c. 3 mm long; lower 3 lobes triangular, acute, c. 3 mm long. *Corolla*: standard transversely ovate, 9–9.5 × c. 11 mm long including the c. 2-mm claw, yellow or orange with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* oblong to obovate, c. 8.5 × 2.5–3 mm including the c. 1.5-mm claw, yellow, orange or red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, slightly saccate; *keel* half transversely broadly elliptic, 7.5–8 × 3–4 mm including the 1.5–2-mm claw, red, apex rounded, base auriculate, saccate. *Style* long, incurved to hooked, lower two-thirds pubescent along inner margin; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, ellipsoid to globose, 4–5 × 2.5–4 mm, moderately to densely villous. *Seed* reniform, 1.5–2 mm long, arillate.

Vernacular name: hook-point poison.

Flowering period: August–October. *Fruiting period*: from October.

Distribution (Fig. 87): south-western Western Australia. A rare species, occurring in the Watheroo and Wongan Hills region.

Habitat: grows in sandy, often gravelly soils in mixed shrubland or wandoo.

Conservation status: IUCN: E. ROTAP: 2E. CALM: R. This species is rare and is considered to be endangered.

Selected specimens (10 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Avon District: N of Wongan Hills, J.D. Briggs 636, 24.ix.1980 (CANB, PERTH); E of Carani, T.E.H. Aplin 5802, 16.ix.1964 (PERTH). Irwin District: N of Watheroo, J.A. Cochrane 2107, 20.xi.1996 (PERTH).

Toxicity: fluoroacetate 100 µg g⁻¹ (Aplin 1971).

Affinity: this species most closely resembles *G. parvifolium*, though the latter lacks the pungent, hooked point on the leaf present in *G. hamulosum* and the leaves are crowded along the stem, so that the apex of one leaf overlaps the base of the next leaf, whereas in *G. hamulosum* they occur at well-spaced intervals.

58. *Gastrolobium oxylobioides* Benth. in Lindley, *Edwards' Bot. Reg. Append.*: xiv (1839). *Type citation*: none cited. *Type specimens*: *lectotype* (here chosen): K (Swan River. Drummond, 1839); *isolecto*: BM, CGE (3 sheets), K

Gastrolobium drummondii Meisn. in Lehm., *Pl. Preiss*. 1: 69 (1844). *Type citation*: 'Swan River. Drummond n. 204 et coll. I.'. *Type specimens*: *holo*: BM; *iso*: K, W (2 sheets).

Low, bushy *shrubs*, up to 0.8 m high. *Branchlets* ascending, angular, densely sericeous. *Petioles* terete, continuous and decurrent with the branchlet, 2–3 mm long. *Leaves* spreading to ascending, in whorls of 3, elliptic to ovate, recurved or straight, 12–37 × 5–10 mm, glabrous, occasionally glaucous, venation prominently reticulate; apex acute or rounded, pungent-pointed; margins usually slightly conduplicate, occasionally flat, minutely crenulate, not recurved; base cuneate to obtuse. *Stipules* erect, hyaline, 3–7 mm long. *Inflorescences* terminal racemes, 5–10-flowered; *peduncle* angular, 10–25 mm long; *rachis* angular, 10–67 mm long; *subtending bracts* caducous, scale-like, entire (though the abruptly acuminate apex may give the appearance of being slightly trifid), narrowly rhombic, 2–3 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 6–7.5 mm long including the *c.* 1.5-mm receptacle, moderately pubescent, lobes not or scarcely recurved; upper 2 lobes united higher than the lower 3, rounded, *c.* 3 mm long; lower 3 lobes triangular, acute, 2–2.5 mm long. *Corolla: standard* transversely ovate, *c.* 10 × 14 mm including the 3.5-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base truncate or cordate, occasionally auriculate; *wings* obovate, *c.* 11 × 4.5 mm including the 4-mm claws, orange and red, apex rounded, incurved and at least partially overlapping to ± enclose the keel, base auriculate on both margins, slightly saccate; *keel* half transversely elliptic, margins not incurved, *c.* 9 × 3.5 mm including the 4-mm claw, pink and maroon, apex rounded, base auriculate, saccate. *Style* long, incurved to hooked, lower half pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, often shortly so, obliquely ellipsoid, 6–7 × 3–3.5 mm, moderately to densely villous. *Seed* ellipsoid, 2.5–3 mm long, arillate.

Notes on juvenile foliage: the juvenile foliage of *G. oxylobioides* is relatively broader than the adult foliage (28–32 × 18–25 mm) and the leaves are flat. This foliage does not appear to persist longer than the first 8–10 nodes and may bear flowers from 3 or 4 nodes.

Vernacular name: Champion Bay poison.

Flowering period: August–October. *Fruiting period:* October–December.

Distribution (Fig. 88): south-western Western Australia. Occurs along the west coast from around the Murchison River at Kalbarri National Park, south through the Geraldton and Gingin areas, to the Darling Range east of Perth.

Habitat: grows on gravelly or sandy gravelly soils in heath or shrubland.

Selected specimens (90 examined): WESTERN AUSTRALIA, Irwin District: 36 km from Geraldton towards Northampton, along Great Northern Hwy, 28°28'48"S, 114°38'07"E, *G.T. Chandler* 654 & *S. Donaldson*, 24.x.1998 (BRI, CANB); Western Australia, *C.E. Carter* s.n., 1.xii.1935 (CANB); near Howatharra, 28°32'S, 114°38'E, *A. Kanis* 1571, 8.viii.1973 (CANB); 6 miles [9.5 km] N from Dandaragan, 30°37'S, 115°45'E, *C.A. Gardner* 11873, 1951 (CANB, PERTH); 17 miles [27 km] E of Murchison River mouth, *M.E. Phillips* 1428,

27.ix.1962 (CANB); 2 km N along Eneabba S road from Green Head Rd, 30°04'S, 115°12'E, *M.D. Crisp* 6221 *et al.*, 29.ix.1979 (CANB, MEL, NSW, PERTH); Badgingarra, 30°24'S, 115°33'E, *A. Hayes* A, x.1969, juvenile (PERTH). Darling District: near Pingelly, 32°32'S, 117°05'E, *A. Despassis* s.n., 2.x.1987, juvenile (PERTH).

Toxicity: often highly toxic; fluoroacetate 0–1050 µg g⁻¹ (Aplin 1971).

Affinity: this species has been confused with *G. propinquum* and *G. calycinum* in the past. *Gastrolobium propinquum* has many more flowers per inflorescence (15 or more), the flowers are much smaller (e.g. standard *c.* 5 × 6 mm), the keel-petal shape is different, noticeably with a spout-like apex and the lower margin is not entire, having a hole towards the base where the stamens are visible and the calyx is generally less pubescent. *Gastrolobium calycinum* has broader leaves (12–24 mm) that are generally more robust, are usually glaucous and are cordate at the base.

59. *Gastrolobium racemosum* (Turcz.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 130 (1987). *Mirbelia racemosa* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 282 (1853). *Oxylobium racemosum* (Turcz.) C.A. Gardner, *J. Proc. R. Soc. Western Austral.* 27: 178 (1942). *Type citation:* 'Drum. V. n. 59.' *Type specimens:* *holo:* KW; *iso:* BM, CGE, K (4 sheets), W

Chorozema magnifolium F. Muell., *Frag. Phyt. Austral.* 4: 18 (1863, p. 18). *Type citation:* 'Ad sinum Bremer Bay et ad montem Middle Mount Barren in virgultis Eucalyptorum. Maxw.' *Type specimen: lectotype* (here chosen): K (Bremer Bay, Maxwell).

Oxylobium bennettsii C.A. Gardner, *J. Proc. R. Soc. Western Austral.* 22: 123 (1936). *Type citation:* 'Stony clay soil, Ravensthorpe Range, Fl. m. Novem.–Decem. A. J. Milesi and C. A. Gardner, 10th November, 1935. The Type is in the State Herbarium, Western Australia'. *Type specimen: holo:* PERTH.

Tall, erect *shrubs*, up to 2.5 m high. *Branchlets* ascending, angular, glabrous. *Petiole* terete, broader and flatter towards base, continuous and slightly decurrent with the branchlet, 4–6 mm long. *Leaves* spreading to ascending, opposite, ovate to elliptic (20–)25–46(–60) × (5–)8–13(–35) mm, glabrous, venation prominently reticulate, with a prominent intramarginal vein, raised; apex rounded to slightly emarginate, unarmed or with a tiny mucro; margins not or scarcely recurved, minutely crenulate; base rounded to truncate. *Stipules* erect, rigid, triangular, 2–4 mm long. *Inflorescences* terminal racemes, 15–30-flowered; *peduncle* 10–20 mm long; *rachis* 25–50 mm long; *subtending bracts* caducous, scale-like, entire, lanceolate, *c.* 2 mm long, glabrous. *Pedicels* terete, 4–6 mm long. *Calyx* campanulate, 6–7 mm long including the *c.* 1-mm receptacle, ± glabrous, lobes not or scarcely recurved; upper 2 lobes united higher than the lower 3, rounded, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla: standard* transversely elliptic, *c.* 12 × 15–16 mm including the 3–4.5-mm claw, orange-apricot with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obliquely obovate, 9–10

× 3–3.5 mm including the 2.5–3-mm claw, red and pink, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only or on both margins, saccate; *keel* half transversely elliptic, margins not incurved, 6.5–7.5 × 3 mm including the 2.5–3-mm claws, pink and maroon, apex acute, almost beaked, base auriculate, saccate. *Style* very short, slightly hooked, lower half pubescent; *ovary* stipitate, moderately pubescent; *ovules* 4–6. *Pod* stipitate, ellipsoid to ovoid, 10–11 × 5–6.5 mm, glabrous. *Seed* ellipsoid, *c.* 3–3.5 mm long, arillate.

Vernacular name: net-leaved poison.

Flowering period: September–November. *Fruiting period:* October and November.

Distribution (Fig. 89): south-western Western Australia. Occurs in the south-coast region, chiefly in Fitzgerald River National Park and the Ravensthorpe Ranges, but east as far as the Lort River.

Habitat: grows on sandplains or hillslopes on sand or shaly clay-loam in mallee shrubland.

Selected specimens (51 examined): WESTERN AUSTRALIA, Eyre District: 5 miles [8 km] S of Mt Short, *c.* 33°30'S, 120°00'E, *K. Newbey* 1896, 31.x.1965 (PERTH); near Naendip, N of Dempster Inlet, 34°03'S, 119°36'E, *A.S. George* 10578, 20.xii.1970 (MEL, PERTH); near Quiss Rd, E of Jerramungup and S of Hwy 1, 33°58'S, 119°13'E, *M.G. Corrick* 8823, 19.x.1983 (CANB, MEL, PERTH); junction of Lake King–Ravensthorpe road and Mt Short Rd, 33°27'32"S, 119°57'50"E, *G.T. Chandler* 705 & *S. Donaldson*, 28.x.1998 (CANB, MEL); Lort River Station, Oldfield loc. 909 lot 47, 33°16'S, 121°23'E, *J. Gardner s.n.*, 15.x.1984 (PERTH).

Toxicity: among the most toxic *Gastrolobium* species; fluoroacetate 1500 µg g⁻¹ (Aplin 1971).

Affinity: *Gastrolobium racemosum* is similar to *G. graniticum*, but the latter differs in the relatively broader leaf with a long petiole (leaf range 48–62 × 19–32 mm, petiole 5–7 mm long), a longer inflorescence with more flowers (rachis 30–75 mm long, more than 30 flowers) and a more hairy inflorescence structure. Furthermore, *G. racemosum* has a standard petal that is a distinctive apricot colour, whereas *G. graniticum* has a yellow-orange standard petal.

60. *Gastrolobium reflexum* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: Avon District: 26 km E of Arrino towards Morawa, 29°20'30"S, 115°50'48"E, *G.T. Chandler* 644 & *S. Donaldson*, 23 Oct. 1998 (*holo:* CANB!; *iso:* AD!, BRI!, K!, MEL!, NSW!, NY!, PERTH!)

Gastrolobium spinosum Benth. var. *grandiflorum* C.A.Gardner, *Western Austral. Nat.* 4: 187 (1955). *Type citation:* 'Hab. in distr. Irwin interiore prope Latham in arenosis apertis, fl. m. Oct. Gardner sine no. (1934)'. *Type specimens:* *Lectotype* (here chosen): PERTH (C.A. Gardner *s.n.*, 11 Oct. 1934); *isolecto:* BM, CANB!, CBG, K, MEL, MO, NSW, PERTH (6 sheets).

A *Gastrolobii* speciebus ceteris stipulis reflexis et foliis valde cordatis plerumque distincta; a *G. spectabili* foliis robustioribus et ovulis duobus differt.

The reflexed stipules and strongly cordate leaf shape distinguish this species from most other species of *Gastrolobium*. Similar to *G. spectabile*, which differs in the non-glabrous leaves that are not fiercely pungent-pointed.

Etymology: this species derives its name from the reflexed stipules.

Tall and open to spreading and dense, glaucous *shrubs*, 0.6–2.5 m high. *Branchlets* ascending, angular, glabrous. *Petioles* very short, terete, continuous and partly decurrent with the branchlet, <0.5 mm long. *Leaves* broadly spreading to ± divaricate, opposite, transversely to very broadly ovate, 10–23 × 15–30 mm, glabrous, glaucous, venation sometimes obscured, reticulate; apex obtuse to acute, fiercely pungent-pointed (pungent point up to 6 mm long); margins entire, flat; bases overlapping, strongly cordate. *Stipules* reflexed to almost appressed to the branchlet below the subtended leaves, rigid, 3.5–6 mm long. *Inflorescences* terminal racemes, 6–15-flowered, axis glabrous; *peduncle* angular, 5–13 mm long; *rachis* angular, 15–40 mm long; *subtending bracts* caducous, scale-like, entire, spathiform (constricted at the base, broadly elliptic in the middle and cupping the bud and acute to acuminate at the apex), 12–13 mm long. *Pedicels* terete, *c.* 2 mm long. *Calyx* tapering to the base, 11–13 mm long including the *c.* 1.5-mm receptacle, glabrous, lobes not recurved or upper 2 lobes slightly recurved; upper 2 lobes united higher than the lower 3, strongly diverging, obtuse, 6.5–7.5 mm long; lower 3 lobes triangular, acute, 5.5–6.5 mm long. *Corolla:* standard transversely ovate to transversely elliptic, 12–13 × 13.5–17.5 mm including the 3–3.5-mm claw, deep orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* oblong, 12.5–13 × 4–4.5 mm including the *c.* 3-mm claws, deep orange, often red towards the base, apex rounded, not incurved, not enclosing the keel, base auriculate on both margins, saccate; *keel* half transversely obovate, margins incurved, 12.5–13 × 4.5–5 mm including the *c.* 4-mm claws, pink, mauve or red, darker towards the apex, apex rounded, base auriculate, saccate. *Style* long, incurved to hooked, pubescent in the lower half on the upper margin; *ovary* strongly stipitate, densely pubescent; *ovules* 2. *Pod* and *seed* not seen. (Fig. 18)

Flowering period: September–December. *Fruiting period:* not known precisely, but early fruit forming in December.

Distribution (Fig. 90): south-western Western Australia. Occurs in the central northern part of this region, particularly around the Arrino and Wubin areas and east to the Kalannie region.

Habitat: grows on undulating dunes on yellow sand or sandy loam, often gravelly, in mallee shrubland or mixed *Allocasuarina* and *Melaleuca* shrubland.

Selected specimens (20 examined): WESTERN AUSTRALIA, Avon District: Kalannie, 30°21'S, 117°07'E, *W.E. Blackall s.n.*, 1938

(PERTH); Ballidu, 30°35'S, 116°46'E, *D.C. White 3893/65*, xi.1965 (PERTH); c. 20 km W of Dalwallinu, 3.4 km along Sanders Rd from Bell Rd, 30°13'12"S, 116°28'48"E, *G.T. Chandler 661 & S. Donaldson*, 25.x.1998 (AD, CANB, HO, K, MEL, MO, NSW, PERTH); 29.4 km NE of Three Springs towards Morawa, 29°20'S, 115°50'E, *J.D. Briggs 629*, 24.ix.1980 (CANB, MEL).

Toxicity: fluoroacetate 400 µg g⁻¹ (Aplin 1971). Gardner and Bennetts (1956) report that it was responsible for heavy stock losses in the Latham and Dalwallinu areas.

Affinity: this species is difficult to confuse with many species of *Gastrolobium*, although there are similarities to *G. spectabile*, particularly in leaf shape, stipule orientation and the presence of a prominent intramarginal vein. However, *G. spectabile* has non-glaucous leaves that are not fiercely spinescent and are generally more herbaceous than the robust leaves of *G. reflexum*. The bracts of *G. spectabile* are quite small (up to 4.5 mm long) and ± linear-lanceolate, the pedicels are relatively long (4–5 mm long), the upper margins of the keel are not incurved and there are 10–12 ovules, whereas *G. reflexum* has large, broad, spathiform bracts, relatively short pedicels (c. 1 mm long), the upper margins of the keel are incurved and there are strictly two ovules.

61. *Gastrolobium rigidum* (C.A. Gardner) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 130 (1987). *Oxylobium rigidum* C.A. Gardner, *J. Proc. R. Soc. Western Austral.* 47: 59 (1964). *Type citation:* 'Hab. in distr. Eyre montem Madden septentrionalem versus, in glareosis fruticetis, fl. m. Oct. Gardner 13635 (TYPUS)'. *Type specimen:* holo: PERTH

Low, bushy *shrubs*, up to 1 m high. *Branchlets* ascending, angular, glabrous. *Petioles* terete, continuous and slightly decurrent with the branchlet, 2–3 mm long. *Leaves* ascending, opposite, elliptic to ovate, 20–40 × 10–20 mm, glabrous, glaucous, venation prominently reticulate to slightly obscured; apex obtuse, slightly pungent-pointed or mucronate; margins flat; base truncate to broadly rounded. *Stipules* erect, rigid, 2–3 mm long. *Inflorescences* terminal racemes, 4–6-flowered; *peduncle* angular, 15–20 mm long; *rachis* angular, 12–18 mm long; *subtending bracts* caducous, scale-like, slightly trilobed, ± rhombic, 2–3 mm long. *Pedicels* terete, 3–5 mm long. *Calyx* campanulate, 6–8 mm long including the c. 0.75-mm receptacle, ± glabrous, lobes not recurved; upper 2 lobes united higher than the lower 3, obtuse, c. 3–3.5 mm long; lower 3 lobes triangular, subacute, 3–3.5 mm long. *Corolla:* standard transversely ovate, c. 7 × 7.5 mm including the 2-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* oblong, c. 7 × 2 mm including the 2-mm claws, orange and red, apex rounded, not incurved, not enclosing the keel, base auriculate on both margins, saccate; *keel* half transversely obovate, margins not incurved, c. 7 × 3 mm including the 2-mm claws, maroon, apex rounded, base auriculate, saccate. *Style* long, strongly

incurved to hooked, pubescent in the lower half on the inner margin; *ovary* stipitate, densely pubescent; *ovules* 4 or 5. *Pod* stipitate, broadly ellipsoid to ± globose, 6–8 × 3.5–7.5 mm, moderately pubescent. *Seed* not seen.

Flowering period: September–October. **Fruiting period:** November and December.

Distribution (Fig. 91): south-western Western Australia. Occurs mainly in the central eastern part of this region, in the sandplains east of Lake King (Frank Hann National Park), although it does occur east as far as Tarin Rock and south to the Ravensthorpe Ranges.

Habitat: grows on undulating sandplains in white, grey or yellow sand over laterite, in mallee-heath, heathland or shrubland.

Conservation status: ROTAP: 3KC-. CALM: P2. This species is considered to be poorly known, but not at risk. This study found numerous, very healthy populations of this species, many of which were in reserves, so this species should not be considered rare in any way.

Selected specimens (30 examined): WESTERN AUSTRALIA, Eyre District: 77 km N of Ravensthorpe to Lake King, 33°24'03"S, 119°54'39"E, *G.T. Chandler 703 & S. Donaldson*, 28.x.1998 (CANB, PERTH); NW slopes of Mt Short, N of Ravensthorpe, 33°27'53"S, 120°00'51"E, *G.T. Chandler 710 & S. Donaldson*, 28.x.1998 (AD, CANB, HO, K, MEL, NSW, NY, PERTH). Roe District: Frank Hahn NP, *R.D. Royce 10247*, 10.xii.1971 (PERTH); Lake King area, 46 km towards Norseman, 33°04'37"S, 120°10'08"E, *G.T. Chandler 907 et al.*, 17.ix.1999 (CANB, UWA); Tarin Rock, 33°06'29"S, 118°13'56"E, *G.T. Chandler 713 & S. Donaldson*, 29.x.1998 (CANB, MEL).

Toxicity: fluoroacetate 10 µg g⁻¹ (Aplin 1971).

Affinity: some specimens of *G. rigidum* have been confused with *G. spectabile* in the past, although *G. spectabile* is easily distinguished by its prominently cordate leaves, many-flowered racemes (18–24-flowered) and larger flowers (e.g. standard 10 × 15 mm).

62. *Gastrolobium spectabile* (Endl.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 130 (1987). *Oxylobium spectabile* Endl. in Endlicher and Fenzl, *Nov. Stirp. Decades:* 2 (1839). *Callistachys spectabilis* (Endl.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891). *Type citation:* 'Novae-Hollandiae Austro-occidentalis interiora (Roe)'. *Type specimen:* lectotype (here chosen): W

Gastrolobium cordatum Benth. in Lindley, *Edwards' Bot. Reg.* Append.: xiii (1839). *Type citation:* none cited. *Type specimens:* lectotype (here chosen): K (Swan River, Capt. Mangles, Lindley, 1838); *isolecto:* CGE.

Tall, erect, spreading, tangled *shrubs* up to small *trees*, 0.8–4 m high. *Branchlets* ascending, angular, glabrous. *Petioles* very short, terete, continuous and partly decurrent with the branchlet, <1 mm long. *Leaves* spreading, opposite, ovate to broadly or transversely so, 25–45 × 23–45 mm, glabrous, venation prominently reticulate, intramarginal vein prominent; apex obtuse, may be pungent-pointed or

mucronate; margins flat or slightly undulate; bases overlapping, prominently cordate. *Stipules* reflexed, often also slightly curling up, hyaline, rigid, 5–7 mm long. *Inflorescences* terminal racemes, 18–24-flowered; *peduncle* angular, 10–20 mm long; *rachis* angular, 40–60 mm long; *subtending bracts* caducous, scale-like, entire, \pm narrowly lanceolate, 2–4.5 mm long. *Pedicels* terete, 3–5 mm long. *Calyx* campanulate, 7–9 mm long including the *c.* 1.5-mm receptacle, glabrous or rarely slightly pubescent, lobes all recurved; upper 2 lobes united higher than the lower 3, obtuse to rounded, *c.* 5 mm long; lower 3 lobes triangular, acute, *c.* 4 mm long. *Corolla: standard* transversely elliptic, *c.* 10 \times 15 mm including the 3-mm claw, rich yellow to light orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 11.5 \times 3 mm including the 2-mm claws, yellow to yellow-orange, apex rounded, not incurved, not enclosing the keel, base auriculate on both margins, saccate; *keel* half transversely obovate, margins not incurved, *c.* 11.5 \times 5 mm including the 3.5-mm claws, creamy green, apex rounded, base auriculate, saccate. *Style* long, incurved to slightly hooked, lower half pubescent on the inner margin; *ovary* strongly stipitate, densely pubescent; *ovules* 10–12. *Pod* stipitate, obliquely ellipsoid, 10–12 \times 5–6 mm, glabrous. *Seed* not seen.

Vernacular name: Roe's poison.

Flowering period: September–November. *Fruiting period:* from November.

Distribution (Fig. 92): south-western Western Australia. Occurs in a relatively small area, from Kununopping south to Lake Grace (though it is unlikely that this population is extant) and from Trayning east to Muntadgin.

Habitat: this species grows around the margins of granite outcrops, in coarse sand, in eucalypt woodland.

Conservation status: CALM: P3. *Gastrolobium spectabile* is rare, possibly because of its restricted habitat: it prefers to grow around the base of granite outcrops, but far enough out from such an outcrop that land clearing for farmland may have vastly reduced the number of populations of this species. This species may in fact be classed as Vulnerable or Rare sometime in the near future.

Selected specimens (19 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Avon District: Cunderdin, *J. Pusenjak 1143/64*, viii.1964, probably a juvenile specimen with large leaves (PERTH); Billyacatting Hill, NE of Kununopping, *G.T. Chandler 820 & S. Donaldson*, 15.xi.1998 (CANB, MEL, PERTH); near Muntadgin, *C.A. Gardner s.n.*, 10.xi.1947 (CANB, PERTH). Roe District: Lake Grace, *D.R. Taylor s.n.*, ix.1945 (CANB, PERTH).

Toxicity: fluoroacetate 400 $\mu\text{g g}^{-1}$ (Aplin 1971).

Affinity: it is difficult to confuse *G. spectabile* with any species of *Gastrolobium*, although there are similarities to *G. reflexum*, particularly in leaf shape, stipule orientation and the presence of a prominent intramarginal vein.

However, *G. reflexum* has glaucous leaves that are fiercely spinescent and are generally more robust than those of *G. spectabile*. The bracts of *G. reflexum* are large, broadly spathe-like (12–13 mm long and about as broad), the pedicels are very short (*c.* 1 mm long), the upper margins of the keel are incurved and there are strictly two ovules, whereas *G. spectabile* has small, linear-lanceolate bracts, relatively long pedicels, the upper margins of the keel are not incurved and there are 10–12 ovules.

63. *Gastrolobium tenue* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: Avon District: Between Bruce Rock and Doodlakine, *c.* 31°45'S, 118°05'E, *G.T. Chandler 252 & W. Keys*, 15 Sep. 1997 (*holo:* CANB!; *iso:* PERTH!). The precise locality has been withheld due to the rarity of this species

Frutices humiles foliis involutis tenue pungentibus; petala persistentia fructum omnino includentia. A *G. stenophyllo* inflorescentia floribus minus quam 10, internodiis inter flores plerumque >10 mm et bracteis subtenentibus persistentibus trifidis distinguenda.

Low, bushy shrubs, with involute leaves that are finely pungent-pointed and the petals persistent in fruit, completely enclosing the fruit, the subtending floral bracts are persistent and trifid and there are less than 10 flowers per inflorescence with *c.* 10-mm floral internodes.

Etymology: this specific epithet means slender and this species is named after the slender leaves.

Bushy, rounded shrubs, 0.2–0.6 m high. *Branchlets* ascending, angular, sparsely to moderately pubescent. *Petioles* terete, slightly swollen at base, continuous and slightly decurrent with the branchlet, 1–2 mm long. *Leaves* ascending, opposite, linear, 15–25 \times *c.* 1 mm, glabrous, venation obscurely reticulate; apex slightly rounded, finely pungent-pointed; margins strongly involute, appearing \pm terete; base cuneate. *Stipules* erect, hyaline, 1.5–3 mm long. *Inflorescences* terminal racemes, 4–10-flowered; *peduncle* angular, 13–25 mm long; *rachis* angular, 15–50 mm long; *subtending bracts* persistent, usually scale-like, rarely with the middle lobe elongated and leaf-like, prominently trifid on the lower flowers, almost entire on the upper-most flowers on the rachis, 2–4 mm long. *Pedicels* terete, 2–3 mm long. *Calyx* campanulate, *c.* 6 mm long including the *c.* 0.5-mm receptacle, sparsely to moderately, shortly pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, triangular, obtuse, *c.* 3 mm long; lower 3 lobes triangular, acute, *c.* 2.5 mm long. *Corolla: standard* transversely ovate, *c.* 8 \times 11 mm including the 1.5-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, *c.* 8.5 \times 3.5 mm including the 1.5-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half broadly elliptic, upper

margins incurved, *c.* 8 × 3 mm including the 1.5-mm claws, red and maroon, apex rounded, base auriculate, saccate. *Style* long, slightly hooked, lower third pubescent on the inner margin; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, floral parts persistent, completely obscuring pod, ellipsoid, 5.5–6 × 3–3.5 mm, moderately pubescent. *Seed* ellipsoid, *c.* 2.5 mm long, arillate. (Fig. 19)

Flowering period: September and October. *Fruiting period*: November and December.

Distribution (Fig. 93): south-western Western Australia. Occurs in a restricted range on the sandplains around Bruce Rock and Doodlakine.

Habitat: undulating dunes in yellow sand or sandy clay in *Eucalyptus* or *Allocasuarina* heath.

Conservation status: CALM: P1. This species is known only to be extant at the type locality, which is on a disturbed road verge and very much in danger of becoming extinct. The population has been steadily in decline during the course of this study, with no seedling recruitment and old plants dying and is in need of urgent measures to ensure its survival. Numerous searches in the area have failed to turn up new populations of this species.

Selected specimens (12 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Avon District: Shackleton, *I. Salter s.n.*, 18.xi.1939 (PERTH); W of Belka, *B.H. Smith 931*, 8.ix.1987 (CANB, HO, MEL, PERTH); between Bruce Rock and Doodlakine, *G.T. Chandler 819 & S. Donaldson*, 15.xi.1998 (CANB).

Toxicity: unknown.

Affinity: the only species of *Gastrolobium* that *G. tenue* may be confused with is *G. stenophyllum*, which has somewhat similar foliage. However, *Gastrolobium stenophyllum* is a large, erect shrub, the leaves are unarmed, the inflorescence is many-flowered (10- to more than 30-flowered), with very short internodes between flowers (<1 mm) and the subtending bracts are caducous and entire, whereas *G. tenue* has relatively few flowers per inflorescence and relatively long internodes between flowers (generally >10 mm).

VIII. The *G. retusum* group

The species in this group all have strongly tomentose calyces that are often bicoloured, they generally have inflorescences that are reduced to a few flowers in the leaf axils (except *G. ebracteolusum*) and they all have trifid bracts.

64. *Gastrolobium dorrienii* (Domin) G.Chandler & Crisp, comb. nov. *Base name*: *Nemcia dorrienii* Domin, *Preslia* 2: 29 (1923a). *Type citation*: 'W.A.: Bridgetown to Kojonup and Slab Hut Gully leg. Capt. A.A. DORRIEN-SMITH (herb Kew)'. *Type specimen*: *holo*: K

Oxylobium emarginatum S.Moore var. *major* S.Moore, *J. Linn. Soc. London, Bot.* 45: 167 (1920). *Type citation*: 'Kojonup; Stoward. 806'. *Type specimen*: *holo*: BM.

Oxylobium emarginatum S.Moore, *J. Linn. Soc. London, Bot.* 45: 167 (1920). *Nemcia emarginata* (S.Moore) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 126 (1987). *Type citation*: 'Kojonup; Stoward, 105'. *Type specimen*: *holo*: BM.

Small, twiggy shrubs, up to 0.5 m high. *Branchlets* ascending, slightly angular, moderately pubescent. *Petioles* terete, continuous and decurrent with the branchlet, 1–2 mm long. *Leaves* patent, ternate, obovate to obtriangular, recurved, 10–17 × 8–12 mm, upper surface glabrous, lower surface moderately pubescent, venation; apex recurved, almost bilobed, mucronate; margins recurved; base rounded. *Stipules* erect, hyaline, 2–3 mm long. *Inflorescences* terminal, sessile clusters of 10 or more flowers; *peduncle* *c.* 1 mm long; *rachis* *c.* 1–3 mm long; *subtending bracts* trifid with lobes much shorter than tube. *Pedicels* 1–3 mm long. *Calyx* campanulate, 6–7 mm long including the *c.* 1-mm receptacle, bicoloured with dense basal white hairs becoming golden brown apically, lobes not recurved; upper 2 lobes united higher than the lower 3, acute to obtuse, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2.5 mm long. *Corolla*: *standard* transversely ovate, 9–10 × 9–10 mm including the *c.* 3-mm claw, rich yellow with a dark red centre, apex emarginate, base truncate; *wings* obovate, 8–9 × 3 mm including the 3-mm claws, base red with yellow tips, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half broadly elliptic, margins incurved, *c.* 8 × 2 mm including the 2.5-mm claws, dark red, apex obtuse, base auriculate, saccate. *Style* long, strongly incurved to hooked, lower third pubescent; *ovary* ± sessile, densely pubescent; *ovules* 2. *Pod* shortly stipitate, ovoid, enclosed in calyx, *c.* 6–7 × 2–3 mm, densely pubescent. *Seed* not seen.

Flowering period: October. *Fruiting period*: November.

Distribution (Fig. 94): south-western Western Australia. Occurs around Kojonup, between Perth and Albany and further south in the Stirling Range.

Habitat: grows on sandy loam over laterite in mallee heath.

Selected specimens (7 examined): WESTERN AUSTRALIA, Darling District: White Elephant Rd, 33 km W of Kojonup, 33°53'36"S, 116°51'35"E, *C.M. Lewis 279*, 1.x.1997 (CANB, PERTH). Eyre District: Stirling Range, Salt River Rd, 11 km W of junction with Formby South Rd, 34°19'28"S, 117°57'41"E, *M.D. Crisp 8963 & W. Keys*, 17.x.1996 (CANB, PERTH); Salt River Rd, 20 km W of its junction with Chester Pass Rd, 34°19'S, 118°00'E, *M.G. Corrick 9683*, 17.x.1985 (CANB, PERTH).

Toxicity: unknown.

Typification: as the name *Gastrolobium emarginatum* is already occupied (see *Gastrolobium velutinum*), this species requires a new name.

Affinity: morphologically similar to *Gastrolobium stowardii*, but this latter species has angular stems, opposite leaves with decurrent petioles and bracts with an elongated middle lobe.

65. *Gastrolobium retusum* Lindl., *Edwards' Bot. Reg.* 19: t. 1647 (1834). *Oxylobium virgatum* Benth., *Fl. Austral.* 2: 22 (1864). *Notes:* Bentham changed the epithet because there was an earlier homonym for *Oxylobium retusum*. *Callistachys retusa* (Lindl.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891). *Nemcia retusa* (Lindl.) Domin, *Preslia* 2: 29 (1923). *Type citation:* 'A native of the south coast of New Holland, whence it was received from Mr. Knight, of the King's Road, in whose Nursery our figure was made in May last.' *Type specimen: holo* (here chosen): CGE

Oxylobium drummondii Meisn. in Lehmann, *Pl. Preiss.* 1: 30 (1844). *Oxylobium cuneatum* Benth. var. *emarginatum* Benth., *Fl. Austral.* 2: 24 (1864). *Nemcia cuneata* (Benth.) Domin var. *drummondii* (Meisn.) Domin, *Preslia* 2: 30 (1923a). *Type citation:* 'Swan River, Drummond n. 210.' *Type specimens: holo:* BM; *iso:* K (2 sheets), W (2 sheets).

Oxylobium melinocaula E.Pritz. in Diels & Pritz. *Bot. Jahrb. Syst.* 35: 253, Fig. 29-D (1904). *Type citation:* 'Hab. in distr. Stirling pr. Cranbrook in fruticetis lapidosis fl. m. Sept. (D. 4452).' *Type:* the plate.

Bushy shrubs, up to 2 m high. *Branchlets* ascending, angular, densely villous. *Petioles* terete, continuous and decurrent with the branchlet, 1–2 mm long. *Leaves* ternate, ± bilobed to spatulate, 11–40 × 6–10 mm, upper surface glabrous, lower surface sparsely to moderately pubescent, glabrescent, venation prominently reticulate; apex often bilobed, mucronate; margins crenulate, becoming plicate; base cuneate. *Stipules* erect, hyaline, 5–6 mm long. *Inflorescences* condensed terminal racemes, 8–12-flowered; *peduncle* 2–10 mm long; *rachis* 2–15 mm long; *subtending bracts* trilobed, the lobes much shorter than the trunk and mostly hyaline, *c.* mm long. *Pedicels* terete, <3 mm long. *Calyx* campanulate, 5–6 mm long including the *c.* 0.5-mm receptacle, densely villous, hairs bicoloured, with white hairs at the base becoming golden to dark brown at the lobe apices, lobes not to slightly recurved; upper 2 lobes united higher than the lower 3 and much narrower, acute, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2.5 mm long. *Corolla: standard* transversely elliptic, *c.* 7.5–10 × 10–11 mm including the 1.5–2-mm claw, orange, dark red at the centre, apex emarginate, base cordate, auriculate; *wings* ± obovate, *c.* 7–10 × 2.5–3 mm including the 2-mm claws, orange and purple red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half very broadly elliptic, *c.* 7–10 × 3 mm including the 2-mm claws, maroon, apex ± obtuse, base auriculate, saccate. *Style* long, strongly incurved to hooked, base pubescent; *ovary* very shortly stipitate, densely pubescent; *ovules* 4. *Pod* ± sessile, ovoid, *c.* 6 × 3 mm, moderately to densely pubescent. *Seed* not seen.

Flowering period: October. *Fruiting period:* October–December.

Distribution (Fig. 95): south-western Western Australia. This species has a disjunct distribution, occurring around Bindoon, near Perth and then around the Stirling Range, Bremer Bay and Cape Riche area, but not in between.

Habitat: occurs on the northern and southern sandplains of south-western Western Australia on sandy soils in heath, woodland or mallee woodland.

Selected specimens (28 examined): WESTERN AUSTRALIA, Darling District: Red Hill, Toodyay Rd, 31°51'S, 116°04'E, *R.D. Royce 4311*, 7.ix.1953 (CANB, PERTH); Nature Reserve, S of Bindoon, 31°28'29"S, 116°02'47"E, *G.T. Chandler 188 & W. Keys*, 9.ix.1997 (CANB, NY); Blackwood River, *Miss Hester s.n.* (right hand specimen; CANB, MEL, PERTH). Eyre District: 11 km on North Woogerelup Rd, from Woogerelup Rd, 34°29'57"S, 117°54'29", *G.T. Chandler 730 & S. Donaldson*, 31.x.1998 (CANB, PERTH); Stirling Range, 4.5 km S of Yungermere Peak, 34°26'S, 118°07'E, *M.D. Crisp 6116 et al.* 24.ix.1979 (CANB, MEL, NSW, PERTH, US); 1.9 km along Swamp Rd towards Fitzgerald River NP, from Bremer Bay Rd, 34°23'12"S, 119°17'18"E, *G.T. Chandler 427 et al.* 15.ii.1998 (CANB, PERTH); 22 km on Chillinup Rd from Chester Pass Rd, intersection with South Stirling Rd, 34°32'55"S, 118°13'50"E, *G.T. Chandler 731 & S. Donaldson*, 31.x.1998 (AD, CANB, MEL, NSW, PERTH).

Toxicity: unknown.

Notes: this is quite a variable species, which requires a detailed study to resolve some complex issues. DNA sequencing of Chandler 427 (Bremer Bay) and Chandler 188 (Bindoon), done as a species replicate, found that these two forms did not fall together on the phylogeny. In fact, they are in quite different groups. However, there was not time to delve into this species to fully resolve this issue.

Affinity: similar to *Gastrolobium whicherensis*, which differs in the leaves being basically oblong, ranging from slightly ovate to slightly obovate, the stipules have a thickened, grey-tomentose base, there are more flowers per inflorescence (greater than 15) and it has longer peduncles (15–33 mm long).

66. *Gastrolobium whicherensis* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: Dardanup Forest Block, E of Dardanup, 33°24'00"S, 115°49'00"E, *G.J. Keighery 14932* (*holo:* PERTH!)

G. retuso similis sed foliis praecipue oblongis (variantibus a vix ovatis ad vix obovatis), stipulis ad basim incrassatis canis tomentosus et pedunculis longioribus (10–25 mm longis) distincta.

Similar to *Gastrolobium retusum* but differing in that the leaves are basically oblong, ranging from slightly ovate to slightly obovate, the stipules have a thickened, grey-tomentose base and the peduncles are longer (15–33 mm long).

Etymology: named after the hills in which this species is endemic, the Whicher Range.

Slender, open shrubs up to 1.6 m high. *Branchlets* ascending, angular to trigonous, moderately to densely sericeous. *Petioles* terete, continuous and may be slightly continuous with the branchlet, 2–4 mm long. *Leaves* ascending, in whorls of three or four, ± oblong, cuneiform or slightly ovate, 20–25 × 3–5 mm, upper surface glabrous, lower

surface glabrous to moderately sericeous, venation openly reticulate; apex rounded, often slightly emarginate, slightly mucronate; margins flat slightly recurved; base cuneate to rounded. *Stipules* erect to recurved, narrowly triangular, hyaline, 3–7 mm long, densely pubescent. *Inflorescences* condensed axillary and terminal racemes, more than 15-flowered, peduncle and rachis densely sericeous; *peduncle* 15–33 mm long, angular; *rachis* 3–10 mm long, angular; *subtending bracts* caducous, scale-like, prominently trifid, 4–6 mm long, densely pubescent. *Pedicels* terete, 2–3 mm long, densely pubescent. *Calyx* campanulate, 5–7 mm long including the *c.* 0.75-mm receptacle, lobes not recurved, densely pubescent, hairs bicoloured, with white hairs becoming golden towards the lobe apices; upper 2 lobes united into a truncate, emarginate lip, *c.* 2.5–3 mm long; lower 3 lobes triangular, acute, *c.* 2.5–3 mm long. *Corolla: standard* transversely elliptic, *c.* 9 × 8 mm including the 3-mm claw, orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 8 × 3 mm including the 2-mm claws, red with a yellow edge, apex rounded, incurved and overlapping the keel, base auriculate on the upper margin only, not or slightly saccate; *keel*/halfbroadly elliptic, *c.* 8 × 2 mm including the 3-mm claws, red, apex rounded, base auriculate, saccate. *Style* very long, hooked, lower third slightly pubescent; *ovary* very shortly stipitate, densely pubescent; *ovules c.* 4. *Pod* and *seed* not seen.

Flowering period: October. *Fruiting period:* unknown.

Distribution (Fig. 96): south-western Western Australia. *Gastrolobium whicherensis* is currently known only from the Whicher Range area, south of Perth.

Habitat: grows on steep westerly slopes on red-grey sandy clay over quartzite, in *Eucalyptus haematoxylon* woodland.

Specimens examined: only the type specimen was seen for this species.

Toxicity: unknown.

Affinity: similar to *Gastrolobium retusum*, which differs by having ± spatulate leaves and the stipules do not have a thickened, grey-tomentose base, fewer flowers per inflorescence (8–12) and shorter peduncles (2–10 mm long).

67. *Gastrolobium ebracteolatum* G.Chandler & Crisp, nom. nov. *Base name:* *Callistachys linearis* Benth., *Enum. Pl. Huegel*: 28 (1837a). *Oxylobium lineare* (Benth.) Benth., *Fl. Austral.* 2: 17 (1864). *Chorizema lineare* (Benth.) F.Muell., *Frag. Phyt. Austral.* 4: 17 (1863), published as '*Chorozema*'. *Type citation:* none cited. *Lectotype* (here chosen): W (Swan River, Hügel); *isolecto:* K. *Notes:* a new specific epithet was required, as the name *G. lineare* was already taken

Etymology: this species has often been confused with *Callistachys lanceolata*, which has bracteoles, so the specific epithet refers to the lack of bracteoles on *G. ebracteolatum*.

Slender, erect *shrubs*, 1.5–4 m high. *Branchlets* slightly angular, ascending, sparsely to moderately pubescent. *Petioles* terete, continuous and slightly decurrent with the branchlet, 2–3 mm long. *Leaves* spreading to ascending, scattered along the branchlet, linear-ovate to linear-elliptic, 50–115 × 3.5–10 mm, upper surface glabrous, lower surface glabrous to moderately sericeous, venation prominently reticulate; apex rounded, weakly mucronate; margins slightly recurved; base rounded to slightly cuneate. *Stipules* erect, hyaline, 2.5–4 mm long. *Inflorescences* terminal racemes, 20- to more than 30-flowered, moderately sericeous; *peduncle* 5–20 mm long; *rachis* 60–180 mm long; *subtending bracts* ultimately caducous but persisting until well after anthesis, scale-like, trilobed (although this may be obscured by the pubescence of the bract), middle lobe longer than the outer two, 4–5 mm long, densely villous. *Pedicels* terete, 1–3 mm long, densely villous. *Calyx* broadly campanulate, 9–10 mm long including the *c.* 1.5-mm receptacle, densely villous, bicoloured, with silvery hairs at the base becoming golden brown at the lobes, or occasionally unicoloured with all hairs golden brown, lobes not recurved, lower 3 lobes may be slightly incurved; upper 2 lobes united higher than the lower 3, obtuse, 6–7 mm long; lower 3 lobes triangular, acute, 5–6 mm long. *Corolla: standard* transversely ovate, *c.* 12 × 13 mm including the 3-mm claw, pale yellow to maroon with a small yellow centre, apex emarginate, base cordate, saccate; *wings* ovate to oblong, *c.* 11 × 3.5 mm including the 2-mm claws, red, apex rounded, not incurved but with apices touching to slightly enclose the keel, base strongly auriculate on both margins, saccate; *keel* half broadly oblong, margins not incurved, *c.* 11 × 3.5 mm including the 2-mm claws, pale yellow to cream or red, apex rounded, base auriculate, saccate. *Style* long, slightly hooked, base pubescent; *ovary* stipitate, densely pubescent; *ovules c.* 18. *Pod* stipitate, ovoid, 11–12 × 5–6 mm, moderately to densely pubescent. *Seed* not seen.

Flowering period: October–December. *Fruiting period:* November and December.

Distribution (Fig. 97): south-western Western Australia. Occurs throughout the Darling escarpment, mostly east and south of Perth from Helena Valley south to Tonebridge, but with one outlier near Gingin, north of Perth.

Habitat: occurs in riverine habitats or in swampy woodlands on loam or sandy loam soils, in open woodland or Jarrah (*Eucalyptus marginata*) forest.

Selected specimens (17 examined): WESTERN AUSTRALIA, Darling District: Tonebridge, 34°5'S, 116°4'E, *M.D. Crisp* 8471 & *W. Keys*, 23.ix.1993 (CANB); Helena Valley, 31°6'S, 116°2'E, *J. Seabrook* 451, 12.xi.1977 (CANB, PERTH); junction of Brookway Rd and Bekin Rd, near bridge over creekline, *c.* 13.5 km NE of Kirup, 33°9'19"S, 116°6'38"E, *T.R. Lally* 1353 & *B.J. Lepschi*, 17.xi.1996 (CANB, PERTH); 140 m S of Cloister Avenue, Canning River foreshore, 32°07'S, 116°01'E, *M.L. Clark* 145, 18.ix.1974 (CANB, PERTH); 10 km NW of Gingin, 31°18'S, 115°50'E, *K. Pajmas* 3784, 19.ix.1980 (CANB).

Toxicity: unknown.

Affinity: the long, linear leaves and long racemes do not resemble those of any other species of *Gastrolobium*, but this species has been confused with the linear-leaved form of *Callistachys lanceolata* in the past. In this case, flowers are required for a positive identification, preferably buds, as *C. lanceolata* has caducous bracteoles on the calyx, whereas *G. ebracteolatum* lacks bracteoles. A further aid to identification is the distribution, with *C. lanceolata* generally confined to the south coast, while *G. ebracteolatum* occurs further north and east, mainly along the Darling Range escarpment.

68. *Gastrolobium acutum* Benth. in Lindley, *Edwards' Bot. Reg. Append.*: xiv (1839). *Oxylobium acutum* (Benth.) Benth., *Fl. Austral.* 2: 24 (1864). *Callistachys acuta* (Benth.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891). *Nemcia acuta* (Benth.) Domin, *Preslia* 2: 30 (1923a). *Type citation*: not cited. *Type specimens*: *Lectotype* (here chosen): K (Swan River. Drummond, 1839); *isolecto*: BM (2 sheets), CGE

Bushy *shrubs*, up to 1.5 m high. *Branchlets* ascending, angular, white tomentose. *Petioles* terete, continuous and slightly decurrent with the branchlet, 1–2 mm long. *Leaves* patent or retrorse, ternate, rigid, narrowly elliptic to ovate, 12–22 × 4–6 mm, glabrous, venation prominently reticulate, raised; yellow-green; apex acute, pungent-pointed; margins incurved to unevenly plicate, entire; base rounded. *Stipules* erect, hyaline, *c.* 3 mm long. *Inflorescences* solitary or paired flowers in the axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, trilobed with a much longer middle lobe, lobes shorter than tube, 4–5 mm long, moderately pubescent outer surface, glabrous inner. *Pedicels* terete, 2–3 mm long, densely pubescent. *Calyx* campanulate, 6–8 mm long including the *c.* 1-mm receptacle, moderately pubescent, lobes not to slightly recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla*: *standard* transversely elliptic, 8–9.5 × 9–9.5 mm including the 3.5–4.5-mm claw, yellow with a thick red area surrounding the tiny, yellow centre, apex emarginate, base truncate, not auriculate; *wings* obovate, 7–8 × 2.5–3 mm including the 2–2.5-mm claws, yellow, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, slightly saccate; *keel* half broadly obovate, 7–8 × 2–2.5 mm including the 2.5–3-mm claws, red, apex obtuse, base auriculate, saccate. *Style* long, hooked, lower half pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, ovoid, 7–9 mm long, densely pubescent. *Seed* not seen.

Flowering period: August and September. *Fruiting period*: from October.

Distribution (Fig. 98): south-western Western Australia. Occurs from the Port Gregory region, near Northampton, south to Armadale, in the Perth region.

Habitat: grows in gravel pits and shrubland with species such as *Dryandra sessilis*, *Boronia cymosa* and *Geleznovia verrucosa*.

Conservation status: ROTAP: 3KC-. CALM: P3. This taxon is rare, though not considered to be at risk and further survey work is required to further determine its conservation status.

Selected specimens (9 examined): WESTERN AUSTRALIA, Irwin District: Gravel pit, 15 km from Northampton on Port Gregory Rd, 28°17'58"S, 114°30'37"E, *R. Davis* 3598, 8.vii.1997 (CANB, PERTH). Darling District: Greenmount, 31°54'S, 116°03'E, ex Herb. *W.V. Fitzgerald s.n.*, ix.1900 (CANB, NSW); Darlington, Darling Range, 31°55'S, 116°04'E, *A. Morrison s.n.*, 11.x.1906 (CANB, PERTH).

Toxicity: unknown.

Affinity: similar to *G. epacridoides*, which is easily differentiated by the lack of stipules and also has shorter, broader leaves (11–14 × 8 mm). *Gastrolobium capitatum* is also similar to *G. acutum*, but the former species can most easily be distinguished by the condensed terminal and axillary racemes, but also by the longer, relatively much narrower leaves (35–55 × 3–10 mm).

69. *Gastrolobium capitatum* (Benth.) G.Chandler & Crisp, comb. nov. *Base name*: *Oxylobium capitatum* Benth., *Enum. Pl. Huegel*: 28 (1837). *Callistachys capitata* (Benth.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891). *Nemcia capitata* (Benth.) Domin, *Preslia* 2: 30 (1923). *Type citation*: 'Swan-River et King Georges Sound. (Hügel.)' *Type specimens*: *lectotype* (here chosen): K (King Georges Sound, Hügel); *isolecto*: W

Prostrate to low, bushy *shrubs*, up to 1 m high. *Branchlets* trailing, white tomentose. *Petioles* terete, continuous but not decurrent with the branchlet, 1–2 mm long. *Leaves* spreading, opposite or alternate, narrowly to linear-elliptic to obovate, 35–55 × 3–10 mm, glabrous, venation prominently reticulate; apex acute with 3–4 mm long filiform mucro; margins not recurved; base cuneate. *Stipules* erect, filiform, 6–8 mm long. *Inflorescences* condensed terminal and axillary racemes, 2–6-flowered; *peduncle* 2–3 mm long; *rachis* 1–2 mm long; *subtending bracts* caducous, scale-like, filiform 4 mm long. *Pedicels* terete, 2–3 mm long. *Calyx* campanulate, 7–8 mm long including the *c.* 1.5-mm receptacle, moderately villous, lobes not or scarcely recurved; upper 2 lobes united higher than the lower 3, rounded, *c.* 3 mm long; lower 3 lobes triangular, acute, *c.* 2.5 mm long. *Corolla*: *standard* transversely ovate, *c.* 10 × 12–15 mm including the 5-mm claw, orange-yellow red ring surrounding the yellow centre, apex emarginate, base strongly cordate, not auriculate; *wings* obovate, 11–12 × 4.5 mm long including the *c.* 4-mm claws, orange, apex rounded, incurved, overlapping and enclosing the keel, base auriculate on the upper margin only, saccate; *keel* half

transversely elliptic, margins not incurved, *c.* 10 × 4 mm including the 4-mm claws, red, apex obtuse, base auriculate, saccate. *Style* long, incurved, pubescent at very base; *ovary* shortly stipitate, densely pubescent; *ovules* 4–8. *Pod* almost sessile, ovoid, 7–9 × 2.5–4 mm, moderately pubescent. *Seed* not seen.

Flowering period: June–September. *Fruiting period*: September–November.

Distribution (Fig. 99): south-western Western Australia. Widespread along the Darling Range escarpment, from Gingin in the north to Capel, near Busselton and King Georges Sound in the south.

Habitat: grows in a variety of habitats, from wet to quite dry, on sandy to loamy soils in woodland or open forest.

Selected specimens (36 examined): WESTERN AUSTRALIA, Darling district: Gingin cemetery, 31°21'S, 115°54'E, *A. Kanis 1503*, 7.viii.1973 (CANB); 0.5 km S of Yoongarillup Community Hall on Vasse Hwy (*c.* 12 km SE of Busselton), 33°43'15"S, 115°26'00"E, *M.D. Crisp 8943 & W. Keys*, 12.x.1996 (CANB, PERTH); Reserve 23172 (C58) along Harvey River, about 8 km E of Yalgorup, 32°52'S, 115°46'E, *B.J. Keighery & N. Gibson 120*, 2.ix.1993 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is somewhat similar to *G. acutum*, which is easily distinguished by the inflorescence, which has flowers that are solitary or in pairs in the axils and the leaves are shorter and relatively broader (12–22 × 4–6 mm). The broader-leaved form of *G. linearifolium* is similar to *G. capitatum*, but can be distinguished by the tomentose to villous indumentum and the glabrate leaves that are generally obovate, whereas *G. capitatum* has a sericeous indumentum (or the calyx may tend to be villous), the leaves are more or less persistently sericeous beneath and are ovate to elliptic (rarely obovate).

70. *Gastrolobium alternifolium* G.Chandler & Crisp, sp. nov. *Type*: Western Australia: Darling District: Brookton Highway, 1.7 km W of Warradale Road, 32°16'02"S, 116°29'15"E, *F. Hort 556 & L. Boyle*, 22 Aug. 1999 (*holo*: CANB!; *iso*: PERTH!)

Frutex humilis ad 0.3 m altus floribus fere sessilibus geminis vel solitariis in axilibus supernis; a *Gastrolobii* speciebus ceteris foliis magnis (25–50 × 12–30 mm) ovatis alternis nec oppositis nec verticillatis facile distincta.

A low shrub up to 0.3 m high with paired or solitary flowers almost sessile in the upper branches, which is easily distinguished from most species of *Gastrolobium*, as the large, ovate leaves (25–50 × 12–30 mm) are alternately arranged, not opposite or whorled.

Etymology: this species is named after the unusual leaf arrangement for *Gastrolobium*, being alternate.

Open, many stemmed *shrubs*, up to 0.3 m high. *Branchlets* ascending, angular, scruffy with mostly

appressed hairs, glabrescent. *Petioles* terete, continuous and slightly decurrent with the branchlet, 1–2 mm long. *Leaves* spreading to ascending, alternate, ovate, 25–50 × 12–30 mm, glabrous, upper surface slightly glaucous, lower surface green, venation prominently reticulate, raised; apex rounded, often somewhat emarginate, stiffly mucronate; margins very slightly crenulate and undulate; base cordate, rounded or obtuse. *Stipules* recurved, triangular, 2–4 mm long, base pubescent. *Inflorescences* single or paired flowers in upper axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, trilobed, lobes all about the same length as the tube, 4–5 mm long. *Pedicels* pubescent, less than 1 mm long. *Calyx* campanulate, 6–8 mm long including the *c.* 1-mm receptacle, densely villous, lobes not or scarcely recurved; upper 2 lobes united higher than the lower 3, acute, 3.5–4 mm long; lower 3 lobes triangular, acute, 3.5–4 mm long. *Corolla*: *standard* elliptic, *c.* 11.5–13 × 10 mm including the 4-mm claw, yellow outer, red in the large, mid-part of the lamina, with a tiny, yellow centre, apex emarginate, base cordate; *wings* broadly obovate, *c.* 10 × 5 mm including the 3-mm claws, yellow and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on upper margin only, saccate; *keel* half obliquely very broadly elliptic, margins not incurved, *c.* 9–11 × 3.5 mm including the 3-mm claws, deep maroon, apex broadly rounded, base auriculate, saccate. *Style* strongly incurved, lower third pubescent; *ovary* sessile, densely pubescent; *ovules* 2 or 3. *Pod* sessile, ovoid, 6–8 mm long, softly grey pubescent. *Seed* not seen. (Fig. 20)

Flowering period: July–September. *Fruiting period*: October and November.

Distribution (Fig. 100): south-western Western Australia. Grows in the Darling escarpment region east of Perth, near York.

Habitat: grows in sandy gravel in *Banksia attenuata* heath.

Conservation status: CALM: P3. This taxon is rare, but not considered to be at risk, but further survey work is required.

Specimens examined: WESTERN AUSTRALIA, Darling District: 33 km WNW of Beverley, W Talbot Rd, 3 km NW of Gunapin Ridge Rd turnoff, 32°00'S, 116°35'E, *M.D. Crisp 6727*, 26.vii.1980 (CANB, PERTH); Kelmscott–Brookton highway, *VE. Sands 638.6.7*, 10.viii.1963 (PERTH); West Talbot Rd, 8 km E of Helena Rd and 3.2 km W of Luelfs Rd (=Gunapin Ridge Rd), 32°00'25"S, 116°35'40"E, *M.D. Crisp 8513 & W. Keys*, 27.ix.1993 (CANB, PERTH).

Toxicity: unknown.

Affinity: the large, ovate, alternately arranged leaves easily distinguish this species from its close relatives *G. capitatum* and *G. acutum* which have opposite leaves. Furthermore, *G. capitatum* has narrower leaves (2–10 mm broad) and *G. acutum* has generally smaller leaves (12–22 × 4–6 mm).

71. *Gastrolobium linearifolium* G.Chandler & Crisp, nom. nov. *Callistachys oxylobioides* Meisn. in Lehm., *Pl. Preiss.* 1: 27 (1844). *Oxylobium reticulatum* Meisn. in Lehm., *Pl. Preiss.* 1: 29 (1844), *pro parte* (only those specimens based on *Callistachys oxylobioides* Meisn.). *Type citation*: 'In arenosis sylvae prope deversorium publicum Pineapple (Perth) d. 6. Jun. Herb. Preiss. no. 842. et in calcareis inter frutices densos prope oppidum Freemantle, d. 18. Dec. 1839. No. 841.' *Type specimens*: lectotype (here chosen): LD (Preiss 842); *isolecto*: GOET (2 sheets), MO (left hand specimen); NY (right hand and centre specimens), S (left hand specimen); W (2 sheets)

Notes: a new specific epithet is required because the name *Gastrolobium oxylobioides* is already occupied (see *Gastrolobium oxylobioides*).

Etymology: the new specific epithet refers to the linear leaves.

Low, bushy, sometimes almost prostrate *shrubs*, 0.3–1 m high. *Branchlets* spreading, angular, densely villous. *Petioles* terete, continuous and decurrent with the branchlet, 1–2 mm long. *Leaves* initially opposite and slightly obovate, rapidly becoming ternate in later developmental stages and very narrowly elliptic to essentially linear, 35–70 × 4–6 mm, glabrous, venation prominently reticulate, raised; apex recurved, prominently mucronate; margins becoming conduplicate; base cuneate. *Stipules* recurved, hyaline, 4–6 mm long. *Inflorescences* condensed axillary racemes or solitary flowers in the axils; *peduncle* 0–2 mm long; *rachis* 0–4 mm long; *subtending bracts* caducous, scale-like, trifid, the lobes about equal and much shorter than the tube, 2–3 mm long. *Pedicels* less than 3 mm long. *Calyx* campanulate, *c.* 7 mm long including the *c.* 1-mm receptacle, densely villous, lobes scarcely recurved; upper 2 lobes united slightly higher than the lower 3, acute, *c.* 5.5 mm long; lower 3 lobes triangular, acuminate, 5 mm long. *Corolla*: *standard* transversely ovate, 13–14 × 14–16 mm including the *c.* 2.5-mm claw, yellow-orange, with a deep maroon reverse side, apex emarginate, base cordate, not auriculate; *wings* obliquely obovate, *c.* 9–11 × 3 mm including the 2.5-mm claws, red and yellow, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half broadly to very broadly ovate, 8–10 × 3 mm including the 3.5-mm claws, dark red-brown, apex rounded, base auriculate, saccate. *Style* long, strongly incurved, base pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 8 or 9. *Pod* almost sessile, broadly ovoid, 8–10 × 4–5 mm long, silky pubescent. *Seed* not seen.

Flowering period: August–October. *Fruiting period*: October and November.

Distribution (Fig. 101): south-western Western Australia. Occurs mainly north of Perth, on the coastal plain and in the Darling escarpment.

Habitat: grows on the near-northern coastal sandplains and in the escarpment on sandy soils, in eucalypt woodland and scrub with a heath understorey.

Selected specimens (20 examined): WESTERN AUSTRALIA, Avon district: Waddington, 30°50'S, 116°16'E, *H.E. Groves s.n.*, 8.viii.1953 (CANB, PERTH). Darling district: 38 km N of Muchea along the Brand Hwy, 31°15'S, 115°49'E, *M.D. Crisp 6454*, 15.vii.1980 (CANB); 4.2 km from turnoff on Lancelin Rd towards Seabird, 31°16'S, 115°27'E, *M.D. Crisp 8531 & W. Keys*, 3.x.1993 (CANB, PERTH); 2 km from Seabird P.O. towards Wanneroo Rd, 31°15'41"S, 115°26'42"E, *G.T. Chandler 540 et al.*, 21.ii.1998 (CANB); 2 miles N of Regans Ford, 30°59'S, 115°42'E, *R.J. Cranfield 210*, 19.vii.1978 (CANB, PERTH). Irwin district: 2 km S of Cockleshell Gully and 13 km NE of Jurien Bay, 30°09'S, 115°07'E, *M.G. Corrick 8037*, 19.ix.1982 (CANB, MEL).

Toxicity: unknown.

Affinity: this species has previously been confused with *Gastrolobium nervosum* Meisn. [syn. *Nemcia reticulata* (Meisn.) Domin], but differs in the dense, silky white, erect hairs on new growth and calyces, the ternate, conduplicate (more or less folded lengthwise) linear leaves with a size range of 35–70 × 4–8 mm and the apex recurved and mucronate, rather than bilobed. The broader-leaved form of *G. linearifolium* is similar to *G. capitatum*, but the latter has a sericeous indumentum (or the calyx may tend to be villous), the leaves are more or less persistently sericeous beneath and are ovate to elliptic (rarely obovate), whereas *G. linearifolium* has a tomentose to villous indumentum and the glabrate leaves are generally obovate.

72. *Gastrolobium nervosum* (Meisn.) G.Chandler & Crisp, comb. nov. *Base name*: *Oxylobium nervosum* Meisn., *Bot. Zeit.* (Berlin) 13: 12 (1855a). *Type citation*: 'Drum. Coll. VI. n. 21.' *Type specimens*: *holo*: K; *iso*: W

Oxylobium reticulatum Meisn. in Lehm., *Pl. Preiss.* 1: 29 (1844). *Nemcia reticulata* (Meisn.) Domin, *Preslia* 2: 30 (1923a). *Type citation*: 'In clivulis arenosis ad littus maria, d. 19.vi.1839. Herb. Preiss. No. 840. et in region. interior. Australiae merid.-occid. m. Febr. 1841 No. 831. (Drummond n. 215).' *Type specimens*: lectotype (here chosen): BM (Drummond 215).

Typification: a new specific epithet is required because the name *Gastrolobium reticulatum* is already occupied [see *Gastrolobium reticulatum*], so the next available name, *G. nervosum*, was chosen.

Small *shrubs*, 0.3–0.5 m high. *Branchlets* ascending, angular, moderately tomentose. *Petioles* terete, continuous and decurrent with the branchlet, 2–5 mm long. *Leaves* opposite, linear, narrowly spatulate, narrowly obovate to obovate, rarely longitudinally recurved, 25–40 × 20–22 mm, glabrous, venation prominently reticulate; apex bilobed or acute, unarmed or mucronate or rarely pungent-pointed; margins flat, slightly crenulate, or strongly undulate, sometimes incurved; base obtuse. *Stipules* erect, hyaline, 3–5 mm long. *Inflorescences* axillary umbels or in pairs in the

axils; *peduncle* 0–4 mm long; *rachis* nil; *subtending bracts* caducous, scale-like, obtriangular, trilobed, lobes much longer than tube, 4–5 mm long. *Pedicels* terete, up to 2 mm long. *Calyx* campanulate, 6–7 mm long including the *c.* 1-mm receptacle, densely tomentose; lobes not recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 3.5 mm long; lower 3 lobes triangular, acute, *c.* 3.5 mm long. *Corolla: standard* transversely ovate, 11–12 × 14–15 mm including the *c.* 3.5-mm claw, yellow and red, apex emarginate, base truncate to slightly cordate, not auriculate; *wings* oblong, *c.* 9–10 × 3 mm including the 3-mm claws, yellow and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half very broadly elliptic, margins not incurved, *c.* 8–9 × 3 mm including the 3.5-mm claws, maroon, deeper at the apex, apex obtuse to slightly rounded, base auriculate, saccate. *Style* longer than the ovary, slightly hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 6–10. *Pod* stipitate, ovoid, 9–11 × 3–4 mm, moderately pubescent. *Seeds* ellipsoid, slightly ridged, *c.* 2.5 mm long, arillate.

Flowering period: August–October. *Fruiting period:* October and November.

Distribution (Fig. 102): south-western Western Australia. Occurs widely, from Eneabba south to Busselton.

Habitat: grows on the coastal limestone plain and coastal sandplains north of Perth in heath and shrubland.

Selected specimens (11 examined): WESTERN AUSTRALIA, Darling district: City Beach, N of Perth, 31°56'S, 115°45'E, *J. Pulley* 1323, 12.viii.1973 (CANB, L); City Beach, 31°56'S, 115°45'E, *R.J. Cranfield* 394, 7.ix.1978 (CANB, PERTH); 1 km S of Seabird, 31°16'S, 115°26'E, *M.D. Crisp* 8526 & *W. Keys*, 3.x.1993 (CANB, NSW, PERTH, UWA); Whitford's Node's, Coast Rd opp. Whitford's Ave, Wanneroo, 25 km N of Perth, 31°45'S, 115°48'E, *G.J. Keighery* 7085, 1.viii.1984 (CANB, PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium nervosum* is similar to *G. linearifolium*, which differs in habitat and has erect, villous hairs on new growth and the calyx. Also, *G. nervosum* always has opposite, obovate, mostly truncate or bilobed leaves, 25–40 × *c.* 20–25 mm, the margins are often undulate or incurved and are not conduplicate. *Gastrolobium nervosum* has also been confused with and is vegetatively similar to *G. crispatum*, which is a tall shrub up to 2 m high, with leaves in whorls of two to five and terminal clusters of up to 10 flowers, which serves to distinguish it quite easily.

73. *Gastrolobium crispatum* G.Chandler & Crisp, sp. nov.

Type: Western Australia: Darling District: Track to Mount Byroomanning, NE of Bindoon, 31°22'09"S, 116°07'22"E, *M. Hislop* 1700, 27 Sep. 1999 (*holo:* PERTH!; *iso:* CANB!).

Notes: this species has also been referred to as *Nemcia sparsa* (Crisp, ined.) in the past

Frutices altis, ramuli flavi internodiis longis, folia ternata spathulata marginibus maxime undulatis, bractee subtendentes 4–5 mm longae integrae et ad apicem recurvae attenuatae, inflorescentia racemus condensatus, calyx villosus pilis argenteis ad basim et aurei-brunneis versus lobiorum apices.

Tall shrubs with long internode distances on the yellow stems, the leaves are ternate, spathulate and have crisped to undulate margins, the subtending bracts are 4–5 mm long, entire and tapering to a recurved apex, the inflorescence is a condensed raceme, the calyx is villous with silver-white hairs at the base and golden brown hairs towards the lobe apices.

Etymology: the specific epithet refers to the crisped leaf margins.

Tall *shrubs*, up to 2.5 m high. *Branchlets* ascending, angular, densely sericeous. *Petioles* terete, continuous and prominently decurrent with the branchlet, *c.* 5 mm long. *Leaves* bilobed in early developmental stages, opposite or in whorls of 3–5, spathulate, 20–35 × 15–20 mm, glabrous or with the lower surface slightly hispid, surfaces shining green, purplish in new growth, venation prominently reticulate; apex rounded, slightly recurved, slightly mucronate; margins crisped to undulate, somewhat recurved; base cuneate. *Stipules* erect, linear-triangular, 6–9 mm long, base pubescent. *Inflorescences* condensed terminal racemes, *c.* 10-flowered; *peduncle* 15–30 mm long; *rachis* 3–7 mm long; *subtending bracts* caducous, scale-like, entire, with a thick base, tapering to a long, recurved apex, 4–5 mm long. *Pedicels* terete, 2–4 mm long. *Calyx* campanulate, 5–6 mm long including the *c.* 0.5-mm receptacle, moderately to densely pubescent, with silky silvery hairs at the base and golden hairs on the lobes, lobes not or scarcely recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 3 mm long; lower 3 lobes triangular, acute, *c.* 3 mm long. *Corolla: standard* transversely ovate, *c.* 8.5–12 × 8–12 mm including the 4-mm claw, yellow becoming orange basally, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 8.5–10 × 3 mm including the 3-mm claws, mainly yellow, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, slightly saccate; *keel* half very broadly elliptic, *c.* 9–10 × 3 mm including the 3-mm claws, red, apex rounded, base auriculate, saccate. *Style* long, strongly incurved, base pubescent; *ovary* very slightly stipitate, densely pubescent; *ovules* 2. *Pod* ± sessile, ovoid, 6–7 × 3–3.5 mm, moderately pubescent. *Seeds* reniform, *c.* 2.5 mm long, arillate. (Fig. 21)

Flowering period: September and October. *Fruiting period:* October and November.

Distribution (Fig. 103): south-western Western Australia. Restricted to the Bindoon area, north of Perth.

Habitat: grows in steep gullies in *Eucalyptus accedens* and *Corymbia calophylla* woodland with *Acacia* sp.,

Xanthorrhoea sp. *Hypocalymma angustifolium*, *Melaleuca uncinata* and *Hakea undulata*.

Conservation status: ROTAP: 2K. CALM: P1. This species is rare and is at some risk, with further survey work urgently required to determine the conservation status.

Specimens examined: WESTERN AUSTRALIA, Darling District: Julimar Farm, Flat Rocks Rd, Bindoon, c. 31°23'S, 116°06'E, *S. Patrick* 458, 8.x.1988 (CANB, PERTH); Bindoon, c. 29°57'S, 115°12'E, *J. Elliot s.n.*, xi.1987 (CANB, PERTH).

Toxicity: trace levels of fluoroacetate were found in this species (<20 µg g⁻¹; tested by the Chemistry Centre, Department of Mines, Western Australia, 24 Nov. 1988).

Affinity: the extremely undulate or crisped leaf margins of this species make it difficult to confuse with any other species of *Gastrolobium*.

74. *Gastrolobium effusum* (Crisp & Mollemans) G.Chandler & Crisp, comb. nov. *Base name*: *Nemcia effusa* Crisp & Mollemans, *Nuytsia* 9: 223 (1993). *Type citation*: 'Western Australia, Wheatbelt (SE), Lake Grace Shire; c. 26 km SE of Kukerin, 25.6 km NE of Nyabing and 51.5 km east of Dumblebung (precise locality withheld), 31°21'S, 118°19'E, 26 Aug. 1992, F.H.Mollemans 4260'. *Type specimens*: *holo*: PERTH!; *iso*: CANB!

Diffuse, open, spreading, straggling *shrubs* up to 1 m high and broad. *Branchlets* ascending, angular, densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, c. 2 mm long, moderately pubescent. *Leaves* broadly spreading, ternate, narrow oblong to elliptic, 10–25 × 3–4 mm, glabrous, venation thickly reticulate, lower surface with areoles impressed-punctate; apex obtuse, scarcely recurved; margins entire, not recurved; base tapering into the petiole. *Stipules* erect, hyaline, prominent, 2–3 mm long. *Inflorescences* condensed axillary racemes, 2–6-flowered; *peduncle* 0–2 mm long; *rachis* 0–1 mm long; *subtending bracts* caducous, trifold, up to 4 mm long, moderately sericeous. *Pedicels* terete, c. 0.5 long. *Calyx* campanulate, 4–5 mm long including the c. 0.5-mm receptacle, moderately villous, lobes not recurved; upper 2 lobes united much higher than the lower 3, acute, c. 2 mm long; lower 3 lobes triangular, acute, c. 1.5 mm long. *Corolla*: *standard* transversely broadly elliptic, c. 9.5 × 9 mm including the 3.5-mm claw, apricot with red-maroon markings, apex emarginate, base truncate; *wings* obovate, c. 8 × 3 mm including the 2-mm claws, apricot and maroon, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half broadly ovate, c. 8 × 2.5 mm including the 2-mm claws, maroon, apex ± acute, base auriculate, saccate. *Style* long, hooked, lower half pubescent; *ovary* ± sessile, densely pubescent; *ovules* 2. *Pod* and *seed* not seen.

Flowering period: July–August. *Fruiting period*: unknown.

Distribution (Fig. 104): south-western Western Australia. Occurs around Lake Grace.

Habitat: grows on undulating dunes on gravelly, sandy soil in mallee and mixed scrub.

Conservation status. ROTAP: 2K. CALM: P2. This species is rare, but does not appear to be at risk.

Specimens examined: known from the type material only.

Toxicity: unknown.

Affinity: with the distinctive punctate pattern on the undersurface of the leaf, this species is unlikely to be confused with any other. *Gastrolobium punctatum* has similar leaf patterning, but much smaller leaves (8–12 × 2–3 mm) that are strongly recurved and exstipulate and has single or paired flowers in the axils, rather than condensed racemes. *Gastrolobium stipulare* also shows some similarity to *G. effusum*, but has erect, linear leaves (c. 2 mm broad) with craspedodromous venation lacking deeply impressed areoles on the lower surface and the stipules are longer (up to 12 mm long).

75. *Gastrolobium stipulare* Meisn. in Lehm., *Pl. Preiss* 2: 218 (1848). *Nemcia stipularis* (Meisn.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 128 (1987). *Type citation*: 'Swan River, Drummond coll. III. No. 93.' *Type specimens*: *lectotype* (here chosen): K (the larger specimen); *isolecto*: K (the smaller, sterile specimen), FI-W, MEL, W

Erect, leafy *shrubs*, c. 0.5 m high. *Branchlets* ascending, ± terete, densely tomentose. *Petioles* terete, articulate with the branchlet, 1–2 mm long. *Leaves* patent to retrorse, in whorls of 3, linear, 20–30 × 2–3 mm, upper leaf surface with distinctive horizontally grooved venation, lower surface with only the midrib visible; apex pungent-pointed; margins recurved; base cuneate. *Stipules* erect, linear-triangular, 8–12 mm long, villous for most of the length. *Inflorescences* 2 or 3 solitary flowers in the axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, trifold, with lobes longer than tube, the middle lobe shorter usually than outer lobes, up to 5 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 5–6 mm long including the c. 1-mm receptacle, moderately pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, acute, c. 3 mm long; lower 3 lobes triangular, acute, c. 3 mm long. *Corolla*: *standard* transversely ovate, 7–9 × 7–10 mm including the c. 2.5-mm claws, yellow with a red-brown centre, apex emarginate, base cordate, slightly auriculate; *wings* obovate, c. 7–9 × 2 mm including the 2.5-mm claws, yellow, apex rounded, not incurved, not enclosing the keel, base auriculate on the upper margin only, saccate; *keel* half broadly to very broadly elliptic, 7–9 × 2.5 mm including the 2.5-mm claws, red-brown, apex rounded, base auriculate, saccate. *Style* much longer than the ovary, slightly hooked, base pubescent; *ovary* sessile, densely pubescent; *ovules* 2. *Pod* and *seed* not seen.

Flowering period: September. *Fruiting period*: unknown.

Distribution (Fig. 105): south-western Western Australia. Known only from a few collections, occurring around the Brookton and Boyagin Rock areas.

Habitat: grows on sandy soils over laterite in heath.

Conservation status: IUCN: R. ROTAP: 2RCi. CALM: P4. This species is rare, but does not appear to be at risk.

Specimens examined: WESTERN AUSTRALIA, Darling District: 16 km W of Brookton, 32°21'S, 116°50'E, *P.C. Williams 121*, 13.ix.1984 (CANB, PERTH); Boyagin Rock, SW of Narrogin, 32°28'S, 116°34'E, *C.E. Woolcock W2342 & D.T. Woolcock*, 17.ix.1985 (CANB).

Toxicity: unknown.

Affinity: the crowded, linear leaves of this species make it unlikely to be confused with any other species of *Gastrolobium*.

IX. The *G. ilicifolium* group

This group contains species that generally have more than three pungent apices on each leaf, with clustered inflorescences.

76. *Gastrolobium ilicifolium* Meisn. in Lehm, *Pl. Preiss.* 1: 67 (1844). *Nemcia ilicifolia* (Meisn.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 126 (1987). *Type citation*: 'In limoso-lapidosis umbrosis ad latus septentrionale montis Bakewell (York) d. 8. Sep. 1839. Herb. Preiss. No. 821. et in region interior. Australiae merid.-occid., m. Febr. 1841. No. 829. (Drummond n. 211.)' *Type specimens*: *lectotype* (here chosen): BM (Drummond 211); *isolecto*: K (2 sheets), W (2 sheets)

Gastrolobium verticillatum Meisn., *Bot. Zeit.* (Berlin) 13: 28 (1855b). *Gastrolobium ilicifolium* Meisn. var. *lobatum* Benth., *Fl. Austral.* 2: 102 (1864). *Type citation*: 'Drumm. Coll. VI. n. 24.' *Type specimens*: *holo*: NY; *iso*: BM, CGE, K, LD, W.

Tall, erect *shrubs* up to 4 m high. *Branchlets* ascending, angular, moderately villous. *Petioles* terete, continuous and decurrent with the branchlet, 1–2 mm long. *Leaves* spreading to ascending, ternate, ± spathulate, 18–48 × 15–30 mm, glabrous, venation prominently reticulate; apex truncate, fiercely pungent-pointed; margins lobed, with numerous pungent angles, slightly recurved; base cuneate. *Stipules* erect, hyaline, 7–8 mm long. *Inflorescences* dense, axillary clusters, 2–5-flowered; *peduncle* 2–3 mm long; *rachis* 1–3 mm long; *subtending bracts* somewhat persistent, scale-like, trifid with the central lobe robust and shorter than the 2 outer, more acuminate lobes, *c.* 5 mm long. *Pedicels* terete, 2–5 mm long. *Calyx* campanulate, 6–7 mm long including the *c.* 1-mm receptacle, moderately to densely villous, lobes not recurved; upper 2 lobes united higher than the lower 3, *c.* 3.5 mm long; lower 3 lobes triangular, acute, *c.* 3 mm long. *Corolla*: *standard* transversely elliptic, *c.* 9–10 × 9 mm including the 4-mm claw, yellow with some red present towards the centre, apex emarginate, base cordate,

not auriculate; *wings* obovate, *c.* 9.5 × 3 mm including the 3-mm claws, yellow, apex rounded, not incurved, not enclosing the keel, base auriculate on the upper margin only, saccate; *keel* half circular, margins not incurved, *c.* 9 × 3 mm including the 6-mm claws, red, apex rounded, base strongly auriculate, saccate. *Style* long, strongly incurved to hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, broadly ellipsoid, *c.* 5 × 3 mm long, moderately to densely villous. *Seed* not seen.

Flowering period: August–October. *Fruiting period*: unknown.

Distribution (Fig. 106): south-western Western Australia. Occurs from Dinner Hill (which is between Eneabba and Moora) south to Beverley, east of Perth, with an outlier further to the south at Kojonup.

Habitat: grows on sand, sandy loam and lateritic clay in heathland and woodland.

Selected specimens (10 examined): WESTERN AUSTRALIA, Darling District: Kojonup, 33°50'S, 117°09'E, *C.F. Bailey & sons*, v.1962 (CANB, PERTH); Dinner Hill, 30°19'S, 115°37'E, *K. Newbey 2959*, 26.viii.1969 (PERTH); Marchagee Track, 15–20 km E of Brand Hwy, 30°12'S, 115°38'E, *D. Foreman 468*, 1.ix.1984 (AD, CANB, MEL, PERTH); Mt Misery, W of Dandaragan, 30°41'S, 115°37'E, *E.A. Griffin 5044*, 11.ix.1988 (CANB, PERTH); Catchment Rd, Sullivan State Forest, Beverley, 8 km SE of Qualen Rd, 32°08'31"S, 116°38'07"E, *F. & J. Hort 631*, 6.x.1999 (CANB, PERTH).

Toxicity: unknown.

Affinity: the highly distinctive leaves make it difficult to confuse with any other species of *Gastrolobium*, as they are generally narrowly obovate to spathulate with numerous pungent points.

77. *Gastrolobium rhombifolium* G.Chandler & Crisp, sp. & stat. nov. *Type*: Western Australia: Darling District: 10 km E (towards York) along Helena Road from West Talbot Road turnoff, 31°57'34"S, 116°37'55"E, *M.D. Crisp 8910 & W. Keys*, 8 Oct. 1996 (*holo*: CANB! (CBG 9616013); *iso*: AD!, K!, MEL!, PERTH!)

Oxylobium dilatatum Benth. var. *trilobum* Meisn. in Lehm., *Pl. Preiss.* 1: 29 (1844). *Type citation*: 'In region. interior. Australiae merid.-occid. m. Febr. 1841, specimen mancum Herb. Preiss. No. 827.' *Type specimens*: *holo*: LD; *iso*: NY.

Robust shrubs with rhombic to cruciform leaves that are fiercely pungent-pointed, the inflorescences are terminal clusters with a short peduncle and rachis (<5 mm long each) and a bicoloured calyx, with white hairs at the base becoming golden brown on the lobes.

Notes: known previously as *Nemcia triloba* (Meisn.) Crisp, ined., but a new specific name was required as previous homonyms already exist for both *G. trilobum* and *G. dilatatum*.

Fiercely robust *shrubs*, up to 2 m. *Branchlets* ascending, angular, rigid, moderately to densely tomentose.

Petioles terete, continuous and decurrent with the branchlet, 1–3 mm long. *Leaves* ascending, ternate, rhombic or cruciform, 20–49 × 8–25 mm, glabrous, leaf surfaces with thickened venation; apex subacute, recurved, pungent-pointed; margins becoming complicate; base cuneate. *Stipules* erect, hyaline, 2–3 mm long. *Inflorescences* terminal clusters, 2–7-flowered; *peduncle* less than 5 mm long; *rachis* <5 mm long; *subtending bracts* caducous, scale-like, either rhombic and sheathing or trilobed, the lobes shorter than the tube, 4–6 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* up to 6 mm long, lobes much shorter than the tube, moderately villous, bicoloured with white silky hairs at the base becoming golden brown on the lobes, lobes not or slightly recurved; upper 2 lobes united higher than the lower 3, obtuse, *c.* 5 mm long; lower 3 lobes triangular, acute, *c.* 4 mm long. *Corolla: standard* transversely ovate, 10–11 × 12–13 mm including the 3-mm claw, yellow with a red ring around the white or yellow centre, apex emarginate, base cordate, not auriculate; *wings* oblong, *c.* 10 × 3 mm including the 3-mm claw, yellow with red markings, apex rounded, incurved and slightly overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half very broadly elliptic, margins not or very slightly incurved, 9–10 × 3–3.5 mm including the 3-mm claws, red, apex narrowly rounded, base auriculate, strongly saccate. *Style* very long, strongly incurved, lower third pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* *c.* 4. *Pod* and *seed* not seen. (Fig. 22)

Flowering period: September. *Fruiting period:* unknown.

Distribution (Fig. 107): south-western Western Australia. Occurs east and south-east of Perth, on the eastern side of the Darling escarpment, particularly in the Boyagin Nature Reserve and Talbot regions.

Habitat: grows on clay-loam over laterite, in Wandoo and Marri woodland.

Selected specimens (10 examined): WESTERN AUSTRALIA, Darling District: 10 km E (toward York) along Helena Rd from West Talbot Rd turnoff, 31°57'4"S, 116°37'55"E, *M.D. Crisp 8912 & W. Keys*, 8.x.1996 (AD, CANB, MEL, PERTH); Catchment Rd and Deefor Rd junction, Talbot State Forest, York, 31°59'08"S, 116°35'44"E, *F. & J. Hort 632 & 636*, 6.x.1999 (CANB, PERTH); 74.6 miles [120 km] from Perth towards New Norcia, along Geraldton Hwy, *E.M. Canning s.n.*, 29.ix.1968 (CANB).

Toxicity: unknown.

Affinity: the uniquely shaped leaves of this species, rhombic and generally fiercely pungent-pointed, make this species difficult to confuse with any other species of *Gastrolobium*. The only other species with rhombic leaves is *G. laytonii*, but the leaves are not as robust as *G. rhombifolium* and the inflorescence consists of long, open racemes (peduncle 3–10 mm long, rachis 25–55 mm long) with 15–30 flowers.

78. *Gastrolobium tricuspdatum* Meisn. in Lehm., *Pl. Preiss.* 1: 66 (1844). *Nemcia tricuspdata* (Meisn.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 128 (1987). *Type citation:* 'In region. interior. Australiae merid.-occid., m. Oct. 1840. Herb. Preiss. No. 839.' *Type specimens:* *holo:* NY; *iso:* GOET, K (2 sheets), LD, MO, S, W (2 sheets)

Gastrolobium tricuspdatum Meisn. var. *latifolium* Meisn. in Lehm., *Pl. Preiss.* 1: 66 (1844). *Type citation:* 'Swan River. Drummond n. 212.' *Type specimens:* *holo:* BM; *iso:* K (2 sheets), W.

Erect, villous *shrubs*, up to 1 m high. *Branchlets* ascending, angular, densely villous. *Petioles* terete, continuous and decurrent with the branchlet, <1 mm long. *Leaves* ascending, crowded, mostly ternate, trilobed-spathulate, 20–30 × 5–15 mm, venation prominently reticulate; apex acute, trilobed, pungent-pointed; margins apically trilobed, with all angles pungent-pointed; base cuneate. *Stipules* erect, ± broad at base, then hyaline, 4–5 mm long. *Inflorescences* condensed axillary racemes, 2–5-flowered; *peduncle* 1–3 mm long; *rachis* 0–3 mm long; *subtending bracts* trilobed with lobes similar size to tube, all about equal, *c.* 2–3 mm long. *Pedicels* terete, 1–3 mm long. *Calyx* campanulate, 5–6 mm long including the *c.* 0.75-mm receptacle, densely villous with golden brown hairs, lobes not recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 3 mm long; lower 3 lobes triangular, acute, *c.* 3.5 mm long. *Corolla: standard* transversely elliptic, 8–10 × 8–10 mm including the 4-mm claw, yellow with a dark red centre, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 7–8 × 2.5 mm including the 2-mm claws, yellow, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half very broadly elliptic, margins not incurved, *c.* 7–8 × 2.5 mm including the 3-mm claws, red, apex obtuse, base auriculate, saccate. *Style* very long, strongly incurved to hooked, lower third pubescent; *ovary* ± sessile, densely pubescent; *ovules* 2. *Pod* and *seed* not seen.

Flowering period: September–October. *Fruiting period:* unknown.

Distribution (Fig. 108): south-western Western Australia. This species has quite a narrow distribution, occurring around the Dudinin and Kulin areas.

Habitat: grows on undulating dunes over laterite, in open mallee woodland or mixed heath.

Specimens examined: WESTERN AUSTRALIA, Avon District: Dudinin, 32°52'S, 117°54'E, *C.A. Gardner s.n.*, x.1934 (CANB, PERTH); Nature Reserve No. 36598, 26 km SSW of Kulin on Grays Rd no. 19, 32°53'S, 118°05'E, *J.M. Brown 129*, 8.x.1984 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is vaguely similar to *G. ilicifolium*, which differs by having larger leaves (18–48 × 15–30 mm) and more than three pungent points per leaf.

X. The *G. cruciatum* group

These species all lack stipules at the base of the leaf and used to belong to *Nemcia*. Their affinities to other groups are uncertain, as they were not included in the molecular analysis, with future work to determine which other species of *Gastrolobium* that they are most closely related to.

79. *Gastrolobium cruciatum* G.Chandler & Crisp sp. nov.
Type: Western Australia: Roe district: 16 km from Newdegate towards Lake King, 33°05'46''S, 119°10'56''E, M.D. Crisp 8521 & W. Keys, 28 Sep. 1993 (*holo*: CANB!; *iso*: GAUBA!, MEL!, NSW!, PERTH!, UWA!, K!)

G. reticulato similis sed habitu effuso 20–50 cm alto latoque, foliis minutis (2–8 mm longis) conspicue decussatis, calyce bicolorato flavo ruboque tantum pubescenti pilis albis adpressis, lobis tubo multo brevioribus differt.

Similar to *Gastrolobium reticulatum*, but the plants are spreading shrubs 20–50 cm high and wide with tiny leaves that are conspicuously opposite and decussate, the calyces are bicoloured yellow and red, the lobes are much shorter than the calyx tube and both lobes and tube are only moderately pubescent with appressed white hairs.

Etymology: from the Latin *crux* (genitive *crucis*) = a cross and refers to the erect leaves which are appressed to the branchlet in a cross-like (decussate) fashion.

Spreading *shrubs*, 20–50 cm high and wide. *Branchlets* ascending, angular, moderately to densely tomentose. *Petioles* terete, continuous and slightly decurrent with the branchlet, <0.5 mm long. *Leaves* erect and appressed to the branchlet, stem clasping, opposite and decussate, oblong to ovate, 2–8 × 1.5–5 mm, glabrous, venation thickly reticulate; apex rounded, slightly recurved, unarmed; margins incurved; base broadly rounded. *Stipules* absent. *Inflorescences* with flowers solitary in upper axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, entire, ovate, 1–2 mm long, moderately pubescent. *Pedicels* terete, 1–2 mm long, moderately pubescent. *Calyx* campanulate, 3–4 mm long including the *c.* 0.5-mm receptacle, moderately pubescent, lobes slightly recurved; upper 2 lobes united slightly higher than the lower 3, obtuse, *c.* 2 mm long; lower 3 lobes triangular, acute, *c.* 1.5 mm long. *Corolla*: *standard* transversely elliptic, 6–8 × 6.5–7 mm including the *c.* 2.5-mm claw, rich golden yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 6–7 × 1.5 mm including the 2-mm claws, yellow with red markings, apex rounded, incurved and just overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half very broadly elliptic, margins incurved, *c.* 6–7 × 2 mm including the 2-mm claws, red, apex subacute, base auriculate, saccate. *Style* long, incurved, very base pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Mature pods* and *seed* not seen. (Fig. 23)

Flowering period: September. *Fruiting period*: unknown, but probably October.

Distribution (Fig. 109): south-western Western Australia. Occurs around the Newdegate and Lake King areas.

Habitat: grows on undulating landscapes on sand over laterite, in *Grevillea* and *Allocasuarina* heath.

Specimens examined: WESTERN AUSTRALIA, Roe District: 16 km E of Newdegate, 33°05'S, 119°12'E, J. Taylor 2296 & P. Ollerenshaw, 26.ix.1983 (CANB, PERTH); 20 km S of Lake King, 33°15'S, 119°44'E, C.E. & D.T. Woolcock W 2356, 1.x.1985 (CANB); Lot 2665, Newdegate, R. Dewar s.n., 21.x.1992 (CANB, PERTH).

Toxicity: unknown.

Affinity: similar to *Gastrolobium reticulatum*, but spreading shrubs 20–50 cm high and wide with exstipulate, tiny leaves that are noticeably arranged opposite and decussate, not whorled. The calyces are bicoloured yellow and red, the lobes much shorter than the calyx tube, both lobes and tube only moderately pubescent (under surface visible) with appressed white hairs.

80. *Gastrolobium epacridoides* Meisn. in Lehm., *Pl. Preiss.* 1: 72 (1844). *Nemcia epacridoides* (Meisn.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 126 (1987). *Type citation*: 'In rupestribus ad jugum montium Darling's-range prope Cataractam (Perth) d. 16. Jan. 1840. Herb. Preiss. No. 837. (Drummond n. 196.)' *Type specimens*: *lectotype* (here chosen): LD (Preiss 837); *isolecto*: MO, NY, S, W

Narrow, erect *shrubs* up to 1 m high. *Branchlets* ascending, angular, densely villous. *Petioles* terete, continuous and decurrent with the branchlet, <1 mm long. *Leaves* broadly spreading to retrorse, ternate, ovate, 11–14 × *c.* 8 mm, glabrous, venation prominently reticulate; apex with a *c.* 3-mm-long pungent point; margins becoming plicate; base broadly rounded. *Stipules* absent. *Inflorescences* single or paired flowers in upper axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, trilobed, the middle lobe much longer, 3–4 mm long. *Pedicels* to 5 mm long. *Calyx* campanulate, 4–6 mm long including the *c.* 0.5-mm receptacle, sparsely to densely pubescent, lobes recurved; upper 2 lobes united higher than the lower 3, acute, *c.* 2 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla*: *standard* very broadly elliptic, 10–12 × 8–9 mm including the 3-mm claw, yellow with a crimson centre, with a tiny yellow centre, apex emarginate, base slightly cordate, slightly auriculate; *wings* obovate, 8–9 × 2.5 mm including the 2-mm claws, yellow and crimson, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, or slightly auriculate on the lower margin as well, saccate; *keel* half broadly elliptic, margins not incurved, 7–8 × 2.5 mm including the 2-mm claws, crimson, apex slightly rounded, base auriculate, saccate. *Style* very long, strongly incurved, base pubescent; *ovary* ± sessile or very shortly stipitate,

densely pubescent; *ovules* 2. *Pod* enclosed in the calyx, sessile, ovoid, *c.* 8 × 3 mm, densely pubescent. *Seed* not seen.

Flowering period: August and September. *Fruiting period*: October.

Distribution (Fig. 110): south-western Western Australia. Occurs from around Toodyay south to the Dale Forest.

Habitat: grows on sandy or loamy soils in open woodland.

Specimens examined: WESTERN AUSTRALIA, Darling District: 26 km SE of the Great Northern Hwy along Toodyay Rd, 31°25'S 116°21'E, *P.S. Short* 2769 *et al.*, 8.ix.1986 (CANB, PERTH); 20 km beyond Keenan College toward New Norcia, *N. Ollerenshaw* 101, 4.x.1975 (CANB); between Toodyay and Bindoon, *C.E. & T.D. Woolcock* W678, 24.viii.1982 (CANB); Dale Forest Block, 32°06'29"S, 116°17'28"E, *F. Hort* 170, 3.v.1998 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is often confused with *Gastrolobium acutum*, but the latter species is easily distinguished by the presence of stipules and also has longer, narrower, elliptical leaves (12–22 × 4–6 mm).

81. *Gastrolobium punctatum* (Turcz.) G.Chandler & Crisp, comb. nov. *Base name*: *Eutaxia punctata* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 272 (1853). *Nemcia punctata* (Turcz.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 127 (1987). *Type citation*: 'Drum. V. n. 69.' *Type specimens*: *holo*: KW; *iso*: BM, K (2 sheets)

Gastrolobium reticulatum (Meisn.) Benth. var. *recurvum* E.Pritz. in Diels & Pritzel, *Bot. Jahrb. Syst.* 35: 253 (1904). *Type citation*: 'Ex interioribus distr. Stirling: Cranbrook (D. 4469), Kalgan super. (D. 4605), usque ad regiones interiores distr. Eyre pr. Gibsons Soak extendit (D. 5428). Fl. m. Sept., Oct.' *Type specimens*: unknown, possibly destroyed when the Berlin herbarium was bombed. *Neotype* (here chosen): Western Australia: Roe district, 11 km towards Gnowangerup along Gnowangerup–Jerramungup road from Borden turn-off, 34 deg 01 min S, 118 deg 09 min E, J.M. Taylor 1892 and P. Ollerenshaw, 16 Sep. 1983 (CANB!); *isoneo*: AD *n.v.*, MEL!, PERTH!.

Small, compact *shrubs* 0.3–1 m high. *Branchlets* ascending to erect, ± terete, moderately sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, *c.* 1 mm long. *Leaves* whorled, stem clasping, oblong to ovate, 8–12 × 2–3 mm, upper leaf surface rarely seen, lower surface with distinctive thickened raised venation, somewhat punctate; apex slightly recurved; margins incurved; base rounded. *Stipules* absent. *Inflorescences* single or paired flowers in the axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, ± entire to slightly trifid, 2–3 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* 4.5–6 mm long including the *c.* 0.75-mm receptacle, sparsely to moderately pubescent, unicoloured, lobes not to slightly recurved; upper 2 lobes united higher than the lower 3, acute, 2–3 mm long; lower 3 lobes triangular, acute, 2–3 mm long. *Corolla*: *standard* transversely elliptic, *c.* 7.5–9 × 7–9 mm including the 3-mm claw, rich yellow with brown on the reverse, apex emarginate, base ± truncate,

auriculate; *wings* obovate, *c.* 6–7.5 × 2 mm including the 2–2.5-mm claws, yellow, apex rounded, curvature unknown, base auriculate, slightly saccate; *keel* half very broadly elliptic, margins incurved, 6–8 × 2–3 mm including the 2.5–3-mm claws, red, apex rounded, base auriculate, saccate. *Style* long, strongly incurved to hooked, lower half quite pubescent; *ovary* ± sessile, densely pubescent; *ovules* 2. *Pod* half enclosed in the calyx, sessile, globose, 5–6 × 5–6 mm, moderately pubescent. *Seeds* ellipsoid, 1–2 mm long, bluntly ridged, arillate.

Flowering period: September and October. *Fruiting period*: November–January.

Distribution (Fig. 111): south-western Western Australia. Occurs in a band from Katanning east to the Lake King–Ravensthorpe area.

Habitat: grows on sandy soils in heath and mallee.

Selected specimens (10 examined): WESTERN AUSTRALIA, Eyre District: Ravensthorpe area, 25 km from Ravensthorpe along Lake King Rd, 33°25'S 119°55'E, *B. Barnsley* 478, 10.i.1979 (CANB, PERTH). Roe District: between Newdegate and Lake Grace, 1.6 km from Newdegate (at 248 milepeg), *E.M. Canning* WA/69, 7370, 7.xi.1968 (CANB); 19 km S of Lake King, 33°14'S, 119°44'E, *C.E. & D.T. Woolcock* W2357, 1.x.1985 (CANB).

Toxicity: unknown.

Affinity: similar to *G. reticulatum*, which differs most notably by the lower surface of the leaf being honeycombed with raised reticulation, but not with the thickened reticulation of *G. punctatum*. *Gastrolobium cruciatum* differs by having smaller leaves (2–8 × 1.5–5 mm) that are strictly opposite and decussate and the calyx is bicoloured (with yellow and rusty hairs).

82. *Gastrolobium reticulatum* (Meisn.) Benth., *Fl. Austral.* 2: 99 (1864). *Base name*: *Eutaxia reticulata* Meisn. in Lehm., *Pl. Preiss.* 1: 65 (1844). *Nemcia carinata* Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 124 (1987). *Type citation*: 'In regionibus interioribus Australiae meridionali-occidentalis, m. Oct. 1840 specimina pauca imperfecta Herb. Preiss. No. 870.' *Type specimens*: *holo*: LD; *iso*: NY

Erect *shrubs* up to 1.2 m high. *Branchlets* moderately to densely tomentose. *Petioles* absent. *Leaves* stem clasping and in whorls of 3, elliptic, less than 10 × 2 mm, upper leaf surface rarely seen, lower surface with prominent, finely reticulate venation, not punctate; apex obtuse; margins slightly incurved; base decurrent with the branchlet. *Stipules* absent. *Inflorescences* single or paired flowers in the axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, trifid, sheathing, apiculate, 1–3 mm long. *Pedicels* less than 3 mm long. *Calyx* campanulate, 5–6 mm long including the *c.* 0.5-mm receptacle, villous, unicoloured, lobes not recurved; upper 2 lobes united higher than the lower 3, acute, 2–2.5 mm long; lower 3 lobes triangular, acute, 1.5–2 mm long. *Corolla*: *standard* very broadly ovate,

7–8 × 7–8 mm including the *c.* 2.5 mm claw, orange with a white or pale yellow centre, apex emarginate, base slightly cordate, slightly auriculate; *wings* obovate, 6–7 × 1.5–2 mm including the 2–2.5-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half very broadly obovate, margins not or slightly incurved, *c.* 6–7 × 2 mm including the 2.5–3-mm claws, dark red-brown, apex subacute, base auriculate, saccate. *Style* long, strongly incurved, lower third pubescent; *ovary* sessile, densely pubescent; *ovules* 2. *Pod* half enclosed in the calyx, sessile, 5–6 × 3–4 mm long, moderately pubescent. *Seed* ellipsoid, 1–2 mm long, arillate.

Flowering period: July–October. *Fruiting period*: unknown.

Distribution (Fig. 112): south-western Western Australia. Occurs from Dryandra south and east to Kamballup.

Habitat: grows on white sand over laterite in heathland and open forest.

Selected specimens (6 examined): WESTERN AUSTRALIA, Darling District: Dryandra Forest. 32°47'S, 116°58'E, *M.G. Corrick* 8406, 12.x.1982 (CANB, MEL); 3 miles [5 km] E of Kamballup, corner of Synid Rd, 34°35'S, 118°02'E, *T.E.H. Aplin* 6027, 25.ix.1974 (CANB, PERTH); *c.* 20 km WSW of Harrismith, 3 km SSW of Wedin, 33°00'S, 117°41'E, *M.D. Crisp* 6150 *et al.* 26.ix.1979 (CANB, NSW, PERTH, US); Highbury, 16 km S of Narrogin, 33°04'S, 117°14'E, *C.A. Gardner*, viii.1934 (CANB, PERTH).

Toxicity: unknown.

Affinity: differs from the close exstipulate relatives, *G. cruciatum* and *G. punctatum*, in having leaves that are whorled, not opposite and decussate (see *G. cruciatum*) and the lower surface of the leaf is honeycombed with raised reticulation that is not thickened as in *G. punctatum*.

XI. The *G. pyramidale* group

These species all have somewhat crenulate leaves, large, orange flowers in terminal and/or axillary clusters and appear somewhat intermediate between the typical, bee-pollinated flowers of most species of *Gastrolobium* and the red-flowered *G. celsianum* group.

83. *Gastrolobium coriaceum* (Sm.) G.Chandler & Crisp, comb. nov. *Base name*: *Chorizema coriaceum* Sm., *Trans. Linn. Soc. London* 9: 254 (1808), as '*Chorozema*'. *Podolobium coriaceum* (Sm.) DC., *Prod.* 2: 103 (1825). *Callistachys coriacea* (Sm.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891). *Oxylobium coriaceum* (Sm.) C.A.Gardner, *Enum. Pl. Austr. Occid.*: 56 (1930). *Type citation*: 'Found also by Mr. Menzies at King George's Sound'. *Type specimens*: *lectotype* (here chosen): LINN (King George's Sound, west coast of New Holl^d., Pat. 35 Menzies. 1803)

Oxylobium retusum R.Br. ex Lindl., *Edwards' Bot. Reg.* 11: t. 913 (1825). *Type citation*: '...native of King George's Sound in New

Holland, whence seeds were brought by Mr. J. Richardson. The specimens from which our drawing was made were communicated from Mr. Colvill's Nursery...' nom. superfl. & illeg. (*Chorizema coriaceum* Sm. given as synonym).

Oxylobium capitatum Benth. var. *ternifolium* Meisn. in Lehm., *Pl. Preiss.* 1: 30 (1844). *Type citation*: 'In glareoso-lapidosis inter frutices densos sylvae ad radices montis Manypeak v. T'jilberup (Plantagenet) d. 23. et 28. Nov. 1840, Herb. Preiss. Nl. 805 et 814.' *Type specimens*: *lectotype* (here chosen): LD (Preiss 814), *iso*: NY.

Oxylobium ovalifolium Meisn. in Lehm., *Pl. Preiss.* 1: 28 (1844). *Gastrolobium ovalifolium* (Meisn.) Lemaire, *Jard. Fleur.* 3: t. 324 (1853) (nom. illeg.). *Callistachys ovalifolia* (Meisn.) Voss in Siebert & Voss, *Vilmorin's Blumengartn.* Ed. 3: 193 (1894). *Type citation*: 'In glareosis inter frutices densos prope montem Manypeak (Kent) 27 Nov. Herb. Preiss. no. 813 et in rupestribus ad radices montibus Baldhead (Sinus Regis Goergii III) 16.x.1840 no. 820.' *Type specimens*: *lectotype* (here chosen): LD (Preiss 820); *isolecto*: GOET, K, MO, NY, S, W (2 sheets).

Callistachys tetragona Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 249 (1853). *Type citation*: 'Drummond. coll. III. n. 83.' *Type specimens*: *holo*: KW; *iso*: K, W.

Erect *shrubs*, up to 2 m high. *Branchlets* ascending, angular, moderately to densely villous. *Petioles* terete, continuous and decurrent with the branchlet, 6–10 mm long. *Leaves* spreading to ascending, mainly ternate, ovate, 25–80 × 6–30 mm, venation prominently reticulate, raised; apex bilobed to emarginate, mucronate; margins crenulate, undulate; base rounded to almost truncate. *Stipules* erect, rigid, lanceolate, 4–5 mm long, base pubescent. *Inflorescences* condensed, terminal racemes, floral internodes very short (<3 mm long); *peduncle* angular, up to 40 mm long, densely pubescent; *rachis* condensed, 0.5–7 mm long; *subtending bracts* caducous, scale-like, entire, ovate, 3–4 mm long. *Pedicels* terete, 3–4 mm long, densely pubescent. *Calyx* campanulate, 7–12 mm long including the *c.* 1.5-mm receptacle, densely villous, hairs bicoloured, with the basal silky-white hairs becoming golden brown towards the lobes, lobes not recurved; upper 2 lobes united higher than the lower 3, triangular, obtuse, 3–3.5 mm long; lower 3 lobes triangular, acute, 3–3.5 mm long. *Corolla*: *standard* very broadly elliptic, 11–12 × 14–16 mm including the 4-mm claw, orange with a red ring surrounding the orange to yellow centre, apex emarginate, base ± truncate; *wings* obovate, 10.5–11 × 3.5–4 mm including the 2.5–3-mm claws, orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half broadly elliptic, margins not incurved, 10–11 × 4 mm including the 3-mm claws, pink and red, apex rounded, base auriculate, saccate. *Style* long, incurved, lower quarter pubescent; *ovary* very shortly stipitate, almost sessile, densely pubescent; *ovules* 4. *Pod* very shortly stipitate, ovoid, 5–6(–8) mm long, moderately to densely villous. *Seed* ellipsoid, 1–2 mm long, arillate.

Flowering period: September and October. *Fruiting period*: November and December.

Distribution (Fig. 113): south-western Western Australia. Occurs along the south coast, from around Albany in the Mt Manypeaks area east to Fitzgerald River National Park, but

with an outlier recorded from the Whicher Range (C. E. & D.T. Woolcock W2355).

Habitat: grows on sandplains or mountain slopes often over limestone on sand, or occasionally on granite, in shrubland or heathland.

Selected specimens (17 examined): WESTERN AUSTRALIA, Darling District: Whicher Range, Sabina Rd, c. 33°51'S, 115°20'E, C.E. & D.T. Woolcock W2355, 20.ix.1985 (CANB). Eyre District: Rd to Little Beach, W end of Two People Bay, 34°58'36"S, 118°10'31"E, G.T. Chandler 725 & S. Donaldson, 31.x.1998 (CANB, MEL, PERTH); 1.9 km along Mt Richards Rd, turn c. 3 km N Nanarup, 34°59'5"S, 118°01'36"E, G.T. Chandler 723 & S. Donaldson, 31.x.1998 (CANB, MEL, PERTH); ravine leading from East into Fitzgerald Inlet, just south of widest part; Fitzgerald River NP, 34°05'S, 119°35'E, A.S. Weston 6397, 22.vii.1971 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is similar to *G. congestum*, *G. pyramidale* and *G. crenulatum*. *Gastrolobium congestum* has a longer rachis [(5–)13–80 mm long] and has a greater number of flowers per inflorescence (30 to more than 50), *G. pyramidale* has rust-coloured hairs on the stems, underside of the leaves and inflorescence axes (whereas *G. coriaceum* has white hairs) and *G. crenulatum* has crenulate leaves and two ovules.

84. *Gastrolobium crenulatum* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 273 (1853). *Nemcia crenulata* (Turcz.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 125 (1987). *Type citation*: 'Drum. V. n. 55.' *Type specimens*: *holo*: KW; *iso*: BM, K (3 sheets), W

Erect *shrubs*, up to 1.2 m high. *Branchlets* ascending, angular, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, c. 3 mm long. *Leaves* spreading, in whorls of 3 or 4, ± oblong or obovate, 11–35 × 9–20 mm, glabrous to glabrescent, venation prominently reticulate, raised; apex emarginate to bilobed, unarmed; margins crenulate; base truncate. *Stipules* erect, hyaline, 2–3 mm long. *Inflorescences* condensed axillary racemes, 3–6-flowered; *peduncle* 3–8 mm long; *rachis* to 5 mm long; *subtending bracts* caducous, scale-like, prominently trifid, 4–6 mm long. *Pedicels* terete, less than 2 mm long. *Calyx* campanulate, c. 5 mm long including the c. 1-mm receptacle, densely villous, hairs bicoloured, with silky white hairs at the base becoming golden brown towards the apices of lobes, lobes not recurved; upper 2 lobes united higher than the lower 3, obtuse, 3.5 mm long; lower 3 lobes triangular, acute, 3 mm long. *Corolla*: *standard* very broadly elliptic, 7–8 × 9.5 mm including the 2.5-mm claw, rich yellow, apex emarginate, base cordate, not auriculate; *wings* broadly obovate, 7.5–9 × 3–3.5 mm including the 2-mm claws, rich yellow, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half transversely elliptic, 7–8 × 3.5 mm including the 2-mm claws, dark red, apex rounded, base auriculate, saccate. *Style* long,

hooked, lower third pubescent; *ovary* ± sessile, densely pubescent; *ovules* 2. *Pod* half enclosed in the calyx, sessile, ovoid, 5–8 mm long, densely pubescent. *Seed* not seen.

Flowering period: September–November. *Fruiting period*: November and December.

Distribution (Fig. 114): south-western Western Australia. Occurs along the south coast and slightly inland, in the Barren and Stirling Ranges.

Habitat: grows on mountain slopes on skeletal sediment in open woodland.

Conservation status: ROTAP: 2KC-. CALM: P2. This species is rare, but does not appear to be at risk.

Selected specimens (11 examined): WESTERN AUSTRALIA, Eyre District: 36.5 km along Stirling Range Drive from Red Gum Pass Rd, 34°22'18"S, 118°04'26"E, G.T. Chandler 490 *et al.* 17.ii.1998 (CANB); Mt Toolbrunup, west Gorge, 34°23'S 118°03'E, A. Morrison *s.n.*, 4.x.1902 (CANB, PERTH); Thumb Peak range, A.S. George 7146B (CANB, PERTH); Stirling Range, Mt Hassell carpark, 34°23'S, 118°04'E, M.D. Crisp 8492 & W. Keys, 24.ix.1993 (CANB, GAUBA, PERTH, UWA); 1.65 km NNE of Ellen Peak, near base of steep spur, 34°20'30"S, 118°20'03"E, M.D. Crisp 8947 & W. Keys, 15.x.1996 (CANB); Thumb Peak Range, c. 34°02'S, 119°43'E, A.S. George 7146B, 31.x.1965 (PERTH).

Toxicity: unknown.

Affinity: this species is similar to *G. congestum*, *G. coriaceum* and *G. pyramidale*. *Gastrolobium congestum* has a longer inflorescence rachis [(5–)13–80 mm long] and has a greater number of flowers per inflorescence (30 to more than 50), *G. coriaceum* differs by not having crenulate leaves and has a greater number of ovules (5–8 ovules) and *G. pyramidale* has rust-coloured hairs on the stems, underside of the leaves and inflorescence axes, whereas *G. crenulatum* has white hairs.

85. *Gastrolobium pyramidale* T. Moore, *Gard. Companion Florists' Guide* 1: 81 (1852). *Nemcia pyramidalis* (T. Moore) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 126 (1987). *Type citation*: '...was raised by Messrs. Henderson of the Edgeware Road, from seeds forwarded by Mr. Drummond from the Swan River colony.' *Type specimens*: *Lectotype* (here chosen): the plate

Gastrolobium polycephalum Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 274 (1853); *Gastrolobium pyramidale* T. Moore, *Proc. Linn. Soc. London* 2: 202 (1853). *Type citation*: 'Hab. ad fl. Cygnorum N. Hollandiae, Drummond, ser. 5. no. 54.' *Type specimens*: *lectotype* (here chosen): K; *isolecto*: BM, K (2 sheets), W.

Erect *shrubs*, up to 1.5 m. *Branchlets* ascending, angular, densely pubescent with rusty brown hairs. *Petioles* terete, continuous and decurrent with the branchlet, 5–6 mm long. *Leaves* broadly spreading, opposite or in whorls of 3, stem clasping, oblong to slightly obovate, 25–50 × 12–25 mm, upper surface glabrous, lower surface sparsely to densely tomentose with rust-coloured hairs (particularly when younger), venation prominently reticulate; apex

emarginate, slightly mucronate; margins slightly crenulate; bases rounded or cordate. *Stipules* recurved, hyaline, 9–12 mm long. *Inflorescences* condensed terminal racemes, 5–12-flowered, densely villous with rust-coloured hairs; *peduncle* 1–15 mm long; *rachis* to 3 mm long; *subtending bracts* caducous or somewhat persistent, scale-like, obtriangular, prominently trilobed, the lobes as long as the base, 5–6 mm long including the *c.* 3 mm lobes; all villous with golden brown hairs. *Calyx* 6–9 mm long including the *c.* 1-mm receptacle, densely pubescent, lobes slightly recurved; upper 2 lobes united very slightly higher than the lower 3, broadly triangular, \pm acute, *c.* 4 mm long; lower 3 lobes triangular, acute, *c.* 4 mm long. *Pedicels* terete, 2–4 mm long. *Corolla: standard* transversely ovate, 10–12 \times 15 mm including the 4-mm claw, orange and yellow with a darker centre, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 11 \times 4.5 mm including the 2-mm claws, orange-yellow, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half very broadly elliptic, *c.* 10 \times 4 mm including the 3-mm claws, dark red, apex broadly rounded, base auriculate, strongly saccate. *Style* very long, strongly incurved, lower half pubescent; *ovary* sessile, densely pubescent; *ovules* 2. *Pod* and *seed* not seen.

Flowering period: September and October. *Fruiting period:* November and December.

Distribution (Fig. 115): south-western Western Australia. Occurs in the Stirling Range.

Habitat: grows on flats, hills or saddles, sometimes in quite craggy places, on skeletal sandy or sandy clay, often stony soils, in tall heath dominated by *Dryandra* and *Allocasuarina*, or in mallee-heath.

Selected specimens (13 examined): WESTERN AUSTRALIA, Eyre District: Stirling Range, foothill NW of Barnett Peak, 34°23'47"S, 117°52'46"E, *M.D. Crisp 8964 & W. Keys*, 17.x.1996 (CANB, PERTH); Stirling Range, Mondurup walking track, 100 m from road, 34°24'S, 117°49'E, *M.D. Crisp 8501 & W. Keys*, 25.ix.1993 (CANB, GAUBA, PERTH); Stirling Range, saddle 3 km ESE of Donnelly Peak, 34°21'S, 117°45'E, *M.D. Crisp 8475 & W. Keys*, 23.ix.1993 (CANB, PERTH); Red Gum Springs, Stirling Range, 34°22'S, 117°47'E, *J.W. Wrigley WA/68-4349*, 10.x.1968 (CANB).

Toxicity: unknown.

Affinity: this species is outwardly similar to *G. congestum*, *G. coriaceum* and *G. crenulatum*, but can be easily distinguished by the rust-coloured hairs on the stems, underside of the leaves and inflorescence axes, which are not present on these other species.

XII. The *G. celsianum* group

This group of species has red flowers that are putatively modified for bird-pollination, such as the red coloration and a reduced standard petal.

86. *Gastrolobium leakeanum* Drum., *Hooker's J. Bot. Kew Gard. Misc.* 1: 247 (1849). *Oxylobium atropurpureum* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 26: 250 (1853). *Callistachys atropurpurea* (Turcz.) Kuntze, *Revisio Generum Pl.* 1: 168 (1891). *Nemcia atropurpurea* (Turcz.) Domin, *Preslia* 2: 27 (1923a). *Nemcia leakeana* (Drumm.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 126 (1987). *Type citation:* '...it is abundant on Congineerup, near the east end of the mountain, growing in all sorts of soil, from the base to the summit.' *Type specimen: lectotype* (here chosen): KW (Drumm. Coll. V. n. 53)

Erect *shrubs*, 1–2 m high. *Branchlets* ascending, compressed, ridged, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, *c.* 15 mm long. *Leaves* spreading, opposite, broadly elliptic, 50–65 \times 20–40 mm, glabrous, venation prominently reticulate; apex slightly emarginate; margins slightly crenulate; base rounded. *Stipules* recurved, hyaline, 8–12 mm long. *Inflorescences* axillary umbels, 2–4-flowered, densely villous; *peduncle* 4–6 mm long; *rachis* nil; *subtending bracts* \pm persistent, scale-like, trifid, lobes much shorter than tube, 5–6 mm long, densely tomentose, middle lobe shorter than outer lobes. *Flowers:* resupinate; *pedicels* terete, 2–3 mm long, densely pubescent. *Calyx* *c.* 10 mm long including the *c.* 1-mm receptacle, densely villous, hairs unicoloured to bicoloured, lobes not or scarcely recurved; upper 2 lobes united much higher than the lower 3, obtuse, *c.* 5 mm long; lower 3 lobes triangular, acute, 4.5 mm long. *Corolla: standard* broadly elliptic to circular, often somewhat folded up longitudinally, *c.* 18–20 \times 14 mm including the 4-mm claw, red or more rarely orange-yellow, with a small, yellow centre, apex emarginate, base cordate; *wings* elliptic, incurved longitudinally, *c.* 15–16 \times 5 mm including the 4-mm claws, red or more rarely orange-yellow, apex rounded, not incurved, not enclosing the keel, base scarcely or not auriculate, saccate; *keel* half very broadly elliptic to circular, incurved longitudinally, margins slightly incurved, *c.* 15–16 \times 6 mm including the 5-mm claws, red, apex rounded, base auriculate, saccate. *Style* very long, strongly incurved to hooked, lower quarter pubescent; *ovary* \pm sessile, densely pubescent; *ovules* 4. *Pod* sessile, ovoid, *c.* 12 \times 4 mm, moderately to densely pubescent. *Seed* not seen.

Flowering period: September. *Fruiting period:* November.

Distribution (Fig. 116): south-western Western Australia. Occurs along the ridge between Ellen Peak and Bluff Knoll, in the Stirling Range.

Habitat: grows on mountain peaks on skeletal sandy soil in scrubby heath and mallee.

Selected specimens (10 examined): WESTERN AUSTRALIA, Eyre district: 1.65 km NNE of Ellen Peak, near base of steep spur,

34°20'30"S, 118°20'03"E, *M.D. Crisp 8946 & W. Keys*, 15.x.1996 (CANB); Stirling Range, Bluff Knoll walking track, c. 0.7 km above carpark, 34°22'S, 118°15'E, *M.D. Crisp 8481 & W. Keys*, 24.ix.1993 (CANB, GAUBA, PERTH); Stirling Range, 34°25'S, 117°53'E, *A.S. Weston s.n.*, 2.vi.1978 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species can be distinguished from *G. rubrum*, *G. vestitum* and *G. luteifolium* by the often somewhat resupinate flowers, the silvery haired calyx and very long petioles at the base of the discolorous leaves. Its closest relative is *G. mondurup*, which differs in having smaller leaves (25–58 × 11–24 mm), the standard petal is not fully reflexed, the inflorescences rarely extend beyond the leaves and are often racemose (rather than consistently umbellate) and the calyx is consistently bicoloured, with white villous hairs towards the base with dense golden brown hairs towards the tips of the lobes.

87. *Gastrolobium mondurup* G.Chandler & Crisp, sp. nov.
Type: Western Australia: Eyre District: Stirling Range, Mondurup, summit ridge, 100 m above 1st saddle, 34°24'S, 117°49'E, 25 Sep. 1993, *M.D. Crisp 8495 & W. Keys (holo: CANB!; iso: K!, PERTH!)*

G. leakeano arte affinis sed foliis paulo minoribus et proportione angustioribus (25–58 × 11–24 mm), vexillo vix expanso cucullato, carina alii longiore (19–24 mm longa) prominenti, inflorescentia folia raro excedenti distinguenda.

Similar to the close relative *Gastrolobium leakeanum* in having resupinate flowers and a somewhat reduced standard petal, but *G. mondurup* differs in the smaller leaves (25–58 × 11–24 mm), the standard petal is not fully reflexed, the calyx is consistently bicoloured (white villous towards the base with dense golden brown hairs towards the tips of the lobes) and the inflorescences rarely extend beyond the leaves.

Etymology: named after the peak from which it was first collected, Mondurup Peak, in the Stirling Range.

Erect *shrubs*, 2–3 m high. *Branchlets* ascending, prominently angular, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, 6–10 mm long. *Leaves* spreading, alternate, elliptic to oblong, 25–58 × 11–24 mm, glabrous, venation prominently reticulate; apex emarginate to bilobed, mucronate; margins crenulate; base rounded. *Stipules* hyaline, 6–10 mm long. *Inflorescences* axillary racemes or umbels, not exceeding the leaves, 4- or 5-flowered; *peduncle* angular to compressed, ridged, 5–7 mm long, pubescent; *rachis* 0–5 mm long; *subtending bracts* caducous, scale-like, apex trilobed, 4–5 mm long, densely tomentose. *Flowers*: resupinate; *pedicels* 5–10 mm long, densely pubescent. *Calyx* campanulate, 10–12 mm long including the c. 1.5-mm receptacle, densely villous, mostly unicoloured with white villous hairs but often some golden brown hairs appearing towards the tips of the lobes, lobes not

recurved; upper 2 lobes united higher than the lower 3, rounded, c. 5 mm long; lower 3 lobes triangular, acute, c. 5 mm long. *Corolla*: *standard* very broadly elliptic, 16–18 × 14–15 mm including the 4.5-mm claw, rosy red with a yellow centre, apex emarginate, base cordate; *wings* elliptic, 20–24 × 4 mm including the 6-mm claws, rosy red, apex rounded, not incurved, not enclosing the keel, base scarcely auriculate on the lower margin only, saccate; *keel* half ovate, margins incurved, 19–24 × 6–7 mm including the 4–5-mm claws, rosy red, apex obtuse, base auriculate, saccate. *Style* very long, incurved, lower half pubescent; *ovary* ± sessile, densely pubescent; *ovules* 5. *Pod* and *seed* not seen. (Fig. 24)

Flowering period: September. *Fruiting period*: unknown.

Distribution (Fig. 117): south-western Western Australia. This species is restricted to several peaks in the central Stirling Ranges.

Habitat: grows on mountain peaks on skeletal soils in heath, or dense mallee-heath.

Specimens examined: WESTERN AUSTRALIA, Eyre district: Stirling Range, Mt Magog, S slope (upper), 34°23'50"S, 117°56'38"E, *M.D. Crisp 8971 & W. Keys*, 18.x.1996 (CANB, PERTH); *ibid.*, *M.D. Crisp 8972, 8973 & W. Keys*, 18.x.1996 (CANB); Mount Magog, 34°24'00"S, 117°48'00"E, *S. Barrett 102*, 15.x.1994 (CANB, PERTH); central summit of Barnett Peak, 34°21'05"S, 117°52'48"E, *M.D. Crisp 8966 & W. Keys*, 17.x.1996 (CANB, MEL, PERTH); Mondurup, summit ridge, 100 m above first saddle, 34°24'S, 117°49'E, *M.D. Crisp 8496, 8497 & W. Keys*, 25.ix.1993 (CANB, NSW, UWA).

Toxicity: unknown.

Affinity: this species is very similar to *G. leakeanum* in having somewhat resupinate flowers and a partially reduced standard petal, but *G. leakeanum* differs most notably by the standard petal being longer than the wing and keel petals (in *G. mondurup* it is the other way around) and also in having larger leaves (50–65 × 20–40 mm), a fully reflexed standard petal (in *G. mondurup* it is only partially recurved), the inflorescence is consistently umbellate rather than often a raceme (rachis up to 5 mm long) and extends beyond the leaves and the calyx is unicoloured with white, villous hairs, or sometimes bicoloured, with white hairs at the base and rust-coloured hairs towards the apex.

88. *Gastrolobium luteifolium* (Domin) G.Chandler & Crisp, comb. nov. *Base name*: *Nemcia luteifolia* Domin, *Preslia* 2: 27 (1923a). *Type citation*: 'W.A.: Warrunup Hill, Stirling Range, leg. Capt. A.A. Dorrien-Smith (Herb. Kew)'. *Type specimen*: *holo*: K

Tall, erect *shrubs*, 1–1.3 m high. *Branchlets* ascending, compressed, prominently ridged, glabrous. *Petioles* terete, tuberculate, continuous and decurrent with the branchlet, 8–10 mm long. *Leaves* opposite, obovate to elliptic, 30–50 × 20–30 mm, glabrous, venation prominently reticulate; yellow-green; apex truncate, may be emarginate; margins crenulate, undulate; base rounded. *Stipules* erect, thickly

lanceolate, plicate, 2–3 mm long. *Inflorescences* short, axillary umbels, 4–5-flowered; *peduncles* compressed, with sheathing, basal bracts that are up to 15 mm long, 10–12 mm long; *rachis* nil; *subtending bracts* ± caducous, scale-like, bilobed, slightly trifid or ± entire, *c.* 13 mm long, densely tomentose. *Flowers*: resupinate; *pedicels* terete, 2–3 mm long. *Calyx* slightly ventricose, 13–15 mm long including the *c.* 1.5-mm receptacle, bicoloured, with basal white silky hairs becoming golden on the lobes, upper 2 lobes recurved, lower 3 lobes straight; upper 2 lobes united higher than the lower 3, obtuse, *c.* 5 mm long; lower 3 lobes triangular, rounded, *c.* 5 mm long. *Corolla*: *standard* very broadly elliptic, *c.* 13–17 × 15 mm including the 6-mm claw, red with yellow guide marks, apex emarginate, base cordate; *wings* elliptic, incurved longitudinally, *c.* 17–18 × 5–6 mm including the 6-mm claws, red, apex rounded, incurved and slightly overlapping to ± enclose the keel, base auriculate on both margins, saccate; *keel* half very broadly elliptic, incurved longitudinally, margins scarcely incurved, *c.* 18–19.5 × 7 mm including the 6.5-mm claws, red, noticeably longer than standard, apex rounded, base auriculate, strongly saccate. *Style* very long, incurved, base pubescent; *ovary* scarcely stipitate, densely pubescent; *ovules* 6. *Pod* and *seed* not seen.

Flowering period: September. *Fruiting period*: unknown.

Distribution (Fig. 118): south-western Western Australia. Occurs in the Stirling Ranges and is known only from Mt Trio.

Habitat: mountain slopes and the summit area of Mt Trio, on skeletal sandy soils in shrubland.

Conservation status: CALM: P2. This species is rare, but does not appear to be at risk.

Specimens examined: WESTERN AUSTRALIA, Eyre District: Stirling Range, summit of Warrungup Peak (Mt Trio), 34°21'S, 118°07'E, *M.D. Crisp* 8507 & *W. Keys*, 25.ix.1993 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species has been reinstated in this treatment and is noticeable for the bicoloured calyces and the keel petals being longer than the standard petal. *Gastrolobium luteifolium* is very similar to *G. vestitum*, but the latter differs by the leaf margins being strongly recurved (rather than undulate in *G. luteifolium*), the leaves are villous on both leaf surfaces and are tardily glabrescent, with the midrib remaining villous (the leaves of *G. luteifolium* are sericeous, glabrate and the midrib is soon glabrous), the subtending floral bracts are smaller (6–10 mm long) and the flowers are generally smaller (*c.* 18 mm long).

89. *Gastrolobium vestitum* (Domin) G.Chandler & Crisp, comb. nov. *Base name*: *Nemcia vestita* Domin, *Preslia* 2: 28 (1923). *Type citation*: 'W.A.: Pass in Stirling Range, East of Mt. Toolbrunup, leg. Capt. A.A. Dorrien-Smith (Herb. Kew).' *Type specimen*: *holo*: K

Erect, arborescent *shrubs*, 1–3 m high. *Branchlets* ascending, compressed, angular, ridged, densely villous. *Petioles* terete, continuous and decurrent with the branchlet, up to 10 mm long. *Leaves* spreading, opposite, elliptic to ± rhombic, 30–45 × 25–35 mm, upper surface with prominent venation, lower surface moderately to densely villous, especially along the veins; apex truncate to retuse; margins strongly recurved; base rounded. *Stipules* erect, *c.* 15 mm long, mostly villous. *Inflorescences* axillary umbels, 4-flowered; *peduncle* compressed, ridged, 10–18 mm long; *rachis* nil; *subtending bracts* somewhat persistent to caducous, scale-like, semi-globose, shallowly trifid, up to 18 mm long including 8–13-mm midrib decurrent extension, densely tomentose. *Flowers*: not resupinate, erect; *pedicels* terete, 4–5 mm long, densely pubescent. *Calyx* 12–13 mm long including the *c.* 1.5-mm receptacle, densely pubescent, unicoloured, with either golden brown or white villous hairs only present, or bicoloured, with both golden brown and white hairs present, upper 2 lobes recurved, lower 3 lobes straight; upper 2 lobes united higher than the lower 3, ± obtuse, *c.* 6 mm long; lower 3 lobes triangular, subacute, *c.* 5.5 mm long. *Corolla*: *standard* transversely elliptic, fleshy, not fully reflexed, giving a hooded appearance, 16–18 × 17–18 mm including the 6.5-mm claw, margins orange, deep red at base with yellow markings, apex emarginate, base cordate, slightly auriculate; *wings* broadly obovate, 16–17 × 6 mm including the 5.5–6-mm claws, deep red, apex rounded, incurved and touching, ± enclosing the keel, base truncate, not or very scarcely auriculate on the upper margin only, saccate; *keel* half broadly elliptic, incurved longitudinally, 16–17 × 6 mm including the 6-mm claws, deep red, margins not incurved, apex broadly rounded, base auriculate, saccate. *Style* very long, strongly incurved, lower-third pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 4 or more. *Pod* sessile, ovoid, 10–12 × 6–7 mm, moderately to densely villous. *Seed* not seen.

Flowering period: October. *Fruiting period*: November.

Distribution (Fig. 119): south-western Western Australia. Occurs in the Stirling Range and is known only from Mt Toolbrunup and the adjacent Mt Hassell.

Habitat: grows on the summit to mid-slopes of Mt Toolbrunup on skeletal soils, in heathland.

Conservation status: ROTAP: 2KC-t. CALM: P2. This species is rare, but does not appear to be at risk.

Specimens examined: WESTERN AUSTRALIA, Eyre District: Stirling Range, Toolbrunup Peak walking track, scree immediately below summit knoll, 34°23'S, 118°03'E, *M.D. Crisp* 8489 & *W. Keys*, 24.ix.1993 (CANB, K, PERTH); *ibid.*, *M.D. Crisp* 8490 & *W. Keys*, 24.ix.1993 (CANB, GAUBA, PERTH, UWA); Stirling Range NP: walking track from carpark to Toolbrunup Peak, 34°23'S, 118°03'E, *J.M. Fox* 88/264, 9.x.1988 (CANB, PERTH); Mt Toolbrunup, 34°23'S, 118°03'E, *A. Morrison s.n.*, 4.x.1902 (CANB, PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium vestitum* is similar to *G. leakeanum*, *G. luteifolium*, *G. mondurup* and *G. rubrum*,

but *G. vestitum* differs from all of these species in its fleshy petals, the rhombic leaves and recurved leaf margins and is generally more hairy. *Gastrolobium leakeanum* differs by the very long, distinct petioles at the base of the discolorous leaves, the often somewhat resupinate flowers and the silvery-haired calyx. *Gastrolobium luteifolium* differs in the rusty tomentose, sheathing bracts to 15 mm long on the peduncle and having a keel petal longer than the standard petal. *Gastrolobium mondurup* differs by having narrower leaves (11–24 mm broad), smaller peduncles and subtending floral bracts (peduncle up to 7 mm long, bracts 4–5 mm long) and much larger flowers (e.g. keel 19–24 mm long). *Gastrolobium rubrum* differs in the obovate to elliptic leaves, the shorter peduncle and subtending floral bracts (peduncle 7–8 mm long, bracts 3–4 mm long), the ventricose calyx and the larger flowers (e.g. keel 18–24 mm long).

90. *Gastrolobium rubrum* (Crisp) G.Chandler & Crisp, comb. nov. *Base name*: *Nemcia atropurpurea* (Turcz.) Domin var. *minorifolia* Domin, *Preslia* 2: 27 (1923a). *Nemcia rubra* Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 127 (1987). *Type citation*: ‘W.A.: cum praecedenti. (W.A.: Warrunup Hill, Stirling Range, Capt. A.A. Dorrien-Smith.)’. *Type specimen*: *holo*: K

Erect, slender *shrubs*, up to 1.5 m high. *Branchlets* ascending, angular to compressed, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, tuberculate, 6–8 mm long, shortly pubescent. *Leaves* spreading, opposite and ternate, stem clasping, obovate to elliptic, 30–70 × 12–30 mm; leaf surfaces with prominent venation; apex emarginate, slightly mucronate; margins slightly crenulate; base rounded. *Stipules* hyaline, 5–6 mm long. *Inflorescences* condensed, axillary racemes, 3–6-flowered; *peduncle* 6–8 mm long; *rachis* to 1–3 mm long; *subtending bracts* caducous, scale-like, entire, sheathing, 3–4 mm long. *Flowers*: nutant, not resupinate; *pedicels* terete, 2–3 mm long. *Calyx* campanulate, ventricose, 10–12 mm long including the *c.* 1.5-mm receptacle, tube truncate at the base, densely villous, hairs bicoloured, with white hairs at the base becoming golden brown near the apices on a maroon surface; upper 2 lobes united much higher than the lower 3, obtuse, *c.* 5.5 mm long; lower 3 lobes triangular, ± acute, *c.* 5 mm long. *Corolla*: *standard* very broadly elliptic to ± circular, longitudinally folded up so that the face is rarely visible, 18–20 × 14–18 mm including the 6-mm claw, orange and red, base truncate, slightly auriculate; *wings* ovate, 18–20 × 6–7 mm including the 4–5-mm claws, red, apex acute to narrowly rounded, not incurved, not enclosing the keel, base auriculate on the lower margin only, not saccate; *keel* half ovate, margins not incurved, *c.* 18–22 × 6–7 mm including the 5-mm claws, red, apex subacute to slightly obtuse, base truncate, only very slightly auriculate,

saccate. *Style* very long, slightly incurved, base pubescent; *ovary* very shortly stipitate, densely pubescent; *ovules* 6. *Pod* wholly enclosed in the calyx, sessile, ovoid, *c.* 9 × 5 mm, moderately to densely pubescent. *Seed* not seen.

Flowering period: September and October. *Fruiting period*: unknown.

Distribution (Fig. 120): south-western Western Australia. Widespread in the Stirling Range, at both high and low elevations, but is also known from near Denmark.

Habitat: mountain slopes and peaks and valleys on skeletal sandy soils, in heath.

Selected specimens (9 examined): WESTERN AUSTRALIA, Eyre District: Stirling Range, Bluff Knoll walking track, *c.* 600 m from carpark, 34°22'S, 118°15'E, *M.D. Crisp 8483 & W. Keys*, 24.ix.1993 (CANB, GAUBA); Stirling Range, Mondurup, summit ridge, 100 m above 1st saddle, 34°24'S, 117°49'E, *M.D. Crisp 8498 & W. Keys*, 25.ix.1993 (CANB, PERTH); Stirling Range NP: walking track from car park to summit of Toolbrunup Peak, 34°23'S, 118°03'E, *J.M. Fox 88/273*, 9.x.1988 (CANB, MEL); 21 km along Stirling Range Drive from Red Gum Pass Rd, 34°24'40"S, 117°57'38"E, *G.T. Chandler 489 et al.* 17.ii.1998 (CANB).

Toxicity: unknown.

Affinity: fairly easily distinguished from its close relatives *G. leakeanum*, *G. luteifolium*, *G. mondurup* and *G. vestitum* by the large nodding, not resupinate red flowers, with the reduced standard not opening and the ventricose calyx with very white hairs at the base becoming golden brown at the apices.

91. *Gastrolobium melanopetalum* (F.Muell.) G.Chandler & Crisp, comb. nov. *Base name*: *Brachysema melanopetalum* F.Muell., *Frag. Phyt. Austral.* 4: 11 (1863). *Type citation*: ‘Ad flumina Don et Tone River Australiae occidentalis.’ *Type specimens*: *holo*: MEL; *iso*: K

Brachysema melananthum Voss in Siebert & Voss, *Vilmorin's Blumengartn.* Ed. 3: 193 (1894). *Type citation*: none cited. *Notes*: insufficiently described for certain application, but probably an erroneous transcription of *Brachysema melanopetalum* F.Muell.

Brachysema sericeum (Sm.) Domin var. *angustifolium* (Benth.) Domin, *Vestník kralovské České Společnosti Nauk*: 26 (1923b). *Base name*: *Brachysema undulatum* Ker Gawler var. *angustifolium* Benth., *Fl. Austral.* 2: 11 (1864). *Type citation*: ‘Gordon, Tone and Blackwood rivers, Oldfield.’ *Type specimens*: *lecto*: Blackwood River (K); *isolecto*: MEL; *syn*: G, K, MEL.

Ascending to erect *shrubs*, up to 3 m high. *Branchlets* ascending, slightly angular, glabrescent. *Petioles* terete, continuous but not decurrent with the branchlet, 1–3 mm long. *Leaves* broadly spreading, mostly alternate, more rarely with some opposite, narrowly ovate to almost elliptic, becoming oblong, 14–60 × 4–20 mm, glabrescent, venation prominently reticulate; apex rounded to acute, mucronate, occasionally emarginate; margins crenulate, undulate or not, slightly recurved; base rounded or obtuse.

Stipules recurved, filiform, 2–3 mm long. *Inflorescences* reduced axillary racemes maturing 1- or 2-flowered, rarely more, with an aborting, terminal bud; *peduncle* spreading to recurved, wiry, 5–20 mm long; *rachis* 0–3 mm long; *subtending bracts* caducous, scale-like or resembling a reduced leaf, sometimes cupped around calyx: if scale-like: trifold, *c.* 1 mm long. *Flowers*: pendulous; *pedicels* terete, 0–1.5 mm long. *Calyx* inflated in the lower half, somewhat constricted in the middle, truncated at base, 6–8 mm long including the 1–2-mm receptacle, densely sericeous, lobes not recurved; united slightly higher and slightly broader than the lower 3, ovate, obtuse, 3–4 mm long; lower 3 lobes triangular to ovate, middle lobe the longest, acute, 3–4 mm long. *Corolla*: *standard* strongly reflexed, broadest across the auricles, *c.* 13 × 5 mm including the 5-mm claws, purple-black, occasionally paler, tapering to a narrowly emarginate apex, lamina bent forwards with incurved margins, base auriculate; *wings* narrowly oblong, *c.* 13 × 3.5 mm including the 3-mm claws, purple-black, occasionally paler, apex broadly rounded, not enclosing the keel, base auriculate, not saccate; *keel* half ovate, margins not incurved, *c.* 14 × 6 mm including the 3-mm claws, purple-black, occasionally paler, apex broadly rounded, base auriculate, saccate. *Style* long, incurved, base pubescent; *ovary* slightly stipitate, with a disc at the base, densely pubescent; *ovules c.* 17. *Pod* partly enclosed in the calyx, obliquely obloid, 9–13 × 4–5 mm, moderately villous. *Seed* not seen.

Flowering period: September–December. *Fruiting period*: December.

Distribution (Fig. 121): south-western Western Australia. Occurs from Kojonup and Frankland, in the Darling escarpment south of Perth, west to the Blackwood River.

Habitat: grows on the margins of freshwater swamps and streams, where it forms thickets.

Selected specimens (8 examined): WESTERN AUSTRALIA, Darling District: 20 km E of Tonebridge towards Frankland; Kulunilup Nature Reserve, 34°13'05"S, 116°54'00"E, *M.D. Crisp 8473 & W. Keys*, 23.ix.1993 (CANB, K, PERTH); 15 km along Northern Rd from turnoff at Perup Rd at 40 km E of Manjimup, 34°12'S, 116°35'E, *M.D. Crisp 8470 & W. Keys*, 23.ix.1993 (CANB, GAUBA, PERTH, UWA); Manjimup, 34°14'S, 116°08'E, *R.D. Royce 2732*, 28.ix.1948 (B, CANB, PERTH).

Toxicity: unknown.

Affinity: the deep purple, almost black flowers of *G. melanopetalum* immediately distinguish it from all other species of *Gastrolobium*, except for *G. subcordatum*, which has deep burgundy-coloured flowers. However, *G. subcordatum* has strictly opposite, cordate, broadly ovate or suborbicular leaves, the inflorescence has several flowers (2–6) that are not pendulous and a standard petal with a truncate apex.

92. *Gastrolobium sericeum* (Sm.) G.Chandler & Crisp, comb.nov. *Base name*: *Chorizema sericeum* Sm., *Trans. Linn. Soc. London* 9: 253 (1808), 'Chorozema'. *Brachysema sericeum* (Smith) Domin, *Vestník královské České Společnosti Nauk, Trida Matematicko-Prirodevedecké* 1921–2, 2: 25 (1923b). *Type citation*: 'Gathered at King George's Sound by Mr. Menzies.' *Type specimens*: *holo*: King George's Sound, west coast of New Holland, lat. 35, Menzies, 1803 (LINN); *iso*: BM

Brachysema undulatum Ker Gawler, *Bot. Reg.* 8: t. 642 (1822). *Type citation*: 'Lately raised by Messrs. Colvill, of the Chelsea Nursery, from seed said to have been collected in the recently explored interior of New South Wales.' *Type specimens*: unknown; *holo*: the plate.

Prostrate or weakly ascending *shrubs*, up to 1 m high, often straggling up through other shrubs. *Branchlets* ascending, ± terete, glabrescent. *Petioles* terete, continuous but not decurrent with the branchlet, 1–3 mm long. *Leaves* ascending, alternate, elliptic to orbicular, occasionally ovate or obovate, 6–50 × 6–30 mm, brittle, glabrescent, venation prominently reticulate; apex rounded to acute, sometimes emarginate, mucronate; margins crenulate, undulate, recurved; base rounded or broadly obtuse. *Stipules* recurved, filiform, 2–3 mm long. *Inflorescences* reduced axillary racemes, 1- or 2-flowered (rarely more), with an aborted, terminal bud, densely sericeous; *peduncle* 5–18 mm long; *rachis c.* 1–3 mm long; *subtending bracts* caducous, scale-like or resembling a reduced leaf, sometimes cupping the base of the calyx; if scale-like: trifold, *c.* 1 mm long. *Flowers*: pendulous; *pedicels* terete, 0–1.5 mm long. *Calyx* inflated in the lower half, slightly constricted in the middle, base truncated, 6–10 mm long including the *c.* 1.5-mm receptacle, densely sericeous, lobes not recurved; upper 2 lobes broader and united scarcely higher than the lower 3, obtuse, *c.* 2.5–4.5 mm long; lower 3 lobes ovate, acute, middle lobe the longest, 2.5–4.5 mm long. *Corolla*: *standard* ± ovate, strongly reflexed, lamina bent forwards, margins incurved, *c.* 15 × 5 mm including the 5-mm claw, pale yellow-green, occasionally infused with pink, drying red-brown, apex peaked, acute, base slightly cordate, auriculate; *wings* narrowly oblong, *c.* 16 × 3.5 mm including the 3-mm claws, pale yellow-green, occasionally infused with pink, apex rounded, not incurved, not enclosing the keel, sitting above the keel, base auriculate on the upper margin only, slightly saccate; *keel* half obliquely ovate, margins slightly incurved, *c.* 17 × 6 mm including the 3-mm claws, pale yellow-green, occasionally infused with pink, apex rounded, base auriculate, saccate. *Style* very long, slightly incurved, base pubescent; *ovary* sessile, with a disc present at the base, densely pubescent; *ovules* 12–14. *Pod* half enclosed in the calyx, slightly stipitate, obliquely oblong, 9–11 × 4–5 mm, sparsely villous. *Seed* not seen.

Chromosome number: $2n = 16$ (Sands 1975).

Flowering period: September–December. *Fruiting period*: December.

Distribution (Fig. 122): south-western Western Australia. Occurs from east of Denmark, to Cranbrook, on the western edge of the Stirling Range.

Habitat: grows on the banks of water courses and at swamp margins on clay or sandy soils in open shrubland.

Selected specimens (10 examined): WESTERN AUSTRALIA, Darling District: 9 km N of Albany, 1 km along road to Two People Bay, 34°56'S, 117°54'E, *M.D. Crisp 6095 et al.* 24.ix.1979 (AD, CANB, PERTH); Cranbrook turnoff, Albany Hwy, 34°17'S, 117°30'E, *M.D. Crisp 8474 & W. Keys*, 23.ix.1993 (CANB, GAUBA, PERTH, UWA); Porongurup Range, W slopes of Nancy's Peak, 34°41'S, 117°52'E, *P.G. Wilson 4254*, 29.ix.1966 (CANB, PERTH).

Toxicity: unknown.

Affinity: *Gastrolobium sericeum* is a very variable species, but is quite distinctive, characterised by the slender, few-flowered inflorescence, pendulous turgid flowers with yellow-green petals. The prostrate forms of *G. sericeum* may be confused with *G. minus*, which is easily distinguished by possessing a standard petal with recurved margins, an inflorescence rachis much shorter [1–3(–5) mm long] and not recurved and the hairs on the pod sericeous, not villous.

93. ***Gastrolobium minus*** (Crisp) G.Chandler & Crisp, comb. nov. **Base name:** *Brachysema minor* Crisp, *Austral. Syst. Bot.* 8: 334 (1995). **Type citation:** 'Western Australia, Mount Barker, Crisp 6105'. **Type specimens:** *holo:* CANB [CBG no. 7908644 (sheet 1/2)]; *iso:* CANB [CBG no. 7908644 (sheet 2/2)], K, PERTH

Prostrate, trailing *shrubs*, 0.2 m high. *Branchlets* spreading, terete, densely sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–8 mm long. *Leaves* ± erect, alternate, ovate, elliptic or orbicular, 10–75 × 10–40 mm, upper surface glabrous, lower surface densely sericeous, venation reticulate; apex obtuse to rounded, often emarginate, mucronate; margins undulate; base rounded, usually slightly cordate. *Stipules* erect, setaceous, ± angular, concave on lower surface, slightly denticulate, 2–7 mm long. *Inflorescences* very condensed axillary racemes, 1 or 2 per axil, usually 1-flowered, often with an aborted bud above the flower; *peduncle* with *c.* 2 barren basal bracts, 1–3(–5) mm long; *rachis* ± nil; *subtending bracts* caducous, scale-like, cupulate, strongly trifid, *c.* 3 mm long. *Flowers:* upright; *pedicels* terete, 2–4 mm long. *Calyx* campanulate, ventricose, 8–10 mm long including the 1.5–2.5-mm receptacle, densely sericeous, lobes not recurved; upper 2 lobes united scarcely higher than the lower 3, ovate, 3.5–4.5 mm long; lower 3 lobes ovate, acute, middle lobe longer than the rest, 3.5–5 mm long. *Corolla:* *standard* strongly reflexed, oblong, deeply concave, constricted above the broad, rounded auricles, *c.* 16 × 5.5 mm including the 5-mm claw, red and yellow, or rarely almost white, apex truncate, ± emarginate, becoming obtuse as upper corners recurve with age, base slightly cordate, strongly auriculate; *wings* narrowly oblong, margins incurved, *c.* 17 × 2.5 mm including the 6-mm claws, red, apex rounded, not

incurved, not enclosing the keel, base slightly auriculate, saccate; *keel* half elliptic, *c.* 17 × 5 mm including the 6-mm claws, red, apex obtuse, sometimes apiculate, base auriculate, saccate. *Style* long, slightly incurved, base pubescent; *ovary* scarcely stipitate, with a disc at the base, densely pubescent; *ovules* 12 or 13. *Pod* partly enclosed in the calyx, ± sessile, obliquely oblong, 9–13 × 5–8 mm, sparsely sericeous. *Seed* not seen.

Flowering period: July–October, rarely in summer.

Fruiting period: September–October.

Distribution (Fig. 123): south-western Western Australia. Occurs in the Mount Barker and Cranbrook area, with an outlier near Middle Mount Barren in Fitzgerald River National Park.

Habitat: grows on sandy loam and gravelly clay soils in *Eucalyptus marginata* open forest.

Selected specimens (8 examined): WESTERN AUSTRALIA, Darling District: midway between Denmark and Mt Barker, 34°45'S, 117°30'E, *C.E. Woolcock s.n. & D.T. Woolcock*, 6.ix.1982 (CANB); Mt Barker, town limits, on road to Porongurups, 34°37'8"S, 117°40'24"E, *M.D. Crisp 8922 & W. Keys*, 10.x.1996 (CANB); 8 miles [13 km] from Cranbrook towards Mt Barker on Albany Hwy, 34°25'S, 117°34'E, *J.W. Wrigley WA/68-4429*, 11.x.1966 (CANB); 45 km from Denmark towards Mt Barker, 34°39'S, 117°36'E, *J.W. Wrigley WA/68-4558*, 13.x.1968 (CANB).

Toxicity: unknown.

Affinity: *Gastrolobium minus* is vegetatively similar to *G. latifolium*, but the latter species has terete, filiform stipules, larger flowers (e.g. calyx 10–12 mm long, keel *c.* 43 mm long), the calyx lobes do not overlap as far (*c.* 0.3 mm zone of overlap, compared with a 0.8–1 mm zone of overlap in *G. minus*) and a villous (not sericeous) pod. *Gastrolobium modestum* also bears some resemblance to *G. minus*, but has stoloniferous shoots, which usually bear the inflorescences, larger flowers (e.g. calyx 8–12 mm long, keel *c.* 19 mm long) and creamy pink petals.

94. ***Gastrolobium modestum*** (Crisp) G.Chandler & Crisp, comb. nov. **Base name:** *Brachysema modestum* Crisp, *Austral. Syst. Bot.* 8: 334 (1995). **Type:** Western Australia, Smith Rd, Treeton Block, State Forest, *B.J. Keighery & N. Gibson 1*, 15 Oct. 1992. **Type specimens:** *holo:* PERTH!; *iso:* CANB! (CBG no. 9612608), K!, MEL!, NSW!

Prostrate to clumped *shrubs*, up to 0.5 m high and 1–3 m broad. *Branchlets* prostrate or ascending, with the prostrate branchlets stoloniferous, often rooting at the nodes, terete, moderately sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–6 mm long. *Leaves* ± erect, alternate, elliptic, ovate or orbicular, 15–70 × 8–45 mm, upper surface glabrescent, lower surface sericeous, venation reticulate; apex obtuse to rounded, occasionally emarginate, mucronate; margins undulate, not recurved; base rounded to cuneate. *Stipules* erect, setaceous, ± angular, concave on

lower face, slightly denticulate, 2–6 mm long. *Inflorescences* dimorphic: those on leafy aerial stems consist of 1 or 2 very condensed racemes per axil, usually 1-flowered, with an aborting bud above the flower, *rachis* 1–3 mm long; those on stolons similar but aggregated into loose panicles by suppression of leaves, up to 30 cm long, with only the flowers emerging from the litter, unit racemes 1- or 2-flowered, *rachis* up to 25 mm long; *subtending bracts* caducous, scale-like, cupulate, strongly trifid, 1.5–1.5 mm long. *Pedicels* terete, 4–12 mm long. *Calyx* campanulate, ventricose, 8–12 mm long including the 2–3-mm receptacle, densely sericeous, lobes not recurved; lobes subequal, upper 2 not united prominently higher than the lower 3, ovate, apiculate, 4–6 mm long, the lower-most lobe being slightly longer and narrower than the others. *Corolla*: cream to pale green, infused with pale pink; *standard* strongly reflexed, truncate, recurved to curled with age, constricted above the broad, rounded auricles, *c.* 16 × 5.5 mm including the 6-mm claw, apex emarginate, base truncate, strongly auriculate; *wings* narrowly obovate, sigmoid with incurved margins, *c.* 19 × 3 mm including the 5-mm claws, apex rounded, not incurved, not enclosing the keel, base auriculate on the upper margin only, slightly saccate; *keel* half broadly elliptic, *c.* 19 × 5 mm including the 6-mm claws, apex apiculate, base auriculate, saccate. *Style* long, slightly incurved, base pubescent; *ovary* scarcely stipitate, with a disc at the base, densely pubescent; *ovules* *c.* 13. *Pod* enclosed in the calyx, ± sessile, obliquely obovoid, turgid, *c.* 8 × 4 mm, sparsely villous. *Seed* not seen.

Flowering period: September–October. *Fruiting period*: unknown.

Distribution (Fig. 124): south-western Western Australia. Occurs near Busselton, south of Perth, on the edge of the Whicher Range.

Habitat: grows on the edges of an ironstone flat on shallow red clay-loam or grey sand, in an ecotone between a seasonal swamp–heath dominated by *Dasypogon* and *Xanthorrhoea* and open forest dominated by jarrah (*Eucalyptus marginata*) and marri (*E. calophylla*).

Conservation status: IUCN: V. ROTAP: 2V. CALM: R. This species is very rare and considered to be vulnerable and measures need to be taken to ensure its survival.

Specimens examined: due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Darling District: SSW of Busselton, near Vasse River, *M.D. Crisp* 8465 & *W. Keys*, 22.ix.1993 (CANB, GAUBA, K, MEL, PERTH, UWA); base of Whicher Range, *B.J. Keighery* 734 & *N. Gibson*, 9.xi.1992 (CANB, PERTH); *ibid.*, *B.J. Keighery* 683 & *N. Gibson*, 15.x.1992 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is distinguished by its inflorescence-bearing stolons, 0.5 m or longer, which makes it difficult to confuse with any species of *Gastrolobium* except for *G. minus*, which has a similar general aspect and shares with *G. modestum* the unique character of recurved

margins at the apex of the standard. However, *G. minus* differs in the inflorescence-bearing stems that, while prostrate, are leafy and never stoloniferous, the inflorescences are never paniculate, the flowers are smaller (e.g. keel *c.* 17 mm long) and the petals are typically red with yellow markings on the standard.

95. *Gastrolobium bracteolosum* (F.Muell.) G.Chandler & Crisp, comb. nov. *Base name*: *Brachysema bracteolosum* F.Muell., *Frag. Phyt. Austral.* 4: 10 (1863). *Type citation*: 'In Nova Hollandia austro-occidentali. Maxw.' *Type specimen*: *holo*: MEL

Brachysema lanceolatum Meisn. {var.} *beta glabrescens* Meisn. in Lehm., *Pl. Preiss.* 1: 25 (1844). *Type citation*: 'Ad promontor. Cape Riche, 21 Nov. 1840, Herb. Preiss. no. 822.' (Locality & date wrong, *vide* Crisp, 1995). *Type specimens*: *lecto*: LD; *isolecto*: G, NY.

Cupulanthus bracteolosus (F.Muell.) Hutch., *The Genera of Flowering Plants*: 341 (1964). *Base name*: *Brachysema bracteolosum* F.Muell. *Notes*: nom. nud. & inval.—no reference is made to the original place of publication of the base name.

Prostrate or straggling *shrubs*, up to 1 m high. *Branchlets* spreading, angular, moderately sericeous to glabrescent. *Petioles* terete, continuous and sometimes slightly decurrent with the branchlet, 2–5 mm long. *Leaves* ascending, alternate, linear-elliptic, becoming broader and obovate towards the base of the branchlet, 30–125 × 2–22 mm, glabrescent, venation reticulate; apex acute or obtuse, rarely truncate and emarginate, mucronate; margins recurved; base tapering into the petiole. *Stipules* ± caducous, recurved, subulate, 3–6 mm long. *Inflorescences* reduced axillary racemes, 1-flowered, 1–3 per axil; *peduncle* recurved, wiry, continuing as a sterile tip 1–2 mm beyond the insertion of the flower, 8–20 mm long; *rachis* 1–2 mm long; *subtending bracts* persistent, enlarged and cupped around the base of the calyx, with two round lobes, the midrib continued as a 1 mm mucro between the lobes, 5–7 mm long, glabrescent. *Flowers*: pendulous, sessile; *pedicels* nil. *Calyx* campanulate, scarcely ventricose, 13–18 mm long including the 3–4-mm receptacle, densely sericeous, lobes not recurved; upper 2 lobes united higher than the lower 3, obtuse, 6–9 mm long; lower 3 lobes ovate, subacute, 6–9 mm long. *Corolla*: orange-red, red-brown or deep red, with purple markings, or yellow-green; *standard* ± ovate, with two broad round auricles abruptly constricted above into a short, narrow, hooded lamina and constricted below into a long claw, 15–20 × 9–10 mm including the *c.* 10-mm claw, apex truncate, ± emarginate, base obtuse, auriculate; *wings* narrowly oblong, *c.* 25 × 3 mm including the 10-mm claws, apex truncate, base auriculate on the upper margin only, saccate; *keel* half ovate to oblong, margins slightly incurved, *c.* 25 × 5 mm including the 8-mm claws, apex obtuse, base auriculate, saccate. *Style* long, slightly incurved, base pubescent; *ovary* subsessile, with a disc at the base, densely pubescent; *ovules* 6–8. *Pod* fully enclosed in the calyx, ellipsoid, *c.* 15 × 8 mm, densely pubescent. *Seed* ovoid, *c.* 3.5 mm long, arillate.

Chromosome number. $2n = 16$ (Sands 1975).

Flowering period: July–November. *Fruiting period:* October–November.

Distribution (Fig. 125): south-western Western Australia. Occurs along the south coast from Bremer Bay to Mt Manypeaks, near Albany and north to the Stirling Range.

Habitat: grows on broad dunes or occasionally in moist sites, on sand or clay, in mallee and heathland.

Selected specimens (21 examined): WESTERN AUSTRALIA, Eyre District: gully between Mondurup and Baby Barnett Hill, 3.6 km along Stirling Drive from Red Gum Pass, 34°24'S, 117°49'E, *M.D. Crisp 8503 & W. Keys*, 25.ix.1993 (CANB, GAUBA, NSW, PERTH, UWA); 4 km E of Kalgan River, 34°53'S, 118°02'E, *R.D. Royce 4270*, 30.vii.1953 (CANB, PERTH); 1.9 km along Swamp Rd towards Fitzgerald River NP, from Bremer Bay Rd, 34°23'12"S, 119°17'18"E, *G.T. Chandler 426 et al.* 15.ii.1998 (CANB); 2 mls [3 km] S of Chester Pass, Stirling Range, 34°25'S, 118°06'E, *M.E. Phillips s.n.*, 10.x.1962 (CANB).

Toxicity: unknown.

Affinity: *Gastrolobium bracteolosum* is easily distinguished from all other species of the genus *Gastrolobium* by its combination of narrow leaves, enlarged, 2-lobed bracts cupped around the calyx, a long claw on the standard and an elongated aril on the seed.

96. *Gastrolobium subcordatum* (Benth.) G.Chandler & Crisp, comb. nov. *Base name:* *Brachysema subcordatum* Benth., *Fl. Austral.* 2: 11 (1864). *Type citation:* 'W. Australia, Drummond, 5th Coll. n. 21.' *Type specimens:* lecto: K; isolecto: BM, FI-W n.v., G, K (2 sheets), MEL, OXF n.v., P, PERTH, W

Bushy, erect or spreading *shrubs*, up to 1.5 m high. *Branchlets* ascending, slightly angular, densely sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 1–3 mm long. *Leaves* spreading, decussate, broadly to very broadly ovate or suborbicular, 6–45 × 7–35 mm, upper surface glabrous, lower surface densely sericeous, venation prominently reticulate; apex obtuse, rounded or slightly emarginate, mucronate; margins crenulate, strongly undulate; base slightly cordate. *Stipules* erect to recurved, setaceous, up to 5 mm long. *Inflorescences* terminal racemes on short shoots or axillary, 2–4(–6)-flowered, rarely once-branched, densely sericeous; *peduncle* occasionally with a pair of barren basal bracts, 0–4 mm long; *rachis* 2–8 mm long; *subtending bracts* caducous, leaf-like or scale-like; if scale like: trifid, *c.* 2 mm long. *Flowers:* not resupinate; *pedicels* terete, 1–2 mm long. *Calyx* campanulate, ventricose, 6–8 mm long including the *c.* 1-mm receptacle, densely sericeous, lobes not recurved; upper 2 lobes united scarcely higher than the lower 3, obtuse, *c.* 2.5–3.5 mm long; lower 3 lobes triangular, acute to acuminate, 3–4 mm long. *Corolla:* standard ± oblong, strongly reflexed, strongly concave, constricted around the large basal auricles, *c.* 10 × 5 mm including the 4-mm claw, burgundy, apex emarginate, base truncate, strongly auriculate,

causing the base to flare; *wings* narrowly obovate, slightly recurved longitudinally, *c.* 14 × 3 mm including the 4–5-mm claws, burgundy, apex obtuse, not incurved, not enclosing keel, base auriculate on the upper margin only, saccate; *keel* half obliquely elliptic, margins not incurved, *c.* 12.5 × 3 mm including the 4-mm claws, burgundy, apex rounded, base auriculate, slightly saccate. *Style* long, incurved, lower third pubescent; *ovary* subsessile, with a disc present at the base, densely pubescent; *ovules* 2–6. *Pod* ± enclosed in the calyx, ± sessile, obliquely ovoid, 8–9 × 4.5–6 mm, sparsely pubescent. *Seed* reniform, *c.* 3 mm long, arillate.

Flowering period: September–October. *Fruiting period:* October and November.

Distribution (Fig. 126): south-western Western Australia. This species occurs in the Porongurup Range and may extend into the Stirling Range.

Habitat: grows in granite declivities on sandy soils, in open shrubland and the margins of *Eucalyptus diversicolor* forest.

Conservation status: IUCN: R. ROTAP: 2RC-. This species is rare, but does not appear to be in any immediate danger.

Selected specimens (6 examined): WESTERN AUSTRALIA, Eyre District: Porongurup Range, Devils Slide, base of granite dome, 34°41'S, 117°52'E, *M.D. Crisp 6097 et al.*, 24.ix.1979 (AD, CANB, NSW, PERTH); Porongurup Range, track to Hayward Peak, *c.* 1 km from Tree in the Rock, 34°41'S, 117°52'E, *M.D. Crisp 8511 & W. Keys*, 26.ix.1993 (CANB, GAUBA, PERTH, UWA); Porongurup Range, W slopes of Nancy's Peak, *P.G. Wilson 4254*, 29.ix.1966 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is somewhat similar to *G. melanopetalum* in its floral morphology and dark petals, but differs by always having mostly alternate leaves, the leaf base is never consistently cordate and the lower leaf surface is glabrescent.

97. *Gastrolobium celsianum* (Lemaire) G.Chandler & Crisp, comb. nov. *Base name:* *Brachysema celsianum* Lemaire, *Jardin Fleuriste* 3: 33 (1843). *Type citation:* none cited. *Type specimens:* *holo:* the plate

Brachysema platypterum Lemaire, *Jardin Fleuriste* 3: 33 (1843) 'platyptera'. *Notes:* nom. inval., given as a synonym of *Brachysema celsianum*.

Brachysema acuminatum Jacques, *J. Soc. Imp. Centrale Hort.* 9: 643 (1863). *Type citation:* none cited; description made from a cultivated plant. *Type specimens:* unknown.

Brachysema lanceolatum Meisn. in Lehm., *Pl. Preiss.* 1: 24 (1844). *Type citation:* Preiss 823 (var. *alpha hypargyreum*) and Preiss 815 (var. *gamma planifolium*). See infraspecific taxa. *Type specimens:* lecto (*fide*, Crisp 1995): LD (Preiss 823).

Brachysema lanceolatum Meisn. [var.] *alpha hypargyreum* Meisn. in Lehm., *Pl. Preiss.* 1: 25 (1844). *Type citation:* 'In planitie arenosa prope montem Manypeak 1. Tjilberup (Kent) 16. Nov. 1840. Herb. Preiss. no. 823.' (Locality & date wrong, *fide* Crisp 1995). *Type specimens:* lecto: LD; isolecto: NY.

Brachysema lanceolatum Meisn. [var.] *gamma planifolium* Meisn. in Lehm., *Pl. Preiss.* 1: 25 (1844), 'planifolia'. *Type citation*: 'In glareosis sylvae 15 mill. a Kojonup (Goderich) m. Febr. 1841. Herb. Preiss. no. 815.' *Type specimens*: *lecto*: NY; *isolecto*: LD.

Brachysema speciosum Lescuyer, *J. Amateurs Interets Hort. Series 2*, 6: t. 18 (1864), 'speciosa'. *Type citation*: none cited. *Type specimen*: unknown; *holo*: plate 18.

Prostrate, scrambling or bushy ascending *shrubs*, up to 1.2 m high. *Branchlets* spreading to ascending, terete, densely sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–5 mm long. *Leaves* broadly spreading, decussate or some alternate, ovate, narrowly ovate or rarely sublinear, 15–100 × 4–55 mm, upper surface glabrous, lower surface densely sericeous, venation reticulate; apex acute, acuminate or rarely rounded, mucronate, uncinata or rarely cirrhous; margins ± undulate, crenulate, not recurved; base rounded. *Stipules* erect to recurved, setaceous, 3–5 mm long. *Inflorescences* axillary racemes, 2–6-flowered; *peduncle* 1–3 mm long; *rachis* 0–10 mm long; *subtending bracts* caducous, leaf-like or scale-like and trifid, 3–4 mm long. *Flowers*: resupinate; *pedicels* terete, 2–3 mm long. *Calyx* campanulate, scarcely ventricose, 12–16 mm long including the 3–4-mm receptacle, densely sericeous, lobes not recurved; upper 2 lobes united higher than the lower 3, obtuse, 5–7 mm long; lower 3 lobes triangular, middle lobe narrower than the other two, 5–7 mm long. *Corolla*: *standard* subreflexed, narrowly ovate to oblong, concave, *c.* 15 × 4 mm including the 5-mm claw, red with a yellow centre, apex emarginate, base, cordate, strongly auriculate; *wings* obliquely narrowly obovate, *c.* 17 × 4–5 mm including the 2-mm claws, red, apex subacute, base auriculate on both margins, saccate; *keel* half elliptic, margins not incurved, *c.* 30 × 7 mm including the 9-mm claws, red, apex acute, base auriculate, saccate. *Style* long, slightly incurved, base pubescent; *ovary* stipitate, with a disc at the base, densely pubescent; *ovules* 14–18. *Pod* ± enclosed in the calyx, ellipsoid, 10–15 × 3–5 mm, densely pubescent. *Seed* reniform, *c.* 2.5 mm long, arillate.

Chromosome number: $2n = 16$ (Sands 1975).

Flowering period: August–November, more rarely in July. *Fruiting period*: October and November.

Distribution (Fig. 127): south-western Western Australia. Occurs from Wagin south to Bremer Bay, with outliers occurring on the Moore River, near Busselton and near Ravensthorpe.

Habitat: grows along watercourses on sandy, gravelly soils, but also extends to flats or moist depressions in mallee and woodland.

Selected specimens (18 examined): WESTERN AUSTRALIA, Eyre District: Pallinup River crossing (Mara Bridge) on Albany–Jerramungup road, 34°24'S, 118°45'E, *E.M. Canning WA/68-7446*, 9.xi.1968 (CANB). Darling District: junction of Brassey Rd and Cranbrook–Broomehill road, 33°52'46"S, 117°39'09"E, *T.R. Lally 1245 & B.J. Lepschi*, 21.ix.1996 (CANB, PERTH); Moore River, 2.5 km NNW of Mogumber, 21°02'03"S, 116°01'00"E, *M.D. Crisp 9009 & W. Keys*, 24.x.1996 (CANB, PERTH). Roe District:

Ongerup–Ravensthorpe road, 20 km E of Ongerup, 33°57'S, 118°42'E, *D.E. Albrecht 4513*, 17.ix.1990 (CANB, MEL).

Toxicity: unknown.

Affinity: *Gastrolobium celsianum* is easily identifiable by its distinctive floral morphology, particularly the wing petals being about half the length of the keel and scarcely emergent from the calyx, making it difficult to confuse with any other species of *Gastrolobium*. The long, curving keel is the most conspicuous feature of the flower.

98. *Gastrolobium formosum* (Kippist ex Lindl.) G.Chandler & Crisp, comb.nov. *Base name*: *Jansonia formosa* Kippist ex Lindley, *Gard. Chron.* 7: 307 (1847). *Type citation*: '...from the south-west coast of New Holland,...specimens...in museums of Mr. Heward and Dr. Leman.' *Type specimens*: Drumm. 100: *G. Notes*: Kippist read a paper describing *Jansonia* to a meeting of the Linnean Society of London on 4 May 1847, but the full text was not published until 1851, in the *Transactions of the Linnean Society*. Meanwhile, versions of the paper appeared in a succession of periodical articles (Hervey 1847; Kippist 1847; Lindley 1847; Kippist 1848), among which Lindley's appears to have effected valid publication of the name *Jansonia formosa*

Cryptosema pimeleoides Meisn. in Lehm., *Pl. Preiss* 2: 207 (1848). *Type citation*: 'In colonia ad fl. Cygnorum detexit Jacobus Drummond. coll. III. no. 100 (Herb. Shuttleworth!).' *Type specimens*: *holo*: BM; *iso*: CGE, E, G, K (4 sheets), LD, MEL (2 sheets), NY, OXF, W.

Jansonia pimeleoides (Meisn.) C.A.Gardner, *Enum. Pl. Austr. Occid.*: 56 (1930). *Base name*: *Cryptosema pimeleoides* Meisn. *Notes*: nom. superfl. because the correct name *Jansonia formosa* Kippist ex Lindley is given in synonymy.

Small, trailing *shrubs*, up to less than 1 m high. *Branchlets* ascending, angular, glabrous to sparsely pubescent. *Petioles* terete, up to 5 mm long. *Leaves* opposite, lanceolate, 40–55 × 10–18 mm, softly pubescent, venation prominently reticulate; apex rounded, softly mucronate; margins almost flat, crenulate or undulate; base rounded to slightly cordate. *Stipules* recurved to slightly coiled, hyaline, up to *c.* 5 mm long. *Inflorescences* terminal capitula, usually on a short, axillary shoot, 4-flowered, enclosed in sheathing globose decurrent bracts; *peduncle* up to 5 mm long; *rachis* nil; *subtending bracts* persistent, scale-like, globose, trifid, sheathing the base of the inflorescence, 10–12 mm long, densely golden pubescent. *Pedicels* nil. *Calyx* 15–17 mm long including the *c.* 2-mm receptacle, densely pubescent, bicoloured, with hairs towards the base silvery and hairs in the upper half golden-brown, lobes not recurved; upper 2 lobes united lower than the lower 3 and much reduced, acute, *c.* 3 mm long; lower 3 lobes enlarged, with the middle lobe longer and broader than the other two, ovate to triangular, subacute, middle lobe *c.* 10 mm long, other two lobes *c.* 8 mm long. *Corolla*: *standard* considerably reduced to less than a third the length of wings, strongly reflexed, ovate, *c.* 6.5 × 3 mm including the 3-mm claw, red, apex triangular,

acute, entire, base cuneate, not auriculate; *wings* elliptic, *c.* 14 × 5 mm including the 5-mm claws, red, apex rounded, not incurved, not enclosing the keel, base auriculate on the upper margin only, saccate; *keel* half elliptic, margins not incurved, *c.* 16 × 4 mm including the 4-mm claws, red, apex ± obtuse, base auriculate, saccate. *Style* very long, hooked, lower third pubescent; *ovary* slightly stipitate, densely pubescent; *ovules* 2–5. *Pod* and *seed* not seen. (Fig. 25)

Flowering period: November. *Fruiting period*: unknown.

Distribution (Fig. 128): south-western Western Australia. Occurs in the wetter, far SW corner of this region, around Margaret River and Augusta.

Habitat: grows along river banks or in swamps on clay loam soils, in marri forest or swamp vegetation.

Conservation status: ROTAP: R. CALM: R. This species is rare, but it may be due to the difficulty in locating this plant even when in flower, as the bright red flowers are enclosed in a brown calyx.

Selected specimens (6 examined): due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Darling District: NNE of Augusta, *R. Davies 164*, 19.ix.1995 (CANB, PERTH); Margaret River crossing, Bussel Hwy, *J.M. Taylor 2057 & P. Ollerenshaw*, 21.ix.1983 (AD, CANB, MEL, MO, PERTH); Scott River, Brennan Ford, *M.D. Crisp 8933 & W. Keys*, 11.x.1996 (CANB).

Toxicity: unknown.

Affinity: the unique inflorescence of *G. formosum*, a 4-flowered capitulum enclosed in sheathing bracts with the large calyx lobes obscuring the corolla, makes it very difficult to confuse with any other species of *Gastrolobium*.

99. *Gastrolobium papilio* (Crisp) G.Chandler & Crisp, comb. nov. *Base name*: *Brachysema papilio* Crisp, *Austral. Syst. Bot.* 8: 326 (1995). *Type*: Western Australia, Williamson Rd, Abba Block, State Forest, 33°42'S, 115°32'E, *B.J. Keighery & N. Gibson 2*, 16 Oct. 1992. *Type specimens*: *holo*: PERTH; *iso*: CANB (CBG no. 9612609)

Tangled, clumped *shrubs*, up to 1.5 m high, often climbing through other shrubs. *Branchlets* ascending, wiry, terete, densely pubescent. *Petioles* terete, continuous but not decurrent with the branchlet, 1–3 mm long. *Leaves* spreading to ascending, opposite (seedling leaves with some subalternate), mostly obrescentic, tending to transversely narrowly rhombic or obtriangular, 5–18 × 10–28 mm, glabrescent, venation reticulate; apex stiffly mucronate, almost pungent-pointed, often with a small triangular lobe; margins undulate, crenulate, recurved; base rounded or cordate. *Stipules* recurved to curled up, setaceous, 3–5 mm long. *Inflorescences* racemes, axillary or terminal on short, axillary shoots, 2(–4)-flowered; *peduncle* 15–25 mm long; *rachis* 0–15 mm long; *subtending bracts* leaf-like or reduced to trilobed scales *c.* 3 mm long. *Flowers*: pendulous, not resupinate; *pedicels* wiry, 6–10 mm long. Calyx campanulate, 12–13 mm long including the 2–3-mm receptacle, densely

villous, lobes not recurved; upper 2 lobes united higher than the lower 3, acute, 7–9 mm long; lower 3 lobes triangular, acute, incurved, 8–10 mm long. *Corolla*: cream to red, darkening with age; *standard* reflexed, narrowly oblong, constricted above the auricles, *c.* 15 × 6 mm including the 6-mm claw, apex emarginate, base strongly auriculate; *wings* narrowly elliptic, *c.* 18 × 4 mm including the 5-mm claws, apex rounded-obtuse, not incurved, not enclosing the keel, base auriculate on the upper margin only, slightly saccate; *keel* half elliptic, *c.* 20 × 6 mm including the 5-mm claws, apex rounded, base auriculate, saccate. *Style* long, slightly incurved, base pubescent; *ovary* stipitate, with a disc present at the base, densely pubescent; *ovules* *c.* 12. *Pod* ± enclosed by the calyx, slightly stipitate, obliquely narrowly ellipsoid, 13–15 × *c.* 5 mm, moderately villous. *Seed* not seen.

Flowering period: from October. *Fruiting period*: unknown.

Distribution (Fig. 129): south-western Western Australia. Occurs near Busselton, south of Perth, on the edge of the Whicher Range.

Habitat: grows on flat plains on sandy clay over ironstone, in low, open, mixed heath.

Conservation status: IUCN: E. ROTAP: 2V. This species is quite rare and is thought to be endangered.

Specimens examined: due to the conservation status of this species, precise localities are not given. WESTERN AUSTRALIA, Darling District: *M.D. Crisp 8461* (CANB, GAUBA, PERTH); *ibid.*, *M.D. Crisp 8462* (CANB, PERTH); *ibid.*, *M.D. Crisp 8463* (CANB, PERTH); base of Whicher Range, near Williamson Rd in State Forest, *B.J. Keighery 1058*, 16.x.1992 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species is very difficult to confuse with any other species of *Gastrolobium*, due to the leaf shape and texture and the nodding, paired flowers. The only exception would be *G. praemorsum*, which has similar leaves, but which differs by having softer, herbaceous leaves that are not pungent, the leaf shape is obovate to obtriangular, rather than crescentic, there is a paler marginal band on the leaf that contrasts with the darker leaf tissue which is absent in *G. papilio* and the flowers are erect, resupinate and larger (e.g. keel *c.* 30 mm long).

100. *Gastrolobium praemorsum* (Meisn.) G.Chandler & Crisp, comb. nov. *Base name*: *Brachysema praemorsum* Meisn. in *Lehm., Pl. Preiss.* 1: 25 (1844). *Type citation*: 'In solo limoso ad ripam fluvii Preston (Wellington) d. 13. Dec. 1839. Herb. Preiss. no. 824.' *Type specimens*: *lecto*: NY; *isolecto*: BR, C (2 sheets), FI-W n.v., G (3 sheets), GOET, HBG, K, L (3 sheets), LD, MEL (2 sheets), MO, P, S (2 sheets), W (2 sheets)

Tangled, ± prostrate *shrubs*, up to 0.6 m high. *Branchlets* tangled, spreading, terete, moderately pubescent. *Petioles* terete, continuous but not decurrent with the branchlet,

1–6 mm long. *Leaves* spreading, opposite, broadly to transversely broadly obovate to obovate, 9–55 × 7–52 mm, glabrescent, venation prominently reticulate, often with a paler marginal band 1–2 mm broad on both faces; apex rounded to ± truncate, occasionally emarginate, often with a small triangular lobe at the apex, mucronate; margins undulate, crenulate, recurved; base rounded to cuneate. *Stipules* recurved, setaceous, 3–5 mm long. *Inflorescences* racemes, axillary or terminal on short shoots, 2–4-flowered, rarely once-branched; *peduncle* 3–15 mm long; *rachis* 4–25 mm long; *subtending bracts* leaf-like and indistinguishable from the leaves, or progressively reduced to 3 mm long and scale-like with 3 subulate lobes. *Flowers*: resupinate; *pedicels* terete, 4–10 mm long. *Calyx* campanulate, 13–16 mm long including the 2–3-mm receptacle, moderately to densely pubescent, lobes not recurved; upper 2 lobes united slightly higher than the lower 3, triangular, acuminate, 8–10 mm long; lower 3 lobes triangular, acuminate, middle lobe the longest, *c.* 13 mm long. *Corolla* initially dull red to greenish, becoming a darker and purer red with age: *standard* subreflexed, narrowly oblong, concave, constricted near the middle of the lamina, *c.* 18 × 6 mm including the 5-mm claw that has a broader, rounded base, apex emarginate, base truncate, prominently auriculate; *wings* narrowly elliptic, *c.* 22 × 5 mm including the 5-mm claws, apex rounded-obtuse, not incurved, not enclosing the keel, base auriculate on the upper margin only, slightly saccate; *keel* half elliptic, *c.* 30 × 8 mm including the 5-mm claws, apex acute, base auriculate, saccate. *Style* long, slightly incurved, base pubescent; *ovary* stipitate, with a disc present at the base, densely pubescent; *ovules* *c.* 19. *Pod* partly enclosed in the calyx, slightly stipitate, ellipsoid, *c.* 15 × 6 mm, moderately villous. *Seed* reniform, *c.* 3 mm long, arillate.

Chromosome number: $2n = 16$ (Sands 1975).

Flowering period: August–December. *Fruiting period*: unknown.

Distribution (Fig. 130): south-western Western Australia. Occurs from Geographe Bay east to Albany, with outliers as far north as Bullsbrook, just north of Perth.

Habitat: grows very well in disturbed areas and occurs in a wide variety of habitats, from wet, boggy areas to laterite ridges on sandy and clay soils, in jarrah forest, wandoo woodland and shrubland.

Selected specimens (18 examined): WESTERN AUSTRALIA, Darling District: Tonebridge, 34°15'S, 116°44'E, *M.D. Crisp 8472 & W. Keys*, 23.ix.1993 (CANB); 20 miles [32 km] from Pingelly towards Wandering, along northern road, 32°35'S, 116°55'E, *J.W. Wrigley WA/68-4243*, 8.x.1968 (CANB); 10 km along Woogenelup Rd, Mt Barker to Stirling Range, 34°33'41"S, 117°44'21"E, *Chandler 792 & S. Donaldson*, 31.x.1998 (CANB, MEL, PERTH); 1 S of Kojonup on Albany Hwy, 33°51'S, 117°09'E, *G.J. Keighery 6182*, 21.vii.1983 (CANB, PERTH).

Toxicity: unknown.

Affinity: the unusual shape of the leaves of this species makes it difficult to confuse with any other species of *Gastrolobium*, except for *G. papilio*, which shares similarly shaped leaves, but differs in having consistently crescentic leaves with a pungent-point and no paler marginal band and the flowers are pendulous and shorter (e.g. keel 20 mm long).

XIII. Unplaced species

These species were not included in any phylogenetic analysis of *Gastrolobium* and their morphology alone is not sufficient to place them into any particular group without further evidence.

101. *Gastrolobium ferrugineum* G.Chandler, Crisp & R.J.Bayer, sp.nov. *Type*: Western Australia: Eyre District: Ca 20 km SW of Narrikup, *L.R. Anderson SPN 1027*, 11 Aug. 1992 (*holo*: PERTH!; *iso*: PERTH!)

G. reflexo et *G. spectabili* vegetative similis sed stipulis nullis, inflorescentia condensata saepe axillari et pedunculo rhachideque angulato distinguenda.

Vegetatively similar to *G. reflexum* and *G. spectabile*, but *G. ferrugineum* has no stipules, the inflorescence is condensed, often axillary, the inflorescence axes are generally covered in short, rust-coloured hairs and the peduncle and rachis are angular.

Etymology: from the Latin *ferrugineus* = rust-coloured and refers to the short, generally rust-coloured hairs on the inflorescence axes.

Erect *shrubs*, 2.5–3 m high. *Branchlets* spreading to ascending, angular, glabrous to sparsely pubescent. *Petioles* sometimes absent; when present: angular, continuous and decurrent with the branchlet, 0–0.5 mm long. *Leaves* spreading, opposite, very broadly triangular, 20–30 × 23–39 mm, glabrous, venation prominently reticulate, intramarginal vein prominent; apex obtuse to barely acute, mucronate or shortly pungent-pointed; margins minutely crenulate, not recurved; base cordate. *Stipules* usually absent; when present erect, very small, *c.* 0.25 mm long. *Inflorescences* terminal or axillary racemes or rarely umbels, 1–4 per terminus or axil, 3–10-flowered; *peduncle* angular, 10–27 mm long; *rachis* angular, 0–10 mm long; *subtending bracts* ± persistent, scale-like, entire, elliptic, 6–8 mm long. *Pedicels* terete, *c.* 2 mm long. *Calyx* campanulate, 5.5–7 mm long, bicoloured, with densely villous white hairs at the base and rust-coloured hairs at the apex of the non-recurved lobes; upper 2 lobes united into an almost truncate lip, rounded, *c.* 3 mm long; lower 3 lobes triangular, subacute, *c.* 2.5 mm long. *Corolla*: *standard* transversely ovate, *c.* 13 × 12 mm including the 5.5-mm claw, yellow to yellow-orange with a maroon ring surrounding the yellow centre, apex emarginate, base truncate, slightly auriculate; *wings* obovate, *c.* 11 × 3 mm including the 4-mm claws, yellow and maroon,

apex rounded, base auriculate on the upper margin only, not saccate; *keel* half broadly elliptic, margins not incurved, *c.* 11 × 3 mm including the 4-mm claws, maroon and pink, apex rounded, base auriculate, saccate. *Style* long, incurved to hooked, very broadly flattened, slightly pubescent at the very base only; *ovary* stipitate, densely pubescent; *ovules* 4. *Pod* and *seed* not seen. (Fig. 26)

Flowering period: May–September. *Fruiting period*: unknown.

Distribution (Fig. 131): south-western Western Australia. Known only from a few collections south of Perth in the Narrikup and Mount Barker regions.

Habitat: grows on sandy gravelly soil in *Eucalyptus marginata* forest.

Conservation status: CALM: P2. This species is poorly known and apparently rare and further survey work is required to fully determine its conservation status.

Specimens examined: WESTERN AUSTRALIA, Darling District: Mt Barker area, *R. Bowering s.n.*, 8.v.1989 (PERTH); Mt Barker–Ravensthorpe, *Heritage Wildflowers s.n.*, 3.v.1990 (CANB, K, NSW, PERTH); 20 km SW of Narrikup, Albany N, 34°53'37"S, 117°33'17"E, *L. Anderson 1072*, 11.viii.1992 (PERTH).

Toxicity: unknown.

Affinity: vegetatively similar in appearance to *G. reflexum* and *G. spectabile*. *Gastrolobium reflexum* has prominent, reflexed stipules, a more open, terminal raceme and the peduncle and rachis are terete, whereas the stipules are absent in *G. ferrugineum*, the inflorescence is condensed and often axillary and the peduncle and rachis are angular. *Gastrolobium spectabile* differs by its prominent recurved to reflexed stipules, long terminal racemes (peduncle 10–20 mm long and rachis 40–60 mm long) and has a terete inflorescence axis.

102. *Gastrolobium humile* G.Chandler & Crisp, sp. nov. *Type*: South Stirlings, *F.L. Counsel s.n.*, Nov. 1967 (*holo*: CANB!; *iso*: PERTH!)

Hac species *G. stowardii* arte simulans sed stipulis longis (4–8 mm longis) partim connatis triangularibusque, racemibus longioribus (pedunculus 4–10 mm longus, rhachis 20–45 mm longa) floribus plus (a 15 ad plus quam 30) distincta.

The long stipules (4–8 mm long) which are partly fused and triangular and the relatively long, many-flowered racemes (15- to more than 30-flowered, peduncle 4–10 mm long, rachis 20–45 mm long) distinguish this species from *G. stowardii*, which it most closely resembles.

Etymology: the specific epithet refers to the low-growing habit of this species.

Low shrubs. *Branchlets* ascending, slightly angular to ± terete, densely pubescent. *Petioles* terete, continuous but not

decurrent with the branchlet, 1–1.5 mm long. *Leaves* spreading to ascending, opposite, cuneiform, 8–11 × 4–6 mm, upper surface glabrous, lower surface moderately to densely villous, venation reticulate; apex truncate to bilobed, weakly mucronate, recurved; margins irregularly recurved; base rounded. *Stipules* erect, partly fused behind the axillary bud, triangular with a long, acuminate apex, 4–8 mm long, moderately pubescent. *Inflorescences* terminal racemes, 15- to more than 30-flowered, densely pubescent; *peduncle* 4–10 mm long; *rachis* 20–45 mm long; *subtending bracts* not seen. *Pedicels* terete, 2–3 mm long, densely pubescent. *Calyx* campanulate, *c.* 4 mm long including the *c.* 0.5-mm receptacle, moderately to densely pubescent, lobe recurvature unknown; upper 2 lobes united higher than the lower 3, obtuse, *c.* 2.5 mm long; lower 3 lobes triangular, acuminate, *c.* 2.5 mm long. *Corolla* not seen. *Style* long, incurved, pubescent in the lower third; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* shortly stipitate, ovoid, *c.* 4 × 3.5 mm, densely pubescent. *Seed* ellipsoid, *c.* 2.5 mm long, arillate. (Fig. 27)

Notes: very little is known about this species. Despite separate searches by G. T. Chandler and M. D. Crisp, this species has not been relocated and only one collection is known. It is probable that it is very localised in the vicinity of South Stirling, where there is a large nature reserve and is difficult to locate.

Flowering period: unknown. *Fruiting period*: beginning in November.

Distribution (Fig. 132): south-western Western Australia. Known from only the one, vague locality at or near South Stirling, which is on the plain *c.* 30 km south of the Stirling Range.

Habitat: unknown.

Conservation status: no official conservation status has been given to this new species, but after a number of searches throughout this study, this species has not been found. It is quite possible that its habitat was cleared for farmland and that this species is extinct. Following the IUCN guidelines, it is recommended that this species be coded Ex/E (possibly extinct in the wild), pending further searches in the future.

Specimens examined: known only from the type collection.

Toxicity: unknown.

Affinity: the leaf shape is similar to that of *G. stowardii*, but the large stipules and long, racemose inflorescence distinguish *G. humile* from this species.

103. *Gastrolobium venulosum* G.Chandler & Crisp, sp. nov. *Type*: Western Australia: Eyre District: 14 km SW of Fitzgerald River Bridge, Ravensthorpe–Jerramungup road, 33°53'S, 119°07'E, *M.D. Crisp 6070*, *J. Taylor & R. Jackson*, 22 Sep. 1979 (*holo*: CBG!; *iso*: NSW!, PERTH!)

G. crassifolium similis sed foliis proportione latioribus (20–27 × 4–7 mm), venatione aperte reticulata et carinae apice orem hydrae simulanti sed vix acuto et margine infero integro differt.

Gastrolobium crassifolium is similar but has relatively narrower leaves (20–27 × 4–7 mm) and openly reticulate leaf venation, which is obscured by glaucousness of the upper leaf surface. Also, *G. crassifolium* has a distinctive keel, which has a prominently spout-like apex and a hole in the base of the lower margin near the claws, through which the stamens are exposed. *Gastrolobium venulosum* also has a spout-like apex, but it is not as acute as in *G. crassifolium* and the lower margin is entire.

Etymology: from the Latin *venulosus* = veined and refers to the prominently open reticulate venation on the leaves.

Erect, bushy shrubs, *c.* 0.5 m high. *Branchlets* ascending, angular, glabrous. *Petioles* terete, continuous and somewhat decurrent with the branchlet, 1–1.5 mm long. *Leaves* ascending, in whorls of 3, elliptic, 20–27 × 4–7 mm, glabrous, lower surface sometimes glaucous, glabrous, with hairs along the midrib, or densely sericeous; apex rounded, occasionally slightly emarginate, slightly mucronate; margins slightly recurved, occasionally slightly con- duplicate; base rounded. *Stipules* erect, hyaline, *c.* 2 mm long. *Inflorescences* terminal racemes, 18–30-flowered, internodes between flowers quite short (<5 mm long); *peduncle* with a sheath of barren bracts at the base, 3–6 mm long, densely pubescent; *rachis* 20–30 mm long, densely pubescent; *subtending bracts* caducous, scale-like, entire or slightly trifid, ovate, *c.* 2 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 5–6 mm long including the *c.* 0.75-m receptacle, sparsely pubescent; upper 2 lobes not recurved, united into an almost truncate lip, obtuse, *c.* 2 mm long; lower 3 lobes recurved, triangular, acute, *c.* 1.5 mm long. *Corolla*: *standard* transversely elliptic, *c.* 6 × 6.5 mm including the 2-mm claw, orange, sometimes with a reddish tinge, with a red ring surrounding the yellow centre, apex emarginate, base cordate; *wings* obovate, *c.* 7 × 2.5 mm including the 2.5-mm claws, orange and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely elliptic, *c.* 5 × 3 mm including the 1.5-mm claws, maroon, apex acute, spout-like, base auriculate, saccate. *Style* long, hooked, lower third pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, broadly ellipsoid to globose, 4–5 × 4–4.5 mm, moderately pubescent. *Seed* not seen. (Fig. 28)

Flowering period: August and September. *Fruiting period*: October.

Distribution (Fig. 133): south-western Western Australia. Occurs along the inland part of the south coast, from west of Jerramungup to Ravensthorpe and as far north as near Lake King.

Habitat: grows on undulating landscapes on sand, in mallee heath.

Specimens examined: WESTERN AUSTRALIA, Eyre District: Dunn Rock Nature Reserve, 30 km SW of Lake King, 33°20'S, 119°30'E, *D.J. Backshall* 202, 15.iv.1984 (PERTH); West River (via Ravensthorpe), 33°40'S, 119°40'E, *S. Kuiper* 194, viii.1964 (PERTH); Ravensthorpe Range, *G. Grewar s.n.*, x.1959 (PERTH); Jerramungup, 33°56'S, 118°55'E, *E. Lindgren s.n.*, 29.viii.1957 (PERTH); 20 km N of Ravensthorpe, 33°25'S, 120°01'E, *C.E. Woolcock W 265 & D.T. Woolcock*, 1.viii.1981 (CANB); W of Jerramungup, *C.E. Woolcock s.n. & D.T. Woolcock*, 14.viii.1982 (CANB); north slopes of Mt Short, 5.5 km E on Mt Short Rd, *c.* 20 km N of Ravensthorpe, 32°27'32"S, 120°00'04"E, *G.T. Chandler 920 et al.*, 18.ix.1999 (CANB, MEL, PERTH); *ibid.*, *G.T. Chandler 708 & S. Donaldson*, 28.x.1998 (BRI, CANB); *ibid.*, *G.T. Chandler 709 & S. Donaldson*, 28.x.1998, seedlings (CANB, PERTH); 511 km S of Perth on Lake King–Ravensthorpe road, E to Mount Short (*c.* 30 km NW of Ravensthorpe), 33°23'S, 119°49'E, *R.A. Saffrey* 373, 8.viii.1968 (CANB, PERTH).

Toxicity: unknown.

Affinity: this species resembles *G. crassifolium*, but can be distinguished by the relatively narrower leaves of *G. crassifolium* (12–25 × 4–14 mm) and by the leaf venation pattern, which is more obscured on *G. crassifolium* because of the upper leaf surface being glaucous. Also, *G. crassifolium* has a distinctive keel, which it shares with the rest of the *G. floribundum* group, which has a prominently spout-like apex and a hole in the base of the lower margin near the claws, exposing the stamens, whereas *G. venulosum* has a spout-like apex, but is not as acute as in *G. crassifolium* and the lower margin is entire.

104. *Gastrolobium axillare* Meisn., *Bot. Zeit.* (Berlin) 13: 29 (1855). *Oxylobium reticulatum* Meisn. var. *gracile* Benth., *Fl. Austral.* 2: 23 (1864). *Nemcia reticulata* (Meisn.) Domin var. *axillaris* (Meisn.) Domin, *Preslia* 2: 30 (1923). *Nemcia axillaris* (Meisn.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 124 (1987). *Type citation*: 'Drum. Coll. VI. n. 22.' *Type specimens*: *holotype* (here chosen): NY; *iso*: BM, K, P

Spreading *shrubs* up to 1.2 m high, 0.5 m wide. *Branchlets* ascending, angular, moderately to densely tomentose. *Petioles* terete, continuous but not decurrent with the branchlet, 3–4 mm long. *Leaves* spreading, opposite, elliptic to almost orbicular in earlier developmental stages, 20–40 × 7–22 mm, upper surface glabrous, lower surface softly pubescent, venation prominently reticulate, raised; apex obtuse, pungent-pointed; margins slightly undulate; base cuneate. *Stipules* erect, subulate, 3–4 mm long. *Inflorescences* condensed terminal or axillary racemes, 4–8-flowered, densely pubescent; *peduncle* 2–4 mm long; *rachis* 1–3 mm long; *subtending bracts* caducous, scale-like, entire, *c.* 4 mm long including 1-mm-long micro. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, ventricose, *c.* 9 mm long including the 1.5-mm receptacle, moderately to densely villous, lobes not or scarcely recurved; upper 2 lobes united higher than the lower 3, ovate, acute, *c.* 3 mm long; lower 3

lobes triangular, acuminate, *c.* 2.5 mm long. *Corolla: standard* very broadly elliptic, 9–10 × 9–10 mm including the *c.* 4-mm claw, orange yellow with a red ring surrounding the white centre apex emarginate, base obtuse, slightly auriculate; *wings* obovate, *c.* 8.5–9 × 3 mm including the 2-mm claws, orange-yellow, red at base, apex rounded, not or scarcely incurved, may slightly overlap to partially enclose the keel, base auriculate on the upper margin only, slightly saccate; *keel* half very broadly elliptic, margins not incurved, *c.* 8.5–9 × 3 mm including the 3-mm claws, maroon, apex ± acute, base auriculate, saccate. *Style* long, hooked, lower third pubescent; *ovary* sessile, densely pubescent; *ovules* 4. *Pod* sessile, ovoid, 6–7 mm long, moderately pubescent. *Seed* not seen.

Flowering period: September. *Fruiting period:* October. *Distribution* (Fig. 134): south-western Western Australia. Occurs north of Perth, from around Eneabba south to Dandaragan.

Habitat: grows on rolling hills to steep hillsides on sand over laterite, in heath and woodland.

Conservation status: ROTAP: 3KC-. CALM: P3. This taxon is fairly rare and poorly known and further survey work is required.

Selected specimens (7 examined): WESTERN AUSTRALIA, Darling District: 12.9 km along Badgingarra Rd from North West Rd, towards Dandaragan, 30°30'53"S, 115°36'54"E, *G.T. Chandler 241 & W. Keys*, 13.ix.1997 (CANB, NSW, PERTH); Hi Vallee property (D. & J. Williams), Warradarge—track at northern head of main valley, 30°06'06"S, 115°24'03"E, *M. Hislop 1541*, 13.ix.1999 (CANB, PERTH). Irwin District: 2.5 km along Tootbardi Rd, from highway, N of Badgingarra, 30°08'59"S, 115°23'40"E, *G.T. Chandler 621 & S. Donaldson*, 23.x.1998 (CANB, MEL, PERTH).

Toxicity: unknown.

Affinity: the juvenile foliage of *G. axillare* somewhat resembles that of *G. nudum*, but the latter always has orbicular leaves when mature which are concolorous and softly pubescent on the lower surface.

105. *Gastrolobium nudum* G.Chandler & Crisp, sp. nov. *Type:* Western Australia: *c.* 900 m from Governors Drive, northern side of south break, near old track, Avon Valley National Park, 31°34'S, 116°15'E, 28 February 1990, *B. Evans* 181 (*holo:* PERTH 01878751!). *Note:* this species has also been known as *Nemcia congesta* Crisp ined., but the the name *Gastrolobium congestum* is pre-empted elsewhere in this monograph

Frutex humilis, folia opposita maximum partem versus ramulorum apices, floribus sessilibus congestis in axillis supernis. *G. axillare* similis sed calycis lobis tubum circa aequantibus et foliis concoloribus glabrescentibus distinguenda.

A low shrub with leaves opposite, mostly in the upper branches and with sessile, congested clusters of flowers also

in the upper axils. Similar in appearance to *Gastrolobium axillare*, but differing in the calyx lobes being about the same length as the tube and concolorous, glabrescent leaves.

Etymology: from the Latin *nudus* = naked and refers to the fact that there are few leaves on the lower portions of the branchlets.

Spreading, twiggy *shrub* up to 0.8 m high, new stems angular ridged, silky white pubescent, glabrescent. *Petioles* terete, continuous and decurrent with the branchlet, 1–2 mm long, pubescent. *Leaves* mostly in upper branches, opposite, broadly ovate to orbicular, 15–34 × 15–34 mm, glabrous, somewhat glaucous, venation reticulate, main veins prominently yellow; apex rounded to emarginate, semi-pungent; margins minutely crenulate, not recurved; base rounded to slightly cordate. *Stipules* erect, hyaline, up to 4 mm long. *Inflorescences* sessile clusters in upper axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous trifold to trilobed to 4 mm long. *Pedicels* 2–3 mm long, densely pubescent. *Calyx* campanulate, 4–5 mm long including the *c.* 1-mm receptacle, densely pubescent, lobes not recurved; upper 2 lobes united higher than the lower 3, obtuse, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla: standard* very broadly elliptic, 8–10 × *c.* 7 mm including the *c.* 2.5-mm claw, orange with a red ring surrounding the yellow centre, apex emarginate, base cordate, not auriculate; *wings* obovate, 6.5–8 × *c.* 1.5 mm including the *c.* 2.5-mm claws, orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half transversely elliptic, margins not incurved, 6.5–8 × *c.* 2.5 mm including the 3-mm claws, red, apex rounded, base auriculate, saccate. *Style* long, incurved, lower third pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* and *seed* not seen.

Flowering period: February. *Fruiting period:* unknown.

Distribution (Fig. 135): south-western Western Australia. This species is known only from the Avon Valley National Park and the Chittering area.

Habitat: found in low heath on laterite with *Eucalyptus accedens*, *E. calophylla*, *Hakea lissocarpa* and *Xanthorrhoea preissii*.

Specimens examined: WESTERN AUSTRALIA, Darling District: S Break, Avon Valley NP, *c.* 31°37'S, 116°12'E, *B. Evans s.n.*, 26.xi.1989 (PERTH); *ibid.*, *B. Evans s.n.*, 29.x.1990 (CANB, PERTH); Yandan Nature Reserve gazetted Reserve No. 39571, N side along breakaway for 50 m S from firebreak on top and *c.* 20 m below breakaway, 30°46'S, 115°36'E, *S.J. Patrick 654a*, 31.vii.1991 (PERTH, CANB); Chittering, 31°28'S, 116°26'E, *H.E. Braine s.n.*, 25.ix.1956 (PERTH).

Toxicity: unknown.

Affinity: this species is morphologically similar to *Gastrolobium axillare* but the latter species has calyx lobes much longer than the tube and discolorous green leaves with the abaxial surface softly pubescent.

106. *Gastrolobium cyanophyllum* G.Chandler & Crisp, sp. nov. *Type*: Western Australia: Darling district: West Talbot Road, 7.8 km W of Helena Road and 3.4 km W of Luelfs Road (Gunapin Ridge Road), 32°00'19"S, 116°35'34"E, *M.D. Crisp* 8517 & *W. Keys*, 27 Sep. 1993 (*holo*: CANB!; *iso*: GAUBA!, PERTH!, UWA!, K!)

G. dilatato similis sed foliis cyaneis glaucis (in superficiebus ambabus) et apicibus recurvis ferociter pungentibus conspicue differens.

Very similar to *Gastrolobium dilatatum* but differing conspicuously in the blue-glaucous leaves (both surfaces) with fiercely pungent, recurved apices.

Etymology: from the Greek *cyaneus* = blue and *phyllon* = leaf and refers to the blue-green leaves.

Spreading *shrub* 0.8 × 1.2 m. *Branchlets* ascending, angular, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, *c.* 1 mm long. *Leaves* patent or retrorse, opposite, obtriangular, 15–30 × 15–20 mm, glabrous, glaucous-blue, venation reticulate; apex acute, recurved, fiercely pungent-pointed; margins flat to plicate; base cuneate. *Stipules* erect, hyaline, 6–7 mm long, red. *Inflorescences* condensed racemes in upper axils; *peduncle* 0–2 mm long; *rachis* 1–13 mm long, *subtending bracts* caducous, scale-like, trifid to trilobed, *c.* 4 mm long, outer surface densely pubescent. *Pedicels* terete, 1–3 mm long. *Calyx* campanulate, 5–6 mm long including the *c.* 0.5-mm receptacle, densely pubescent, lobes strongly recurved to reflexed; upper 2 lobes united higher than the lower 3, acute, *c.* 2.5 mm long; lower 3 lobes triangular, acute, *c.* 2 mm long. *Corolla*: standard transversely elliptic, *c.* 8–11 × 8–10 mm including the 2.5-mm claw, orange with a red ring surrounding the white centre, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 7–9 × 2 mm including the 2-mm claws, orange, apex rounded, slightly incurved, not enclosing the keel, base auriculate on upper margin only, saccate; *keel* halfelliptic, margins incurved, *c.* 7.5–9 × 2 mm including the 2.5-mm claws, red, apex rounded, base auriculate, saccate. *Style* long, incurved to hooked, base pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Mature pods* and *seed* not seen. (Fig. 29)

Flowering period: September– November. *Fruiting period*: unknown.

Distribution (Fig. 136): south-western Western Australia. Occurs around the York region, NE of Perth, in the Gunapin State Forest and on Cut Hill.

Habitat: grows on undulating landscapes on yellow-brown sand over laterite, in open eucalypt woodland and *Banksia* scrub.

Specimens examined: WESTERN AUSTRALIA, Darling District: W Tuckey property, Mawson, *c.* 32°00'S, 117°10'E, *C. Brown s.n.*, 16.i.1988 (CANB, PERTH); Qualen Rd, Gunapin State Forest, York: take Qualen Rd E of Catchment Rd for 12.5 km then track W for *c.* 800 m to top of the breakaway, 32°05'15"S, 116°39'41"E, *F. Hort, J. Hort*

& *M. Hislop* 788, 20.xi.1999 (CANB, PERTH), Cut Hill, 31°54'S, 116°43'E, *O.H. Sargent* 693, 8 Oct 1908 (CANB, NSW).

Toxicity: unknown.

Affinity: similar to *G. dilatatum*, but differing in the non-glaucous leaves that are less-fiercely pungent-pointed and not recurved.

107. *Gastrolobium dilatatum* (Benth.) G.Chandler & Crisp, comb. nov. *Base name*: *Oxylobium dilatatum* Benth., in Lindley, *Edwards' Bot. Reg.* Append.: xii (1839). *Oxylobium cuneatum* Benth. var. *dilatatum* (Benth.) Benth., *Fl. Austral.* 2: 24 (1864). *Nemcia cuneata* (Benth.) Domin var. *dilatata* (Benth.) Domin, *Preslia* 2: 30 (1923a). *Nemcia dilatata* (Benth.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 125 (1987). *Type citation*: none cited. *Type specimens*: *lectotype* (here chosen): K (Swan River. Drummond 1839); *isolecto*: CGE, K

Oxylobium cuneatum Benth. in Lindley, *Edwards' Bot. Reg.* Append.: xii (1839). *Oxylobium obovatum* Benth. var. *angustatum* Meisn., *Pl. Preiss.* 1: 29 (1844). *Callistachys cuneata* (Benth.) Kuntze, *Revisio Plantarum Pl.* 1: 168 (1891). *Nemcia cuneata* (Benth.) Domin, *Preslia* 2: 30 (1923a). *Type citation*: none cited. *Type specimens*: *lectotype* (here chosen): K (Swan River. Drummond 1839); *isolecto*: BM (2 sheets), K.

Oxylobium obovatum Benth., in Lindley, *Edwards' Bot. Reg.* Append.: xii (1839). *Oxylobium cuneatum* Benth. var. *obovatum* (Benth.) Benth., *Fl. Austral.* 2: 24 (1864). *Nemcia cuneata* (Benth.) Domin var. *obovatum* (Benth.) Domin, *Preslia* 2: 30 (1923a). *Type citation*: none cited. *Type specimens*: K (Swan River. Drummond 1839); *isolecto*: CGE.

Oxylobium cuneatum Benth. var. *cuneifolium* Benth., *Fl. Austral.* 2: 24 (1864). *Nemcia cuneata* (Benth.) Domin var. *cuneifolia* (Benth.) Domin, *Preslia* 2: 30 (1923). *Type citation*: 'Swan River, Drummond, 1st Coll., also n. 71 and 207 (partly).' *Type specimens*: *lectotype* (here chosen): K (Drummond, 1st Coll.).

Oxylobium obovatum Benth. var. *latifolium* Meisn. in Lehm., *Pl. Preiss.* 1: 29 (1844). *Type citation*: 'In region. interior. Australiae meridionale-occidentalis Herb. Preiss No. 828. (Drummond coll. I, sine no.)'. *Type specimens*: LD (Preiss 828).

Erect *shrubs*, up to 1 m high. *Branchlets* ascending, angular, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, sheathing the stem, <0.5 mm long. *Leaves* patent, in whorls of 3 or 4, mostly conduplicate, ± obovate, 20–40 × 8–20 mm, glabrous, venation prominently reticulate, raised; apex semi-pungent; margins becoming plicate; base cuneate. *Stipules* erect, hyaline, 6–7 mm long. *Inflorescences* solitary or paired flowers in upper axils; *peduncle* nil; *rachis* nil; *subtending bracts* caducous, scale-like, trilobed with a robust middle lobe and hyaline outer lobes, *c.* 4 mm long. *Pedicels* terete, 1–2 mm long. *Calyx* campanulate, 6–7 mm long including the *c.* 0.75-mm receptacle, base densely pubescent, becoming less dense towards the apex, hairs basically bicoloured, with the lower hairs silvery and the upper hairs golden brown, occasionally all hairs golden brown, lobes recurved; upper lobes united into an emarginate, truncate lip or united higher than the lower 3 and ± triangular, *c.* 4 mm long; lower lobes triangular, acute *c.* 3 mm long. *Corolla*:

standard very broadly elliptic, *c.* 11–12 × 9 mm including the 3.5-mm claw, orange with a dark red centre, with a tiny, dirty-yellow centre, apex emarginate, base slightly cordate; *wings* obovate, *c.* 10 × 3 mm including the 3-mm claws, orange, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half very broadly elliptic, *c.* 9–10 × 3 mm including the 3-mm claws, red, apex subacute, base auriculate, saccate. *Style* very long, strongly incurved, base pubescent; *ovary* shortly stipitate, densely pubescent; *ovules* 2. *Pod* ± sessile, broadly ovoid, *c.* 8 × 4–5 mm long, densely villous. *Seed* not seen.

Flowering period: August and September. *Fruiting period*: October and November.

Distribution (Fig. 137): south-western Western Australia. Occurs in the Darling escarpment east and south of Perth.

Habitat: grows throughout the Darling escarpment on sandy soils in heath and woodland.

Selected specimens (19 examined): WESTERN AUSTRALIA, Darling District: Darlington, Darling Range, 31°55'S, 116°04'E, *A. Morrison s.n.*, 6.xi.1900 (CANB, PERTH); West Talbot Rd, 8 km E of Helena Rd and 3.2 km W of Luelfs Rd (=Gunapin Ridge Rd), 32°00'25"S, 116°35'40"E, *M.D. Crisp 8515 & W. Keys*, 27.ix.1993 (CANB, GAUBA, PERTH); Kingsbury Drive 2 km from Southwestern Hwy, 32°22'S, 116°02'E, *M.G. Corrick 9418*, 2.xi.1984 (CANB, HO, MEL).

Toxicity: unknown.

Affinity: this species is very similar to *G. cyanophyllum*, which differs in having glaucous leaves that are fiercely pungent-pointed and longitudinally recurved. Also, the upper two calyx lobes are not united into an emarginate, truncate lip and the subtending bracts are trilobed and not hyaline.

108. *Gastrolobium elegans* G.Chandler & Crisp, sp. nov. *Type*: Western Australia: Eyre District: Stirling Range, unnamed hill in SW corner of park, 34°23'11"S, 117°42'19"E, *M.D. Crisp 8958 & W. Keys*, 16 Oct. 1996 (*holo*: CANB!; *iso*: CANB!, MEL!, PERTH!)

Frutex erectus gracilis 2–3 m altus, folia opposita anguste elliptica vel oblonga undulata discoloria, pagina inferna sericea, inflorescentia fasciculata axillaris stricta pedunculata, flores minus quam 15 mm longa, petala vitellina maculis rubris, calyx sericeus bicolor pilis albis in tubo et pilis aurei-brunneis in lobis.

An erect, slender shrub 2–3 m high, with opposite, narrowly elliptic or oblong, undulate, discoloured leaves, the undersurface silky pubescent; flowers in pedunculate, erect, axillary clusters, less than 15 mm long, mainly orange and yellow with red markings; calyces silky pubescent and bicoloured, with white hairs on the tube and golden brown hairs on the lobes.

Etymology: the specific epithet refers to the elegant appearance of this shrub.

Erect, slender shrubs, 2–3 m high. *Branchlets* ascending, angular, densely tomentose. *Petioles* terete, continuous and decurrent with the branchlet, *c.* 6 mm long. *Leaves* broadly spreading, opposite, narrowly elliptic or oblong, 25–40 × 5–7 mm, upper surface glabrous, lower surface densely sericeous, venation prominently reticulate; apex rounded, semi-pungent-pointed; margins recurved, prominently undulate; base rounded to almost truncate. *Stipules* erect, hyaline, 4–5 mm long. *Inflorescences* axillary clusters, 4–6-flowered; *peduncle* angular, up to 10 mm long, pubescent *rachis* angular, up to 5 mm long; *subtending bracts* caducous, scale-like, trilobed, the middle lobe longest, 5–6 mm long, densely pubescent on outer surface. *Pedicels* terete, 4–5 mm long. *Calyx* campanulate, 8–9 mm long including the *c.* 1-mm receptacle, densely villous, bicoloured with silky white hairs on tube, golden brown hairs on lobes, lobes strongly recurved; upper 2 lobes united higher than the lower 3, ± acute, *c.* 4 mm long; lower 3 lobes triangular, *c.* 4 mm long. *Corolla: standard* transversely elliptic, 14–15 × 17–18 mm including the 3-mm claw, yellow-orange with a red centre, apex emarginate, base cordate, not auriculate; *wings* obovate, *c.* 11–12 × 6 mm including the 1.5-mm claws, yellow and red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on the upper margin only, saccate; *keel* half very broadly obovate, strongly incurved longitudinally, margins not incurved, *c.* 10–11 × 4 mm including the 2.5-mm claws, dark pink, apex obtuse, base auriculate, saccate. *Style* very long, strongly incurved, very base slightly pubescent; *ovary* ± sessile, densely pubescent; *ovules* 4. *Pod* and *seed* not seen. (Fig. 30)

Flowering period: September and October. *Fruiting period*: unknown.

Distribution (Fig. 138): south-western Western Australia. This species is endemic to the western end of the Stirling Range, on a low ridge.

Habitat: grows on hillsides on skeletal stony quartzite in heath with *Lambertia ericifolia*, *Xanthorrhoea* sp., *Hakea cucullata*, *Eucalyptus pachyloma* and *E. preissiana*.

Specimens seen: WESTERN AUSTRALIA, Eyre district: Hill, 3 km SE of Peak Donnelly; Stirling Range, 43°21'S, 117°41'E, *G.J. Keighery s.n.*, 15.ix.1986 (PERTH); Stirling Range, saddle between hills 4 km SW of Donnelly Peak, 34°21'S, 117°32'E, 350 m alt., 25.ix.1993, *M.D. Crisp 8504 & W. Keys*, 25.ix.1993 (CANB, GAUBA, K, PERTH).

Toxicity: unknown.

Affinity: this species can be distinguished from *G. leakeanum*, *G. mondurup*, *G. luteifolium* and *G. rubrum* by the erect (i.e. not resupinate) yellow-orange flowers with red markings that are less than 15 mm long and the paired leaves which are narrowly oblong with very undulate margins and the silky pubescent indumentum on the lower surface makes the leaves conspicuously discoloured.

109. *Gastrolobium lehmannii* Meisn. in Lehm., *Pl. Preiss.* 1: 70 (1844). *Nemcia lehmannii* (Meisn.) Crisp in Crisp and Weston, *Adv. Legume Syst.* 3: 127 (1987). *Type citation*: 'In regionibus interioribus Australiae meridionali-occid., m. Febr. 1841. Herb. Preiss. No. 806'. *Type specimens*: *holo*: NY; *iso*: LD

Erect domed *shrubs* up to 1.5 m high. *Branchlets* ascending, either terete or slightly angular, densely whitish to greyish tomentose. *Petioles* adaxially shallowly channelled, continuous and decurrent with the branchlet, 1.5–3 mm long, tomentose. *Leaves* ascending at *c.* 45°, opposite, oblong to elliptic (rarely obovate), usually narrow, 25–50 × 12–22 mm; upper surface glabrescent, obscurely reticulate; lower surface densely tomentose, reticulate; apex more or less rounded, often emarginate, slightly mucronate; margins recurved, minutely crenulate; base cuneate to rounded. *Stipules* erect, subulate, *c.* 3 mm long, red, sericeous. *Inflorescences* condensed axillary racemes, 6–10-flowered, sericeous; *peduncle* 0–2 mm long; *rachis* 1–3 mm long; *bracts* caducous, not seen. *Calyx* campanulate, *c.* 4.5 mm long, densely sericeous, lobes not recurved, triangular, *c.* 3 mm long, acute; upper 2 lobes united *c.* 1.5 mm higher than the lower 3. *Flowers* yellow and purple; *pedicels* terete, 2–3 mm long, densely sericeous. *Corolla* orange to orange-yellow and red: *standard* transversely to very broadly elliptic, *c.* 11–15 × 10 mm including the 4.5-mm claw, apex emarginate, base truncate; *wings* obovate, *c.* 8–10 × 2.5 mm including the 2-mm claws, apex rounded, base auriculate; *keel* half very broadly elliptic, 8–10 × 3 mm including the 3-mm claws, apex subacute, base auriculate. *Style* incurved to slightly hooked, *c.* 5 mm long, lower third sparsely sericeous; *ovary* ± sessile, densely sericeous; *ovules* 2. *Pod* sessile, ovoid, slightly compressed, *c.* 7 × 3.5 mm, densely sericeous to villous. *Seed* not seen.

Flowering period: September–October. *Fruiting period*: November–December.

Distribution (Fig. 139): south-western Western Australia. Near Cranbrook, at the western end of the Stirling Ranges.

Habitat: the single known population occurs on a lateritic breakaway, in red clay, under low woodland of *Eucalyptus marginata* Donn ex Sm. and *E. falcata* Turcz., with *Hakea lissocarpha* R.Br., *Austrostipa* and *Austrodanthonia*.

Conservation status: this taxon was presumed extinct (IUCN: Ex. ROTAP: 2X. CALM: X); however, late in 2000 a population of about 90 plants was rediscovered.

Specimens examined: WESTERN AUSTRALIA, Darling district: NW of Cranbrook, *c.* 34°10'S, *c.* 117°20'E, *S. Barrett 904* & *W. Bradshaw*, 30.xi.2000 (CANB); prope Cranbrook, Stirling Range, *E. Pelloe s.n.*, x.1918 (PERTH); Cranbrook, *Mr Johnson s.n.*, ix.1916 (PERTH); Cranbrook, *F. Stoward s.n.*, 23.ix.1917 (PERTH); Blackwood R., *Miss Hester s.n.* (PERTH); *sine loc.*, *J. Drummond 239*

(PERTH 01101749; 'matches Drummond, Swan River 95', *sine loc.* (PERTH 01101765).

Toxicity: unknown.

Affinity: the leaves of this species are somewhat similar to those of *G. crenulatum*, but the latter differs in having leaves in whorls of three or four, glabrous or glabrescent and with conspicuously crenulate margins.

Nomina incertae sedis

Gastrolobium makoyanum Heynh., *Nom. Bot. Hort.* 2: 255 (1846), nom. nud.

Gastrolobium splendens Heynh., *Nom. Bot. Hort.* 2: 255 (1846), nom. nud.

Gastrolobium verticillatum Heynh., *Nom. Bot. Hort.* 2: 255 (1846), nom. nud.

Names previously in use

Brachysema bracteolosum (F.Muell.) = *Gastrolobium bracteolosum* (F.Muell.) G.Chandler & Crisp

Brachysema celsianum Lemaire = *Gastrolobium celsianum* (Lemaire) G.Chandler & Crisp

Brachysema latifolium R.Br. = *Gastrolobium latifolium* (R.Br.) G.Chandler & Crisp

Brachysema melanopetalum F.Muell. = *Gastrolobium melanopetalum* (F.Muell.) G.Chandler & Crisp

Brachysema minor Crisp = *Gastrolobium minus* (Crisp) G.Chandler & Crisp

Brachysema modestum Crisp = *Gastrolobium modestum* (Crisp) G.Chandler & Crisp

Brachysema papilio Crisp = *Gastrolobium papilio* (Crisp) G.Chandler & Crisp

Brachysema praemorsum Meisn. = *Gastrolobium praemorsum* (Meisn.) G.Chandler & Crisp

Brachysema sericeum (Sm.) Domin = *Gastrolobium sericeum* (Sm.) G.Chandler & Crisp

Brachysema subcordatum Benth. = *Gastrolobium subcordatum* (Benth.) G.Chandler & Crisp

Gastrolobium forrestii Ewart = *Gastrolobium cuneatum* Henfry

Gastrolobium spinosum Benth. var. *triangulare* Benth. = *Gastrolobium triangulare* (Benth.) Domin

Gastrolobium spinosum Benth. var. *trilobum* S.Moore = *Gastrolobium trilobum* Benth.

Gastrolobium verticillatum Meisn. = *Gastrolobium ilicifolium* Meisn.

Jansonia formosum Kippist = *Gastrolobium formosum* (Kippist) G.Chandler & Crisp

Nemcia acuta (Benth.) Domin = *Gastrolobium acutum* Benth.

Nemcia axillaris (Meisn.) Crisp = *Gastrolobium axillare* Meisn.

Nemcia capitata (Benth.) Domin = *Gastrolobium capitatum* (Benth.) G.Chandler & Crisp

Nemcia carinata Crisp = *Gastrolobium reticulatum* (Meisn.) Benth.

Nemcia coriacea (Sm.) Domin = *Gastrolobium coriaceum* (Sm.) G.Chandler & Crisp

Nemcia crenulata (Turcz.) Crisp = *Gastrolobium crenulatum* Turcz.

Nemcia dilatata (Benth.) Crisp = *Gastrolobium dilatatum* (Benth.) G.Chandler & Crisp

Nemcia effusa Crisp & Mollemans = *Gastrolobium effusum* (Crisp & Mollemans) G.Chandler & Crisp

Nemcia emarginata (S.Moore) Crisp = *Gastrolobium dorrieni* (Domin) G.Chandler & Crisp

Nemcia epacridoides (Meisn.) Crisp = *Gastrolobium epacridoides* Meisn.

Nemcia hookeri (Meisn.) Crisp = *Gastrolobium hookeri* Meisn.

Nemcia ilicifolia (Meisn.) Crisp = *Gastrolobium ilicifolium* Meisn.

Nemcia leakeana (Drumm.) Crisp = *Gastrolobium leakeanum* Drumm.

Nemcia lehmannii (Meisn.) Crisp = *Gastrolobium lehmannii* Meisn.

Nemcia luteifolia Domin = *Gastrolobium luteifolium* (Domin) G.Chandler & Crisp

Nemcia obovata (Benth.) Crisp = *Gastrolobium obovatum* Benth.

Nemcia pauciflora (C.A.Gardner) Crisp = *Gastrolobium plicatum* Turcz.

Nemcia plicata (Turcz.) Crisp = *Gastrolobium plicatum* Turcz.

Nemcia pulchella (Turcz.) Crisp = *Gastrolobium pulchellum* Turcz.

Nemcia punctata (Turcz.) Crisp = *Gastrolobium punctatum* (Turcz.) G.Chandler & Crisp

Nemcia pyramidalis (T.Moore) Crisp = *Gastrolobium pyramidale* T.Moore

Nemcia reticulata (Meisn.) Domin = *Gastrolobium nervosum* (Meisn.) G.Chandler & Crisp

Nemcia retusa (Lindl.) Domin = *Gastrolobium retusum* Lindl.

Nemcia rubra Crisp = *Gastrolobium rubrum* (Crisp) G.Chandler & Crisp

Nemcia spathulata (Benth.) Crisp = *Gastrolobium spathulatum* Benth.

Nemcia stipularis (Meisn.) Crisp = *Gastrolobium stipulare* Meisn.

Nemcia tricuspидata (Meisn.) Crisp = *Gastrolobium tricuspидatum* Meisn.

Nemcia vestita Domin = *Gastrolobium vestitum* (Domin) G.Chandler & Crisp

Oxylobium lineare Meisn. = *Gastrolobium ebracteolosum* G.Chandler & Crisp

Oxylobium dilatatum Benth. var. *trilobum* Meisn. = *Gastrolobium rhombifolium* G.Chandler & Crisp

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References

- Aplin TEH (1971) Poison plants of Western Australia: the toxic species of *Gastrolobium* and *Oxylobium*. *Western Australian Department of Agriculture Bulletin* **3772**, 1–66.
- Bentham G (1837a) 'Leguminosae. Tribus Podalyrieae. Enumeratio plantarum quas in Novae Hollandiae ora austro-occidentali ad fluvium Cygnorum et in sinu Regis Georgii collegit Carolus Liber Baro de Huegel.' (Eds SL Endlicher, E Fenzl, G Bentham, HW Schott) pp. 27–35. (Fr. Beck: Vienna)
- Bentham G (1837b) 'Commentationes de Leguminosarum generibus.' (JP Sollinger: Vienna). Reprinted 1839 as 'De leguminosarum generibus commentationes' in *Annalen des Wiener Museums der Naturgeschichte* **2**, 61–142.
- Bentham G (1864) 'Flora Australiensis.' (Reeve & Co.: London)
- Briggs JD, Leigh JH (1995) 'Rare or threatened Australian plants.' (CSIRO: Melbourne)
- Brown R (1811) Decandria Monogynia (part). In 'Hortus Kewensis', vol. 3. (Ed. WT Aiton) pp. 8–21. (Longman: London)
- Chandler GT (2001) Systematic studies in *Gastrolobium* (Fabaceae: Mirbelieae). PhD Thesis, Australian National University, Australia.
- Chandler GT, Bayer RJ, Crisp MD (2001) A molecular phylogeny of the endemic Australian genus *Gastrolobium* (Fabaceae: Mirbelieae) and allied genera using chloroplast and nuclear markers. *American Journal of Botany* **88**, 1675–1687.
- Chandler GT, Crisp MD (1997) Contributions towards a revision of *Daviesia* (Fabaceae: Mirbelieae). IV. *Daviesia ulicifolia* sens. lat. *Australian Systematic Botany* **10**, 31–48.
- Crisp MD (1990) On the typification of *Brachysema latifolium* R.Br. *Glazra* **1**, 9.
- Crisp MD (1994) Evolution of bird-pollination in some Australian legumes (Fabaceae). In 'Phylogenetics and ecology'. (Eds

- P Eggleton, R Vane-Wright) pp. 281–309. (Academic Press: London, UK)
- Crisp MD (1995) Revision of *Brachysema* (Fabaceae: Mirbelieae). *Australian Systematic Botany* **8**, 307–353.
- Crisp MD (1996) Convergent evolution of bird-pollination in Western Australian Fabaceae, and its taxonomic implications. In 'Gondwanan heritage: past, present and future of the Western Australian biota'. (Eds SD Hopper, JA Chappill, M Harvey, AS George) pp. 179–186. (Surrey Beatty & Sons: Sydney)
- Crisp MD, Weston PH (1987) Cladistics and legume systematics, with an analysis of the Bossiaeeae, Brongniartieae and Mirbelieae. In 'Advances in legumes systematics, part 3'. (Ed. CH Stirton) pp. 65–130. (Royal Botanic Gardens: Kew)
- Crisp MD, Weston PH (1995) Mirbelieae. In 'Advances in legume systematics, part 7, phylogeny'. (Eds MD Crisp, JJ Doyle) pp. 245–282. (Royal Botanic Gardens: Kew)
- Crisp MD, Gilmore S, Van Wyk B-E (2000) Molecular phylogeny of the genistoid tribes of papilionoid legumes. In 'Advances in legume systematics, part 9'. (Eds PS Herendeen, A Bruneau) pp. 249–276. (Royal Botanic Gardens: Kew)
- De Candolle AP (1825) 'Prodromus systematis naturalis regni vegetabilis.' Vol. 2, pp. 102–115. (Treuttel and Würtz: Paris)
- Domin K (1923a) *Nemcia*, a new genus of the Leguminosae. *Preslia* **2**, 26–31.
- Domin K (1923b) New additions to the flora of Western Australia. *Věstník královské České Společnosti Nauk, Třída Matematicko-Přírodovědecké 1921–2*, **2**, 1–125.
- Erickson R (1969) 'The Drummonds of Hawthornden.' (Lamb Paterson Pty Ltd: Osborne Park, WA)
- Gardner CA, Bennetts G (1956) 'The toxic plants of Western Australia.' (Western Australian Newspapers: Perth)
- Hervey TK (1847) Linnean—May 4. *Athenaeum (London)* **1020**, 523.
- Keighery GJ (1980) Bird pollination in south Western Australia: a checklist. *Plant Systematics and Evolution* **135**, 171–176.
- Keighery GJ (1982) Bird-pollinated plants in Western Australia. In 'Pollination and evolution'. (Eds JA Armstrong, JM Powell, AJ Richards) pp. 77–89. (Royal Botanic Gardens: Sydney)
- Keighery GJ (1984) Pollination of *Jansonia formosa* Kipp. ex Lindl. (Papilionaceae). *Western Australian Naturalist* **16**, 21.
- Kippist R (1847) On *Jansonia*, a new genus of Leguminosae, from Western Australia. *Proceedings of the Linnean Society of London* **1**, 330–331.
- Kippist R (1848) On *Jansonia*, a new genus of Leguminosae, from Western Australia. *Annals and Magazine of Natural History Series* **2** **1**, 235–236.
- Kuntze CEO (1891) 'Revisio generum plantarum.' (Arthur Felix: Leipzig)
- Lindley J (1834) *Gastrolobium retusum*. *Edwards' Botanical Register* **19**, t. 1647.
- Lindley J (1839) 'A Sketch of the vegetation of the Swan River Colony part 1.' Appendix to the first twenty-three volumes of Edward's Botanical Register. (James Ridgway: London)
- Lindley J (1847) Linnean Society. *Gardner's Chronicle* **7**, 307.
- McEwan T (1964) Isolation and identification of the toxic principle of *Gastrolobium grandiflorum*. *Queensland Journal of Agricultural Science* **21**, 1–14.
- Peters RA, Hall RJ (1960) Fluorine compounds in Nature; the distribution of carbon-fluorine compounds in some species of *Dichapetalum*. *Nature, Lond.* **187**, 573.
- Sands VE (1975) The cytoevolution of the Australian Papilionaceae. *Proceedings of the Linnean Society of New South Wales* **100**, 118–115.
- Turczaninow NS (1853) Papilionaceae. Podalyrieae et Loteae Australasicae nonnullae, hucusque non descriptae. *Bulletin de la Société Impériale des Naturalistes de Moscou* **26**, 249–288.
- Twigg LE, King DR (1991) The impact of fluoroacetate-bearing vegetation on native Australian fauna: a review. *Oikos* **61**, 412–430.
- Twigg LE, King DR, Bowen LH, Wright GR, Eason CT (1996a) Fluoroacetate found in *Nemcia spathulata*. *Australian Journal of Botany* **44**, 411–412.
- Twigg LE, King DR, Bowen LH, Wright GR, Eason CT (1996b) Fluoroacetate content of some species of the toxic Australian plant genus, *Gastrolobium*, and its environmental persistence. *Natural Toxins* **4**, 122–127.
- Twigg LE, Wright GR, Potts MD (1999) Fluoroacetate content of *Gastrolobium brevipes* in central Australia. *Australian Journal of Botany* **47**, 877–880.

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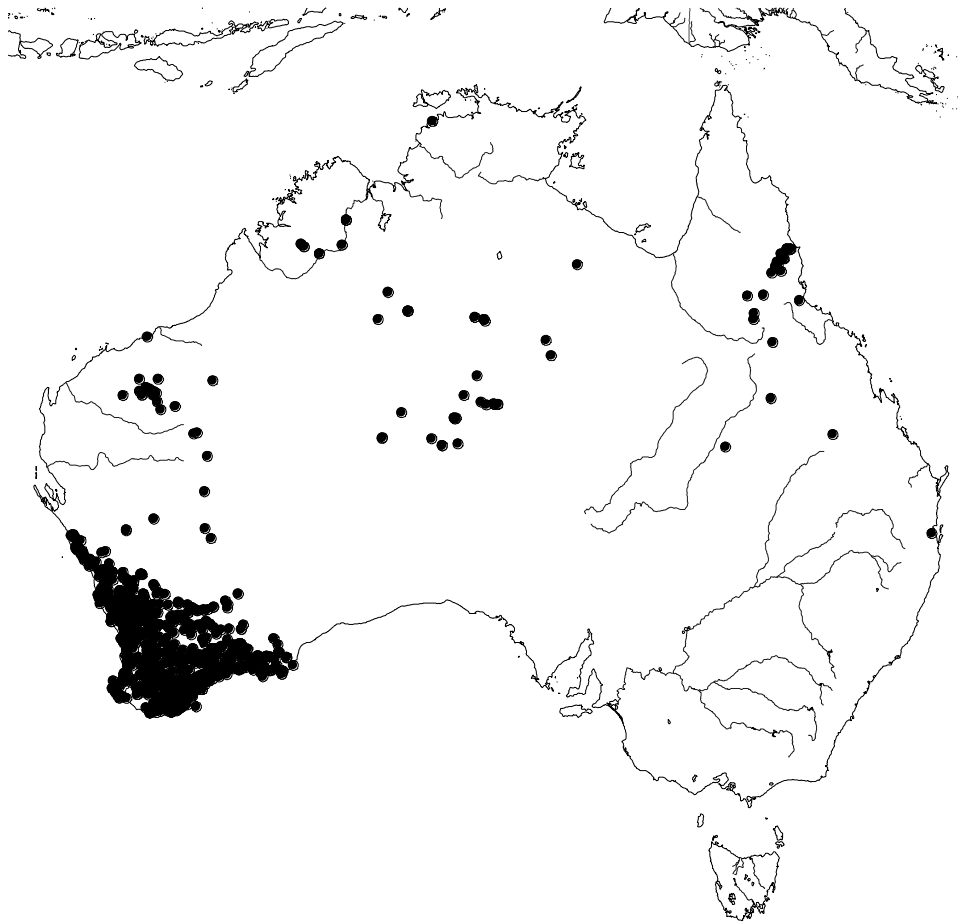


Fig. 1. Distribution of *Gastrolobium sens. lat.*

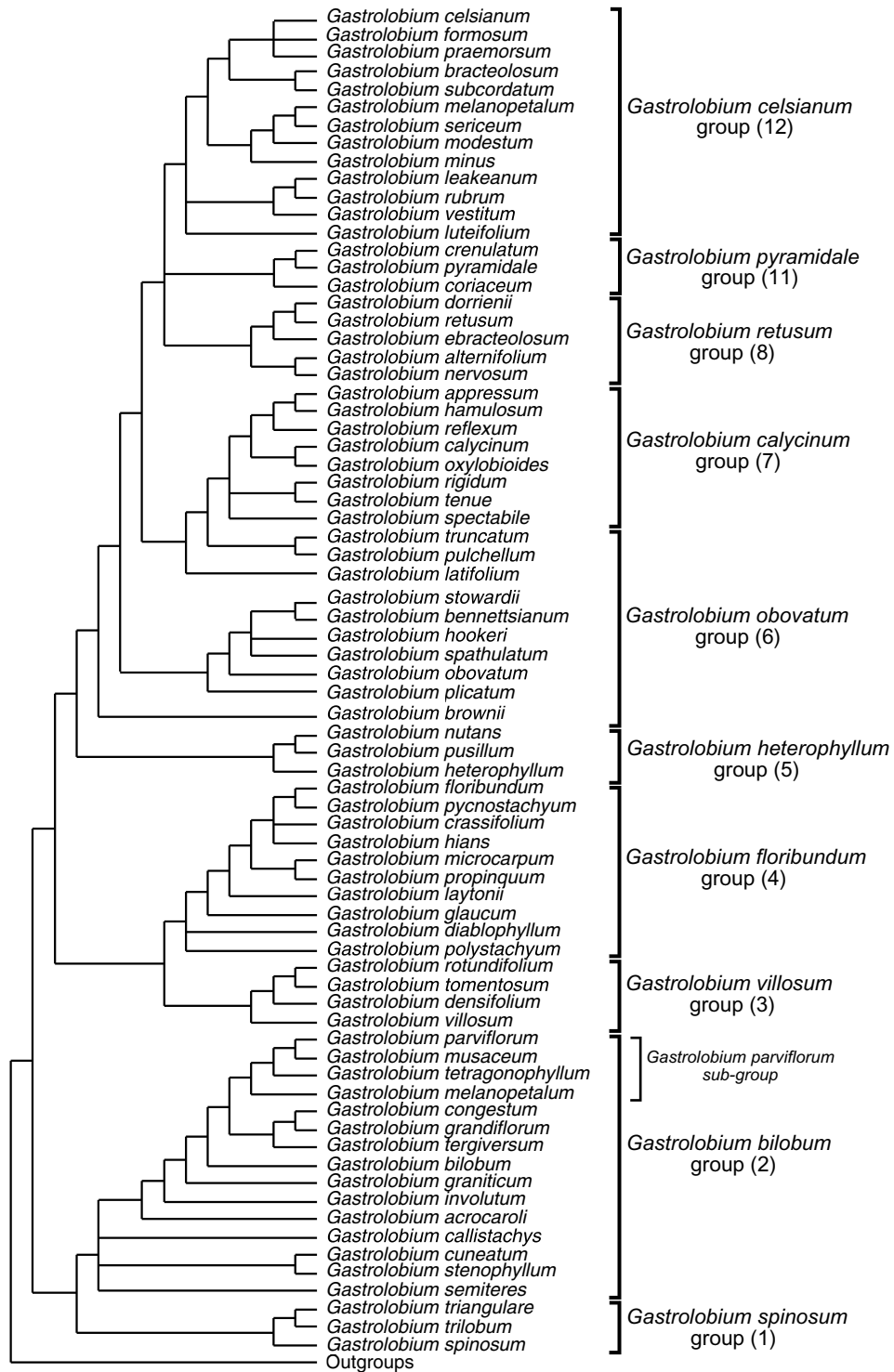


Fig. 2. Classification tree of *Gastrolobium* (showing the strict consensus tree) based on two molecular analyses (after Chandler 2001; Chandler, *et al.* 2001). Outgroups have been condensed to a single node. Informal *Gastrolobium* groups are shown on the right-hand side, with the numbers in parentheses corresponding to the number of the group presented in the taxonomy section.

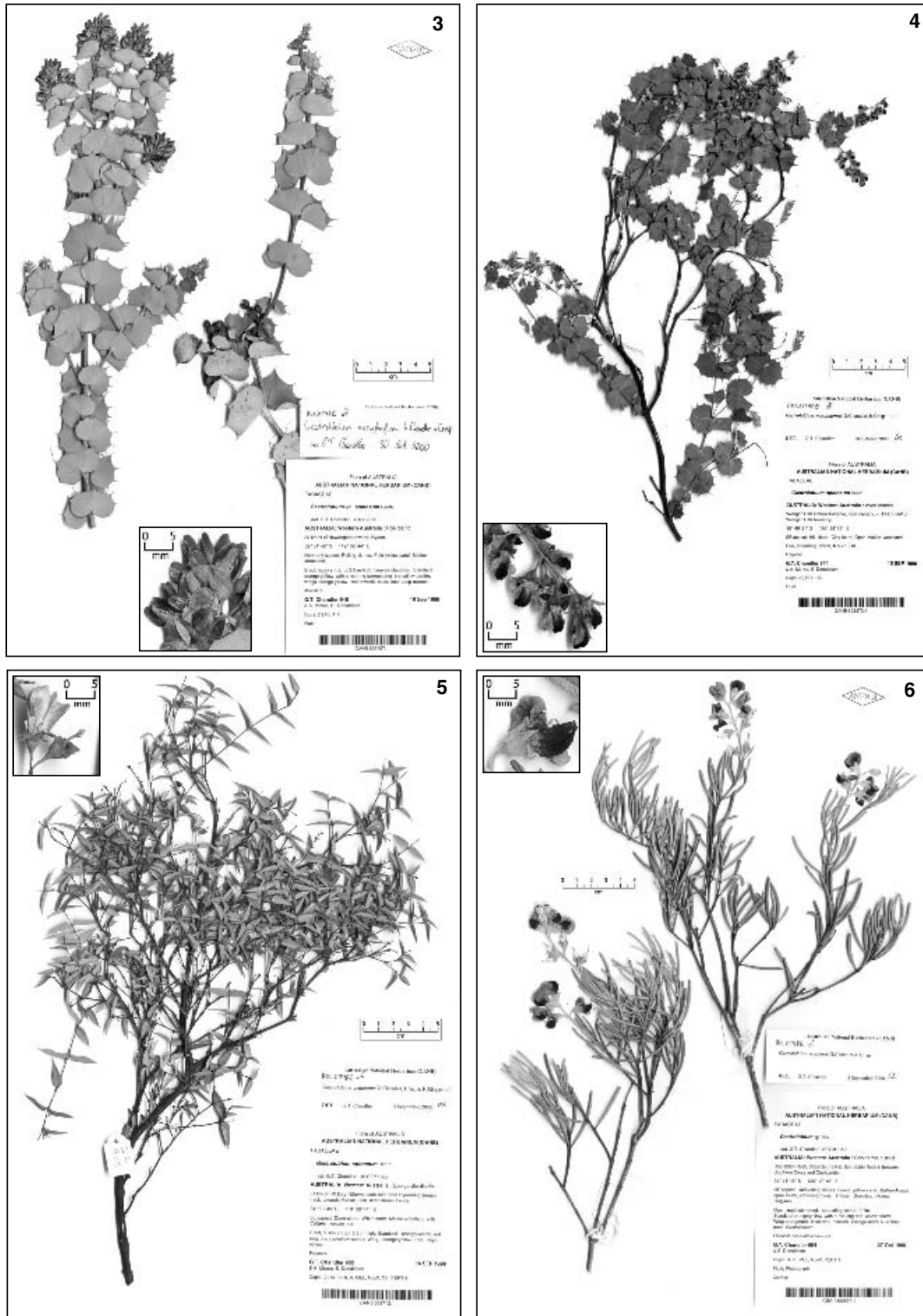


Fig. 3. Photograph of the type specimen of *Gastrolobium eurphyllum*. **Fig. 4.** Photograph of the type specimen of *Gastrolobium wonganensis* (note: there is an additional isotype at PERTH, which was erroneously left of the herbarium label). **Fig. 5.** Photograph of the type specimen of *Gastrolobium aculeatum*. **Fig. 6.** Photograph of the type specimen of *Gastrolobium semiteres*.

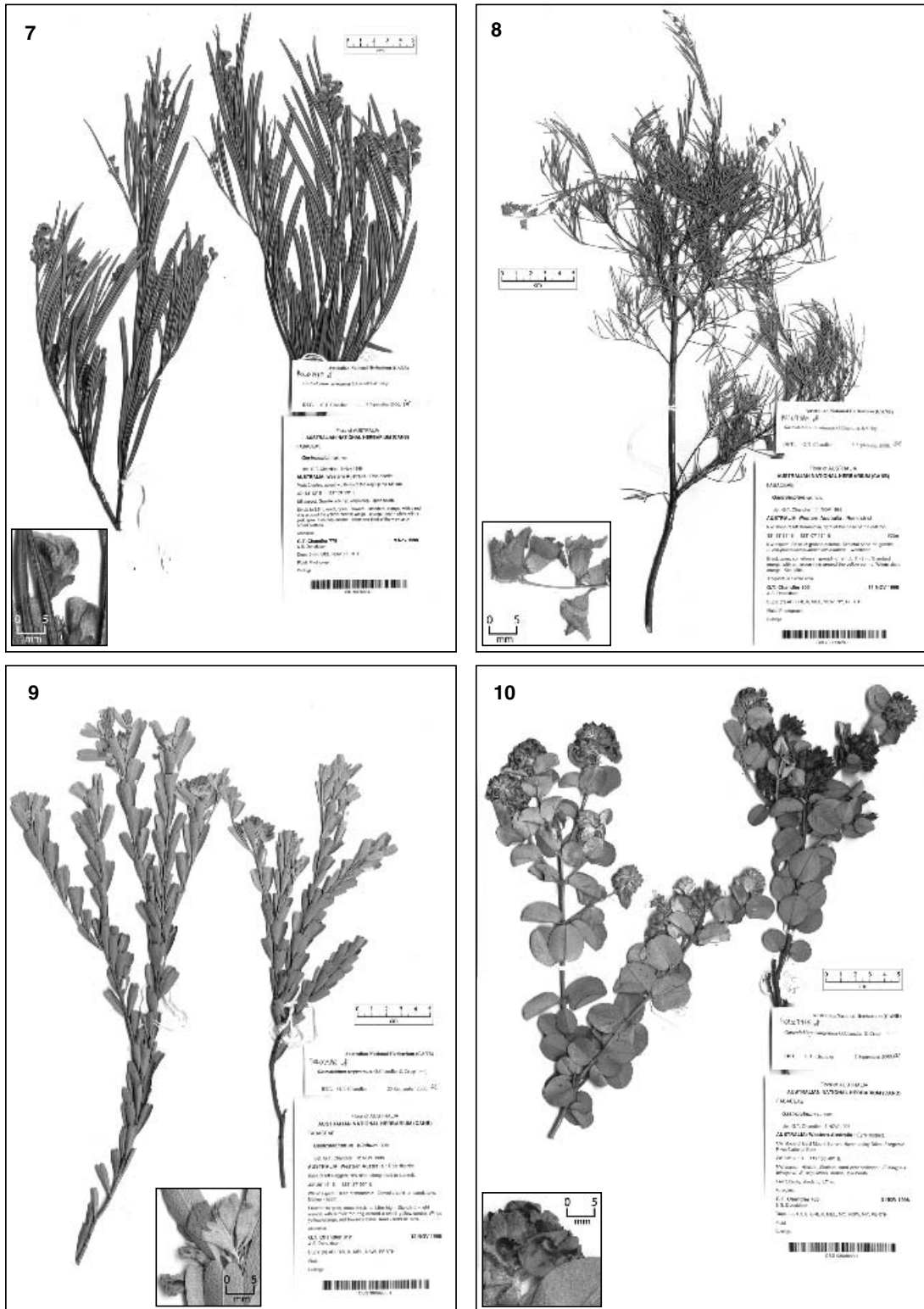


Fig. 7. Photograph of the type specimen of *Gastrolobium acrocaroli*. **Fig. 8.** Photograph of the type specimen of *Gastrolobium involutum*. **Fig. 9.** Photograph of the type specimen of *Gastrolobium tergiversum*. **Fig. 10.** Photograph of the type specimen of *Gastrolobium congestum*.

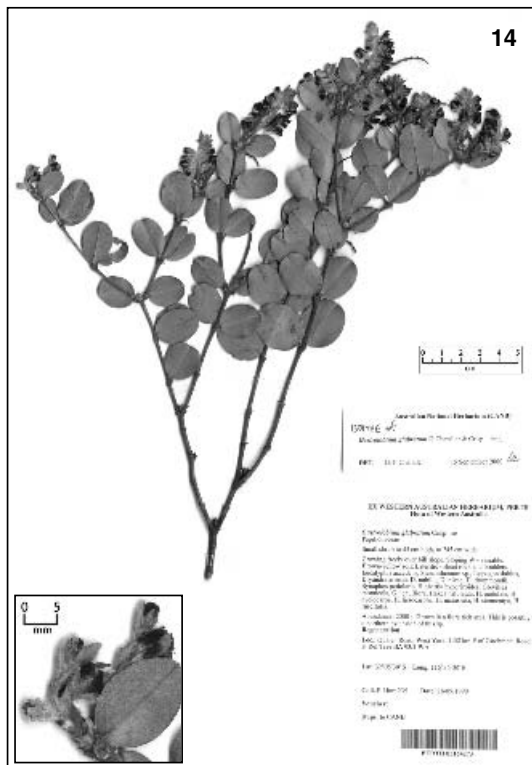
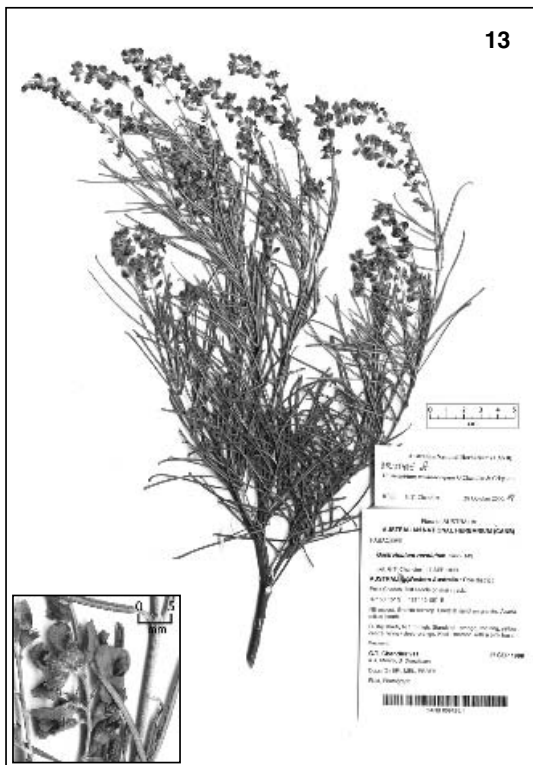
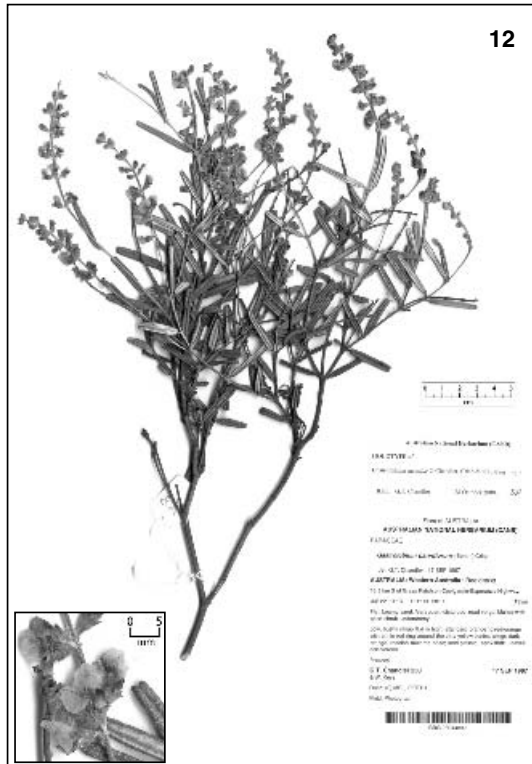
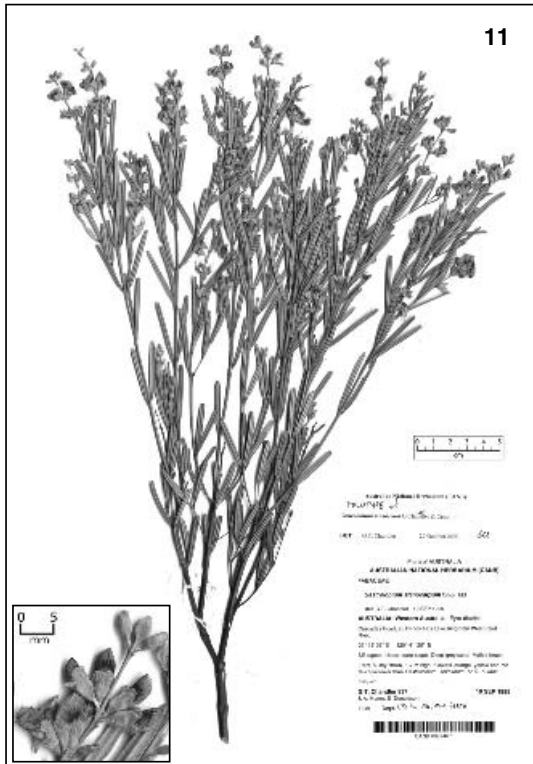


Fig. 11. Photograph of the type specimen of *Gastrolobium musaceum*. **Fig. 12.** Photograph of the type specimen of *Gastrolobium discolor*. **Fig. 13.** Photograph of the type specimen of *Gastrolobium melanocarpum*. **Fig. 14.** Photograph of the type specimen of *Gastrolobium glabratum*.

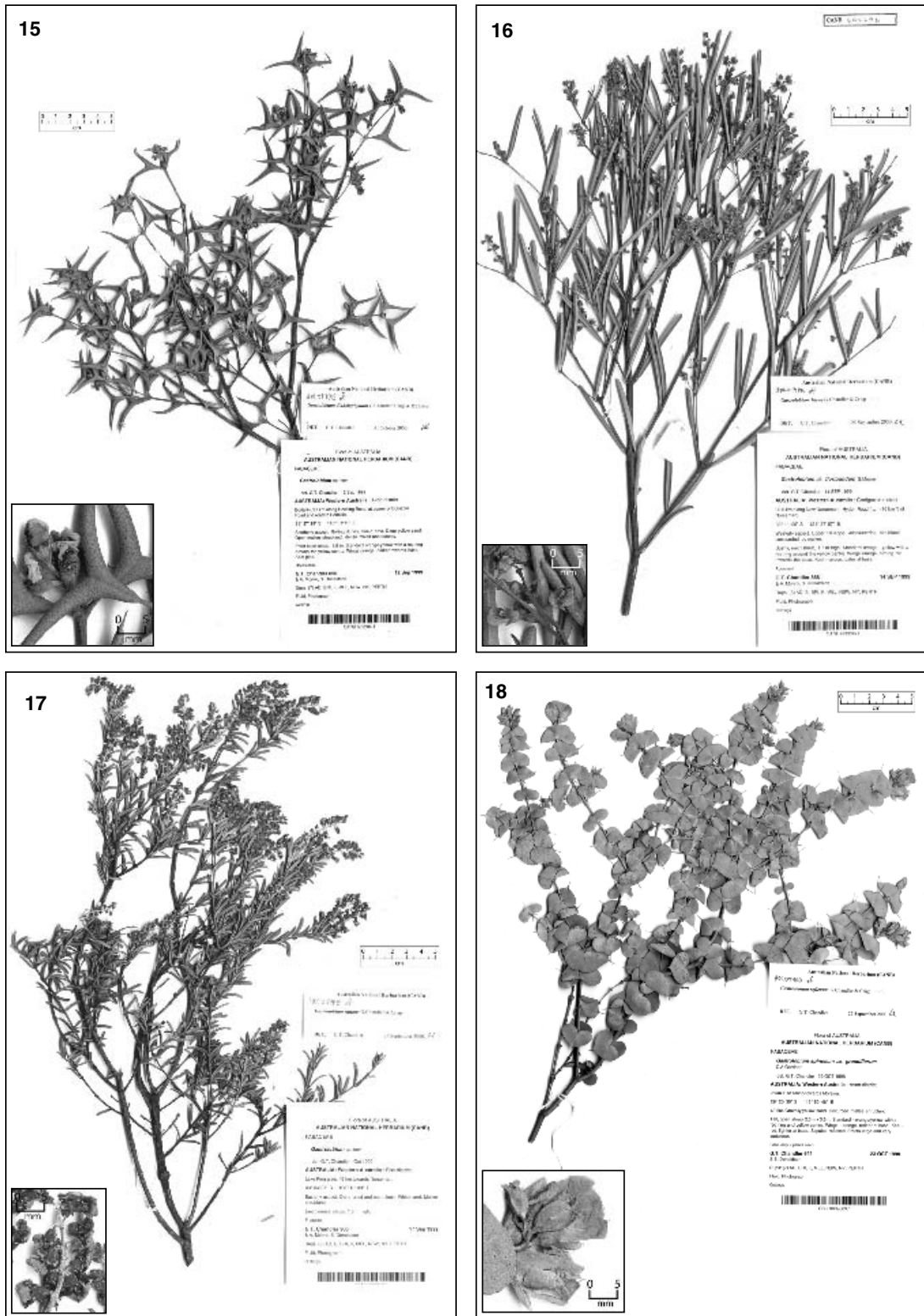


Fig. 15. Photograph of the type specimen of *Gastrolobium diabolophyllum*. **Fig. 16.** Photograph of the type specimen of *Gastrolobium hians*. **Fig. 17.** Photograph of the type specimen of *Gastrolobium nutans*. **Fig. 18.** Photograph of the type specimen of *Gastrolobium reflexum*.

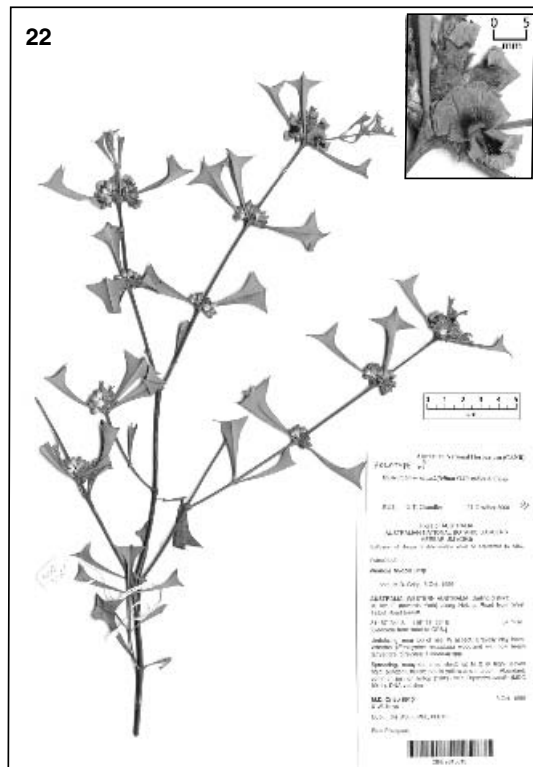
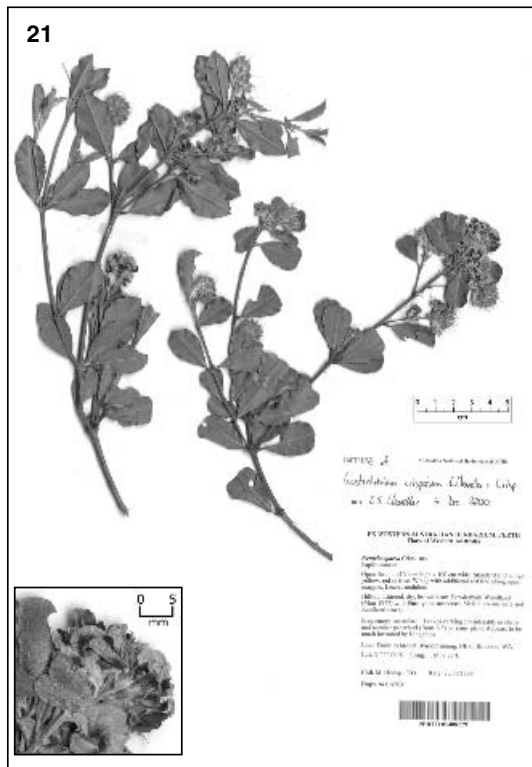
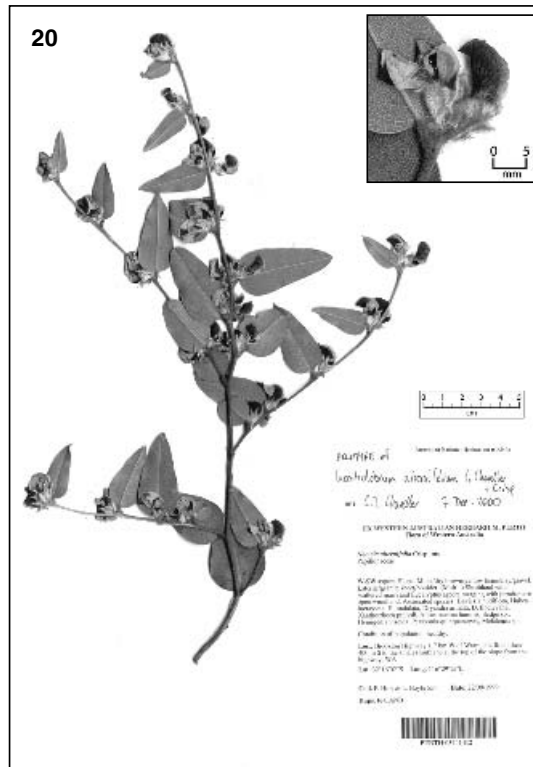
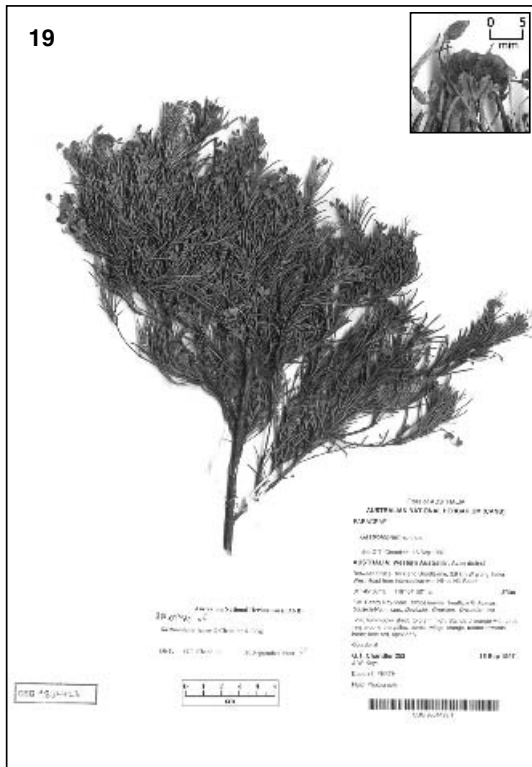


Fig. 19. Photograph of the type specimen of *Gastrolobium tenue*. **Fig. 20.** Photograph of the type specimen of *Gastrolobium alterniflorum*. **Fig. 21.** Photograph of the type specimen of *Gastrolobium crispatum*. **Fig. 22.** Photograph of the type specimen of *Gastrolobium rhombifolium*.

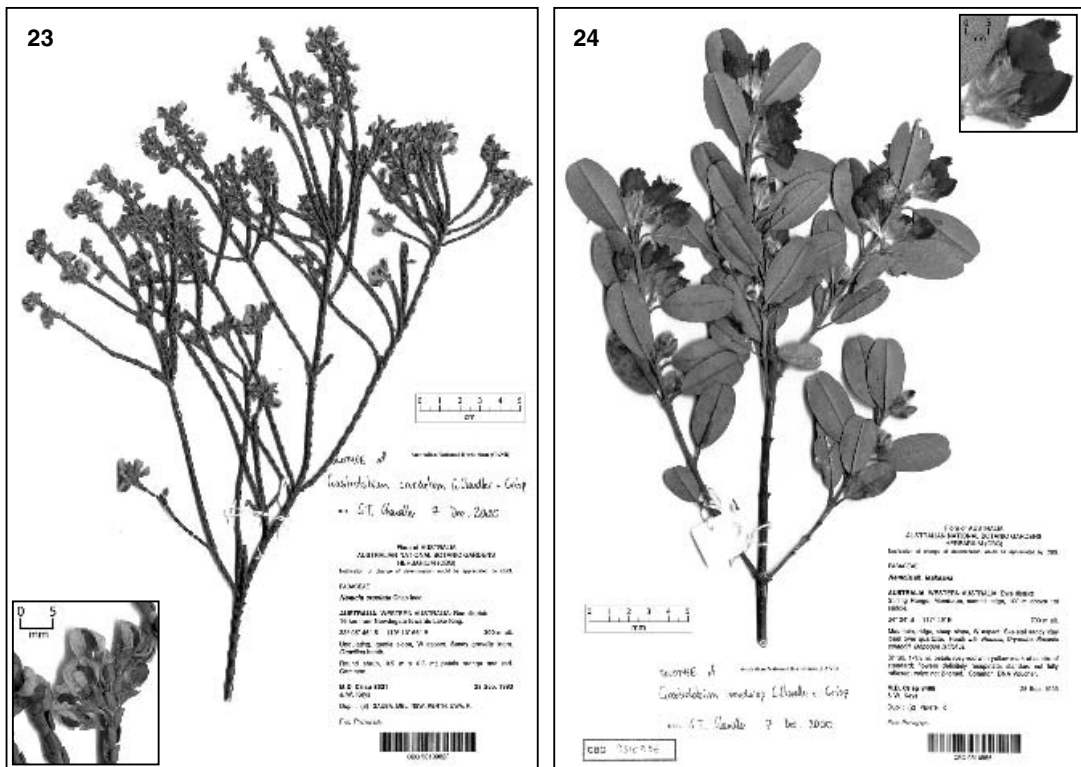


Fig. 23. Photograph of the type specimen of *Gastrolobium cruciatum*. **Fig. 24.** Photograph of the type specimen of *Gastrolobium mondurup*.

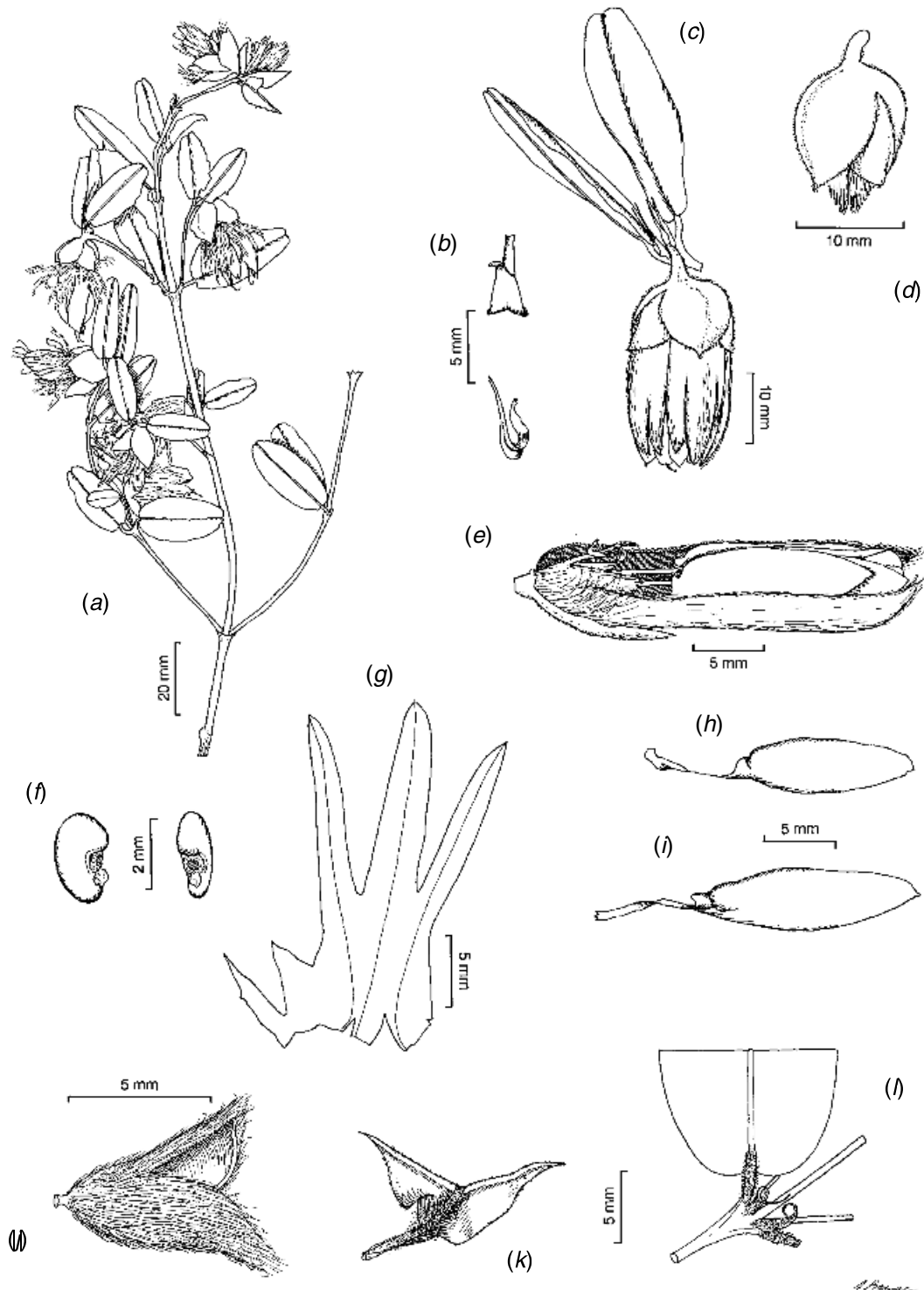


Fig. 25. Line drawing of *Gastrolobium formosum*. (a) Mature branchlet, showing leaves and inflorescences; (b) standard petal, showing top and side views; (c) mature capitulum; (d) flower bud mostly enclosed in the subtending bracts; (e) single flower; (f) seed, showing top and side views; (g) dissected calyx, with the two shortest lobes the upper lobes, which are enclosed in the capitulum; (h) wing petal; (i) keel petal; (j) legume; (k) a pair of larger than usual stipules that sometimes happen to the leaves just below the inflorescences; (l) leaf base and stipule detail. Drawing by A. Prowse.

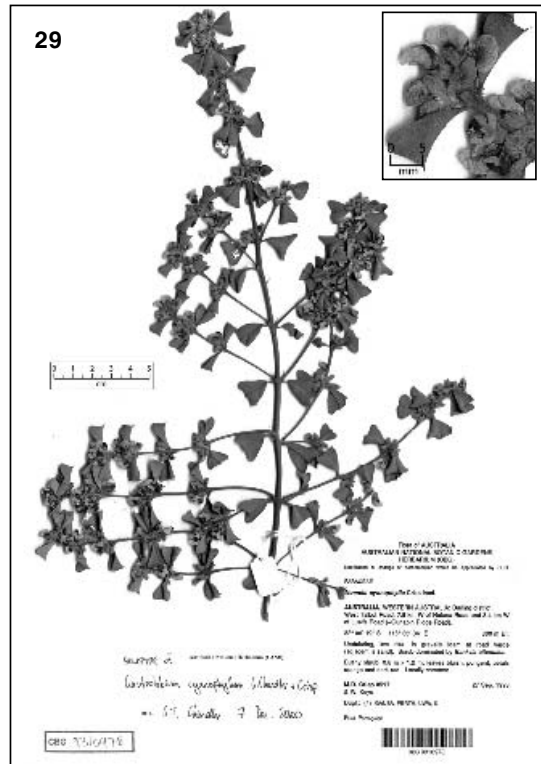
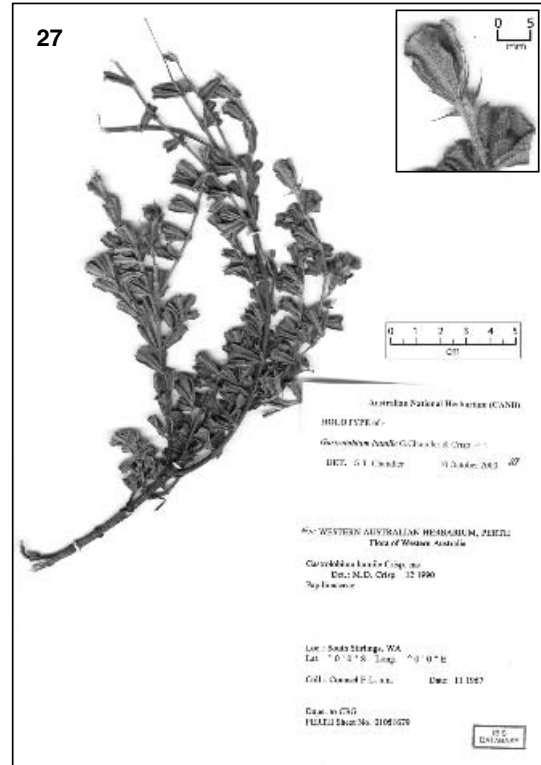
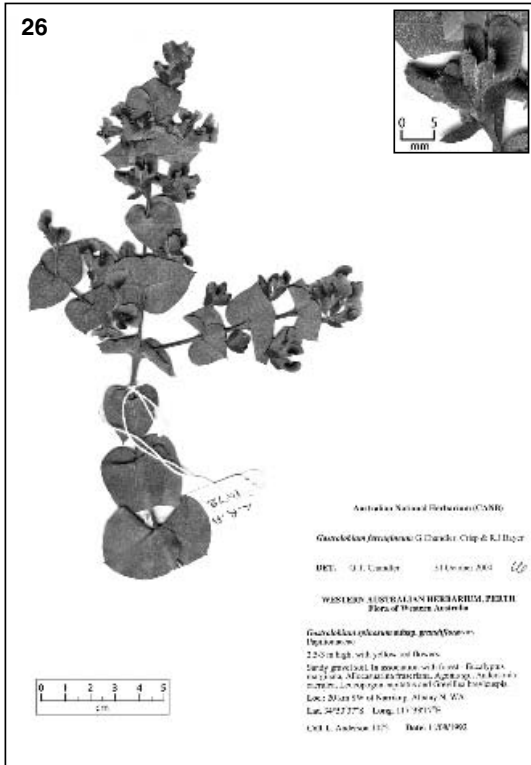


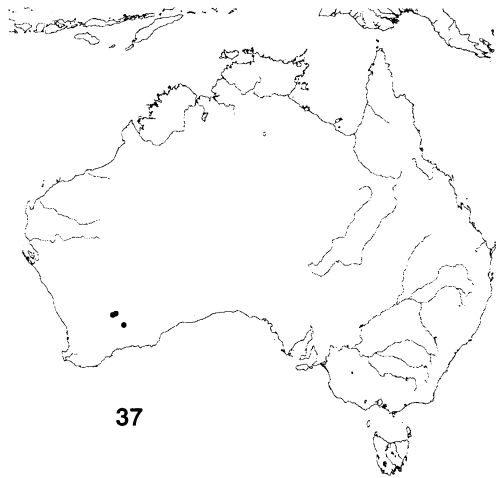
Fig. 26. Photograph of a representative specimen of *Gastrolobium ferrugineum*. Fig. 27. Photograph of the type specimen of *Gastrolobium humile*. Fig. 28. Photograph of the type specimen of *Gastrolobium venulosum*. Fig. 29. Photograph of the type specimen of *Gastrolobium cyanophyllum*.



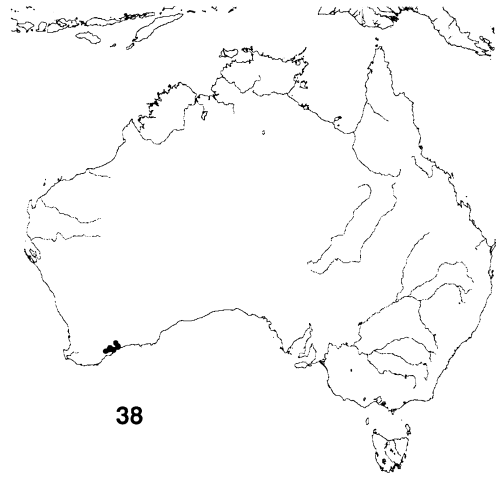
Fig. 30. Photograph of the type specimen of *Gastrolobium elegans*.



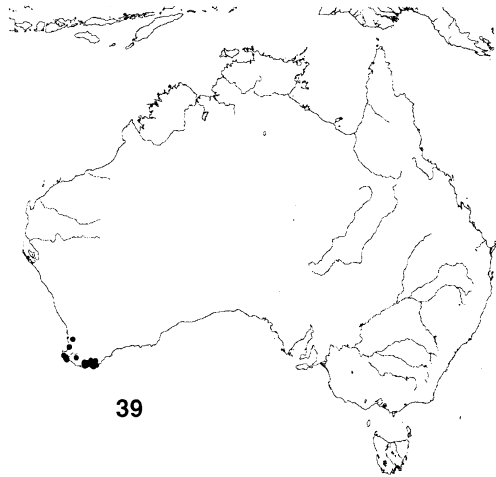
Figs 31–36. Distributions. **Fig. 31.** *Gastrolobium spinosum*. **Fig. 32.** *G. euryphyllum*. **Fig. 33.** *G. wonganensis*. **Fig. 34.** *G. triangulare*. **Fig. 35.** *G. trilobum*. **Fig. 36.** *G. aculeatum*.



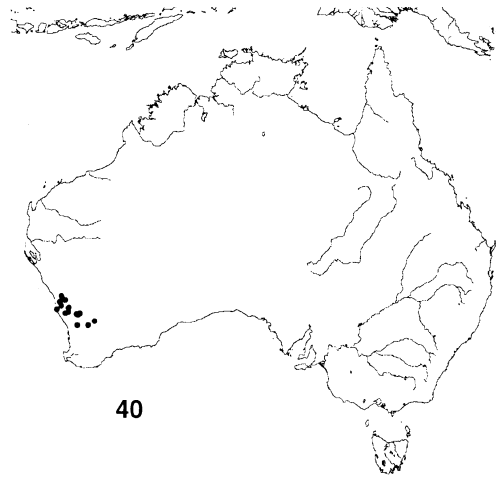
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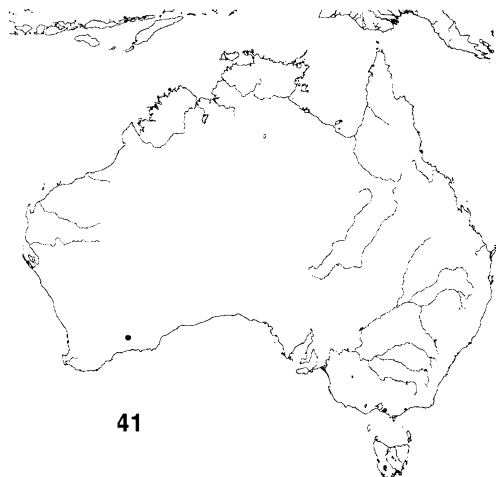
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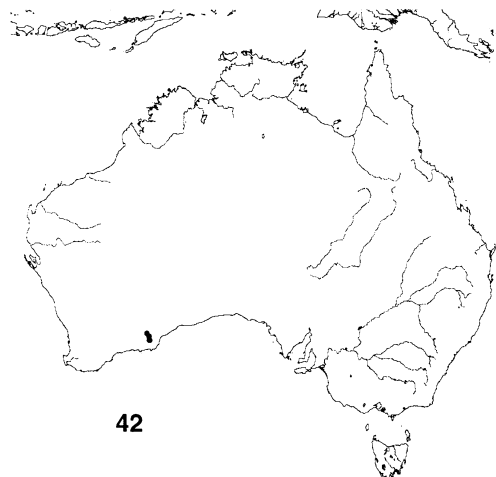
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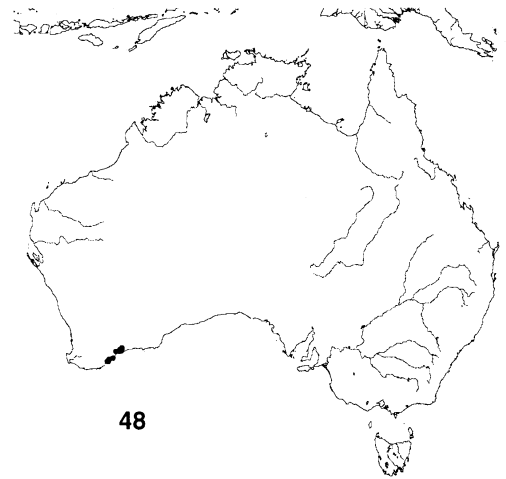
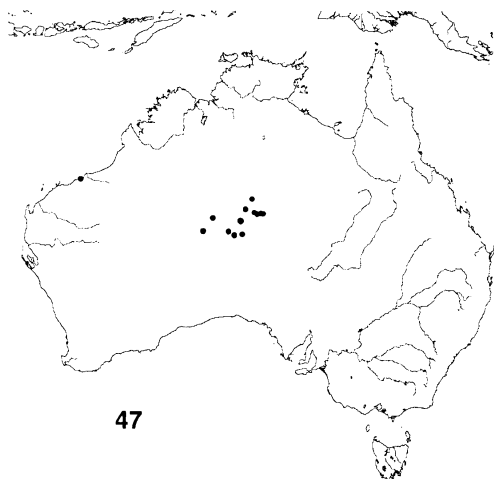
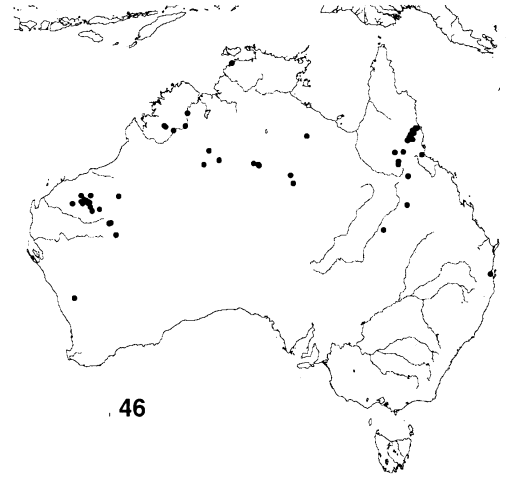
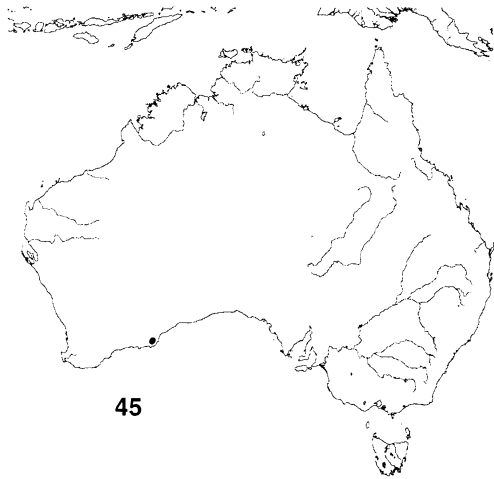
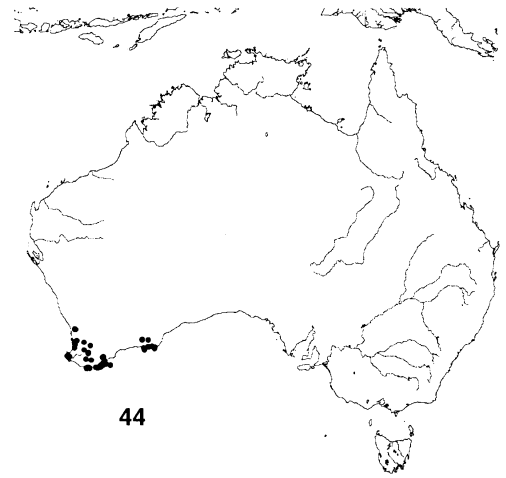
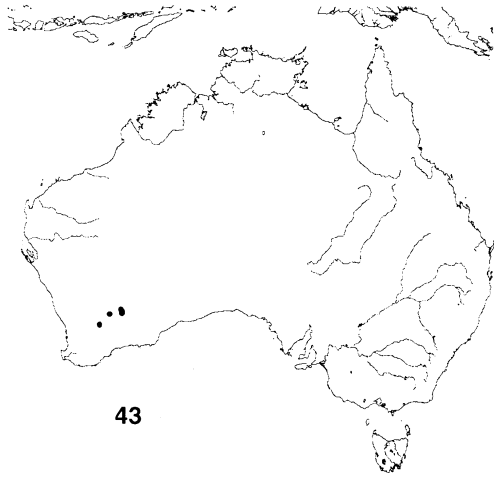


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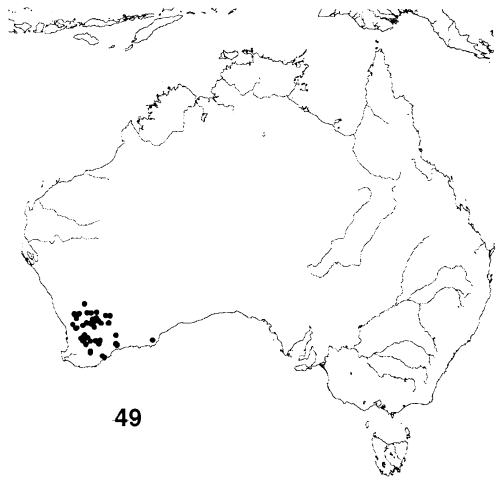


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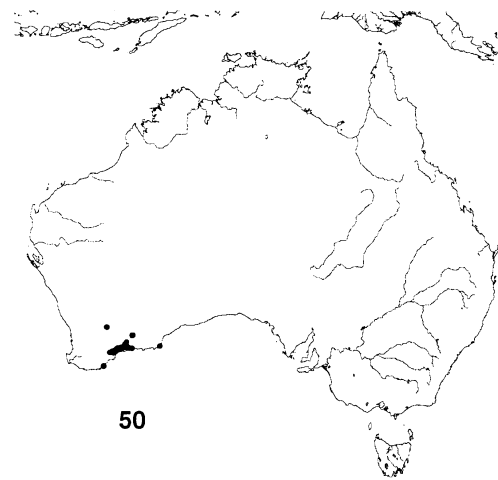
Figs 37–42. Distributions. **Fig. 37.** *Gastrolobium semiteres*. **Fig. 38.** *G. stenophyllum*. **Fig. 39.** *G. cuneatum*. **Fig. 40.** *G. callistachys*. **Fig. 41.** *G. acroacrolis*. **Fig. 42.** *G. involutum*.



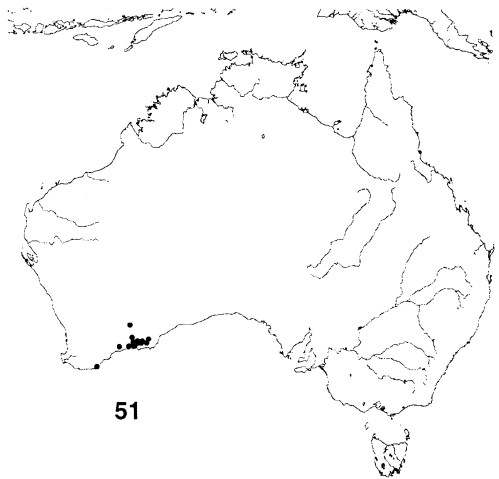
Figs 43–48. Distributions. **Fig. 43.** *Gastrolobium graniticum*. **Fig. 44.** *G. bilobum*. **Fig. 45.** *G. tergiversum*. **Fig. 46.** *G. grandiflorum*. **Fig. 47.** *G. brevipes*. **Fig. 48.** *G. congestum*.



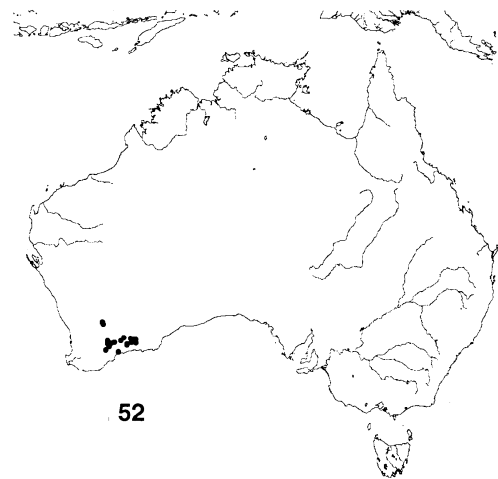
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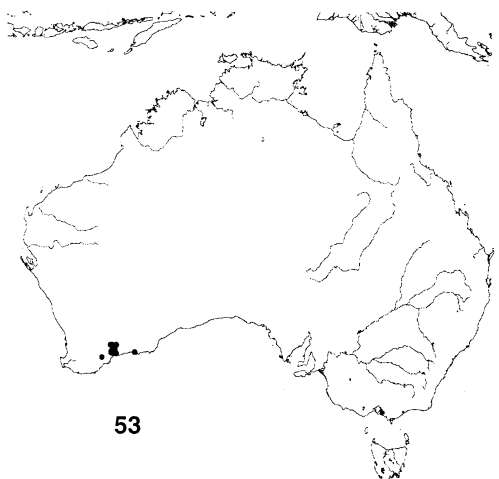
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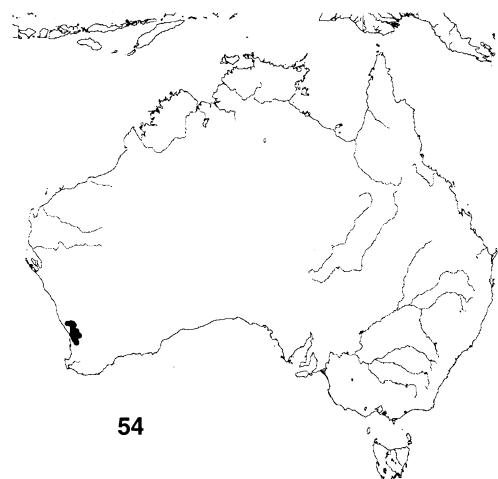
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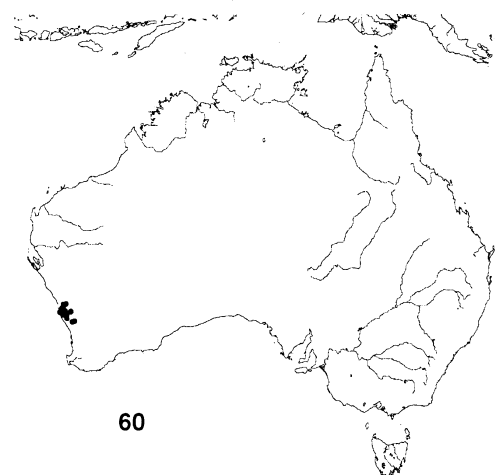
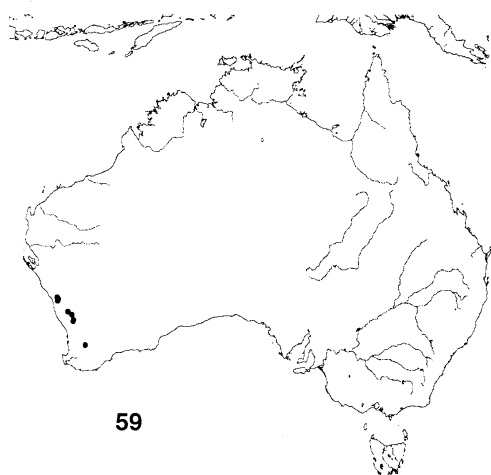
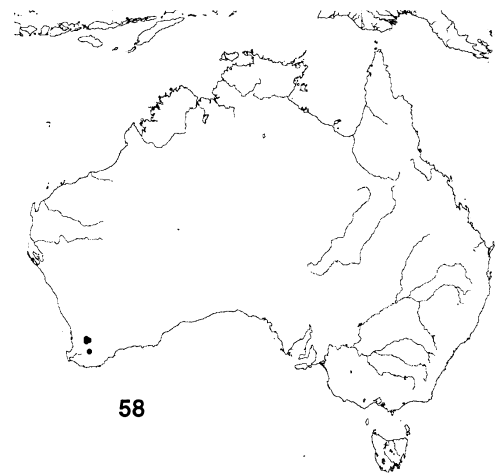
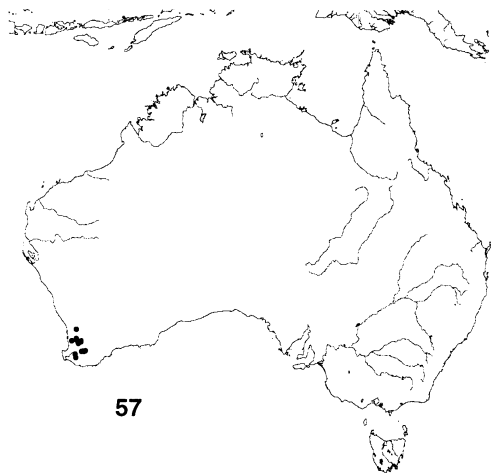
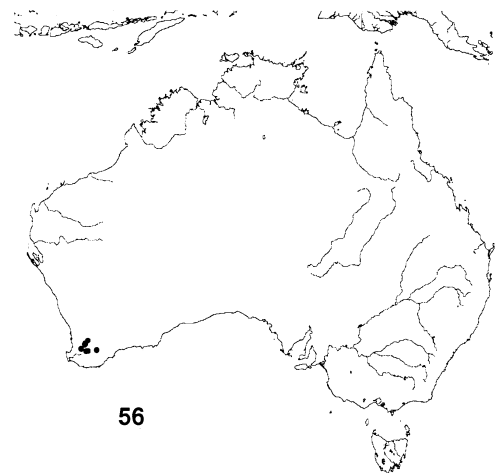
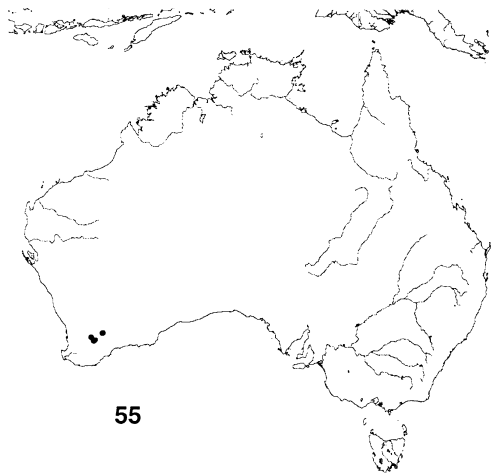


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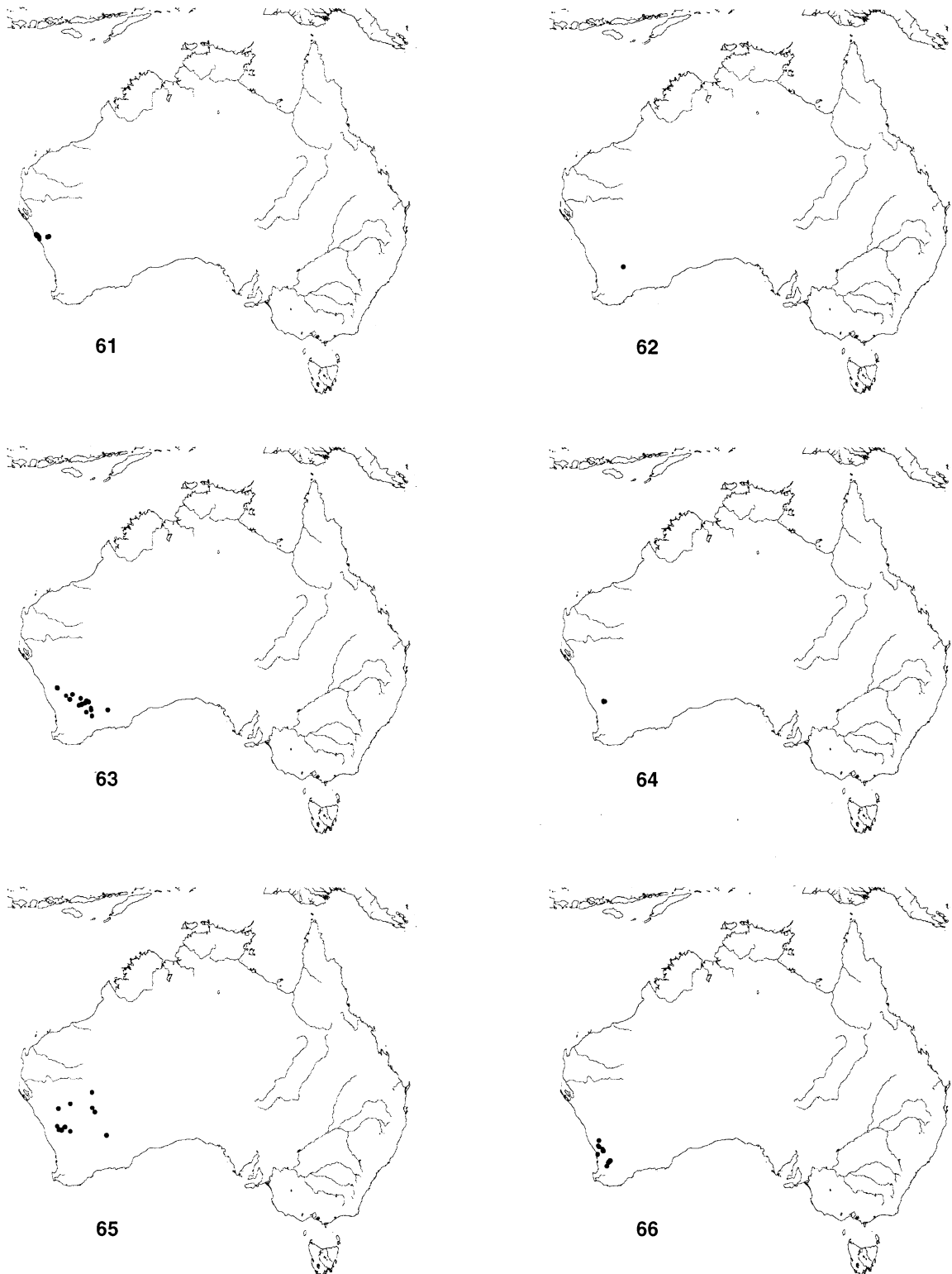


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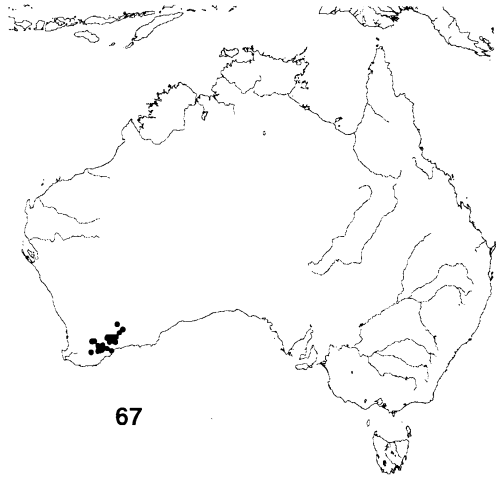
Figs 49–54. Distributions. **Fig. 49.** *Gastrolobium parviflorum*. **Fig. 50.** *G. musaceum*. **Fig. 51.** *G. discolor*. **Fig. 52.** *G. melanocarpum*. **Fig. 53.** *G. tetragonophyllum*. **Fig. 54.** *G. villosum*.



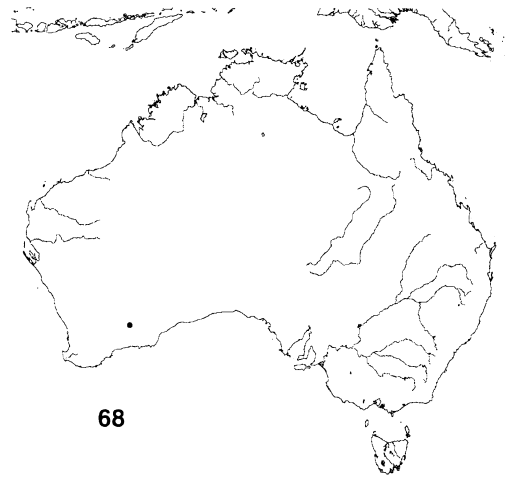
Figs 55–60. Distributions. **Fig. 55.** *Gastrolobium densifolium*. **Fig. 56.** *G. tomentosum*. **Fig. 57.** *G. glabratum*. **Fig. 58.** *G. ovalifolium*. **Fig. 59.** *G. rotundifolium*. **Fig. 60.** *G. polystachyum*.



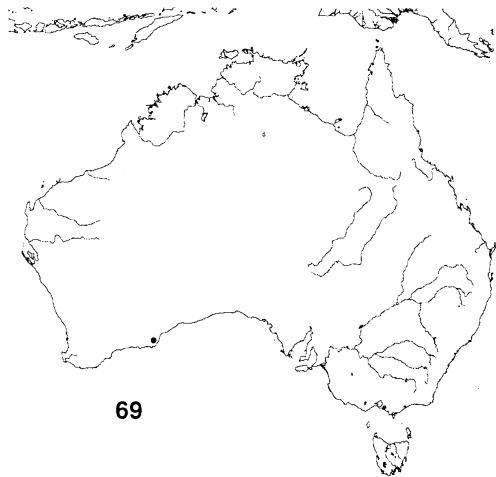
Figs 61–66. Distributions. **Fig. 61.** *Gastrolobium propinquum*. **Fig. 62.** *G. diablophyllum*. **Fig. 63.** *G. floribundum*. **Fig. 64.** *G. glaucum*. **Fig. 65.** *G. laytonii*. **Fig. 66.** *G. microcarpum*.



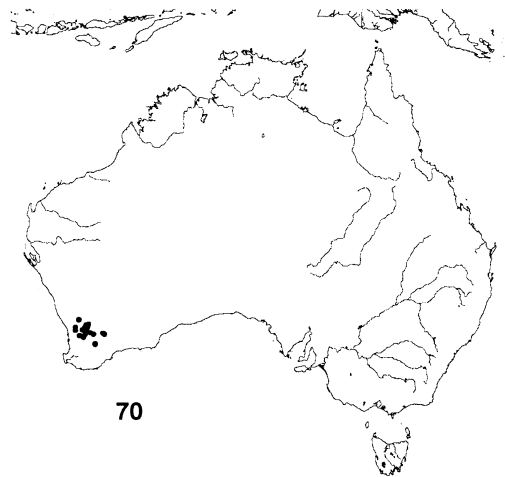
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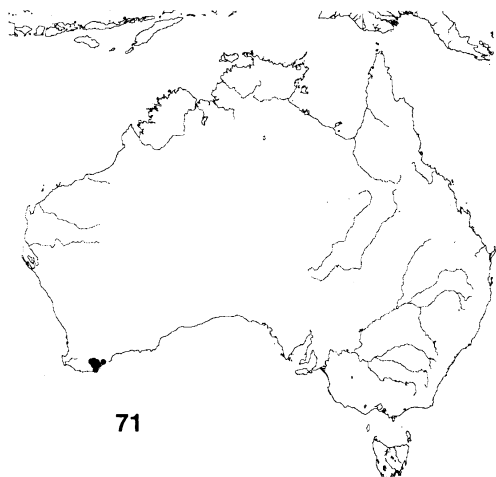
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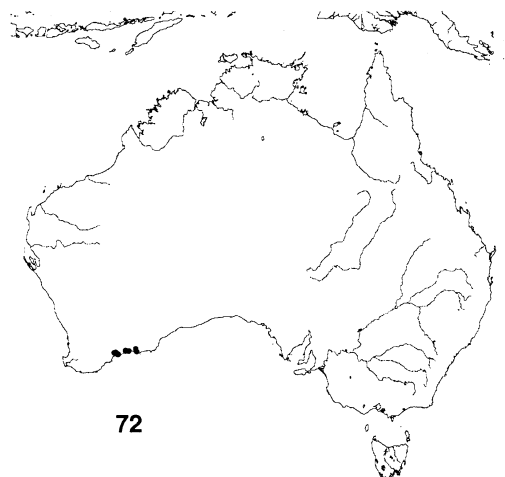
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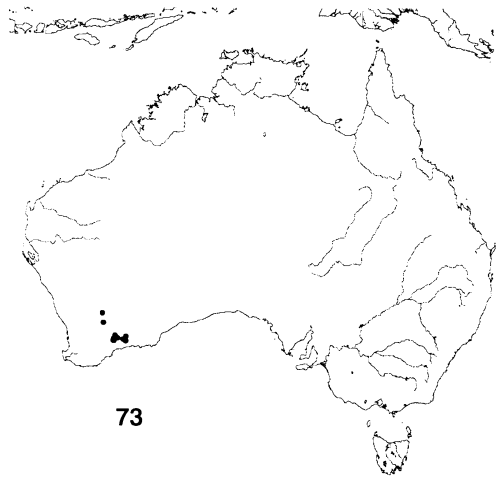


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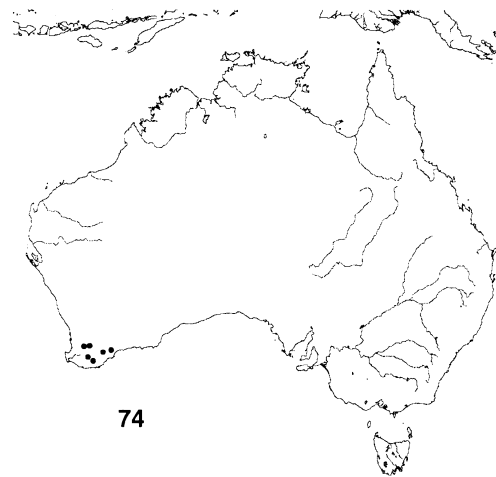


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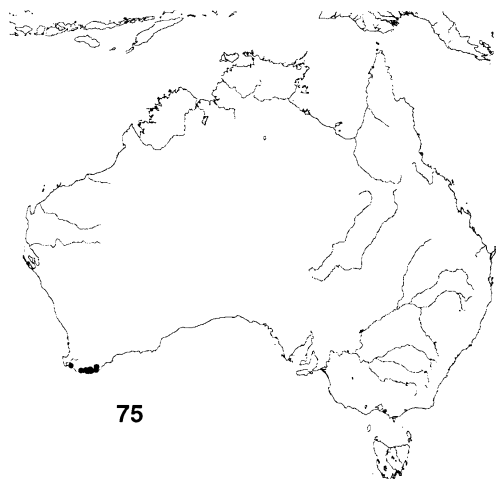
Figs 67–72. Distributions. **Fig. 67.** *Gastrolobium crassifolium*. **Fig. 68.** *G. hians*. **Fig. 69.** *G. pycnostachyum*. **Fig. 70.** *G. parvifolium*. **Fig. 71.** *G. velutinum*. **Fig. 72.** *G. heterophyllum*.



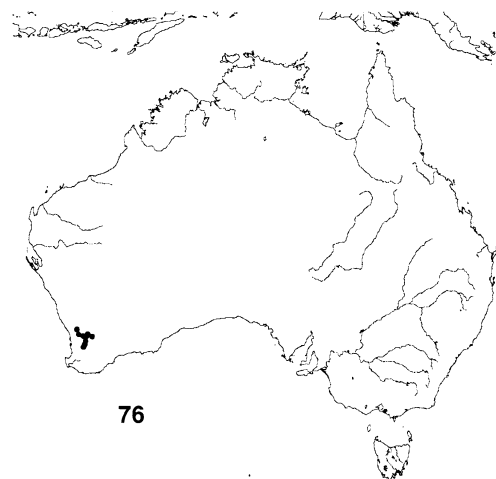
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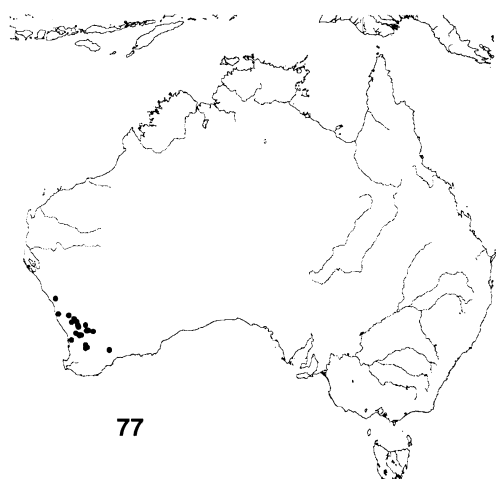
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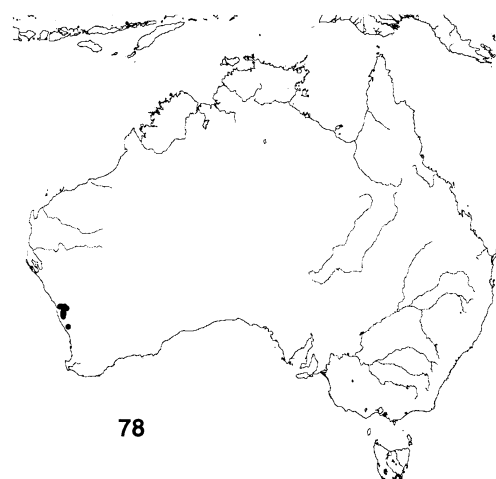
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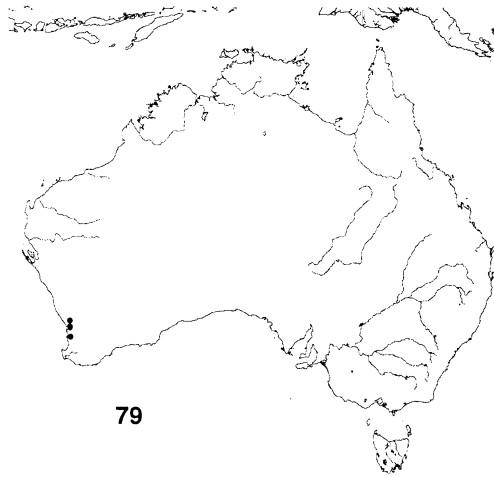


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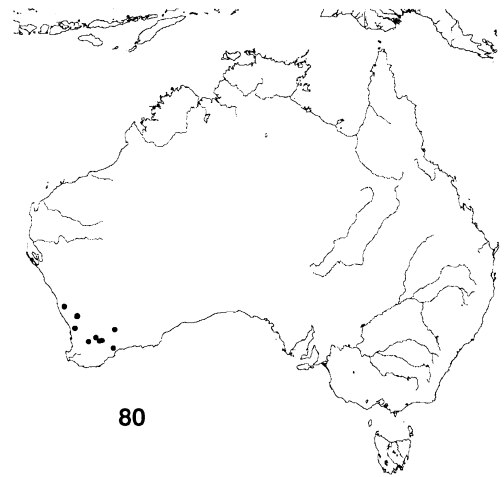


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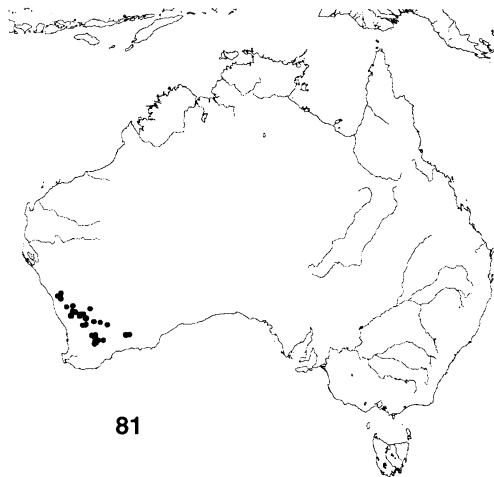
Figs 73–78. Distributions. **Fig. 73.** *Gastrolobium nutans*. **Fig. 74.** *G. pusillum*. **Fig. 75.** *G. brownii*. **Fig. 76.** *G. hookeri*. **Fig. 77.** *G. obovatum*. **Fig. 78.** *G. plicatum*.



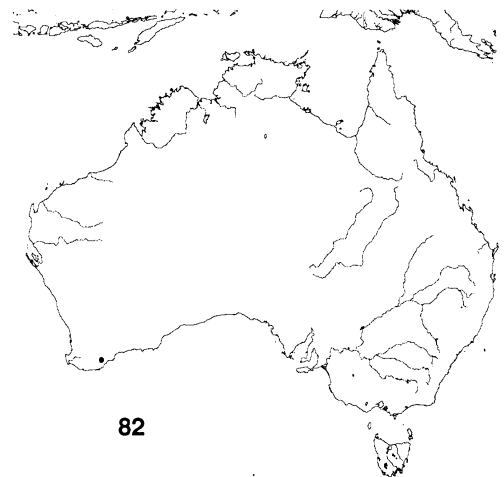
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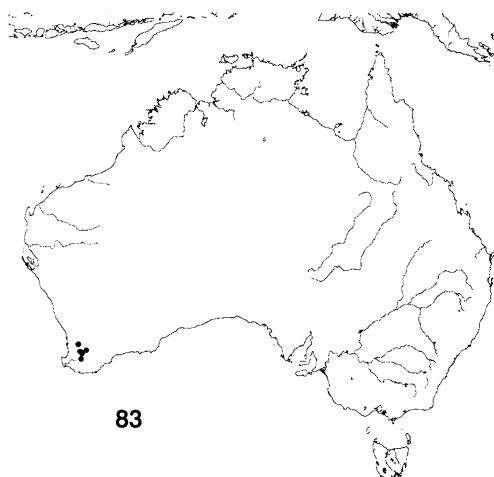
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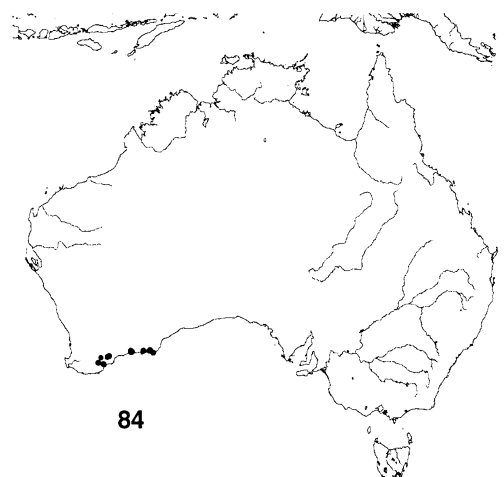
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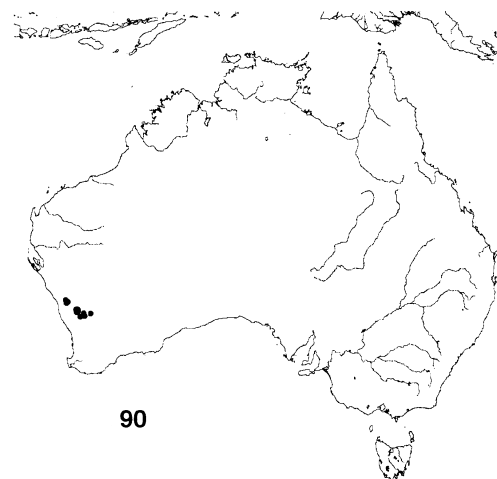
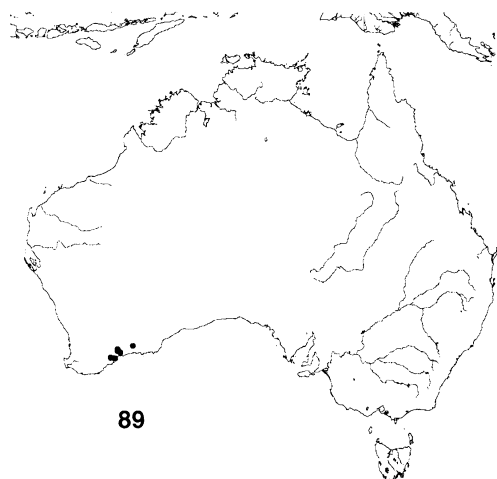
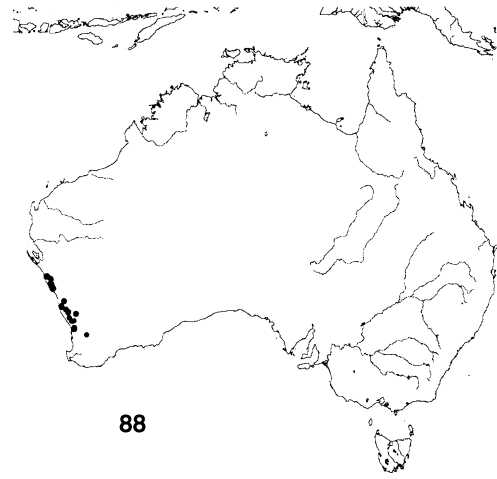
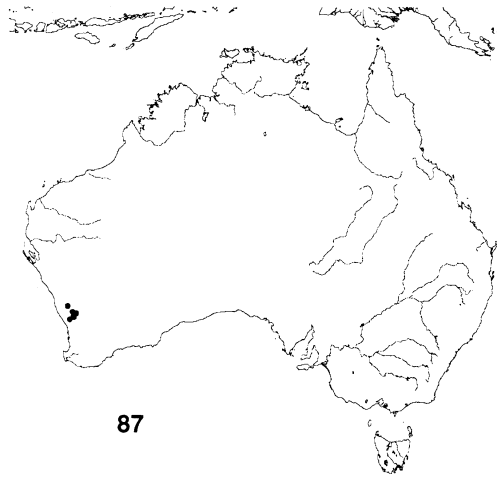
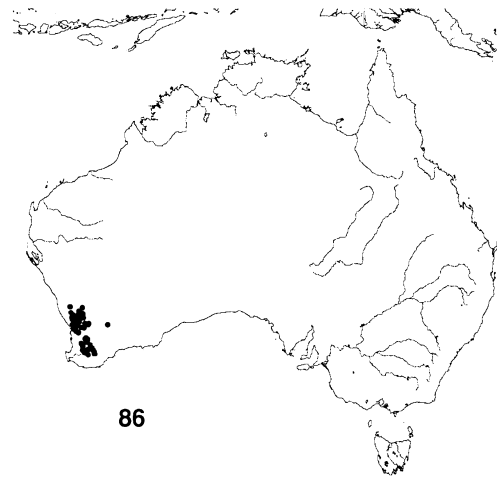
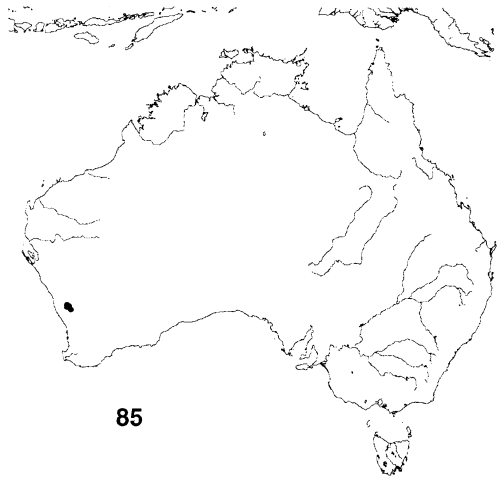


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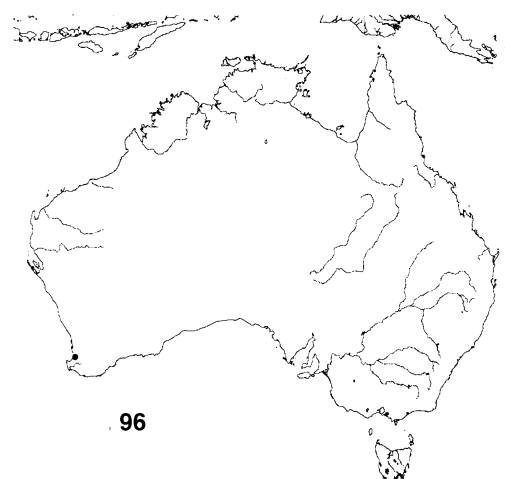
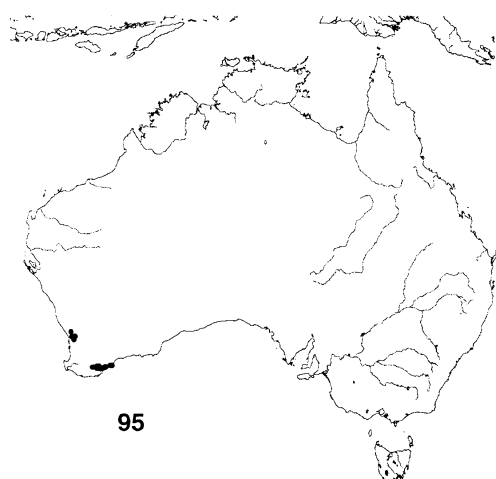
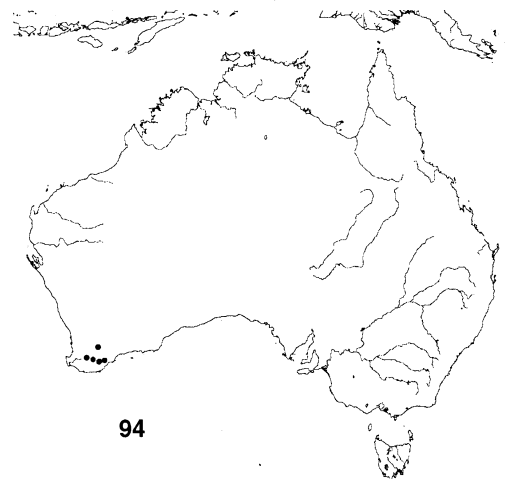
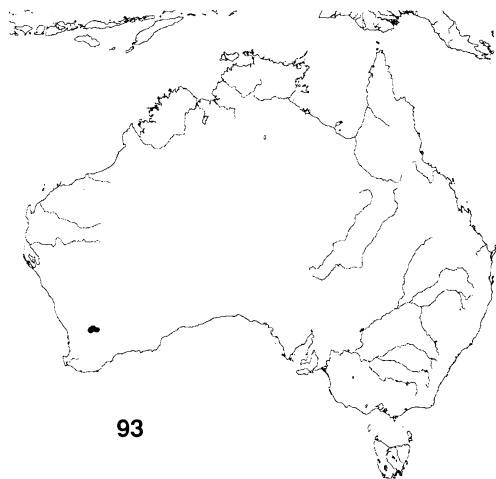
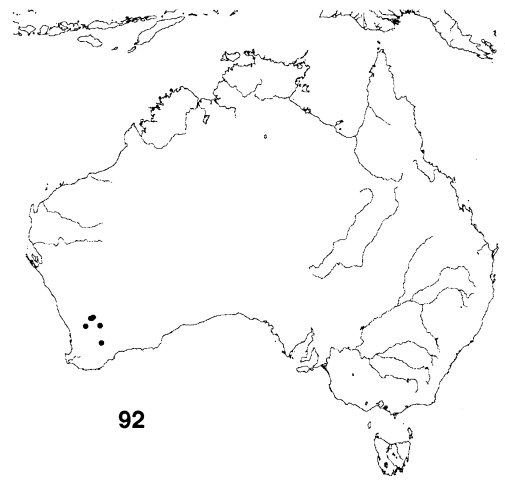
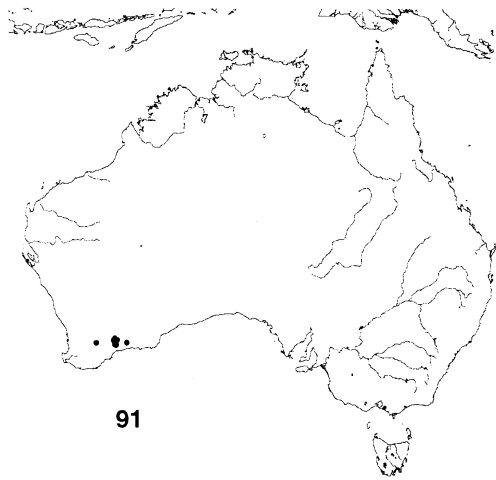


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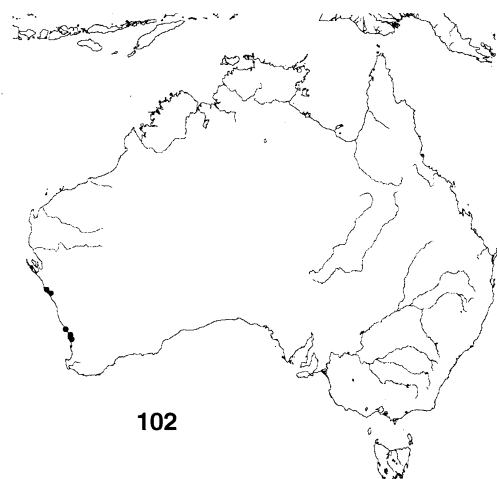
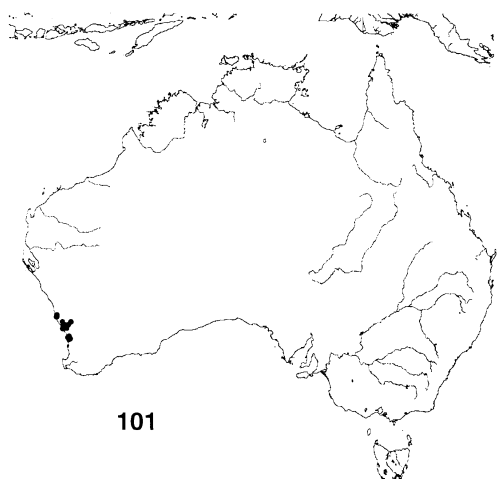
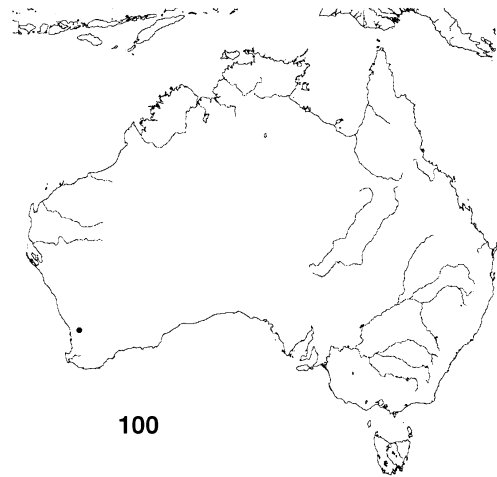
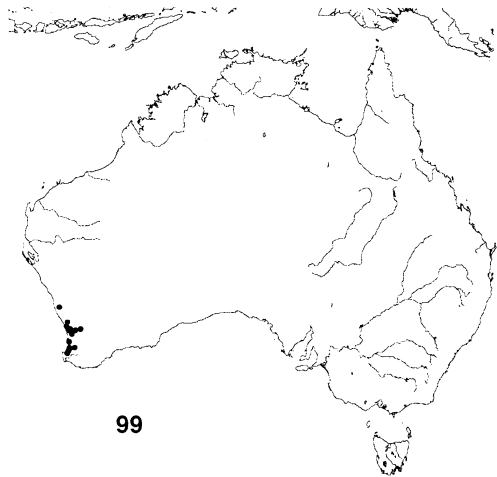
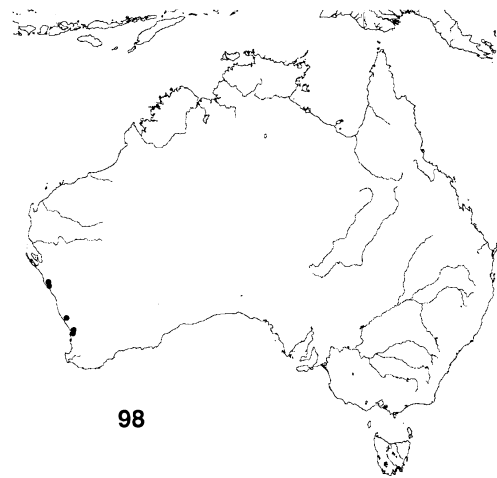
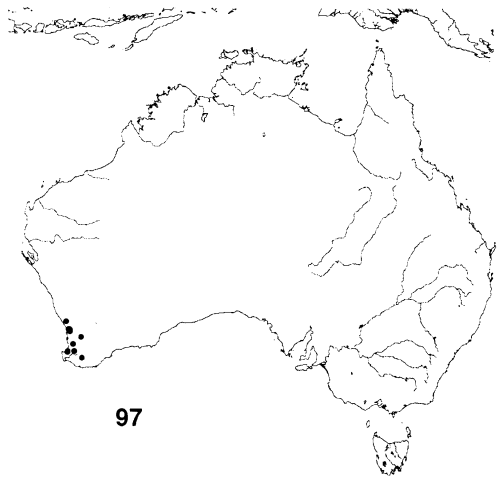
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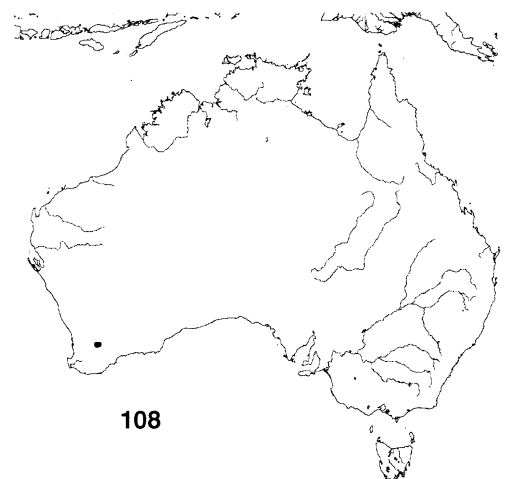
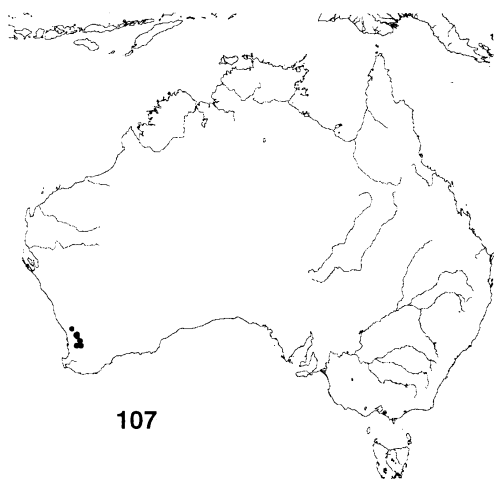
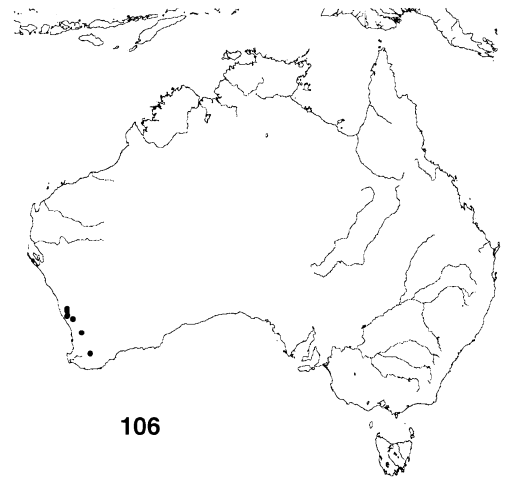
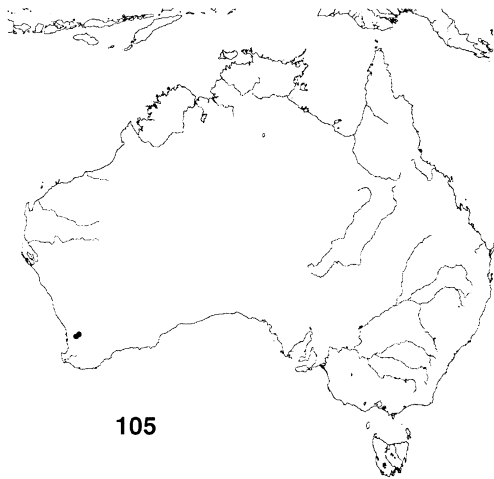
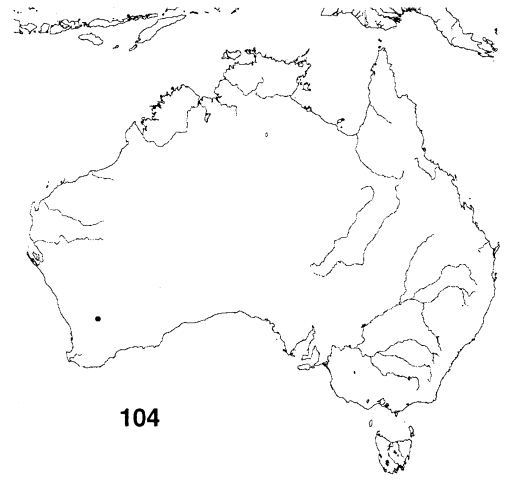
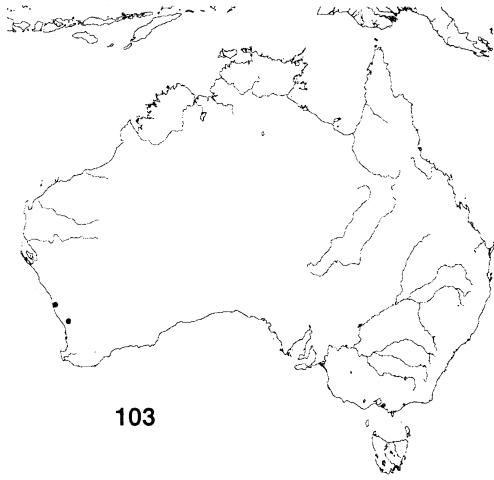
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Figs 91–96. Distributions. Fig. 91. *Gastrolobium rigidum*. Fig. 92. *G. spectabile*. Fig. 93. *G. tenue*. Fig. 94. *G. dorrienii*. Fig. 95. *G. retusum*. Fig. 96. *G. whicherensis*.



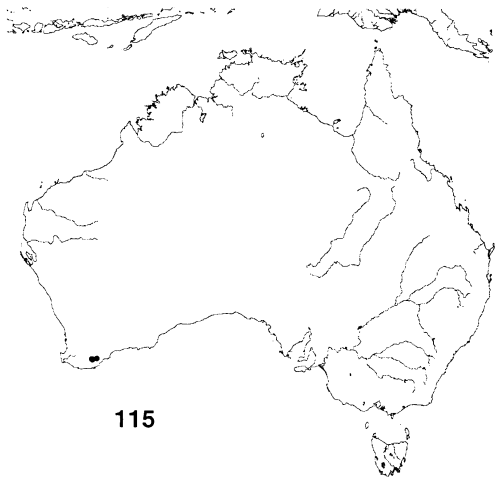
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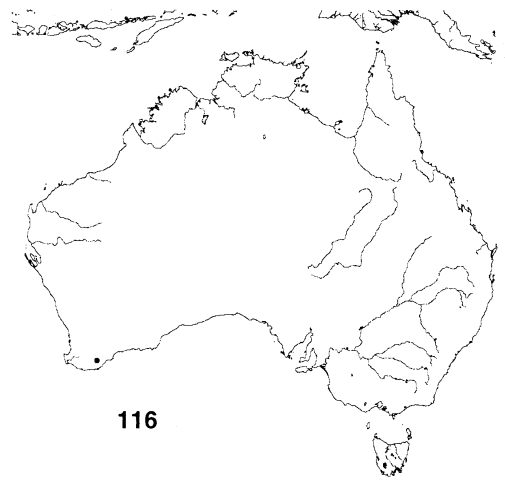
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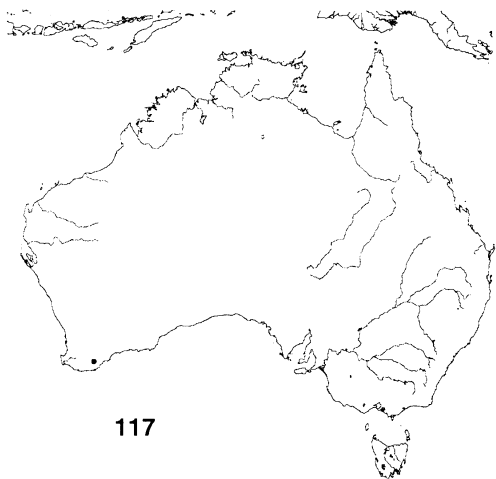
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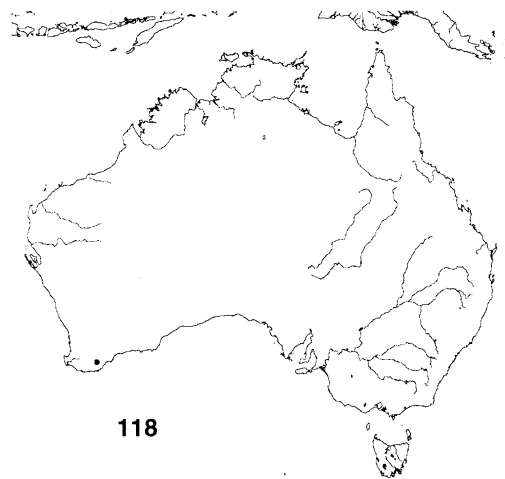
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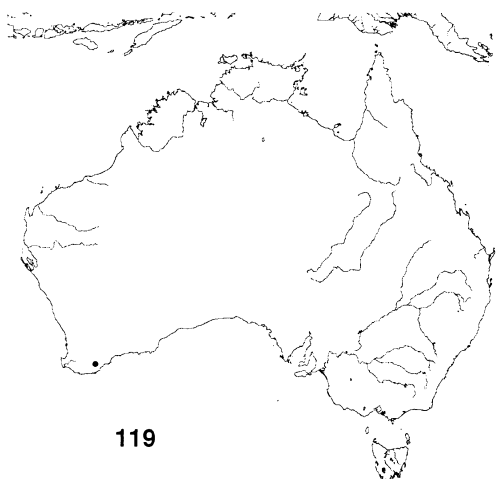
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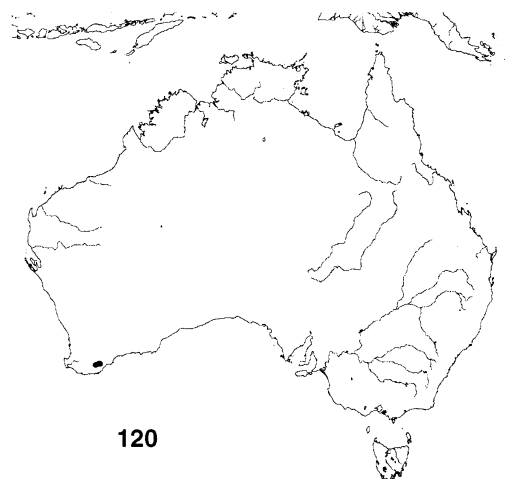
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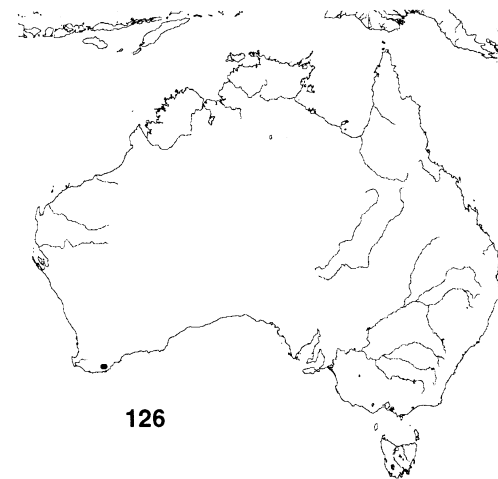
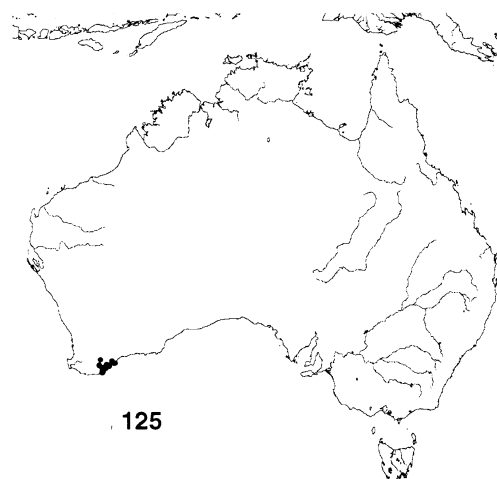
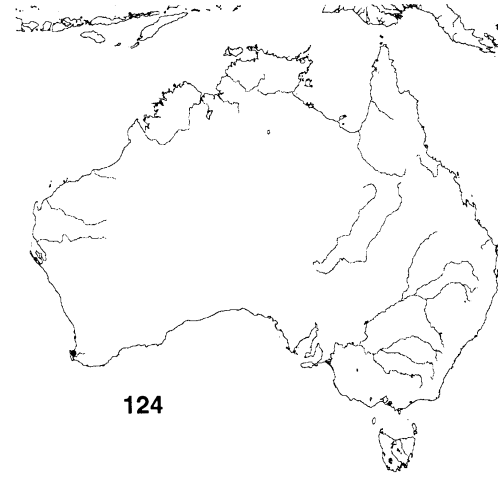
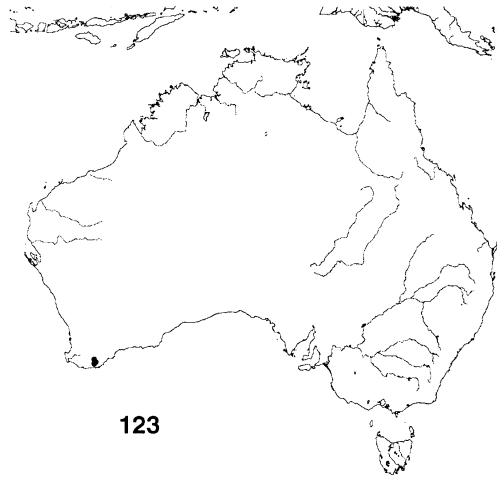
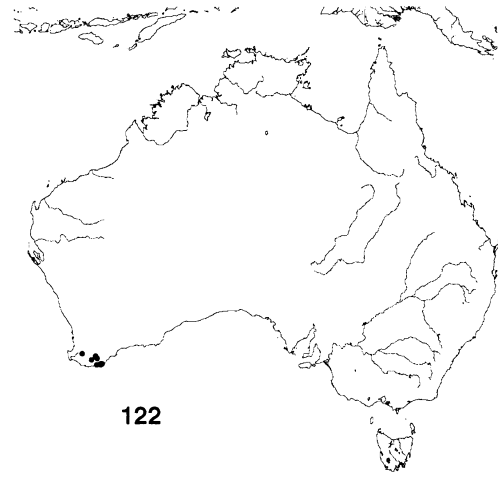
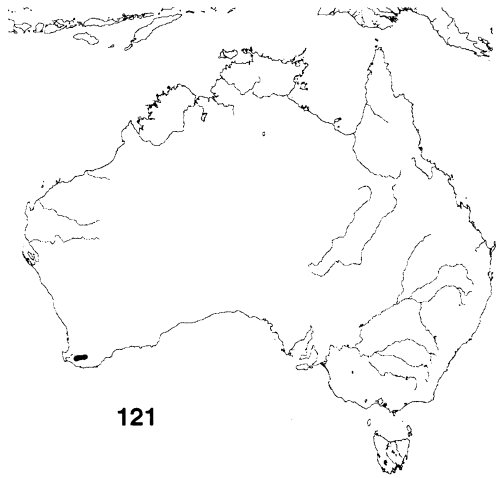


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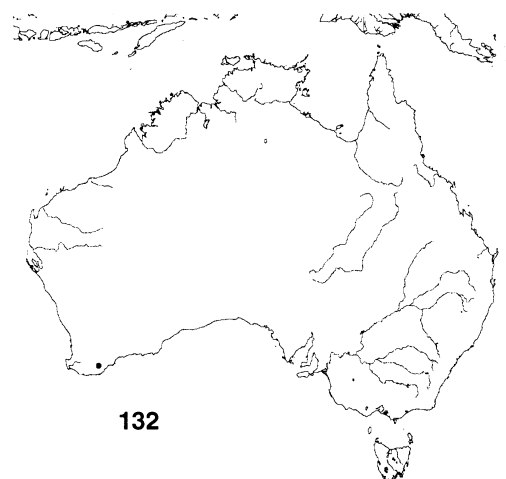
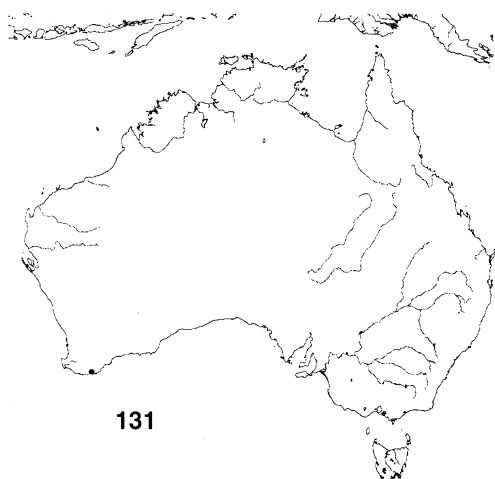
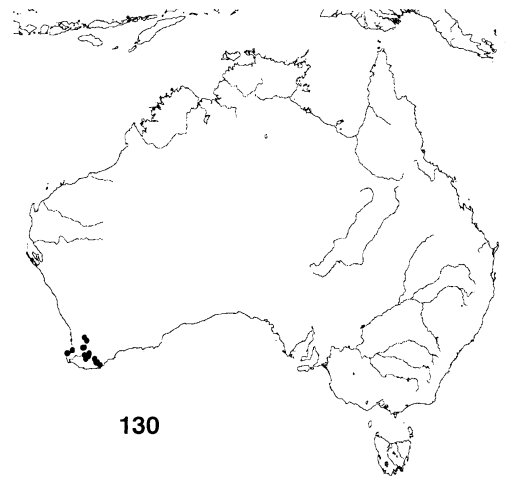
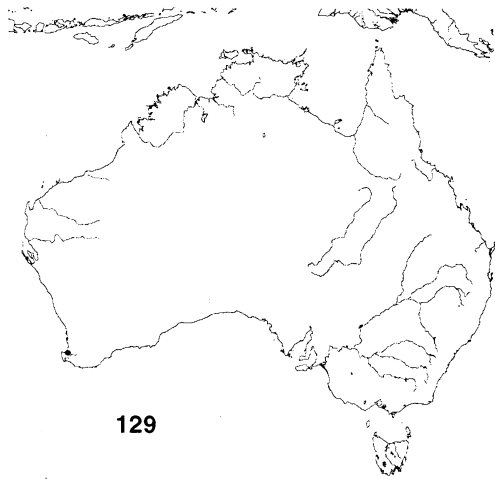
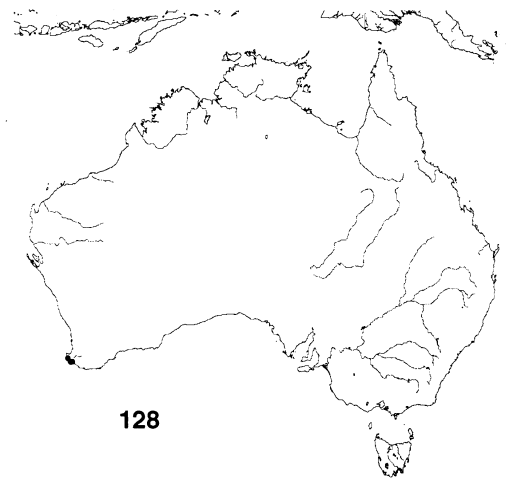
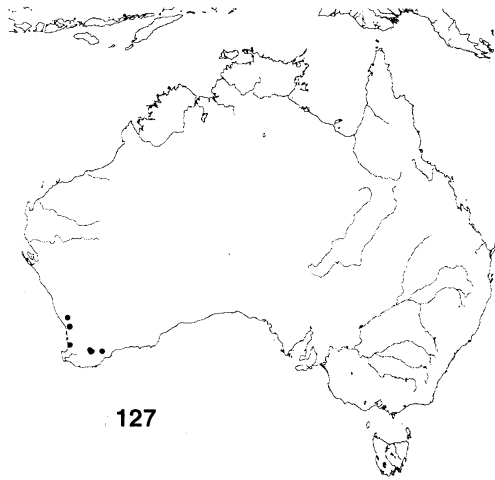


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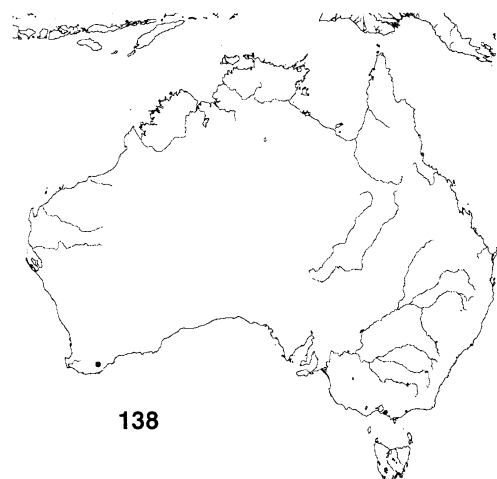
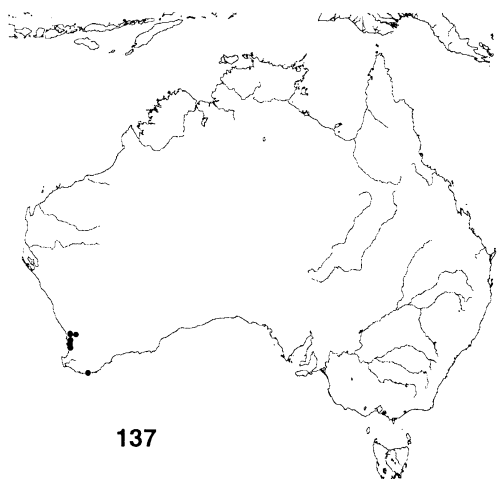
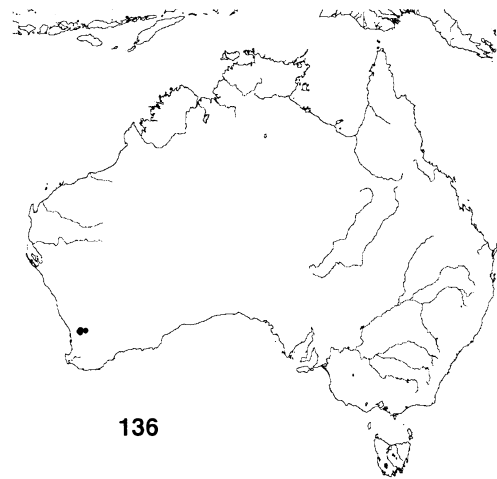
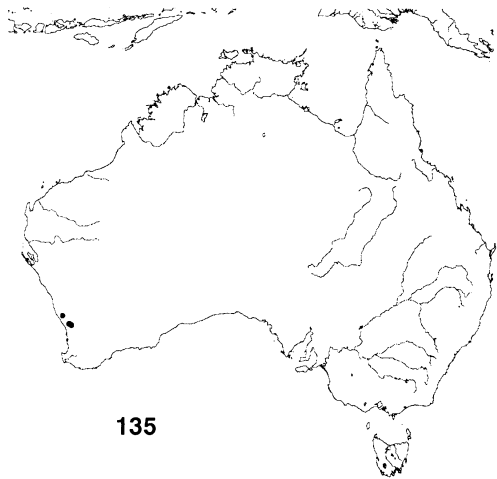
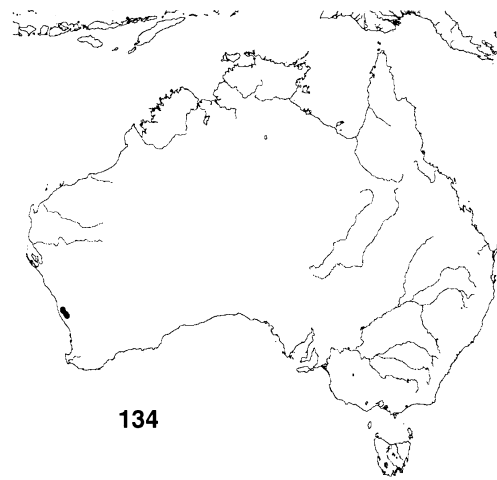
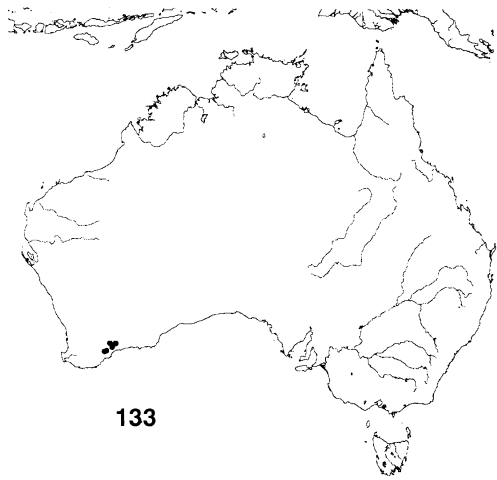
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Figs 121–126. Distributions. **Fig. 121.** *Gastrolobium melanopetalum*. **Fig. 122.** *G. sericeum*. **Fig. 123.** *G. minus*. **Fig. 124.** *G. modestum*. **Fig. 125.** *G. bracteolosum*. **Fig. 126.** *G. subcordatum*.



Figs 127–132. Distributions. **Fig. 127.** *Gastrolobium celsianum*. **Fig. 128.** *G. formosum*. **Fig. 129.** *G. papilio*. **Fig. 130.** *G. praemorsum*. **Fig. 131.** *G. ferrugineum*. **Fig. 132.** *G. humile*.



Figs 133–138. Distributions. **Fig. 133.** *Gastrolobium venulosum*. **Fig. 134.** *G. axillare*. **Fig. 135.** *G. nudum*. **Fig. 136.** *G. cyanophyllum*. **Fig. 137.** *G. dilatatum*. **Fig. 138.** *G. elegans*.



Fig. 139. Distribution of *Gastrolobium lehmannii*.

Taxonomic index

Names in **bold** type are currently accepted

<i>Brachysema acuminatum</i>	696	<i>Callistachys spectabilis</i>	673
<i>Brachysema bracteolosum</i>	695	<i>Callistachys tetragona</i>	687
<i>Brachysema celsianum</i>	696	<i>Chorizema coriaceum</i>	687
<i>Brachysema lanceolatum</i>	695, 696	<i>Chorizema heterophyllum</i>	660
{var.} <i>alpha hypargyreum</i>	696	<i>Chorizema lineare</i>	677
{var.} <i>beta glabrescens</i>	695	<i>Chorizema magnifolium</i>	671
{var.} <i>gamma planifolium</i>	696	<i>Chorizema sericeum</i>	693
<i>Brachysema latifolium</i>	668	<i>Chorozema</i>	See 'Chorizema'
<i>Brachysema melanopetalum</i>	692	<i>Cryptosema pimeleoides</i>	697
<i>Brachysema melananthum</i>	692	<i>Cupulanthus bracteolosus</i>	695
<i>Brachysema minor</i>	693	<i>Eutaxia punctata</i>	686
<i>Brachysema modestum</i>	694	<i>Eutaxia reticulata</i>	686
<i>Brachysema papilio</i>	698	<i>Gastrolobium acrocaroli</i>	637
<i>Brachysema platypterum</i>	696	<i>Gastrolobium aculeatum</i>	633
<i>Brachysema praemorsum</i>	698	<i>Gastrolobium acutum</i>	678
<i>Brachysema sericeum</i>	693	<i>Gastrolobium alternifolium</i>	679
var. <i>angustifolium</i>	692	<i>Gastrolobium appressum</i>	669
<i>Brachysema speciosum</i>	696	<i>Gastrolobium axillare</i>	699
<i>Brachysema subcordatum</i>	695	<i>Gastrolobium bennettsianum</i>	666
<i>Brachysema undulatum</i>	693	<i>Gastrolobium bidens</i>	652
var. <i>angustifolium</i>	692	<i>Gastrolobium bilobum</i>	639
<i>Callistachys acuta</i>	678	var. <i>angustifolium</i>	639
<i>Callistachys atropurpurea</i>	689	<i>Gastrolobium bracteolosum</i>	695
<i>Callistachys capitata</i>	678	<i>Gastrolobium brevipes</i>	642
<i>Callistachys coriacea</i>	687	<i>Gastrolobium brownii</i>	662
<i>Callistachys cuneata</i>	703	<i>Gastrolobium callistachys</i>	636
<i>Callistachys heterophylla</i>	660	<i>Gastrolobium calycinum</i>	669
<i>Callistachys linearis</i>	677	<i>Gastrolobium capitatum</i>	678
<i>Callistachys ovalifolia</i>	687	<i>Gastrolobium celsianum</i>	696
<i>Callistachys oxylobioides</i>	679	<i>Gastrolobium congestum</i>	642
<i>Callistachys parviflora</i>	643	<i>Gastrolobium cordatum</i>	673
<i>Callistachys retusa</i>	676	<i>Gastrolobium coriaceum</i>	687
		<i>Gastrolobium corymbosum</i>	639
		<i>Gastrolobium crassifolium</i>	657
		<i>Gastrolobium crenulatum</i>	688

<i>Gastrolobium crispatum</i>	681	var. <i>verticillatum</i>	663
<i>Gastrolobium crispifolium</i>	667	<i>Gastrolobium ovalifolium</i> Henfry	650
<i>Gastrolobium cruciatum</i>	684	<i>Gastrolobium ovalifolium</i> (Meisn.) Lemaire	687
<i>Gastrolobium cuneatum</i>	636	<i>Gastrolobium oxylobioides</i>	670
<i>Gastrolobium cyanophyllum</i>	702	var. <i>microcarpum</i>	656
<i>Gastrolobium densifolium</i>	648	<i>Gastrolobium papilio</i>	698
<i>Gastrolobium diabolophyllum</i>	653	<i>Gastrolobium parviflorum</i>	643
<i>Gastrolobium dilatatum</i>	703	<i>Gastrolobium parvifolium</i>	659
<i>Gastrolobium discolor</i>	645	<i>Gastrolobium pauciflorum</i>	664
<i>Gastrolobium dorrienii</i>	675	<i>Gastrolobium plicatum</i>	664
<i>Gastrolobium drummondii</i>	670	<i>Gastrolobium polycephalum</i>	688
<i>Gastrolobium ebracteolatum</i>	677	<i>Gastrolobium polystachyum</i>	652
<i>Gastrolobium effusum</i>	682	var. <i>revolutum</i>	652
<i>Gastrolobium elegans</i>	703	<i>Gastrolobium praemorsum</i>	698
<i>Gastrolobium emarginatum</i>	659	<i>Gastrolobium preissii</i>	629
<i>Gastrolobium epacridoides</i>	685	<i>Gastrolobium propinquum</i>	653
<i>Gastrolobium euryphyllum</i>	630	<i>Gastrolobium pulchellum</i>	667
<i>Gastrolobium ferrugineum</i>	699	<i>Gastrolobium punctatum</i>	686
<i>Gastrolobium floribundum</i>	654	<i>Gastrolobium pusillum</i>	661
<i>Gastrolobium formosum</i>	697	<i>Gastrolobium pycnostachyum</i>	658
<i>Gastrolobium forrestii</i>	636	<i>Gastrolobium pyramidale</i> (1852)	688
<i>Gastrolobium glabratum</i>	649	<i>Gastrolobium pyramidale</i> (1853)	688
<i>Gastrolobium glaucum</i>	655	<i>Gastrolobium racemosum</i>	671
<i>Gastrolobium grandiflorum</i>	641	<i>Gastrolobium reflexum</i>	672
var. <i>luteum</i>	641	<i>Gastrolobium reticulatum</i>	686
<i>Gastrolobium graniticum</i>	638	var. <i>recurvum</i>	686
<i>Gastrolobium hamulosum</i>	670	<i>Gastrolobium retusum</i>	676
<i>Gastrolobium heterophyllum</i>	660	<i>Gastrolobium rhombifolium</i>	683
<i>Gastrolobium hians</i>	658	<i>Gastrolobium rigidum</i>	673
<i>Gastrolobium hookeri</i>	663	<i>Gastrolobium rotundifolium</i>	651
<i>Gastrolobium humile</i>	700	var. <i>angustifolium</i>	651
<i>Gastrolobium ilicifolium</i>	683	<i>Gastrolobium rubrum</i>	691
var. <i>lobatum</i>	683	<i>Gastrolobium sagittulatum</i>	669
<i>Gastrolobium involutum</i>	638	<i>Gastrolobium semiteres</i>	634
<i>Gastrolobium latifolium</i>	668	<i>Gastrolobium sericeum</i>	693
<i>Gastrolobium laytonii</i>	655	<i>Gastrolobium spathulatum</i>	665
<i>Gastrolobium leakeanum</i>	689	var. <i>latifolium</i>	665
<i>Gastrolobium lehmannii</i>	704	<i>Gastrolobium spectabile</i>	673
<i>Gastrolobium lineare</i>	636	<i>Gastrolobium spinosum</i>	629
<i>Gastrolobium linearifolium</i>	679	forma <i>angustum</i>	629
<i>Gastrolobium luteifolium</i>	690	forma <i>crassifolium</i>	629
<i>Gastrolobium makoyanum</i>	705	forma <i>oliganthum</i>	629
<i>Gastrolobium melanocarpum</i>	646	forma <i>parvifolium</i>	629
<i>Gastrolobium melanopetalum</i>	692	forma <i>typicum</i>	629
<i>Gastrolobium microcarpum</i>	656	var. <i>angustum</i>	629
<i>Gastrolobium minus</i>	693	var. <i>grandiflorum</i>	672
<i>Gastrolobium modestum</i>	694	var. <i>inermis</i>	629
<i>Gastrolobium mondurup</i>	689	var. <i>microphyllum</i>	629
<i>Gastrolobium musaceum</i>	644	var. <i>subinermis</i>	629
<i>Gastrolobium nervosum</i>	680	var. <i>triangulare</i>	632
<i>Gastrolobium nudum</i>	702	var. <i>trilobum</i>	632
<i>Gastrolobium nutans</i>	661	<i>Gastrolobium splendens</i>	705
<i>Gastrolobium obovatum</i>	663	<i>Gastrolobium stenophyllum</i>	635
var. <i>subverticillatum</i>	663	<i>Gastrolobium stipulare</i>	682

<i>Gastrolobium stowardii</i>	665	<i>Nemcia punctata</i>	686
<i>Gastrolobium subcordatum</i>	695	<i>Nemcia pyramidalis</i>	688
<i>Gastrolobium tenue</i>	674	<i>Nemcia reticulata</i>	680
<i>Gastrolobium tergiversum</i>	640	var. <i>axillaris</i>	701
<i>Gastrolobium tetragonophyllum</i>	647	<i>Nemcia retusa</i>	676
<i>Gastrolobium tomentosum</i>	649	<i>Nemcia rubra</i>	691
<i>Gastrolobium triangulare</i>	632	<i>Nemcia spathulata</i>	665
<i>Gastrolobium tricuspdatum</i>	684	<i>Nemcia stipularis</i>	682
var. <i>latifolium</i>	684	<i>Nemcia tricuspdata</i>	684
var. <i>subinerme</i>	663	<i>Nemcia truncata</i>	667
<i>Gastrolobium trilobum</i>	632	<i>Nemcia vestita</i>	691
<i>Gastrolobium truncatum</i>	667	<i>Oxylobium acutum</i>	678
<i>Gastrolobium velutinum</i>	659	<i>Oxylobium atropurpureum</i>	689
<i>Gastrolobium venulosum</i>	700	<i>Oxylobium batillum</i>	652
<i>Gastrolobium verticillatum</i>	705	<i>Oxylobium bennettsii</i>	671
<i>Gastrolobium vestitum</i>	691	<i>Oxylobium capitatum</i>	678
<i>Gastrolobium villosum</i>	647	var. <i>ternifolium</i>	687
<i>Gastrolobium whicherensis</i>	676	<i>Oxylobium coriaceum</i>	687
<i>Gastrolobium wonganensis</i>	631	<i>Oxylobium cuneatum</i>	703
<i>Jansonia formosa</i>	697	var. <i>cuneifolium</i>	703
<i>Jansonia pimeleoides</i>	697	var. <i>dilatatum</i>	703
<i>Mirbelia racemosa</i>	671	var. <i>emarginatum</i>	676
<i>Nemcia acuta</i>	678	var. <i>obovatum</i>	703
<i>Nemcia atropurpurea</i>	689	<i>Oxylobium dilatatum</i>	703
var. <i>minorifolia</i>	691	var. <i>trilobum</i>	683
<i>Nemcia axillaris</i>	701	<i>Oxylobium drummondii</i>	676
<i>Nemcia brownii</i>	662	<i>Oxylobium emarginatum</i>	675
<i>Nemcia capitata</i>	678	var. <i>major</i>	675
<i>Nemcia carinata</i>	686	<i>Oxylobium graniticum</i>	638
<i>Nemcia coriacea</i>	687	<i>Oxylobium heterophyllum</i>	660
var. <i>minor</i>	642	<i>Oxylobium kelsoi</i>	638
<i>Nemcia crenulata</i>	688	<i>Oxylobium lineare</i>	677
<i>Nemcia cuneata</i>	703	<i>Oxylobium melinocaule</i>	676
var. <i>cuneifolia</i>	703	<i>Oxylobium nervosum</i>	680
var. <i>dilatata</i>	703	<i>Oxylobium obovatum</i>	703
var. <i>drummondii</i>	676	var. <i>angustatum</i>	703
var. <i>obovata</i>	703	var. <i>latifolium</i>	703
<i>Nemcia dilatata</i>	703	<i>Oxylobium ovalifolium</i>	687
<i>Nemcia dorrienii</i>	675	<i>Oxylobium parviflorum</i>	643
<i>Nemcia effusa</i>	682	var. <i>revolutum</i>	646
<i>Nemcia emarginata</i>	675	var. <i>stenocarpum</i>	644
<i>Nemcia epacridioides</i>	685	<i>Oxylobium racemosum</i>	671
<i>Nemcia heterophylla</i>	660	<i>Oxylobium reticulatum</i>	679, 680
<i>Nemcia hookeri</i>	663	var. <i>gracile</i>	701
<i>Nemcia ilicifolia</i>	683	<i>Oxylobium retusum</i>	687
<i>Nemcia leakeana</i>	689	var. <i>minus</i>	642
<i>Nemcia lehmannii</i>	704	<i>Oxylobium rigidum</i>	673
<i>Nemcia luteifolia</i>	690	<i>Oxylobium spectabile</i>	673
<i>Nemcia obovata</i>	663	<i>Oxylobium tetragonophyllum</i>	647
<i>Nemcia parviflora</i>	643	<i>Oxylobium tricuspdatum</i>	661
<i>Nemcia pauciflora</i>	664	<i>Oxylobium virgatum</i>	676
<i>Nemcia plicata</i>	664	<i>Podolobium coriaceum</i>	687
<i>Nemcia pulchella</i>	667		