# New species and taxonomic changes in *Grevillea* (Proteaceae: Grevilleoideae) from south-west Western Australia

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## Abstract

Olde, Peter M. and Marriott, Neil R. New species and taxonomic changes in *Grevillea* (Proteaceae: Grevilleoideae) from south-west Western Australia. Nuytsia 9 (2): 237-304 (1993). Eight new species and 8 new subspecies are described; 3 currently accepted subspecies are raised to specific rank; 1 species currently in synonymy is reinstated at specific rank. Keys are provided to enable separation from closely related species. An index to taxa is given on page 304.

## Introduction

This paper presents some of the results of our ongoing studies in the genus *Grevillea*. These studies have involved extensive field work over a period of four flowering seasons as well as relevant herbarium studies, particularly on specimens at NSW and PERTH. With the exception of *G. coccinea* subsp. *lanata,* all taxa have been studied as natural populations. Keys are provided where small, closely related groups are involved. Conservation codes follow those required by the Department of Conservation and Land Management, Western Australia. Synonymy and typification details where applicable are drawn from McGillivray (1993).

Eight new species are described: *Grevillea adpressa* P. Olde & N. Marriott, *G. althoferi* P. Olde & N. Marriott, *G. corrugata* P. Olde & N. Marriott, *G. crowleyi* P. Olde & N. Marriott, *G. prominens* P. Olde & N. Marriott, *G. pythara* P. Olde & N. Marriott, *G. rara* P. Olde & N. Marriott and *G. superba* P. Olde & N. Marriott. Eight new subspecies are described: *G. coccinea* Meissn. subsp. *lanata* P. Olde & N. Marriott, *G. curviloba* McGillivray subsp. *incurva* P. Olde & N. Marriott, *G. dryandroides* C.A. Gardner subsp. *hirsuta* P. Olde & N. Marriott, *G. haplantha* F. Muell. ex Benth. subsp. *recedens* P. Olde & N. Marriott, *G. insignis* Kippist ex Meissn. subsp. *elliotii* P. Olde & N. Marriott, *G. pilosa* A.S. George subsp. *redacta* P. Olde & N. Marriott, *G. synapheae* R. Brown subsp. *pachyphylla* P. Olde & N. Marriott, *G. thyrsoides* Meissn. subsp. *pustulata* P. Olde & N. Marriott. Three currently accepted subspecies *G. pilosa* A.S. George subsp. *dissecta* McGillivray, *G. acrobotrya* Meissn. subsp. *uniformis* McGillivray, *G. disjuncta* F. Muell. subsp. *dolichopoda* McGillivray are respectively raised to specific rank as *Grevillea dissecta* (McGillivray) P. Olde & N. Marriott, *G. uniformis* (McGillivray)

P. Olde & N. Marriott, and *G. dolichopoda* (McGillivray) P. Olde & N. Marriott. One species, *G. flexuosa* (Lindley) Meissn., referred to synonymy by McGillivray (1993), is reinstated at specific rank.

The paper is divided into 6 parts. Part 1: species 1-5 (*G. curviloba, G. rara, G. corrugata, G. adpressa, G. uniformis*), species referable to Section 11 *Manglesia sensu* Bentham. This group is distinguished in having pedicels elongate, filiform; perianth actinomorphic; pistils very short (2.5-6.5 mm long), glabrous and with styles strongly constricted above the ovary below a conspicuous dilation beyond which the style tapers to a conical style-end; fruits oblong-ellipsoid. Part 2: species 6-8 (*G. synapheae, G. flexuosa, G. prominens*) , species referable to Section 9 *Conogyne sensu* Bentham. This group is distinguished by its conflorescences with development basipetal, perianth strongly curled in young bud; pistils glabrous, <10 mm long with styles retrorse to sigmoid after anthesis and with an erect, conical pollen-presenter; nectary absent. Part 3: species 9-12 (*G. thyrsoides, G. dryandroides, G. crowleyi, G. coccinea*), species referable to Section 1 *Eugrevillea* Series 2 *Hebegyne sensu* Bentham. This group is distinguished by its conflorescences usually secund; perianth zygomorphic and glabrous on the inner surface; ovary densely hairy and either sessile or shortly stipitate; fruits with an indumentum of reddish or purple-coloured stripes or blotches. Part 4: species 13-15 (*G. pilosa, G. dissecta, G. insignis*). This assemblage was partially placed by McGillivray (1993: 454) in his Group 12. These species have conflorescences with development basipetal; torus very oblique; ovarian stipe adnate at its base to the inside of the torus, usually refracted at right angles at the upper margin of the torus; perianth zygomorphic, the tepals strongly ridged, the limb with segments impressed along their margins; ovary densely hairy; fruits oblong-ellipsoid with bony pericarp. Part 5: species 16-17 (*G. haplantha, G. dolichopoda*). These species are referable to Section 1 *Eugrevillea* Series 3 *Plagiopoda sensu* Bentham, a group distinguished by its leaves simple and entire, conflorescences axillary or cauline and generally few-flowered; torus oblique; perianth zygomorphic, dilated at the base, hairy on both surfaces; ovary densely hairy, shortly stipitate; pollen-presenter very oblique to lateral. Part 6: species 18-20 (*G. althoferi, G. pythara, G. superba*); a group of three unrelated species whose affinities are discussed within the text.

New taxa are described at specific and subspecific ranks some of which have not been previously recognised. Perhaps the most controversial aspect of the paper will be the decision to rank at specific rank three taxa recently described at subspecific rank (McGillivray 1986), to restore one species from synonymy and to recognise taxa at both specific and subspecific rank that have been treated informally in the recently published revision of the genus (McGillivray 1993). As this paper will be followed by a book on the genus by the two authors in which other similar changes may be made and further new taxa will be either restored or newly described, it is proper and reasonable that a brief outline of our species concept be given in order that the reasons for our actions can be understood and our position in relation to the McGillivray revision can be evaluated.

We should make it clear from the outset that our treatments are not intended to diminish McGillivray's revision, which stands as a taxonomic document of significant internal integrity, erudition and research and will remain the standard reference for many years against which we and others can make valid taxonomic comparisons. Rather, we put forward a different perspective in the admittedly more subjective area of interpretation and ranking which reflects our adoption of a somewhat narrower, biologically orientated species concept as the basic unit of practical human recognition. To some extent, this approach is more concordant with historically accepted species concepts within the genus. Therefore we do not argue anything particularly new, nor do we assert any empirical error on the part of others but rather our disagreement centres on the classification

hierarchy erected, especially in relation to populations in sympatry, and the broad concepts adopted in relation to some species *sensu* McGillivray, many of which might better be regarded as taxonomically unresolved super-species.

We would assert that a classification hierarchy should be founded on the dictum that reproductively isolated, self-reproducing populations exhibiting morphological consistency (that is morphologically discontinuous from other closely related populations) should be regarded as species, irrespective of the kind and degree of morphological distinction. It is therefore axiomatic to our species concept that when such populations occur sympatrically and most especially where sympatric occurrence occurs more than once, then these populations represent biological species. There is thus an implication that one centred on the phenetic similarity of flowers alone or one requiring too high a level of discontinuity is liable to distort the biological reality and although useful in the elucidation of phylogeny, often obscures discontinuity exhibited in other, sometimes more obscure but equally valid features such as habit, leaf and fruit morphology, flowering time, flower and foliage colour, floral orientation and ontogeny, and pollinators (often yet to be ascertained).

Ranking of allopatric populations exhibiting only slight morphological discontinuity may involve a degree of subjective assessment and needs to be balanced against the number of populations involved, the degree of variation and the number of other closely related species accepted. Here we would acknowledge the value of the rank of subspecies or variety or a mixture of the two. In this system, some morphological overlaps can be tolerated between discrete infraspecific populations. Indeed, they are perhaps desirable and add support to their conspecific assignation. For practical purposes, however, these populations should nonetheless be visually recognisable as different. We would assert that, at least in Western Australia, it is reasonable to assume reproductive isolation in geographically disjunct populations, as it is a matter of direct observation, at least in Proteaceae, that there is a very low degree of genetic interchange among wild populations. Even in Section *Manglesia sensu* Bentham, which is often claimed to be genetically labile, it has been our observation that, by and large, the group consists of reproductively isolated wild species, exhibiting no greater tendency to hybridise than species in other groups.

The narrower, biologically based species concept which we apply necessitates recognition of a much greater number of taxa at specific rank than does a conceptually broad one. Widened species circumscriptions tend to obscure polymorphism and sometimes even create polyphyletic, biological entities, even when some infraspecific recognition is accorded them. The priority for us is to describe all taxa and thus give a clearer picture of the biological entities involved. Some might misinterpret this as an obsession with naming. However, we would reply that formal rather than informal nomenclature is more satisfying to the end-user in that it validates perceptions of the biological diversity observed, provides a better avenue of communication and very often leads to a different legal and conservation imperative.

McGillivray (1993) has delimited and provided data about a large number of informal entities, which *prima facie* in our concept, warrant more formalised nomenclature. In some cases, our research has provided additional evidence to strengthen his observations. In others, it has confirmed the reality of the biological entity to which the clues provided by McGillivray point, without providing any new evidence.

Along with a number of other authors, we have enjoyed, from 1986 to 1990, privileged consultatory rights to the manuscript of the *Grevillea* revision (McGillivray 1993) through the kind

permission of its author. This revision has acted as a foundation stone and catalyst to our own work and enabled us to progress exponentially in knowledge about this beautiful genus. Although our views are now, in some instances, at variance with those of its author, Mr McGillivray has continued to promote our interest, encouraged us to develop our critical faculties beyond their early rudimentary state and, both then and now, urged us to form our own views in the interest of advancing knowledge.

## Morphology and methods

Species descriptions and terminology follow McGillivray (1993) and measurements have been made on most character states used in this revision to enable objective comparison. In that revision, the indumentum term 'tomentose' is defined as a moderately dense, often untidy indumentum of ascending hairs, more or less intermediate between subsericeous and subvillous. This more restricted usage applies to a condition frequently found in *Grevillea* (McGillivray 1993: 11). Other morphological terms follow those given in a prior paper (Olde & Marriott 1993: 401) and in Hewson (1988).

All taxa have been re-measured using dried specimens at PERTH and NSW as well as our own collections. Where large numbers of specimens are involved, approximately 20 were first measured to gain upper and lower limits and compared with measurements given in McGillivray (1993). They were then compared by visual check with all other specimens to check conformity. Where small numbers of specimens were involved, all were measured. Re-measurement has provided significant differences in the measures of some character states for some species.

Perianth length is the distance measured at right angles from the mid-point of the torus to the top of the flower. In zygomorphic flowers this is usually where the perianth curves, not the apex of the limb.

**1. Grevillea curviloba** McGillivray in New Names in Grevillea: 4 (1986). (Figure 1)

Replaced synonym (McGillivray 1986: 4) *Grevillea vestita* var. *angustata* Meissn. in Lehmann [ed.], Pl. Preiss. 1: 549 (1845), 'ß* angustata'. *Lectotype* (McGillivray 1993: 412): Swan River, *Drummond* 1839 (lecto: photo seen, G-DC; isolecto: *(n.v.)* [*J. Drummond* I. 622]: CGE, G, MEL 52541, P).

*Grevillea diversifolia* var. *rigida* Meissn. in Candolle, Prodr. 14: 368 (1856), '* rigida'. *Lectotype: (n.v.)* (*fide* McGillivray 1993: 412) Drummond Coll. 1848 n. 286! hb. Shuttl. (lecto: NY - packet at left of sheet; isolecto: [*Drummond* IV, 286] CGE, G, K - (Neg. No. Kew 2312), MEL 47020, P - 2 sheets, TCD.

*Juveniles*: prostrate, sprawling, dense shrubs with sparsely sericeous foliage. *Adults:* prostrate to erect shrubs 0.1-2.5 m high, 1-2 m wide, with weakly ascending to erect floral branches; branchlets slightly angular, brittle, glabrous or sparsely tomentose, slightly ridged. *Leaves* pale green, 1-5.2 cm long, < 1.5 cm wide, sessile to shortly petiolate, crowded, pinnatifid and usually obovate-cuneate in outline or secund-subpinnatisect; leaf rachis medially grooved, straight to incurved; primary lobes 3-5, ascending, sometimes with secondary or tertiary division; ultimate lobes 0.4-1.5 cm long, 0.7-1.5 mm wide, triangular to linear, straight to incurved, scarcely pungent, the basal lobes of pinnatisect leaves (3.5)6-20 mm from the axis of attachment, the intervening rachis with revolute margin on either side except at the axis; upper surface glabrous or sparsely sericeous, the venation obscure, usually grooved along the midvein of leaves and lobes; lower surface exposed and glabrous or sprinkled with

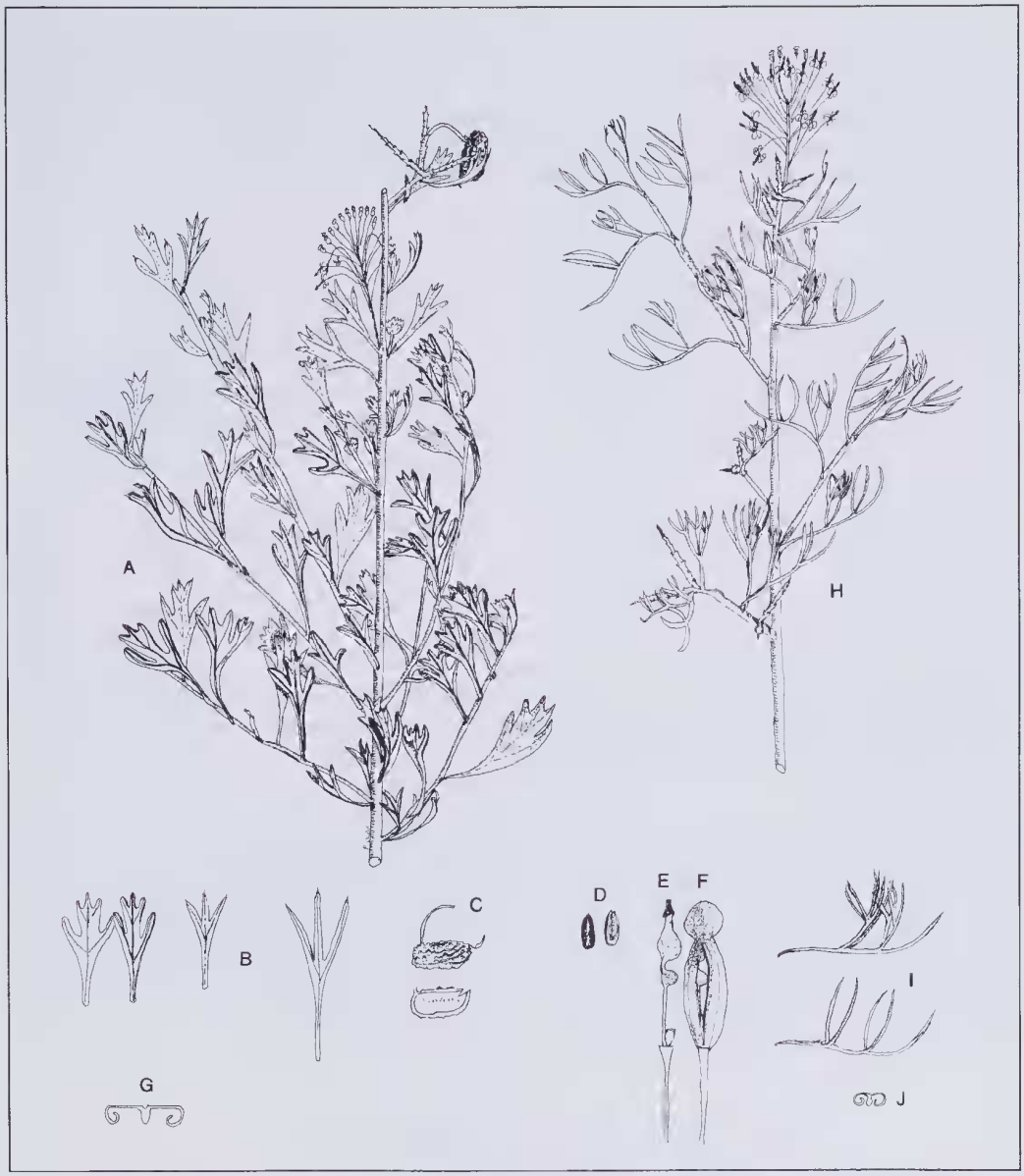


Figure 1. *G. curviloba* subsp. *curviloba* A - habit, B - leaf shapes, C - fruit, D - seed, E - pistil, F - perianth, G - cross-section of leaf lobe. *G. curviloba* subsp. *incurva* H - habit, I - leaves, J - cross-section of leaf lobe.

appressed hairs, sometimes mostly enclosed and obscured by the margin except at the sinuses or beside the midvein, the midvein and lateral veins smoothly rounded, protuberant and surmounted on raised lamina; margin smoothly recurved to loosely revolute, not firmly abutting the midvein over its entire length. *Conflorescence* sessile, mostly axillary, sometimes terminal, mostly on conspicuous floral branches, simple to 5-branched at the base; unit conflorescence 1-3 cm long, 1.5-2.5 cm wide at the base, ovoid to subglobose, loose, usually partially exceeding the foliage, development acropetal; floral rachis 1-3 cm long, glabrous, sometimes sparsely tomentose at the base, usually much-thickened after anthesis; floral bracts 1.5-3 mm long, 1.5-3 mm wide, imbricate, ovate-cupuliform

to oblong-ovate or ovate-acuminate, glabrous to sparsely tomentose outside with ciliate margins, caducous. *Flowers* usually glabrous: pedicels 7-10 mm long; nectary erect, U-shaped to oblong with the apex slightly lipped, extending 0.1-0.2 mm above the toral rim; *perianth* white to cream, 3.5-4 mm long 0.8-1 mm wide, actinomorphic, oblong-obovoid below the limb, rarely a few hairs below the limb inside; tepals medially ribbed, separating below the limb before anthesis, free to the base and rolling back after; limb 1 mm long, 1.5 mm wide, ovoid to subglobose, the apex sometimes depressed, the segments ribbed, firmly enclosing the style-end before anthesis; pistil 3.5-6.5 mm long; stipe 1.4-2 mm long; ovary c. 1 mm long, globose; style white, constricted above the ovary below an abrupt and conspicuous dilation, the zone of constriction 0.2-0.5 mm long, the dilation ovoid 0.5-0.7 mm wide, again contracted beneath a slightly expanded style-end; pollen-presenter erect, conical, its base 0.5-0.6 mm wide, oblique, wider than the style; stigma 0.1-0.2 mm across. *Fruit* 10-13 mm long, 6-9 mm wide, oblong-ellipsoid, echinulo-rugose with irregular raised asperities sometimes joined in continuous ridges; pericarp 0.9-1.2 mm thick. *Seed* 7-9 mm long, 3-3.5 mm wide, obovoid to ellipsoid with a shortly apiculate or tapered apex and base, biconvex; outer face shiny, slightly wrinkled; inner face with a broad, waxy border surmounted by a smooth, central elliptic section.

*Affinities. G. curviloba* is closely related to a number of species including *G. corrugata, G. paniculata, G. phanerophlebia, G. rara* and *G. vestita*, for which a key is provided (Key 1, see page 250). The diagnostic features that enable sure identification of *G. curviloba* are: ascending to erect floral branches; branchlets glabrous or sparsely tomentose; leaves with obscure venation on the upper surface and usually grooved along the midvein, the undersurface either clearly exposed or visible at the sinuses or beside the margin and with protuberant rounded veins surmounted on raised lamina, margin loosely revolute; floral rachises glabrous in the apical half and usually thickened after anthesis; floral bracts broadly ovate, glabrous or almost so except the margins ciliate; fruits strongly rugose and enlarged with pericarp 0.8-1.2 mm thick.

*Discussion.* There are two visually distinct morphological entities in *G. curviloba*. Field collections and herbarium study of these entities show that they occur in homogeneous populations that are geographically disjunct, admittedly by only a few kilometres. Both entities grow in grey sand in winter-wet, low-lying depressions in heath. This species has high horticultural usage and conservation value and, as there is considerable confusion as to the identity of one of these entities, we consider it appropriate to divide the species into two subspecies, subsp. *curviloba* and subsp. *incurva* P. Olde & N. Marriott. Re-measurement of specimens showed considerable quantitative differences to those given for floral bract and pistil length in McGillivray (1993).

### Key to subspecies of *Grevillea curviloba*

1 Leaves usually pinnatifid, sometimes subpinnatisect but with broad sinuses and with the leaf undersurface clearly exposed; simple leaves or primary leaf lobes > 1.5 mm wide, mostly obovate-cuneate with ascending lobes, sometimes linear; secondary division mostly lacking or -fid if present ..... subsp. *curviloba*

1* Leaves secund-subpinnatisect, the undersurface either not visible or very inconspicuously so at the sinuses or beside the midvein; primary leaf lobes 0.8-1.2 mm wide, narrow-linear to subulate; secondary -sect division of the basal vegetative leaves usually present ..... subsp. *incurva*

**Grevillea curviloba** subsp. **curviloba**

Leaves 1.5-5 cm long, mostly pinnatifid, obovate-cuneate and coarsely divided either with apical toothing or more deeply cleft with strongly ascending lobes, rarely simple, entire and linear; simple leaves or leaf lobes mostly 1.5-2 mm wide, triangular to narrowly so, occasionally a deeply cleft lobe with -fid division of the apex; undersurface exposed over most of its area, glabrous or sparsely tomentose; pistil 3.5-4.5 mm long.

*Selected specimens* (6 examined). WESTERN AUSTRALIA: Warbrook Rd, South of Bullsbrook, *Olde* 91/78, 12 Sep. 1991 (NSW); RAAF base, Bullsbrook, *Olde* 88/63, 9 Oct. 1988 (NSW); 2 km N of Bullsbrook, *Olde* 86/283, 9 Sep. 1986 (NSW); Between Wanneroo and Bullsbrook at railway crossing, *Olde* 88/61, 9 Oct. 1988 (NSW); Bullsbrook, *Demarz* 3945, Oct. 1972 (PERTH); Bullsbrook, *Morrison*, 14 Aug. 1900 (PERTH).

*Distribution.* Restricted to an area near Bullsbrook, where often scattered in degraded situations.

*Habitat and ecology.* Winter-wet heath in grey sand. The flowers are attended by numerous insects, including wasps.

*Flowering period.* Spring.

*Affinities.* In the overall outline of its leaves, subsp. *curviloba* is most closely allied with *G. vestita* (Endl.) Meissn. subsp. *vestita*. Indeed, *G. vestita* var. *angustata* Meissn. is the replaced synonym of *G. curviloba*. Endlicher's (Endlicher 1839: 26) original description is worth noting in part, 'foliis ...cuneatis apice trifidis' (the leaves...cuneate, apically trifid) as well as Meissner's (Meissner 1845: 549) description of var. *angustata*...'lobis dimidium laminae aequantibus v. superantibus' (the lobes cleft about half the length of the lamina or a little more). The visual similarity of its leaves notwithstanding, *G. vestita* differs from *G. curviloba* in its villous branchlets, its leaves densely hairy on the undersurface, its persistent floral bracts and in its smooth fruits.

*Conservation status.* CALM Priority One.

**Grevillea curviloba** subsp. **incurva** P. Olde & N. Marriott subsp. nov.

A subspecie typica foliis secundis, subpinnatisectis, foliorum lobis incurvis angustioribus (0.8-1.2 mm latis) cum lamina infra ab margine revoluta pro parte maxima occulta differt.

*Typus:* Western Australia: Steer St, Muchea, *P. Olde* 92/108, 26 Sep. 1992 (holo: NSW; iso: PERTH).

Differs from the type in its secund, subpinnatisect leaves, the lobes narrower (0.8-1.2 mm wide) and incurved, the leaf undersurface almost entirely enclosed by the revolute margin.

Leaves 1.8-5.2 cm long, secund, tripartite to bipinnatisect, the first lobe arising 6-32 mm from the leaf base, with three to five narrow-linear primary lobes, sometimes the lower lobes bi- or trisect; ultimate lobes 7-20 mm long, 0.8-1.2 mm wide, strongly incurved, narrow-linear to subulate, weakly pungent; lower surface bisulcate, the lamina either obscured by the margin or almost so; pistil 4-6.5 mm long.

*Selected specimens* (10 examined). WESTERN AUSTRALIA: Brand Hway, Muchea, *Olde* 86/632, 25 Sep. 1986 (NSW); Near Muchea, *McGillivray* 3273 & *George*, 10 June 1976 (NSW, PERTH); Muchea Townsite Reserve, *Keighery & Alford* 83, 27 Aug. 1985 (PERTH); 1 mi. N of Muchea, *Newbey* 1674, 26 Aug. 1964 (PERTH); Muchea, *Steedman*, Sep. 1927 (PERTH).

*Distribution.* Western Australia, near Muchea.

*Habitat and ecology.* Winter-wet heath in grey sand. The flowers are attended by numerous insects, including wasps.

*Flowering period.* Late Winter-early Spring.

*Affinities.* There is a very close relationship with *G. rara.* The distinguishing features are listed in Table 1 (see page 246).

*Notes.* The description of subsp. *incurva* regrettably results in a further modification to the name of a widely cultivated taxon which has been, for many years, misidentified as *G. biternata* Meissn.

*Conservation status.* As for subsp. *curviloba.*

*Etymology.* The subspecific epithet is derived from the Latin *incurvus* - curved inwards, in reference to the leaf lobe curvature.

**2. Grevillea rara** P. Olde & N. Marriott sp. nov. (Figure 2)

Ad *Grevilleam curvilobam* McGillivray affinis sed ramulis dense tomentosis, rhachidibus conflorescentiarum omnino tomentosis, foliorum lobis plerumque angustioribus (0.3-0.8 mm latis) lamina subtus non exposita, pedicellis brevioribus (3.5-4.5 mm longis), nectario obscuro differt.

*Typus:* Western Australia: 14.5 km N of Collie on road to Tallanalla, 33° 11'S, 116° 08'E, *P.M. Olde* 86/1008, 31 Oct. 1986 (holo: PERTH; iso: NSW).

Aff. *Grevillea curviloba* McGillivray, but differs in its densely tomentose branchlets, its floral rachises entirely tomentose, in its mostly narrower leaf lobes (0.3-0.8 mm wide), the lamina on the undersurface not exposed, in its shorter pedicels (3.5-5 mm long) and in its obscure nectary.

*Juveniles:* prostrate sprawling densely foliaged shrubs with young leaves sericeous. *Adults:* dense, prickly, irregular shrubs to 2 m high, 1 m wide; branches irregularly spreading, dense to the ground; branchlets angular to smoothly rounded, densely tomentose-pubescent. *Leaves* 1.5-2.5 cm long, <1.5 cm wide, ascending to erect, sessile to shortly petiolate, crowded, secund-subpinnatisect, sometimes the apical lobe divaricate; leaf rachis medially and longitudinally channelled, straight to slightly incurved along its axis or, very often slightly refracted or recurved at the junction of the nodes, the axis between the nodes slightly incurved; primary leaf lobes 3-5, ascending, sometimes with secondary bi- or tripartite division, the apical lobe simple; ultimate lobes 0.4-2 cm long, 0.3-0.8 mm wide, narrow-linear, straight to very slightly incurved, apex scarcely pungent, the basal lobes 5-7 mm from the axis of attachment and with a narrow, tightly revolute margin abutting the rachis on either side; upper surface smooth, glabrous, the venation obscure; lower surface bisulcate, the lamina enclosed by the margin, the grooves glabrous, the midvein rounded, level with or raised slightly above the abutting margin; margin smoothly revolute. *Conflorescence* 1-2 cm long, 1-1.5 cm wide, sessile to shortly pedunculate, terminal or axillary and crowded in the upper axils, simple, shortly cylindrical

to subglobose, dense, scarcely to not exceeding the foliage, development acropetal; floral rachis 1-1.5 cm long, tomentose; floral bracts 1.2 mm long, 1.2-1.8 mm wide, imbricate, broadly ovate-cupuliform to almost square, tomentose or sparsely so outside with ciliate margins, caducous. *Flowers* glabrous; pedicel 3.5-5 mm long; torus 0.5 mm across, oblique at c. 10-30°; nectary obscure, extending 0.1 mm above the toral rim; *perianth* white to pale pink, all white at anthesis, 3-3.5 mm long, 0.8 mm wide, actinomorphic, narrowly oblong-obovoid, slightly constricted below the much broader limb; tepals medially ribbed, separating below the limb before anthesis, becoming free to the base and rolling independently back after; limb 1 mm long, 1.3-1.5 mm wide, spheroidal, apically depressed, the segments ribbed, firmly enclosing the style-end before anthesis; *pistil* 3.5 mm long; stipe 1.5 mm long, flexuous, inserted on the dorsal rim of the torus; ovary 0.8 mm long, subglobose; style white with occasional pink tinges on the pollen-presenter, constricted for 0.2-0.5 mm above the ovary, then dilating 0.3-0.5 mm wide, the dilation ovoid to almost cylindrical, tapered to 0.3 mm wide just below the style-end; pollen-presenter 0.5-0.6 mm long, erect, truncate-conic to subcylindrical, the base 0.5 mm wide, slightly oblique and scarcely broader than the style; stigma 0.3 mm wide. *Fruits* oblong-ellipsoid, rugose on young fertilised ovaries. *Seeds* not seen.

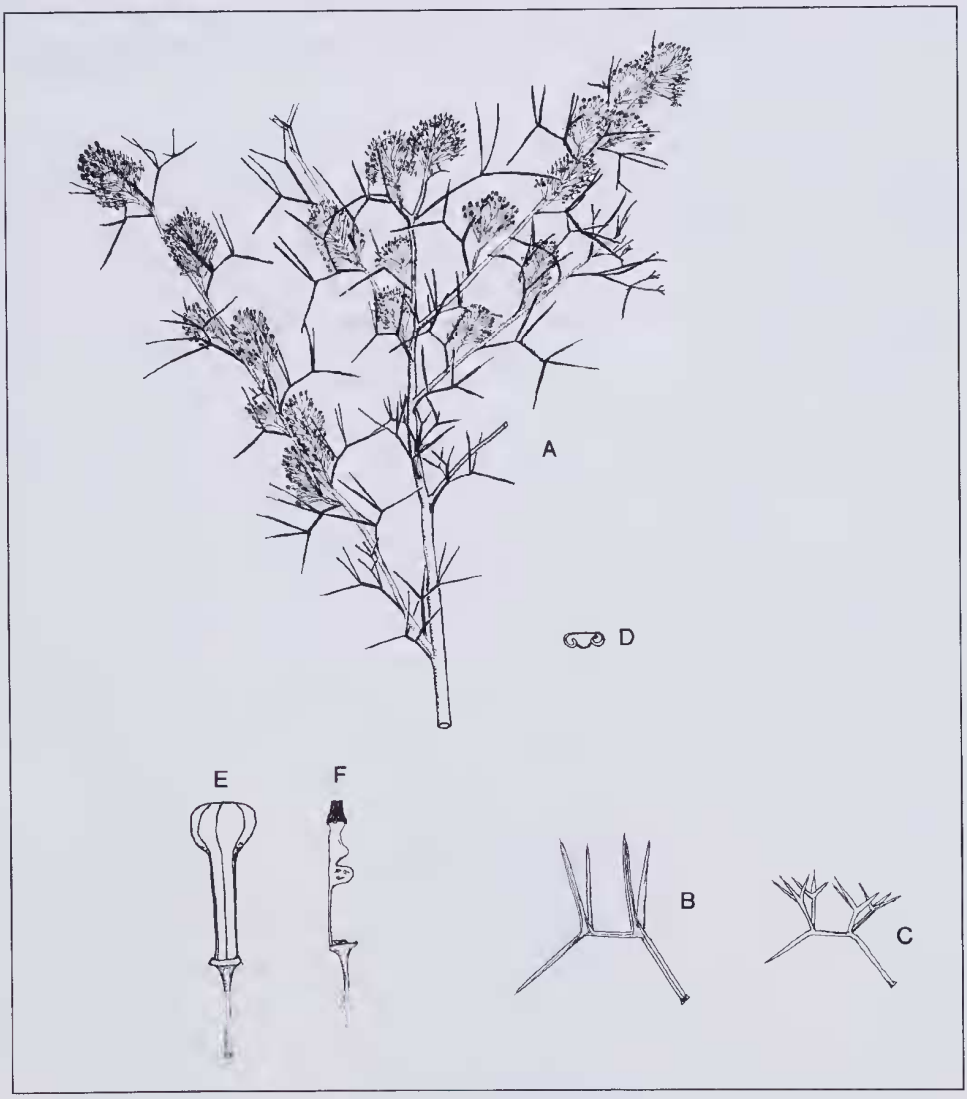


Figure 2. *G. rara* A - habit, B, C - leaves, D - leaf lobe in cross-section, E - perianth, F - pistil.

*Distribution.* Western Australia: known only from 2 sites approximately 1 km apart, at 14.5 and 15.5 km north of Collie, both of which have been flooded by the Harris River Dam.

*Habitat and ecology.* Occurs along creek lines in lateritic loam in jarrah forest. Pollination probably by insects. Regeneration appears to be from seed only.

*Flowering period.* Spring.

*Affinities.* This species is close to *Grevillea curviloba* McGillivray especially subsp. *incurva* P. Olde & N. Marriott. The differences are listed in Table 1. In *G. curviloba* subsp. *incurva* the leaf margins are revolute but do not firmly and consistently abut the midvein on the undersurface. It is unfortunate that fruits were unavailable for comparison.

The combination of important features assisting recognition of *G. rara* are: branchlets with a dense indumentum of short, ascending to spreading hairs; leaves subpinnatisect with the margin smoothly rounded and completely enclosing the undersurface, the upper surface with obscure venation, ultimate lobes < 1 mm wide, slightly divaricate, inflorescences unbranched with rachises densely hairy to the apex and pedicels 3.5-5 mm long.

*Conservation status.* A code of Priority One is recommended. Although now extinct at the Type locality, the species was propagated successfully from cuttings sent in 1986 and is being grown at Stawell, Victoria by Neil Marriott and, more recently, at Mt Annan Botanic Garden, New South Wales. Further searches along creek lines in the general area may relocate the plant in the wild.

*Etymology.* The epithet is derived from the Latin *rarus* - rare, in reference to the conservation status of this species.

**TABLE 1**

| | **G. curviloba** subsp. **incurva** | **G. rara** |
|---|---|---|
| Branchlet indumentum | absent to sparse | dense |
| Leaf lobes | 0.7-1.5 mm wide<br>incurved<br>ascending | 0.3-0.8 mm wide<br>mostly straight<br>divaricate |
| Leaf undersurface | partially exposed | obscured |
| Conflorescence | branched or simple | simple |
| Floral rachis | glabrous in the distal half | densely hairy all over |
| Pedicels | 7-10 mm long | 3.5-5 mm long |
| Nectary | prominent | obscure |
| Habitat | open heath<br>winter-wet swamp | Eucalypt forest<br>creek line |
| Soil | grey sand | lateritic loam |

**3. Grevillea corrugata** P. Olde & N. Marriott sp. nov. (Figure 3)

Ad *Grevilleam curvilobam* McGillivray affinis praecipue subsp. *incurvam* P. Olde & N. Marriott sed habitu erecto, foliis remotis latioribusque (plerumque 5-9 cm latis) inter basem et lobum infimum plerumque alatis, foliorum lobis pro parte maxima longioribus (2-2.5 cm longis) rectis divaricatisque, costa in pagina superna visibile, rhachidibus conflorescentiarum omnino tomentosis-villosis, florum bracteis extra villosis differt.

*Typus:* Western Australia: c. 10 km S of Bindoon [precise locality withheld], *P. Olde* 92/230, 4 Oct. 1992 (holo: NSW; iso: PERTH, CANB.)

Aff. *Grevillea curviloba* McGillivray especially subsp. *incurva* P. Olde & N. Marriott but differs in its erect habit, its distant leaves wider (usually 5-9 cm wide) and with the base usually winged between the lowest lobe and the base, its leaf lobes mostly longer (2-2.5 cm long), straight and divaricate, the midvein evident on the upper surface, its floral rachises tomentose-villous all over, its floral bracts villous.

*Juveniles* not seen. *Adults:* single-stemmed dense shrubs 1.5-2.5 m tall, 1.5-2 m wide with numerous spreading to ascending branches; branchlets slightly angular and conspicuously villous when very young, rounded and openly to sparsely subvillous with age, longitudinally ribbed. *Leaves* 4-6 cm long, 5-9 cm wide, ascending, sessile, subpinnatisect, sometimes tripartite or pinnate, usually biternate, occasionally the central lobe with up to 5 secondary lobes with rare tertiary bi- or tripartite division; leaf rachis channelled, straight to slightly refracted; ultimate lobes (0.8)1.5-3(3.4) cm long, 0.7-1.2 mm wide, linear-subulate, straight, pungent, the basal lobes patent to spreading; distance from axis of attachment to first lobe 2-20 mm, during branchlet elongation the distance reducing from 20 mm on first-formed leaves to 5-10 mm on the fifth-formed leaf, the intervening rachis on late-formed leaves with a strip of unfurled lamina 1-1.2 mm wide on either side of the midvein extending from basal lobe to the axis of attachment and bearing a flat margin; upper surface glabrous or sparsely tomentose, the midvein and faint edge-veins also evident on some leaf lobes; lower surface mostly enclosed by the margin but with some exposure at the sinuses or occasionally beside the midvein, glabrous or with a few wavy hairs, midvein rounded, protuberant and surmounted on raised laminal tissue; margin loose, smoothly to angularly recurved or revolute. *Conflorescences* subsessile, simple to 3-branched at the base, usually terminal on short axillary branchlets and subtended by a vegetative branchlet, sometimes axillary; unit conflorescence 1-2.5 cm long, 2 cm wide at the base, ovoid to subglobose, open, partly exceeding the foliage, development acropetal; floral rachises 0.8-2 cm long, loosely tomentose-villous; floral bracts 3.5-4 mm long, 3 mm wide, ovate-cymbiform, villous or sparsely so outside, caducous. *Flowers* mostly glabrous; pedicels 7-9 mm long; torus c. 0.5 mm across, ± straight; nectary U-shaped to sublinguiform, extending c. 0.25 mm above the toral rim, slightly lipped at the margin; *perianth* white, 4 mm long, 0.7 mm wide, actinomorphic, narrowly oblong-obovoid to ellipsoid, sometimes a few scattered, erect trichomes on the inner surface 1.5-2 mm from the base; tepals separating below the limb before anthesis, free to the base and rolling independently back after; limb 1-1.2 mm long, 1.2 mm wide, subglobose, the segments ribbed, the style completely enclosed before anthesis; *pistil* 3.5-4 mm long, glabrous; stipe 1.5 mm long, flexuous; ovary c. 1 mm long, globose; style white, constricted for c. 0.2 mm above the ovary, dilating to c. 0.5 mm wide, the dilation ovoid, tapering above to the style-end; pollen-presenter 0.5-0.8 mm long, conico-cylindrical, its base 0.4 mm wide, straight to slightly oblique, scarcely to not broader than the style, the stigma 0.25-0.3 mm wide. *Fruits* (almost mature) 7-11 mm long, 3-6 mm wide, 3-5 mm deep, ± perpendicular to the stipe, oblong-ellipsoid, echinulo-rugose with irregular raised asperities sometimes joined in

continuous ridges; style deciduous; pericarp 0.8 mm thick. *Seed* (released from immature fruit) 7 mm long, 3 mm wide, obovoid, biconvex; outer face smooth; inner face with a broad waxy intramarginal border; margin shortly recurved.

*Specimens studied.* Known only from the Type collection.

*Distribution.* Western Australia, where confined to an area near Bindoon.

*Habitat and ecology.* Grows in gravelly loam in a roadside situation in partially cleared *Eucalyptus* woodland. The species is probably insect-pollinated and regenerates from seed, judging from the number of fruits freely setting.

*Flowering period.* ?August-September.

*Fruiting period.* October-November.

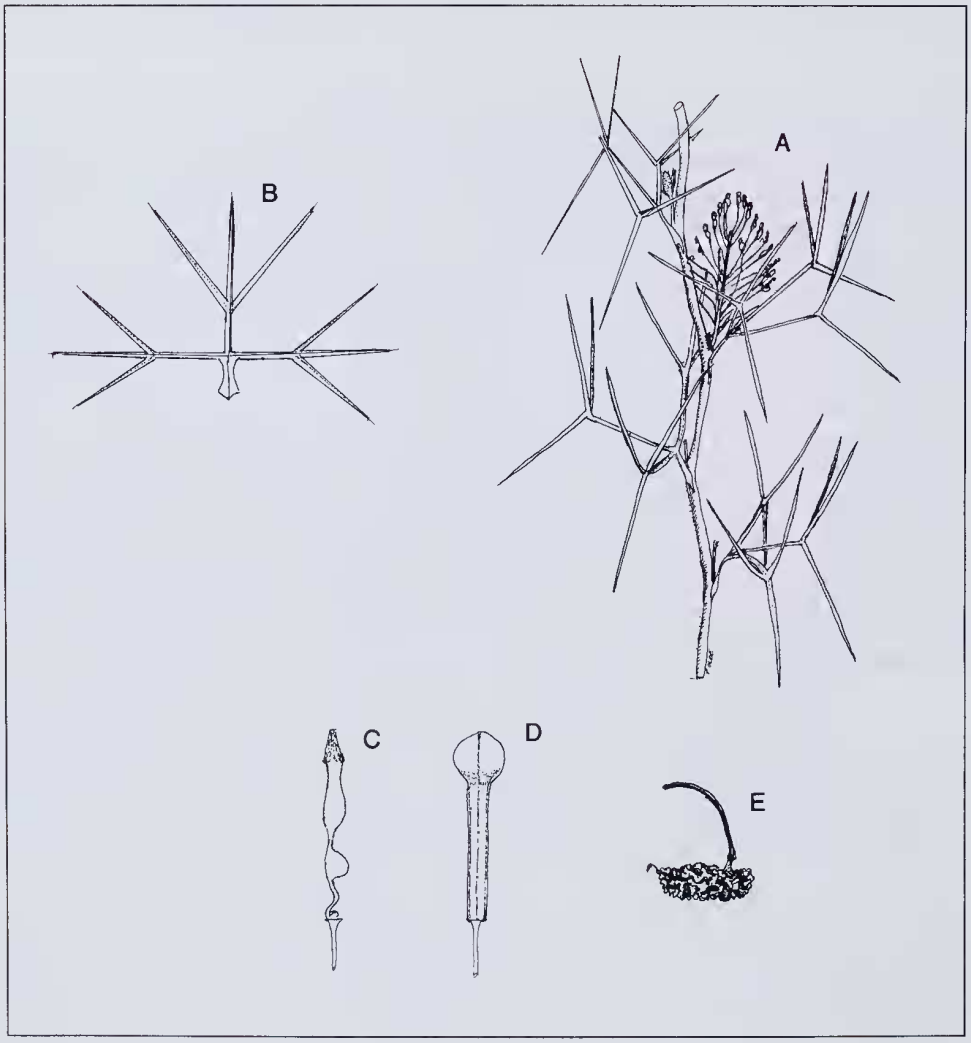


Figure 3. *G. corrugata* A - habit, B - adult leaf, C - pistil, D - perianth, E - fruit.

*Affinities. G. corrugata* is closely related to *G. curviloba*, especially subsp. *incurva*, with which it shares enlarged (*cf.* related species), strongly rugose fruits with thickened pericarp, 'loose' leaf margins leaving the undersurface at least partially exposed, smoothly rounded, protuberant midveins on the leaf undersurface. The new growth of *G. corrugata* is conspicuously villous and an overall impression of hoariness is gained about the shrub, and the pollen-presenter is conico-cylindrical with its base scarcely to not wider than the style. *G. curviloba* differs in its bushy to prostrate habit with one to several, weakly ascending to erect floral branches, its more crowded, narrower, secund leaves with the lobes incurved and usually shorter (mostly 1-1.5 cm long) and with the upper surface medially grooved and the venation obscure, its floral rachises glabrous or sometimes a few hairs at the base and its glabrous floral bracts with ciliate margins. The hairs on new growth are somewhat appressed and sparsely distributed and there is an overall impression of glabrescence about the plants. The pollen-presenter is conical to conic-apiculate with its base slightly broader than the style and its stigma more narrowed (0.1-0.2 mm across). Strongly rugose fruits are also evident on *G. paniculata* Meissn. *sens. str.* but this species differs in its thinner pericarp (c. 0.3-0.7 mm thick), its refracted leaf margins completely enclosing the leaf undersurface and in its more conspicuously conical pollen-presenter.

*Discussion.* Our reason for recognising *G. corrugata* as a distinct species lies mostly in its leaf morphology. The pattern of distance-reduction between the point of attachment and the basal lobes (reducing from 20 mm to 5-10 mm within approximately 5 leaves) as the branchlet elongates, in combination with the broad lamina on the lower rachis of late-formed leaves constitutes a clear synapomorphy in Section *Manglesia sensu* Bentham. This tissue consists of leaf lamina that unfurls at the sinus of the basal lobes and is then broadly continuous on both sides of the midvein to the point of leaf attachment. The character of unfurling lamina on subpinnatisect leaves is sometimes noted in *G. curviloba* subsp. *incurva* but only at the point of leaf attachment.

Nonetheless, the possibility that our *G. corrugata* is the product of hybridisation between *G. curviloba* and another species (?*G. vestita* (Endl.) Meissn., ?*G. phanerophlebia* Diels) cannot be discounted. However, the population of *G. corrugata*, numbering some 20-30 plants at two shortly distant sites (50-100 m) expresses itself in a morphologically consistent manner. A search of the area along the roadside (by Olde) showed that there are no other related species (Section *Manglesia sensu* Bentham) of *Grevillea* at the collection site, although part of the area had been cleared and there was some roadside disturbance.

Although there is a collection, cited by McGillivray (1993), of *G. curviloba* at Badgingarra (*Steenbohm s.n.* Sep. 1960), and some from uncertain locality (*McHard* 1883, *Drummond* 1, 622) the distribution of *G. curviloba sens. lat.* is otherwise confined to the winter-wet lowland in the Muchea and Bullsbrook area, in a habitat distinctively different and locality quite disjunct from that of *G. corrugata.*

*Conservation.* A code of CALM Priority One is recommended. The species was discovered in 1992 but a full search of the locality was not made as it is mostly private property. There are about 10-20 plants (not counted) at the Type locality although there are more at a further location a short distance along the road.

*Etymology.* Latin *corrugatus* - strongly wrinkled, in reference to the fruit surface.

## KEY 1

### Key to related species in Section *Manglesia sensu* Bentham

1 Fruits rugulose to rugose
2 Leaf undersurface enclosed, the margin firmly abutting the midvein
3 Midvein visible on the upper surface; floral bracts usually < 1 mm wide ..... *G. paniculata sens. lat.*
3* Venation obscure on the upper surface; floral bracts > 1 mm wide ..... *G. rara*
2* Leaf undersurface partially or completely exposed
4 Venation of the leaf upper surface obscure ..... *G. curviloba*
4* Venation of the leaf upper surface clearly evident
5 Leaves ± flat, coarsely divided, pinnatifid; leaf lobes triangular, extremely pungent ..... *G. phanerophlebia*
5* Leaves with divaricate, narrow-linear to subulate lobes, subpinnatisect; leaf lobes pungent
6 Leaf rachis broadly winged between the basal lobes and the leaf node on some or all leaves ..... *G. corrugata*
6* Leaf rachis not winged between the basal lobes and the leaf node ..... *G. paniculata*
1* Fruits smooth
7 Floral bracts persistent to anthesis; branchlets with a spreading indumentum; leaf lobes not linear-subulate ..... *G. vestita*
7* Floral bracts caducous; branchlets glabrous or with an appressed indumentum; leaf lobes linear-subulate ..... *G. paniculata sens. lat.*

**4. Grevillea adpressa** P. Olde & N. Marriott sp. nov. (Figure 4)

A *Grevillea amplexanti* foliorum lamina subtus hirsuta differt.

*Typus:* Western Australia; 5.6 km W of Arrino on Arrino West Rd, *P. Olde* 91/112, 16 September 1991 (holo: NSW).

Differs from *Grevillea amplexans* in its hairy leaf undersurface.

Irregular shrub to 1-2 m high, 1-2 m wide; branchlets white-sericeous or tomentose. *Leaves* 0.7-1.2 cm long, 1-1.5 cm wide, patent to spreading, sessile, amplexicaul, rhomboid to angularly ovate, broadly dentate with basal lobes consistently retrorse; venation conspicuous, palmate, the primary and sometimes secondary veins tipped by excurrent, pungent spines 1-5 mm long; reticulate venation evident, edge veins conspicuous; upper surface glabrous; lower surface white-sericeous to tomentose; margin shortly recurved to flat; texture coriaceous. *Conflorescence* axillary or terminal, pedunculate, simple or few-branched; unit conflorescence 1-3 cm long, globose, open, development acropetal; peduncles and floral rachises glabrous or almost so; floral bracts ± 2 mm long, ovate to lanceolate, ciliate, rarely persistent to anthesis. *Flowers* white with brown limb, glabrous; pedicels 7-12 mm long; torus 0.5-1 mm across, straight to slightly oblique at 30°; nectary scarcely evident; *perianth* 3.5-5.5

mm long, 0.7-0.8 mm wide, white, actinomorphic, oblong-obovoid below the limb, a few trichomes sometimes at the base inside; limb 1.5 mm wide, brown, globose to subovoid, the segments ribbed; *pistil* 2.5-5.8 mm long; stipe 1-2.5 mm long, flexuose; ovary globose; style white, constricted immediately above the ovary, the zone of constriction 0.1-0.3 mm long, then dilated, the dilation globose to cylindrical, 0.5-1 mm wide; pollen-presenter conical, its base 0.6-1 mm wide, straight, broader than the style. *Fruits* 9-12 mm long, 5 mm wide, 5 mm deep, ± perpendicular to the stipe on curved pedicels, oblong-ellipsoidal, smooth; style shortly persistent; pericarp 0.5 mm thick throughout. *Seed* 5.5-6 mm long, 2.5 mm wide, elliptic with a membranaceous border on the inner face, otherwise smooth.

*Selected specimens* (5 examined). WESTERN AUSTRALIA: Arrino, *Speck s.n.*, 23 Sep. 1953 (PERTH); 20 km from Three Springs on road to Eneabba, *McGillivray* 3307 & *George*, 11 June 1976 (NSW, PERTH); 9 km N of Watheroo, *Woolcock* G26, 15 Aug. 1985 (PERTH).

*Distribution.* Western Australia, from Arrino to Watheroo.

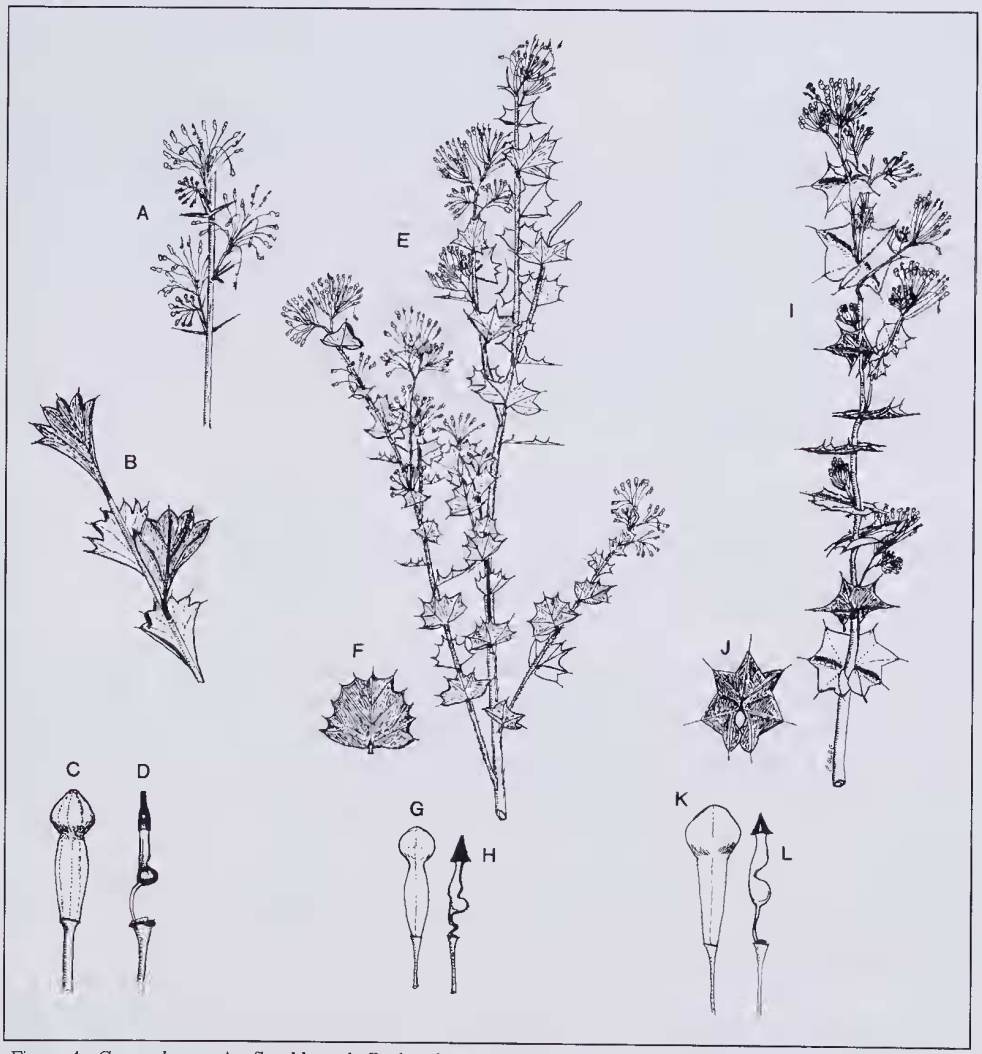


Figure 4. *G. acrobotrya* A - floral branch, B - basal leaves, C - perianth, D - pistil. *G. uniformis* E - habit, F - leaf, G - perianth, H - pistil. *G. adpressa* I - habit, J - leaf, K - perianth, L - pistil.

*Habitat and ecology.* Yellow sand-heath or brown gravelly loam. Flowers are insect-pollinated. Plants regenerate from seed after fire.

*Flowering period.* Winter-early Spring.

*Conservation status.* Not endangered.

*Affinities. G. adpressa* is most closely related to *G. amplexans* F. Muell.,*G. phanerophleba* Diels, *G. vestita* (Endl.) Meissn. and *G. acrobotrya* Meissn., the last prior to this paper comprising two subspecies, subsp. *acrobotrya* and subsp. *uniformis* McGillivray (McGillivary 1986). Both *G. vestita* and *G. acrobotrya* also have smooth fruits. Both *G. amplexans* and *G. adpressa* are distinguished by amplexicaul leaves which have the lamina clearly exposed on the undersurfacc and the basal leaf lobes strongly retrorse.

*Discussion.* McGillivray (1993: 175-176) recognises two forms of *G. amplexans*, the glaucous form and the hairy-leaved form, (the latter more or less conspecific with our *G. adpressa*), and notes the possibility of a third. Field research shows that the two recognised forms *sensu* McGillivray are represented in morphologically consistent populations that occur in an irregular, geographic replacement pattern throughout the range. We consider, following additional studies of all specimens at PERTH and our own, that two species should be recognised. The only attribute distinguishing the two populations is the presence or absence of indumentum on the leaf undersurface, although a tendency to robustness was observed in the habit of *G. amplexans* (the glaucous form *sensu* McGillivray). In a transect over 60 km along Watheroo Rd between Brand Highway and Midlands Rd, every population was physically searched and examined. At no time did we find mixed populations. However the distributions overlap continuously over their range and the probability of reproductive isolation in sympatry is very high. Species rank is therefore considered more appropriate. We were unable to ascertain any underlying association which might attach to one species occupying any particular habitat, although populations of one or the other tended to predominate over geographic areas.

*Grevillea amplexans* has a glabrous leaf undersurface and usually has glabrous and sometimes glaucous branchlets, although a number of specimens from the Watheroo area have hairy branchlets. Plants of *G. amplexans* from the southern part of the distribution tend to have smaller leaves, similar in size to *G. adpressa.*

*Grevillea adpressa* has a hairy leaf undersurface and hairy branchlets. Study of the specimens at PERTH and our own showed that nectary prominence and degree of leaf margin recurvature varies randomly between and within the species, although most specimens of *G. amplexans* have flat leaf margins and prominent nectaries while those of *G. adpressa* have shortly recurved leaf margins and obscure nectaries as observed by McGillivray (McGillivray 1993: 176). Trichomes on the inner perianth surface at the base were also observed on some specimens of *G. adpressa*.

*Etymology.* Latin *adpressus* - appressed, in reference to the indumentum on the leaf undersurface.

**5. Grevillea uniformis** (McGillivray) P. Olde & N. Marriott stat. nov. (Figure 4)

*Basionym: Grevillea acrobotrya* subsp. *uniforma* McGillivray (1986) in New Names in Grevillea :1. (Note- orthographic error).

Shrub 1.5-1.8 m tall, 1.5-3 m wide; branchlets tomentose or, rarely (*Olde* 91/97) glabrous, elongate, virgate. *Leaves* 0.5-2 cm long, 0.8-3 cm wide, sessile to very shortly petiolate, ovate to obovate with venation craspedodromous, the lateral veins tipped by spines 1-1.5 mm long; reticulate venation faintly evident, edge veins prominent; upper surface glabrous or sparsely sericeous; lower surface white-sericeous to tomentose; margin dentate, shortly recurved; leaf base truncate to spreading, sometimes cuneate; texture stiffly papyraceous. *Conflorescence* axillary or terminal, subsessile or shortly pedunculate, simple or few-branched; unit conflorescence 1-1.5 cm long, globose, open, development acropetal; peduncle sericeous; ultimate floral rachis 10-20 mm long, glabrous; bracts 0.5 mm long, 0.5 mm wide, ovate, glabrous, ciliate, caducous. *Flowers* white with dark-brown to reddish-brown limb, glabrous; pedicel 5-9 mm long, glabrous; torus 0.5-1 mm wide, straight to slightly oblique; nectary obscure; *perianth* 2.5-3 mm long, 0.5 mm wide, actinomorphic, cylindrical, glabrous; limb 1.2 mm wide, globose, erect; *pistil* 2.5-3.5 mm long, glabrous; stipe 1.5 mm long, flexuose; ovary globose; style 1.5 mm long, constricted above the ovary, the zone of constriction 0.1 mm long, then slightly dilated, the dilation 0.3-0.4 mm wide, terminated by a conical pollen-presenter 0.6-0.7 mm long, 0.3-0.4 mm wide at the base, the base broader than the style. Fruits 8-10 mm long, 6-8 mm wide, perpendicular to the stipe on curved pedicels, oblong-ellipsoidal, smooth; pericarp 0.6 mm thick at the suture. Seeds 7-8.5 mm long, 3-4 mm wide, elliptic with a membranaceous border on the inner face, otherwise smooth.

*Selected specimens* (5 examined). WESTERN AUSTRALIA: Cockleshell Gully, *Olde* 86/611, 24 Sep. 1986 (NSW); 8 km SW of Mt Lesueur, 8.8 km along track from Cockleshell Gully (Padbury) to main Jurien Rd, *B.G. Briggs* 6369, 26 Sep. 1976 (NSW, PERTH); Pen Rd, 2 km N of Road to Greenhead, SW of Eneabba, *Olde* 91/97, 15 Sep. 1991 (NSW, PERTH); North of Mt Lesueur, *Olde* 91/258, 6 Oct. 1991 (NSW).

*Distribution.* Western Australia, from south-west of Eneabba to Jurien, east to Mt Lesueur.

*Habitat and ecology.* Grows in exposed sandstone outcrops in crevices, beside creek lines in grey sand over brown loam, sand over laterite in low open heath, yellow sand-heath.

*Flowering period.* Late Winter-Spring.

*Discussion.* During the course of our study of the variation within *G. amplexans*, specimens of closely related species were also studied. These studies showed that *G. acrobotrya* subsp. *uniformis* McGillivray was as closely related to *G. amplexans sens. lat.* as to *G. acrobotrya sens. strict.* and that the degree of sharing of features suggested to us that species ranking is more appropriate for this taxon (see also *G. adpressa*). *G. acrobotrya sens. str.* is thus seen as unique in Section *Manglesia sensu* Bentham for its dimorphic leaves (obovate-cuneate at the base, tripartite on the floral branches), for its scarcely dilated style with a scarcely evident zone of constriction above the ovary and for its fusiform style-end. The basal leaves of *G. acrobotrya* are more clearly obovate-cuneate whereas those of *G. uniformis* are usually ovate with patent to spreading bases.

In its pistil length and stylar dilation, *G. uniformis* more closely approaches *G. acrobotrya* although there is overlap with *G. adpressa* in pistil length. However, most specimens of *G. uniformis* have a more conspicuously dilated style above an obvious though minute zone of constriction. Most significantly though, through its conical style-end with its base broader than the style, it is closer to *G. adpressa*. In addition, it shares with *G. adpressa* an obscure nectary and uniform foliage; its leaves have similar venation prominence and degree of marginal curvature and a similar indumentum on the undersurface. In fact, *G. uniformis* is so close visually to *G. adpressa* that they can scarcely be

separated without close inspection of the leaves. Indeed, some specimens of *G. uniformis*, including *Briggs* 6369, *Olde* 91/97, also have occasional leaves with retrorse basal leaf lobes (*cf.* consistently retrorse in *G. adpressa*). *G. uniformis* is clearly intermediate between *G. acrobotrya* and *G. adpressa* and therefore, in our opinion, deserves recognition at the ranking proposed.

*Conservation status.* A code of CALM Priority Three is recommended.

**6. Grevillea synapheae** R. Brown in Prodr. Flor. Nov. Holl. Suppl. 1: Prot. Nov. 23, (1830)

*Typus: (n.v.) fide* McGillivray 1993: Swan River, *Fraser*, 1827 (BM excluding the specimen at the lower right of the sheet).

*Anadenia gracilis* Lindl. (1840) in Edwards' Bot. Reg. App. Swan River Colony: xxxi n. 144. *Type (n.v.):* Swan River. *Drummond*, 1839 (CGE).

*Grevillea flexuosa* var. *pauciloba* Benth. (1870) in Fl. Austral. 5: 480, 'Var. ?*pauciloba*'. *Lectotype* (McGillivray 1993: 443): Darling Range, W. Aust., *Oldfield* (lecto: K *(n.v.)*; isolecto: K *(n.v.)*, MEL 74817, MEL 74818).

A lignotuberous shrub, variable in habit from prostrate and sprawling to open and erect to c. 1.5 m; branchlets ± glabrous or sparsely tomentose. *Leaves* 4-18 cm long, 1-6 cm wide, ascending to spreading, sessile, usually obovate-cuneate in broad outline, extremely variable even on the same shrub, from simple and entire to trifid to (bi-)pinnatifid, sometimes the primary division almost pinnatisect with pinnatifid to (rarely) subpinnatisect secondary lobes; rachis straight to slightly flexuous; primary lobes (0)3-7, ascending, rarely (Mt Misery) patent to retrorse; ultimate lobes 10-25 mm long, linear to broad-triangular, mostly terminated by a brittle excurrent spine; upper surface glabrous, occasionally glaucous, midvein and lateral veins visible, sometimes obscure; lower surface glabrous or sparsely sericeous, punctate, midvein and lateral veins prominent. *Conflorescence* erect, pedunculate, sometimes markedly so, terminal or axillary, simple or branched; unit conflorescence cylindrical, dense, with development basipetal, enclosed within or conspicuously exceeding the foliage; peduncles 0.8-3.5 cm long, glabrous, angular; floral rachises glabrous or sericeous or sparsely so; floral bracts 0.3-1.2 mm long, ovate-cymbiform to obovate or linear, glabrous or sparsely hairy, usually ciliate, patent, caducous or persistent beyond anthesis. *Flowers* creamy-yellow: pedicels 1.5-2.5 mm long, glabrous or with scattered hairs, the apex expanded with 4 sub-opposite lobes c. 0.1 mm long; torus ± 0.5 mm across, straight; nectary absent or minutely pulvinate; *perianth* 2.5-3 mm long, 0.7 mm wide, oblong-cylindrical, strongly curled in bud, glabrous outside, mealy to papillose inside; tepals persistent, separating markedly on the dorsal side and reflexing to expose the inner surface at anthesis; limb revolute, spheroidal to subcubic, prominently carinate; *pistil* 4.5-5.5 mm long, glabrous; stipe 0.6-1 mm long; ovary subglobose; style strongly retrorse to sigmoid after anthesis; pollen-presenter ± straight, broadly conical with faint to obscure basal rim. *Fruit* 8-13 mm long, 7-9 mm wide, erect to oblique, sometimes persistent, ovoid, ellipsoid to obovoid, glabrous, rugulose; style persistent, shrivelled; pericarp ± 1 mm thick. *Seed* 6-7 mm long, 4-4.5 mm wide, obovate, rugulose; outer face slightly convex; inner face with a raised, central elliptic section, channelled near the border, all encircled by a waxy, excurrent wing.

*Affinities.* Key 2 on page 260 is provided to facilitate separation of all members of this group.

*Discussion.* McGillivray (1993: 163) asserts that "the apparent two-state nature of the delapsus of floral bracts...may prove to be associated with other features". Our research, which involves the

physical inspection of all populations seen in the range over four flowering seasons, plus an examination of all specimens at PERTH and NSW, shows that two subspecies are clearly justified. However, the partition of the species along these lines is to some extent artificial in that both subspecies exhibit internal variation that is, to some extent, population-based but insufficiently discontinuous on the characters examined to warrant more formal recognition. This variation is here treated informally but further separations may be warranted following research using new character states and modern methods of analysis.

**Key to subspecies of *Grevillea synapheae***

1 Floral bracts deciduous before anthesis; leaves papyraceous the margin flat or shortly recurved; unit conflorescence 1-2 cm long ..... subsp. *synapheae*

1* Floral bracts persistent at and sometimes beyond anthesis; leaves coriaceous the margin strongly recurved to revolute; unit conflorescence 2-6 cm long ..... subsp. *pachyphylla*

**Grevillea synapheae** subsp. **synapheae** (Figure 5)

*Grevillea synapheae* var. *latiloba* Meissn. in Lehmann (Ed.) Pl. Preiss. 2: 259 (1848). *Neotype* (McGillivray 1993: 443): *Drummond* Coll. II n. 313 in hb. Shuttl. 11 Oct. 53. (*Type:* NY- specimen at right of sheet; iso: A,G,LD, LE, MEL- 2 sheets, NSW, P-2 sheets).

Branchlets rounded to sharply angular; leaves papyraceous or firmly so, the margin flat or shortly recurved; floral bracts caducous, usually before the buds are 1 mm long; unit conflorescence 1-2(3) cm long, usually borne within the foliage; pistil 4-5 mm long; stipe c. 1 mm long.

*Selected specimens* (90 examined). WESTERN AUSTRALIA: 33 mi. from Perth towards Brookton on Brookton Highway, *Phillips* (CBG022086), 6 Oct. 1962 (CBG, NSW); Mt Dale Rd, *Demarz* 6406, 8 Dec. 1976 (PERTH); Berry Reserve, Stoneville, *Olde* 91/76, 12 Sep. 1991 (NSW); Ridge Hill Rd., Helena Valley, *Olde* 86/272, 6 Sep. 1986 (NSW); Mundaring Weir, *Olde* 86/280, 6 Sep. 1986 (NSW); Canning Dam, *Went* 14, 2 Sep. 1962 (PERTH); Glenn Forest, *Sonster* 498, 8 Sep. 1946 (NSW); Parkerville, *Diels & Pritzel*, Aug. 1901 (PERTH); Smith's Mill, *Morrison*, 9 Aug. 1898 (PERTH); *Drummond* 313, Coll II, (NSW); Drummond's Track, S of New Norcia, *Gardner* 8675, 1 Oct. 1947 (PERTH); Gt Northern Highway, S of New Norcia, just S of Mogumber turn-off, *Strid* 20644, 20 Sep. 1982 (NSW); 16 mi. N of Bindoon, *R.V. Smith* 66/126, 30 Aug. 1966 (AD, MEL, NSW, PERTH); Wooroloo, *Koch*, Sep. 1906 (PERTH); 22 km S of Toodyay, *Olde* 86/843, 11 Oct. 1986 (NSW); Swan View, *Fitzgerald*, Sep. 1901 NSW 129248); 6.2 km S of Mogumber turn-off on Gt Northern Highway, *Olde* 86/317, 10 Sep. 1986 (NSW); 79 m.p. Geraldton Highway (1 km N of Mogumber), *McCrum* 61, 5 Sep. 1957 (PERTH); N edge of Mt Misery, W of Dandaragan, *Hopper* 6333, Feb. 1988 (PERTH); Mt Misery, *Olde* 91/82, 14 Sep. 1991 (NSW).

*Distribution.* Western Australia, from near Narrogin to New Norcia, with a small population on Mt Misery in the Irwin District.

*Habitat and ecology.* Grows in lateritic loam in *Eucalyptus* woodland. Resprouts from lignotuber after fire with some regeneration from seed. Pollination is by insects.

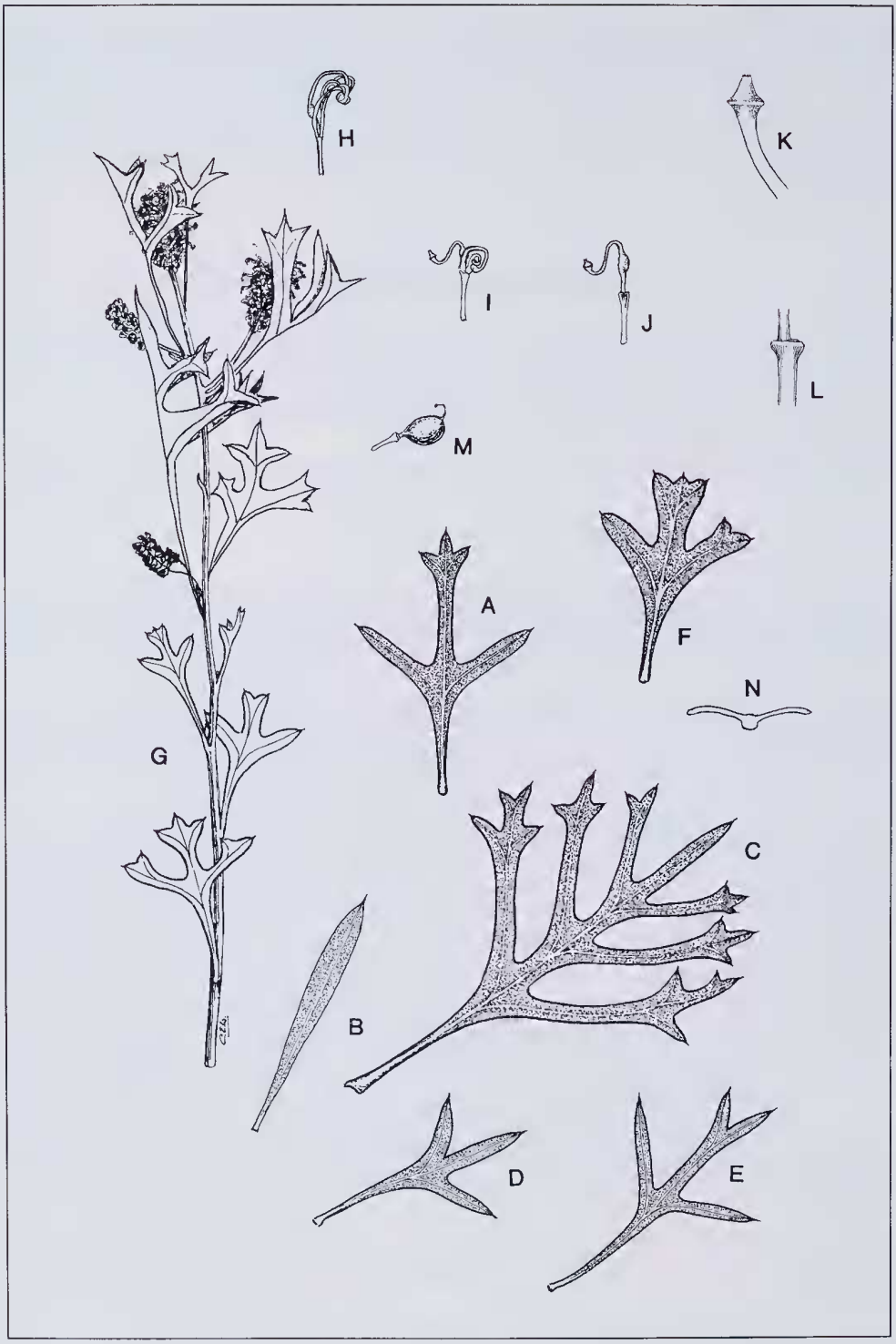


Figure 5. *G. synapheae* subsp. *synapheae* A-F - leaf shapes, G - habit, H, I - perianth, J - pistil, K - style-end, L - torus, M - fruit, N - leaf in cross-section.

*Flowering period.* Late Winter-Spring.

*Fruiting period.* Spring-early Summer.

*Typification.* Only the isotype of var. *latiloba* at NSW has been seen.

*Conservation status.* Not rare or endangered overall. However, at least two forms may need monitoring.

*Discussion.* Within subsp. *synapheae* there are at least three elements. The typical form occurs in the Darling Range in the Perth region extending south almost to Williams. It is a prostrate to diffuse shrub with unit conflorescences 1-2(2.8) cm long, mostly enclosed within the foliage and with relatively thin, round to slightly angular branchlets. McGillivray (1993: 163) has also observed that "at the southern end of the species' range, some specimens e.g. *Phillips* CBG 021636, 022086, have longer pedicels and looser inflorescences than other collections of *G. synapheae*". These populations warrant further study. There appears to be no conservation imperative with regard to this form.

The second element included in subsp. *synapheae,* here termed the broad-leaved form, are plants from the Bindoon to Mogumber area. At first we had the impression that these plants belonged with our subsp. *pachyphylla.* They share a similar, erect habit (sometimes to 1.5 m), stout, sharply angular branchlets, apically toothed obovate-cuneate to bipinnatifid leaves and longer unit conflorescences (c. 2 cm long), which sometimes conspicuously exceed the foliage. The leaves also dry to a whitish-green colour. However, the leaves are firmly papyraceous with scarcely recurved margins and the floral bracts are not persistent. Accordingly they have been placed in subsp. *synapheae.* Meissner's var. *latiloba* (*Drummond* 313, Coll. II) is from this population. Future studies aimed at more accurate delimitation of this population may be worthwhile. There may be some conservation risk to this form.

The third element, here termed the Mt Misery form, is a geographically disjunct population from Mt Misery, near Dandaragan, in the Irwin District (*Hopper* 6333, *Olde* 91/82). This population has leaves with the primary lobes almost pinnatisect with pinnatifid secondary lobes. However, some specimens e.g. *Olde* 86/843 and *Fitzgerald* (NSW129248), closely approach the leaf type and preclude any formal separations at least until further sampling is conducted. There is also some approach of this element to *G. flexuosa* Meissn. through its slightly flexuous leaf rachis and patent to retrorse leaf lobes. However, it differs in its fewer leaf lobes and smaller fruits. We understand that this population is conserved but, as its distribution is so restricted and its taxonomy unresolved, investigation of its conservation status is considered worthwhile.

**Grevillea synapheae** subsp. **pachyphylla** P. Olde & N. Marriott subsp. nov. (Figure 6)

A subspecie typica bracteis florum persistentibus, foliis coriaceis cum marginibus forte recurvato vel revoluto differt.

*Type:* Western Australia: Brand Highway, 8 km S of Half Way Mill Roadhouse, *P. Olde* 91/87, 14 Sep. 1991 (holo: PERTH; iso: NSW).

Differs from the type in its persistent floral bracts, its coriaceous leaves with strongly recurved to revolute margins.

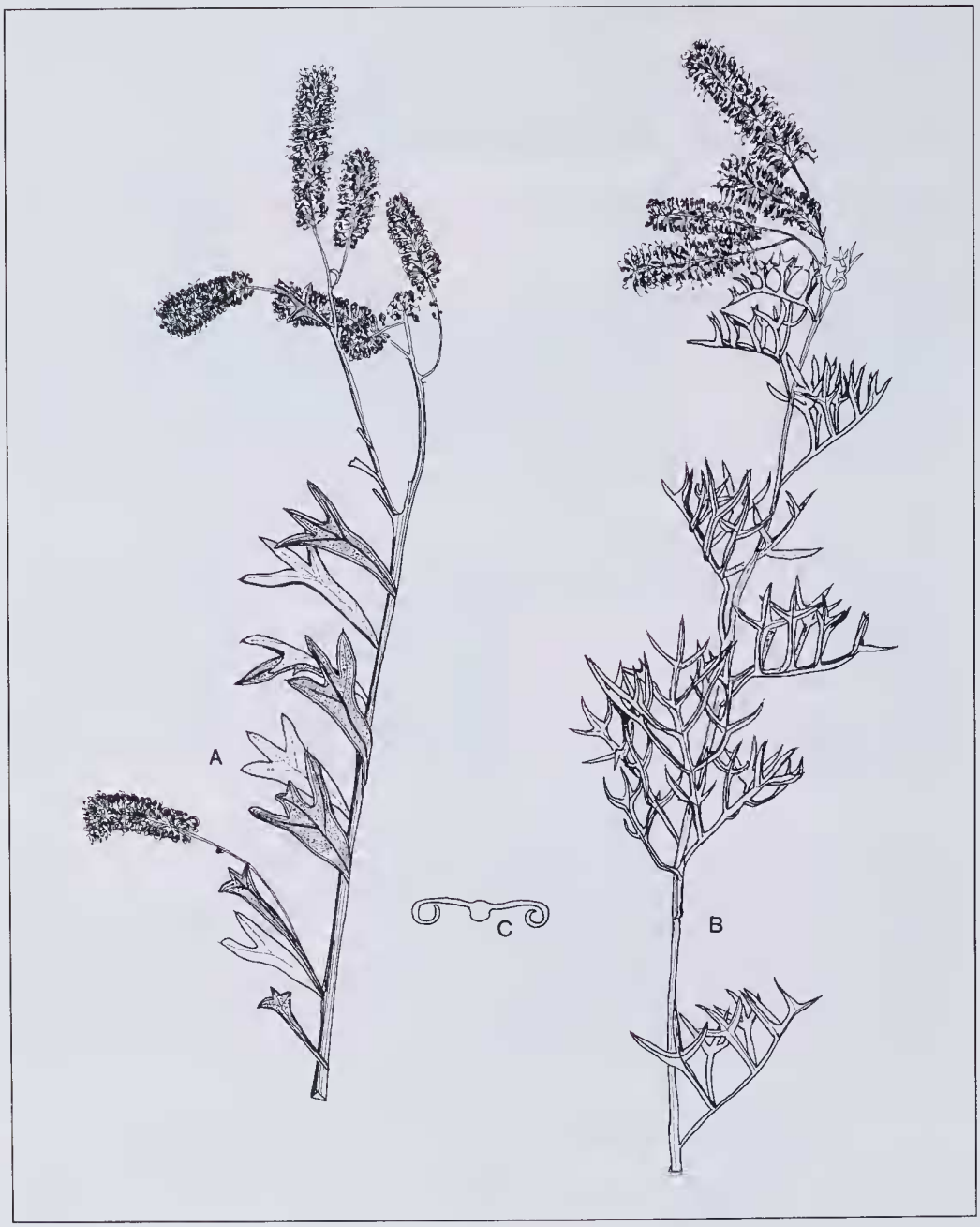


Figure 6. *G. synapheae* subsp. *pachyphylla* A - typical form, B - Minyolo form, C - leaf in cross-section.

Shrub 50 cm to 1 m high; branchlets stout, angular, usually sharply so; leaves trifid to obovate-cuneate with apical toothing, sometimes pinnatifid with ascending lobes, sometimes bipinnatisect, sometimes simple, elliptic, coriaceous, the margin strongly recurved to revolute; conflorescences branched, exceeding the foliage; unit conflorescence 2-4(6) cm long; floral bracts persistent at or beyond anthesis; pistil 4.5-5 mm long; stipe 1 mm long.

*Selected specimens* (42 examined). WESTERN AUSTRALIA: Irwin District; Hills S from Three Springs, *Gardner* 9052, 23 Aug. 1948 (PERTH); 10 miles NE of Cockleshell Gully, *Anway* 151, 18 July 1965 (PERTH); 5 km N on Erindoon Rd, south of Eneabba, *Olde* 91/99, 15 Sep. 1991 (NSW, PERTH); Bibby Rd, Cervantes, 5 km from Highway, *Woolcock* G33, 16 Aug. 1985 (NSW); 18 mi. E of Jurien Bay, *Beard* 7885, 19 Sep. 1976 (NSW, PERTH); 15 mi. NNW Dinner Hill, *Newbey* 2297, 31 Aug. 1965 (PERTH); 5 miles W of Jurien Bay turnoff, *Cranfield* 249, 20 July 1978 (PERTH); 0.5 km E of Badgingarra, *McGillivray* 3283 & *George*, 10 June 1976 (NSW, PERTH); 1 km S of Minyolo Brook, *Pieronii* 90/4, 20 Sep. 1990 (NSW, PERTH); Mullering Rd, Cataby, *Olde* 91/86, 14 Sep. 1991 (NSW); Minyolo Rd, W of Dandaragan, *Griffin* 5060, 11 Sep. 1988 (PERTH); "Dunearn" NW of Dandaragan, *Griffin* 4912, 11 Aug. 1988 (PERTH).

*Distribution.* Western Australia, from near Cataby to Eneabba, usually within c. 70 km of the coast.

*Habitat and ecology.* Grows in open heath usually at or near the top of rises in strongly laterised loam or sandy loam over laterite. Regenerates from lignotuber and/or seed after fire.

*Flowering period.* As for subsp. *synapheae.*

*Discussion.* In addition to the features listed in the diagnosis, most plants of subsp. *pachyphylla* also usually have have an erect few-branched, ?non-lignotuberous habit with 1 to 3 branches from the base, branched conflorescences 2-4 cm long that clearly exceed the leaves, stout, sharply angular branchlets and obovate-cuneate leaves with apical toothing. Dried specimens of this subspecies sometimes have a whitish appearance. The specimen *Cranfield* 249 (NSW, PERTH) has only one persistent floral bract, but is placed with subsp. *pachyphylla* because of foliar features that more closely conform with this subspecies. Subsp. *pachyphylla* occurs in the Irwin District and is found from c. Eneabba to Cataby, possibly extending to around New Norcia.

A few specimens from south of New Norcia e.g. *Gardner* 8675 (PERTH), *Strid* 20644 (NSW), have some conflorescences with persistent bracts and some without. These specimens are intermediate between subsp. *synapheae* (broad-leaved form) and subsp. *pachyphylla* but are placed with subsp. *synapheae* because of their papyraceous leaves and flat margins. Further field study of these specimens may show sympatric occurrence and that specific rank is more appropriate for subsp. *pachyphylla.* However, on the character states that we have examined, we did not feel there was sufficient discontinuity to warrant this ranking.

Some collections from the Badgingarra-Dandaragan area (*Griffin* 4912, *Olde* 91/86, *McGillivray* 3282 & *George, Anway* 151) have a lignotuberous habit with numerous branches from the base, branched conflorescences borne conspicuously beyond the foliage with leaves subtending the conflorescence much-reduced in size (*cf. G. muelleri* Benth.). Unit conflorescences are up to 6 cm long and leaves are sometimes deeply divided to subpinnatisect (*Pieronii* 90/4, *Olde* 88/95) with secondary sect division and ultimate lobes narrow-linear to narrow-triangular, c. 2-3 mm wide and with a slightly flexuous rachis. In addition, they have a shorter pollen-presenter with a slight basal collar. These plants, which are c. 30 cm tall, spreading 1-2 m wide, grow sympatrically with more typical plants of subsp. *pachyphylla.* At first, we had the impression that these plants formed part of a separate taxon and indeed they might. However, the differences are not sufficiently clear to warrant separate ranking at this stage and they are here treated informally as the Minyolo form of subsp. *pachyphylla.* The specimen *Anway* 151 (PERTH 02439115) has unit conflorescences c. 6 cm long with apically toothed, obovate-cuneate leaves and cannot be clearly assigned to either form.

*Conservation status.* Not rare or endangered except that the Minyolo form requires assessment.

*Etymology.* From the Greek *pachys* - thick and *phyllon* - a leaf.

## KEY 2

### Key to species related to *Grevillea synapheae*

1 Floral rachis 1 or more cm long
2 Unit conflorescence loose; flowers pink ..... *G. leptobotrys*
2* Unit conflorescence dense; flowers creamy-white
3 Pollen-presenter lacking a basal collar
4 Fruits ovoid with apical attenuation, ± 20 mm long; leaf rachis conspicuously flexuous; basal leaves mostly with >10 retrorse to patent primary lobes ..... *G. flexuosa*
4* Fruits ellipsoid to obovoid with obtuse apex, 8-13 mm long; leaf rachis straight or scarcely flexuous; basal leaves either dentate or mostly with 7 or less ascending, primary lobes ..... *G. synapheae*
3* Pollen-presenter with a conspicuous basal collar
5 Leaves dentate ..... *G. monticola*
5* Leaves divaricately divided ..... *G. prominens*
1* Leaf rachis 0.5 or less cm long
6 Conflorescence umbelliform, extending ± regularly along the whole branchlet; leaves on the floral branches usually not reduced in size ..... *G. trifida*
6* Conflorescence globose, crowded in the upper axils; leaves on the floral branches usually much reduced in size or linear ..... *G. muelleri*

**7. Grevillea flexuosa** (Lindl.) Meissn. (1845) in Lehmann's Pl. Preiss.1: 553 (1845). *Anadenia flexuosa* Lindl. (1840) in Edwards' Bot. Reg. App. Swan River Colony: xxxi n. 142. (Figure 7)

*Grevillea flexuosa* var. *pauciloba* Benth. in Flor. Aust. 5: 480 (1870) is a synonym of *G. synapheae* R. Br. subsp. *synapheae*

*Typus:* Swan River. *Drummond,* 1839 (holo: CGE; iso: LE, MEL, NSW, P, PERTH). Only the isotypes at NSW and PERTH have been seen.

An irregular, few-branched, ± glabrous shrub to 1.5 m,; branchlets sharply angular, glabrous. *Leaves* 5-10 cm long, 5-7 cm wide on the floral branches, 15-26 cm long, 10-16 cm wide at the base, spreading to patent, sessile but appearing petiolate, subpinnatisect; rachis markedly flexuous; primary lobes 7-18, patent to retrorse, usually distant, pinnatifid with up to 5 secondary lobes, sometimes tertiary -fid lobing evident; ultimate lobes 0.5-3 cm long, 5-10 mm wide, broad- to narrow-triangular, terminated by scarcely pungent, excurrent spines 2 mm long; upper surface glabrous, the midvein and lateral veins evident; lower surface glabrous, glaucous, the midvein and lateral prominently raised; margin shortly recurved. *Conflorescence* erect, conspicuously pedunculate, terminal or axillary in the upper axils, clearly exceeding the foliage, usually branched; unit conflorescence 3.5-6.5 cm long,

1 cm wide, cylindrical, very condensed with development basipetal; peduncle sharply angular, glabrous; floral rachis glabrous; floral bracts 0.7 mm long, ovate, glabrous with ciliate margins, caducous. *Flowers* creamy-yellow, glabrous: pedicels 2-2.2 mm long; torus c. 0.5 mm wide, straight, expanded at its apex into 4 obtuse, subopposite lobes c. 0.2 mm long; nectary absent; *perianth* 3.5 mm long, 0.5 mm wide, creamy-white, oblong-cylindrical, strongly recurved, papillose on the inside; limb revolute, spheroidal, the segments carinate; tepals persistent, reflexing to reveal inner surface at anthesis; *pistil* 5-8.5 mm long; stipe 0.5-1.2 mm long; ovary globose; style creamy-white, retrorse to sigmoid after anthesis, terminated by a scarcely expanded style-end; pollen-presenter ± straight, conical with base round to oblong-elliptic. *Fruits* 20 mm long, 10 mm wide, erect, ovoid to ovoid-ellipsoid with the apex attenuate, rugulose; style deciduous; pericarp 1.5-2 mm thick at the suture. *Seeds* (cult.) 9 mm long, 3 mm wide, oblong with acute apices; outer face convex, smooth, slightly crimped before the margin; inner face with a raised, central ridge, encircled by a broad channel; the margin recurved with a short, waxy wing prominent in the basal half.

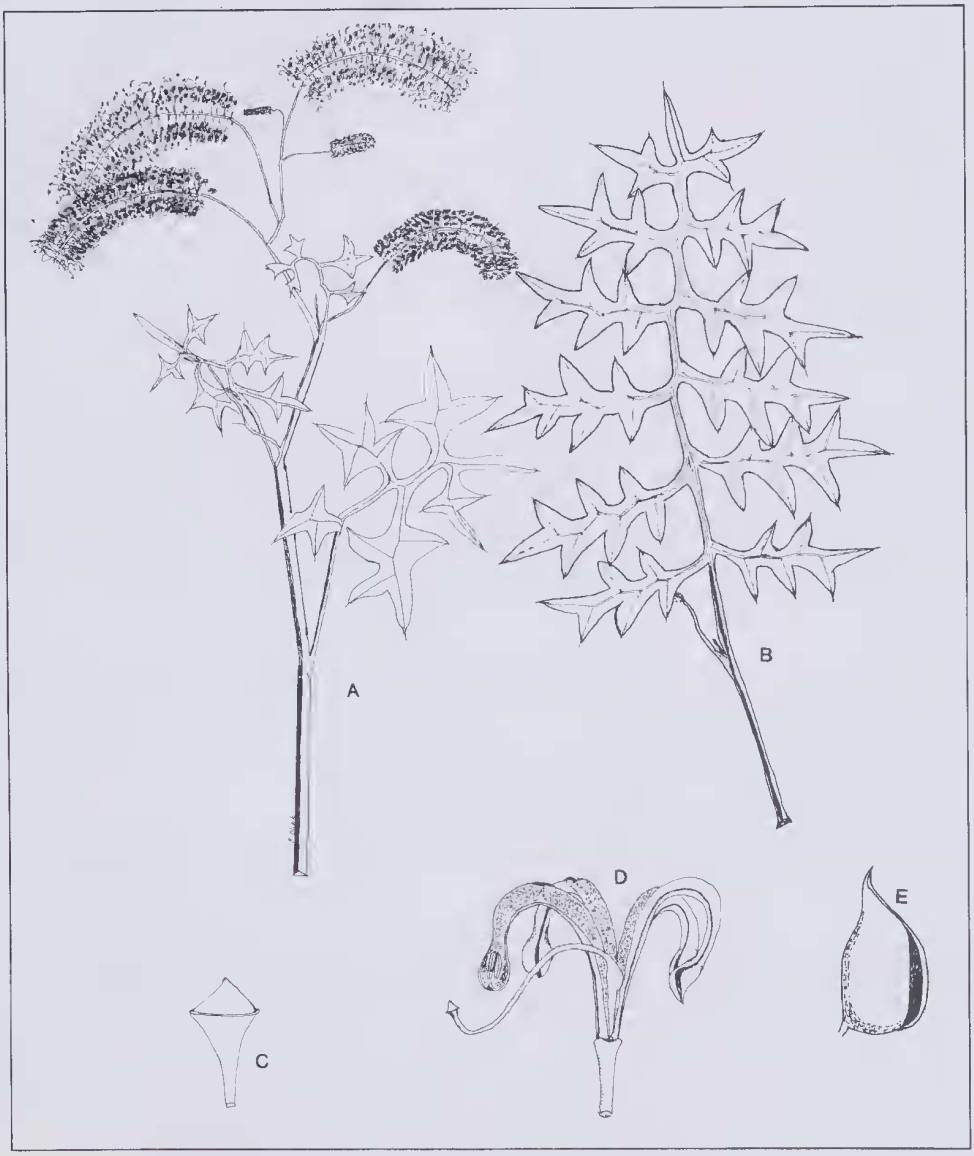


Figure 7. *G. flexuosa* A - flowering habit, B - leaf, C - style-end, D - flower, E - fruit.

*Specimens examined* (2). WESTERN AUSTRALIA: Berry Reserve, Stoneville, *Olde* 91/75, 12 Sep. 1991 (NSW); Swan River, *Drummond,* 1839 (PERTH).

*Distribution.* Western Australia, where confined to a few locations near Stoneville and Toodyay.

*Habitat and ecology.* Grows in granite sand among granite rocks in exposed platform vegetation or low heath. Fire response unknown. Pollination by insect.

*Flowering time.* Winter-early Spring.

*Fruiting period.* Late Spring.

*Discussion.* McGillivray(1993), having seen only the Type collection, has referred *G. flexuosa* (Lindl.) Meissn. to synonymy under *G. synapheae.* However, the species, rediscovered in 1985 by Mrs Gwen Abbott, although clearly and most closely related to *G. synapheae* is, in our opinion, quite distinct. It grows sympatrically with *G. synapheae* at Stoneville, in Berry Reserve and is, at this site, morphologically discontinuous and reproductively isolated. The diagnostic features which distinguish *G. flexuosa* are its ovoid to ovoid-ellipsoid fruits (c. 20 mm long) with an attenuated apex and a thicker pericarp (c. 1.5 mm thick) and its much longer basal leaves (up to 26 cm long) bearing a conspicuously flexuous rachis with 7-18 distant, patent to retrorse primary lobes. *G. synapheae* sometimes approaches *G. flexuosa* in its foliar morphology but is readily distinguished by its obovoid fruits which are <13 mm long with the apex obtuse and the pericarp <1 mm thick, its smaller basal leaves (mostly <10 cm long) with a mostly straight to scarcely flexuous rachis and with 3-7 relatively close, ascending primary lobes.

Additionally, in the area of its sympatric occurrence with *G. synapheae, G. flexuosa* is a robust, non-lignotuberous shrub 1.5-2 m high with angular branchlets and unit conflorescences up to 6 cm long borne clear of the foliage and with pistils 8-8.5 mm long, whereas *G. synapheae* is a low, lignotuberous subshrub to 10 cm with rounded branchlets and conflorescences c. 1 cm long borne within the foliage and pistils c. 5 mm long. The Type of *G. flexuosa* at NSW has shorter pistils (c. 5 mm long) and conflorescences enclosed within the foliage and differs from the Stoneville populations in this respect. A full key to the group is provided (Key 2, see page 260).

*Conservation status.* A conservation code of Priority Two is recommended but *G. flexuosa* does occur in a known reserve. The current code of Priority Four (Hopper *et al.* 1990: 114) does not reflect more recent collections of this species.

**8. Grevillea prominens** P. Olde & N. Marriott sp. nov. (Figure 8)

Affinis *G. trifidae* sed conflorescentiis longioribus subsecundis, pedunculis longioribus, pedicellis plerumque brevioribus (1.8-3 mm longis) differt.

*Typus:* Western Australia, corner of Victor Mount Rd and Harvey-Quindanning Rd, near Harvey, *P. Olde* 91/237, 26 Sep. 1991 (holo: NSW; iso: PERTH).

Aff. *Grevillea trifida* but differs in its longer, subsecund conflorescences, its longer peduncles and shorter pedicels.

An open shrub 0.5-1.2 m high, 0.3-1 m wide; branchlets angular, glabrous. *Leaves* 3-4.5 cm long, ascending, sessile, but appearing petiolate, mostly biternate, sometimes bipinnate; primary lobes 3-5, usually with secondary division, the secondary lobes sometimes with tertiary-fid division, sometimes the primary apical lobe undivided; ultimate lobes 4-22 mm long, 0.6-2 mm wide, linear to narrow-triangular, pungent; upper surface glabrous, smooth, angularly concave or grooved along the midvein, the venation otherwise obscure; lower surface exposed, glabrous with prominent midvein and lateral veins; margin smoothly revolute. *Conflorescence* erect, pedunculate, terminal, usually branched; unit conflorescence 1-3 cm long, secund, sometimes becoming subcylindrical at length, quite condensed, development basipetal, usually exceeding the foliage; primary peduncles 0.5-2 cm long, secondary peduncles 1-2 cm long, glabrous; floral rachises glabrous; floral bracts not seen. *Flowers* creamy-white, glabrous: pedicels 1.8-3 mm long, the apex not expanded into sub-opposite lobes; torus c.0.5 mm across, ± straight; nectary not seen; *perianth* 4.5 mm long, creamy-white, oblong-cylindrical, strongly curled; limb revolute, subglobose, firmly cohering at anthesis, the segments carinate; tepals separating and reflexing to reveal the inner surface at anthesis; *pistil* 4.5-5.5 mm long, glabrous; stipe 0.5-0.7 mm long; ovary c. 0.8 mm long, globose; style creamy-white, retrorse to sigmoid after anthesis; pollen-presenter conical, its base 0.8 mm wide, round, collared, wider than the style. *Fruit* 8.5-10 mm long, 6-6.5 mm wide, perpendicular to the pedicels, obovoid, smooth; style deciduous; pericarp 0.5-0.9 mm thick. *Seed* not seen.

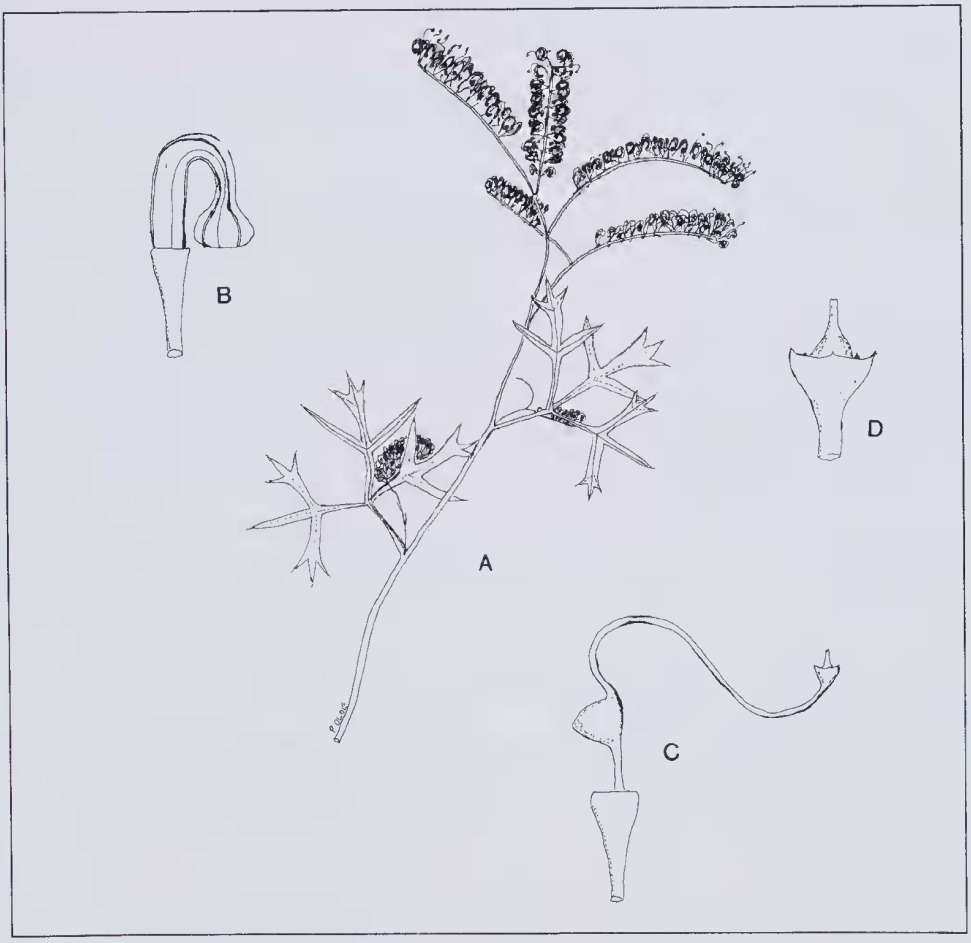


Figure 8. *G. prominens* A - habit, B - perianth, C - pistil, D - style-end.

*Selected specimens* (8 examined). WESTERN AUSTRALIA: Mount William, *Gilbert* 139, 1842 (NSW); Mount William near Wagerup, *van der Moezel* 7, 5 Sep. 1979 (NSW, PERTH); Hoffmans Mill, NE of Harvey, *R.F. Williams*, 16 Sep. 1932 (CANB); 11.8 km N of Collie towards Tallanalla, *Canning* CBG 065483, 2 Oct. 1968 (CBG, NSW, PERTH).

*Distribution.* Western Australia, where known from only a few collections in the Harvey area.

*Habitat and ecology.* Grows along creek lines in Jarrah forest in gravelly loam. No pollinators were seen to visit the flowers but the species is almost certainly insect-pollinated. Fire effects are unknown. The collared pollen-presenter of this species seems to permit an unusually large pollen-deposit to be stacked around the pollen-presenter and would thus appear to act as a facilitator of increased fertilisation.

*Flowering period.* Late Winter-Spring.

*Fruiting period.* Late Spring-Summer.

*Affinities.* McGillivray (1993: 164) has included our *G. prominens* in *G. trifida* as the long-inflorescence form, noting that plants "show remarkable differences from all other material of *G. trifida* in the shape of the inflorescences". Reasons are there advanced for retaining it as an informal entity in *G. trifida,* among them its divaricately divided leaves and collared pollen-presenter. There is also a perceived close relationship with *G. synapheae* through a shared pattern of leaf and inflorescence structure.

*Discussion.* Examination of these arguments do not convince. The conflorescence structure of *G. prominens* is not subcylindrical as stated but secund. Hence the discontinuity from *G. synapheae* which has dense cylindrical conflorescences is apparent. Further, not all populations of *G. trifida sensu* McGillivray have divaricate leaves (e.g. *G. trifida sens. str.*) while a collared pollen-presenter is found in *G. monticola* Meissn. It therefore becomes a matter of considerable argument as to what are the closest affinities of *G. prominens.* Secund conflorescences are a shared feature with *G. monticola* Meissn. which has, in addition, conflorescences of similar length and prominence. No populations of *G. trifida* have secund conflorescences. Further, as well as the discontinuities evident in its conflorescence length, structure and prominence in relation to *G. trifida* (see Table 2), the flowers of *G. prominens* have pedicels shorter (1.8-2.5(3) mm long). We would therefore assert that sufficient grounds are present to withdraw *G. prominens* from *G. trifida sensu* McGillivray. Our position in relation to other elements of *G. trifida sensu* McGillivray is currently being assessed, although we shall continue recognition of *G. muelleri* Benth. at specific rank (*G. trifida* Stirling Range form *sensu* McGillivray).

*Conservation status.* A code of CALM Priority Three is recommended.

*Etymology.* Latin *prominens* - prominent, in reference to the longer, more conspicuously pedunculate conflorescences.

**TABLE 2**

| | **G. prominens** | **G. trifida** |
|---|---|---|
| Pedicels | 1.5-2.5(3)mm long | 3-7 mm long |
| Primary peduncles | 0.5-2 cm long | 0-0.5 cm long |
| Unit conflorescence | secund<br>beyond the foliage | umbelliform/globose<br>within the foliage |
| Floral rachis | 1-3 cm long | 0.2-0.5 cm long |
| Pistil | 4.5-5.5 mm long | 5-7.5 mm long |

**9. Grevillea thyrsoides** Meissn. in Hooker's Journ. Bot. Kew Gard. Misc. 7: 77 (1855)

*Typus:* From the protologue:"Common between Dundaragan and Smith River". *Lectotype:* (McGillivray 1993: 445): Interior North of Swan River. A. 1850-51. *legit Drummond*, Coll. VI. No. 183 (lecto: NY; isolecto: CGE, FI, G-DC, K, LD, MEL, P, PERTH). Only the isolectotype at PERTH has been seen.

A low, mounding, lignotuberous shrub to 70 cm high, spreading 1-2 m.; branchlets rounded to slightly angular, openly villous. *Leaves* 2.5-11.5 cm long, ascending, shortly petiolate, subpinnatisect, secund; leaf rachis straight or recurved, sometimes strongly so near the apex; leaf lobes 9-65 mm long, 1-1.5 mm wide, linear, the lower lobes often strongly introrse on dried specimens, the apex scarcely pungent to uncinate; upper surface granulate, loosely villous, sometimes with intermixed glandular hairs, midvein evident; margins angularly revolute; lower surface bisulcate, the lamina almost obscured by the margin, villous in the grooves, the midvein prominent. *Conflorescence* erect on trailing peduncles, terminal, branched; unit conflorescences 2.5-25 cm long, conico-secund, dense, the flowers at the proximal end usually becoming shrivelled and dying before anthesis of those at the distal end; peduncles tomentose to glandular-villous; floral rachis glandular-villous; floral bracts 3.5-7.5 mm long, ovate-acuminate, glabrous to sparsely villous outside, the margins usually ciliate, persistent to anthesis. *Flowers:* pedicels 1.3-4 mm long, villous; torus ± 1.5 mm across, oblique; nectary U-shaped, smooth; *perianth* 7-8 mm long, 3 mm wide, whitish-pink, ovoid-sigmoid, dilated at the base, villous and longitudinally ribbed outside, glabrous inside, persistent to fruiting; limb green, revolute, globular; *pistil* 24-33 mm long; stipe 1-2.8 mm long, sparsely villous; ovary densely appressed-villous; style pink, gently curved, introrse after anthesis, pilose-villous, dilating gradually into the style-end; pollen-presenter oblique, convex, ovate to almost round. *Fruit* 14-18 mm long, 8 mm wide, oblique, ellipsoidal to obovoidal, somewhat compressed, tomentose; style persistent; pericarp c. ± 0.5 mm thick. *Seeds* 9-10 mm long, 3.5 mm wide, elliptic with a laterally recurved apical elaiasome c. 2 mm long, outer face convex, smooth; inner face smooth, concave; margin recurved, bordered by a waxy wing c. 1 mm wide.

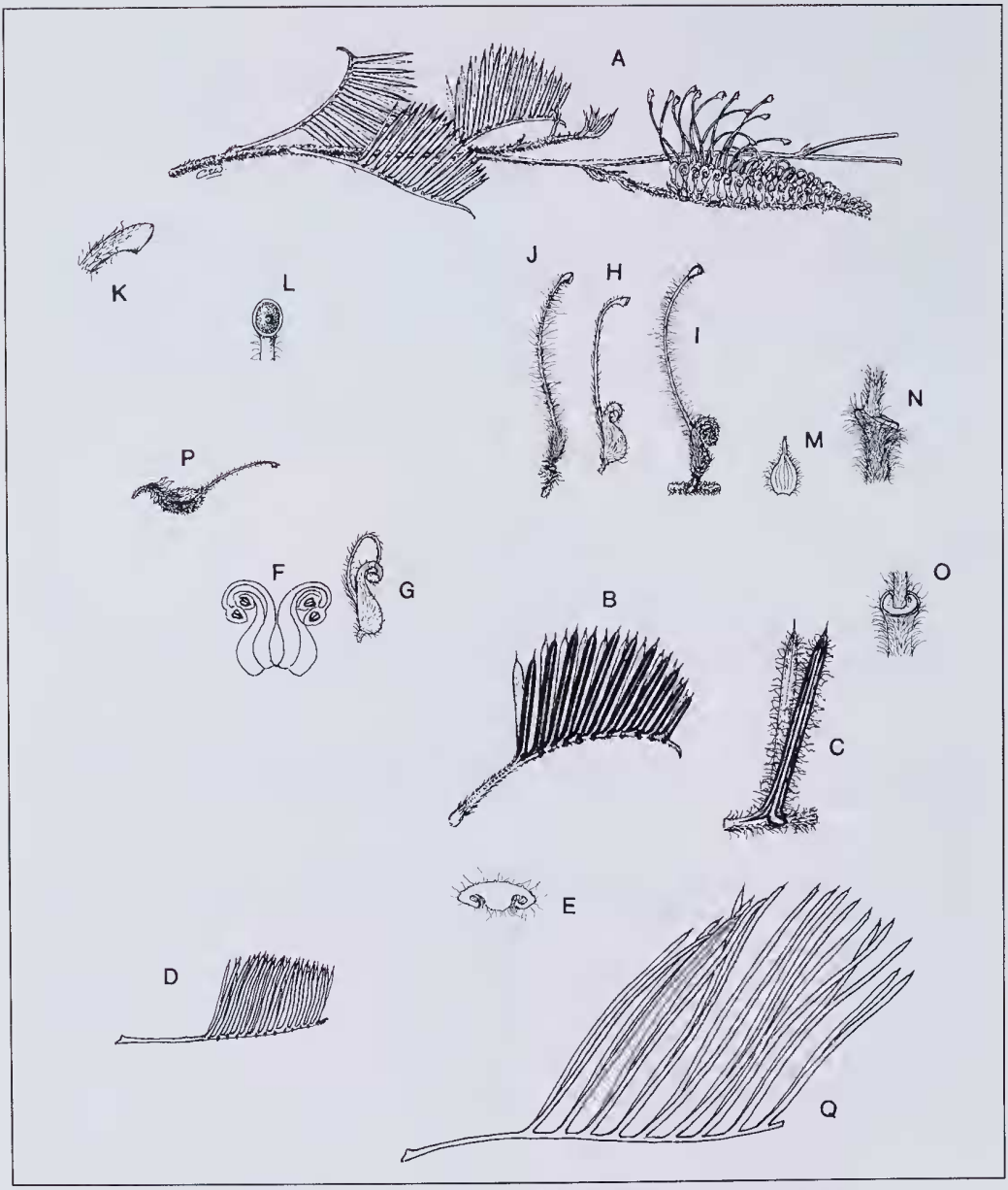


Figure 9. *G. thyrsoides* subsp. *pustulata* A - habit, B-D - leaves, E - leaf in cross-section, F - inner perianth surface, G-I - flowers, J - pistil, K - style-end, L - pollen-presenter, M - floral bract, N, O - torus/nectary, P - fruit. *G. thyrsoides* subsp. *thyrsoides* Q- leaf.

*Affinities. G. thyrsoides* appears to be quite remote from other related species. Visually, its affinities are with *G. dryandroides* C.A. Gardner which differs in its elongate-conical pollen-presenter.

*Discussion.* McGillivray (1993: 100) distinguishes two forms on the basis of leaf and bract characteristics. We have examined this species in the field and all specimens at PERTH and NSW, including specimens cited by McGillivray (*Gardner* 9017, *Gardner* 9297, *Drummond* VI. 183). The two forms *sensu* McGillivray, termed respectively the longer-leaved form and the shorter-leaved

form, are visually distinct, in that the leaves, leaf lobes, inflorescences and floral bracts of the former entity are, with very few exceptions, longer than those of the latter entity. In addition, the leaf lobes of the longer-leaved form are usually spreading (*cf.* closely aligned in the shorter-leaved form).

There is morphological discontinuity between the forms in the leaf length on all but one or two leaves, but in addition, through the development of a pimple-like protuberance at the base between the midvein and anterior margin on the undersurface of each leaf lobe of specimens of the shorter-leaved form, there is a further, very obvious discontinuity. The protuberance is completely absent from all but three specimens of the longer-leaved form. Our examination of these specimens, cited above and by McGillivray (1993), showed that the development of this protuberance on leaves otherwise clearly assignable to the longer-leaved form because of the other features which all conformed to be exceedingly obscure, was developed on only a few proximal lobes of a few leaves and could not on any account cause confusion when used in combination with the other distinguishing features. Given further that the two populations defined by this unusual morphological feature are geographically and (geologically E. Griffin pers. comm.) disjunct and that there is both a conservation imperative with respect to both of them and a high horticultural usage and that, as well, there is no confusion about the entity to which all specimens can be assigned, we submit that subspecific rank for the two entities is both reasonable and warranted. Accordingly, two subspecies, subsp. *thyrsoides* and subsp. *pustulata* P. Olde & N. Marriott are here recognised.

### Key to subspecies of *Grevillea thyrsoides*

1 Most leaves > 5 cm long; leaf lobes lacking a prominent basal pimple-like protuberance on the undersurface ..... subsp. *thyrsoides*

1* Most leaves < 5 cm long; leaf lobes bearing a prominent basal pimple-like protuberance on the undersurface ..... subsp. *pustulata*

**Grevillea thyrsoides** subsp. **thyrsoides** (Figure 9)

Leaves (3) 5.5-11.5 cm long; lobes 15-65 mm long, straight to irregularly curved, closely aligned to spreading, the terminal lobe 1-16 mm long; unit conflorescence 5-25 cm long; floral bracts 4.6-7.4 mm long.

*Selected specimens* (20 examined). WESTERN AUSTRALIA: 14.6 mi. along Jurien Bay Rd from Dandaragan, *George* 230, 13 Dec. 1958 (PERTH); 5 km S of Cataby, *Keighery* 10273, 10 July 1988 (PERTH); "Dunearn", NW of Dandaragan, *Griffin* 4921, 28 Sep. 1988 (PERTH); 21.5 km from Badgingarra on road to Dandaragan, *Olde* 86/913, 17 Oct. 1986 (NSW); Source of the Hill River, *Gardner* 9017, 23 Aug. 1948 (PERTH).

*Distribution.* Western Australia, where confined to an area between Badginarra and Jurien Bay.

*Habitat and ecology.* Grows in gravelly or sandy loam in mallee shrubland. Pollinator unknown, presumably nectarivorous birds. Regeneration is from seed and lignotuber.

*Flowering period.* All year with a peak in Spring.

*Fruiting period.* Fruiting specimens have been collected in late Spring.

*Conservation status.* A code of CALM Priority Three is recommended. Most extant populations occur in degraded roadside habitats.

**Grevillea thyrsoides** subsp. **pustulata** P. Olde & N. Marriott subsp. nov. (Figure 9)

A subspecie typica foliis brevioribus (pro parte maxime minus quam 5 cm longis) cum lobis brevioribus approximatioribusque unisquisque basi in pagina infera pustulam gerentibus, bracteis florum saepe brevioribus differt.

*Typus:* Western Australia: 12 mi. S of Marchagee, *M. Tindale* 1275, 27 Mar. 1970 (holo: PERTH; iso: NSW).

Differs from the type in its shorter leaves (mostly less than 5 cm long) with shorter, more closely aligned lobes each bearing at its base on the undersurface a pimple, and in its often shorter floral bracts.

Leaves 2.5-4 (6) cm long; lobes 9-32 mm long, straight and closely aligned, bearing a terminal lobe 2-3 mm long; unit conflorescence 2.5-11 cm long; floral bracts 2-5.3 mm long.

*Selected specimens* (23 examined). WESTERN AUSTRALIA: 13.2 km N of Watheroo on Midlands Rd, *Hopper* 1644, 29 July 1980 (PERTH); Coorow, *E. Salisbury s.n.*, 10 Aug. 1949 (PERTH); 54 km N of Moora, *Olde* 86/920, 17 Oct. 1986 (NSW); *pr.* Watheroo, *Gardner* 1935, 23 Sep. 1926 (PERTH).

*Distribution.* Western Australia, where confined to an area between Coorow and Watheroo.

*Habitat and ecology.* As for subsp. *thyrsoides.*

*Flowering period.* All year.

*Conservation status.* Subsp. *pustulata* has a limited distribution and is confined to an area which has been largely cleared. It survives mainly in unreserved road verges. A conservation code of CALM Priority One is recommended.

*Etymology.* Latin *pustula* - a pimple, in reference to the pimple-like protuberance at the base of the leaf lobes.

**10. Grevillea dryandroides** C.A. Gardner in J. & Proc. Roy. Soc. W.A. 19: 81 (1934). (Figure 10)

*Lectotypus* (McGillivray 1993: 415): Ballidu, in yellow sandy loam, with *Synaphea polymorpha, Ecdeiocolea etc., C.A. Gardner* 2711, 22 Sep. 1931 (lecto: PERTH - with rubber stamp "TYPE" and 'TYPE SPECIMEN' sticker; isolecto: K *(n.v.)*, PERTH).

Tufty, root-suckering shrub 10-50 cm high with leafless peduncles trailing up to 1 m from the foliage; branchlets angular, villous. *Leaves* 5-20 cm long, ascending, shortly petiolate, subpinnatisect, secund; leaf rachis straight, incurved or recurved; leaf lobes 5-35 mm long, 1.2-2.5 mm wide, linear, closely aligned, the apex uncinate; upper surface glabrous to villous, the midvein evident; margin angularly to smoothly refracted; lower surface bisulcate, the lamina obscured or almost so by the margin, villous in the grooves, the midvein prominent. *Conflorescence* erect on trailing peduncles, terminal, usually branched, sometimes simple; unit conflorescence 3-10 cm long, conico- to oblong-

secund, dense; peduncles sparsely to densely sericeous to appressed-villous; floral rachis sericeous; floral bracts 1-2 mm long, ovate-acuminate, some usually persistent at anthesis. *Flowers:* pedicels 1-2 mm long, sericeous; torus 1-1.5 mm across, oblique to almost straight; *perianth* 6-8 mm long, pink to purplish-red, ovoid-sigmoid, sericeous to tomentose outside, glabrous inside; limb green, revolute, ellipsoid; *pistil* 17-23 mm long; stipe 0.5-1.5 mm long; ovary appressed-villous; style red, straight, sparsely villous becoming glabrous near the style-end; pollen-presenter straight, erect,

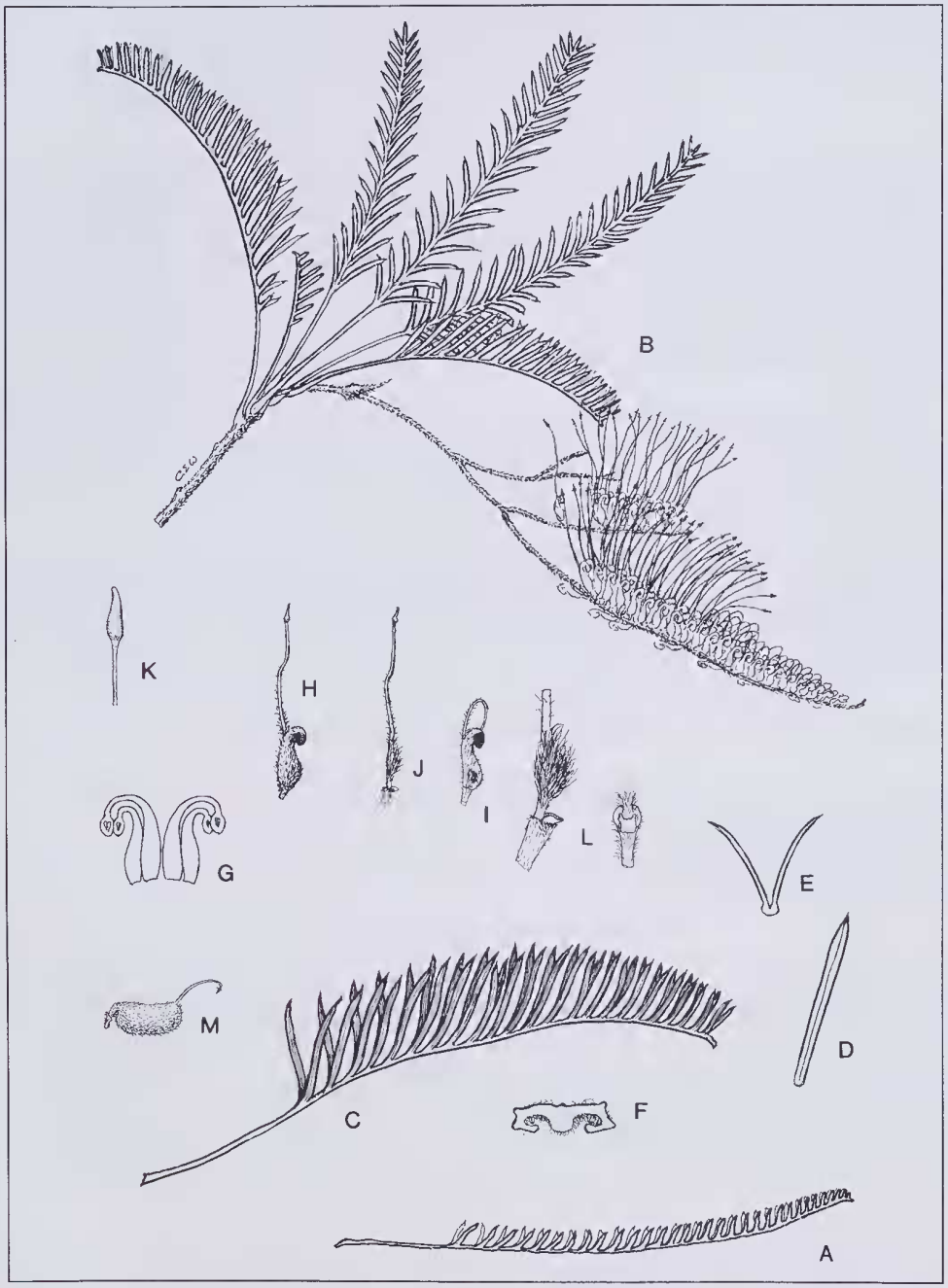


Figure 10. A - *G. dryandroides* subsp. *dryandroides* leaf. *G. dryandroides* subsp. *hirsuta* B - habit, C-E - leaves, F - leaf in cross-section, G - inner perianth surface, H, I - perianth, J - pistil, K - style-end, L - nectary/ovary, M - fruit.

very narrowly elongate-conical, the base slightly bulbous. *Fruits* 14-16.5 mm long, 8.5 mm wide, oblique, oblong to ellipsoid; pericarp 0.5 mm thick throughout. *Seed* 7 mm long, 2.5 mm wide, oblong-ellipsoid; outer face convex, rugulose; inner face flat, channelled around the margin; margin recurved with a papery or waxy border.

*Discussion.* Two subspecies are here recognised based on the persistence of foliar indumentum, leaf lobe length, conflorescence and pistil length.

**Key to subspecies of *Grevillea dryandroides***

1 Most leaf lobes <10 mm long, glabrescent; pistil 17 mm long; ovarian stipe <1 mm long ..... subsp. *dryandroides*

1* Most leaf lobes >12 mm long, persistently hairy; pistil 19-23 mm long; ovarian stipe 1-1.5 mm long ..... subsp. *hirsuta*

**Grevillea dryandroides** subsp. **dryandroides**

A lightly root-suckering shrub 10-50 cm high, usually forming colonies of <5 plants or scattered singly among the vegetation; leaves dull, yellow-green; leaf rachis glabrous; leaf lobes 5-10(15) mm long, glabrescent; unit conflorescence 3-4 cm long, oblong-secund; pedicels 1-1.5 mm long; torus oblique at c. 30°; perianth 6-7 mm long; pistil 17 mm long; ovarian stipe 0.5-0.7 mm long.

*Selected specimens* (8 examined). WESTERN AUSTRALIA: 1 km S of Ballidu, *Olde* 86/850, 12 Oct. 1986 (NSW); Ballidu, *Gardner,* 10 Feb. 1940 (PERTH); 2.2 km N of Ballidu, *S. Patrick* 255, 20 May 1986 (PERTH); Between Pithara and Wongan Hills, *Blackall* B791, 26 Sep. 1931 (PERTH); 27 mi. from Wubin towards Wongan Hills, *Canning,* 13 Sep. 1968 (CBG, NSW).

*Distribution.* Western Australia where confined to a small area near Ballidu.

*Habitat and ecology.* Grows in sandy clay loam in heath. Pollinator unknown, probably ground-hopping, nectarivorous birds. The flowers are attended by numerous 'meat-ants'.

*Flowering period.* Winter-Summer.

*Notes.* The Type specimen has mostly hairy leaves with a few older leaf lobes starting to shed hairs. The same has been observed on cultivated plants with shedding of hairs becoming apparent only after some months. It is presumed that the Type was collected from a plant in vigorous growth as it otherwise complies with the features observed for this subspecies at the Type locality, including shorter leaf lobes, pistils and conflorescences and shorter ovarian stipe.

*Conservation status.* A code of CALM Priority One is recommended.

**Grevillea dryandroides** subsp. **hirsuta** P. Olde & N. Marriott subsp. nov.

Ab subsp. *dryandroides* foliorum lobis cum indumento persistenti longioribus, conflorescentiis pistillisque longioribus distinguitur.

*Typus:* Western Australia: 2.6 km N of Cadoux, *J. Briggs* 645, 25 Sep. 1980 (holo: PERTH; iso: CBG, NSW).

Distinguished from subsp. *dryandroides* in its longer leaf lobes with a persistent indumentum and in its longer conflorescences and pistils.

Tufty, vigorously root-suckering shrub 10-30 cm high, usually forming colonies in excess of 50 clones; leaves grey; rachis appressed-villous; leaf lobes (8)12-35 mm long, persistently hirsute, the hairs crisped; unit conflorescence 5.5-10 cm long, conico-secund; pedicels 1.5-2 mm long; perianth 7-8 mm long; pistil 19-23 mm long; ovarian stipe 1-1.5 mm long.

*Selected specimens* (11 examined). WESTERN AUSTRALIA: 2-3 km N of Cadoux, *Olde* 86/874, 14 Oct. 1986 (NSW); Baandee Rd, N of Cadoux, *R. Gibbons*, Oct. 1964 (PERTH); 15 km N of Yardingalong, *Cranfield* 4834, 27 Oct. 1983 (PERTH); Hindmarsh Nature Reserve, 16 km SSE Dowerin, *A.P. Brown* 284, 1 June 1986 (PERTH); Durrakoppinen Nature Reserve, N of Kellerberrin, *Olde* 91/67, 11 Sep. 1991 (NSW); Cnr Gill & Creek Rds, NW of Corrigin, *Olde* 88/ 55, 6 Oct. 1988 (NSW); 30 km S Quairaiding, (5 km S of Lake Mears), *J. Taylor* 913, *M. Crisp* & *R. Jackson,* 27 Sep. 1979 (AD, CBG, NSW, PERTH); near wheatbin, 6.6 km N of Lomos, W of Corrigin, *George* 12915, 30 Oct. 1974 (PERTH).

*Distribution.* Western Australia, between Cadoux and Corrigin.

*Habitat and ecology.* Grows in yellow sand-heath, sometimes with *Eucalyptus* or *Banksia.*

*Conservation status.* A code of CALM Priority Two is recommended. This subspecies is more common than subsp. *dryandroides* but has nonetheless suffered severely from the loss of habitat due to agricultural clearing.

*Etymology.* Latin *hirsutus* - hairy, in reference to the persistent leaf indumentum.

**11. Grevillea crowleyi** P. Olde & N. Marriott sp. nov. (Figure 11)

Affinis *Grevilleae callianthae* Makinson et Olde, sed foliorum lobis angustioribus approximatioribusque, conflorescentiis plerumque brevioribus (2-5 cm longis), pedunculis brevioribus (2.5-4 mm longis), secus stylum biramosis trichomis supra ovarium 5-10 mm extensis, florum bracteis minoribus, trichomis biramosis in fructibus adultis persistentibus differt.

*Typus:* Western Australia: North-east of Darkan, near Dardadine [precise locality withheld], *P. Olde* 91/234, 26 September 1991 (holo: PERTH; iso: CANB, NSW).

Aff. *G. calliantha* Makinson & Olde, but differs in its narrower and more closely aligned leaf lobes, in its generally shorter conflorescences (2-5 cm long), in its shorter peduncles (2.5-4 mm long), in hairs extending 5-10 mm along the style above the ovary, in its smaller floral bracts and in persistent two-armed trichomes on the fruits.

Shrub 0.5-1.5 m high, dense and spreading up to 1.5 m wide when young, becoming spindly with leaves crowded on the upper branchlets when older; bark grey, rough; branchlets round, occasionally

angular, tomentose to pubescent, striation lacking. *Leaves* (2)3-7 cm long, grey to grey-green, ascending, subsessile but appearing petiolate (distance from leaf base to first lobe 10-20 mm) subpinnatisect; leaf lobes 3-7 per leaf, (4)10-42 mm long, 0.8 mm wide, narrow-linear, dipleural to dorsiventral, basal lobes longest; lobe apex acute, scarcely pungent with a straight to slightly uncinate spine 0.8 mm long; upper surface white tomentose to pubescent when young, becoming ± glabrous with age and either smooth or with 2 longitudinal sulci beside a scarcely evident midvein; lower surface bisulcate, the lamina enclosed by the margin, the grooves packed with white or black, wavy trichomes, the midvein prominent; margin smoothly or angularly revolute; venation obscure except the midvein on the undersurface; texture firmly chartaceous. *Conflorescence* 2-5 cm long, erect or occasionally decurved, subsessile to shortly pedunculate, terminal, secund, dense, simple but sometimes appearing branched with peduncles arising terminally on successive subterminal branchlets, scarcely exceeding the foliage, development acropetal; peduncle 2.5-4 mm long, bracteate (bracts 3-4.5 mm long) lanate; floral rachis 1.2-1.5 mm thick at the base, villous to sublanate; floral bracts 2 mm long, 1-1.2 mm wide, ovate-acuminate, ascending to spreading, persistent, imbricate in bud, villous to tomentose throughout, glabrous at the base inside. *Flowers:* pedicel 1.5-2.5 mm long, villous; torus 1.2-1.5 mm across, straight to oblique at 30°, projecting further on the ventral side; nectary linguiform, slightly lipped at the apex, patent, spreading ± 1 mm from the stipe and exceeding the torus 0.2-0.5 mm, margin entire; *perianth* 7-8 mm long, 2-3 mm wide at the base, grey, obliquely ovoid, tomentose outside, the indumentum consisting mostly of white biramous trichomes mixed with a few red, glabrous inside; limb 1.8 mm long, 2 mm wide, villous, revolute, globose to spheroidal; dorsal tepals 12 mm long, 2 mm wide; *pistil* (23)34-38 mm long; stipe 0.2-0.5 mm long, villous, inserted on the dorsal rim of the torus; ovary subsessile, villous with mixed red and white trichomes; style maroon-black to red, gently incurved, biramous trichomes extending (3)5-10 mm along the style above the ovary, otherwise glabrous; style-end gradually dilated c. 1 mm from the end; pollen-presenter 1 mm long, 0.8 mm wide, 0.5 mm high, convex to subconic, ± round, oblique at c. 45°; stigma distally off-centre. *Fruit* 13-16 mm long, 6-9 mm wide, 8-9.5 mm deep, erect or reflexed on straight or incurved pedicels, oblong-ellipsoidal with recurved apiculum, slightly compressed laterally, tomentose with mixed biramous and glandular trichomes, conspicuous red or brownish blotches or striping evident caused by the trichome cell colour; style persistent; pericarp c. 0.3 mm thick throughout. *Seeds* 12 mm long, 5 mm wide, 2 mm deep, oblong-elliptic; outer face convex, smooth with a prominent submarginal ridge all round; margin undulate, entire, paler than the central area; inner face concave with conspicuous, gill-like fluting radiating c. 2 mm from the margin all round towards a central, more open base 6 mm long, 1.5 mm wide.

*Selected specimen* (15 examined). WESTERN AUSTRALIA: North-east of Darkan. *V. Crowley s.n.*, 5 November 1990 (NSW).

*Distribution.* Western Australia, confined to the Type location where only 10 plants remain. Most are found in a disturbed gravel pit. Two were found in nearby undisturbed bushland.

*Habitat and ecology.* Grows in *Eucalyptus wandoo* forest in heavily laterised loam in association with *Allocasuarina* sp., *Glischrocaryon aureum, Baeckea crispiflora, Grevillea leptobotrys, Synaphea* sp., *Calothamnus* sp. The area contains about 75 different species. Pollination is probably by birds. Regeneration is from seed only.

*Flowering period.* August-November.

*Fruiting period.* November-December.

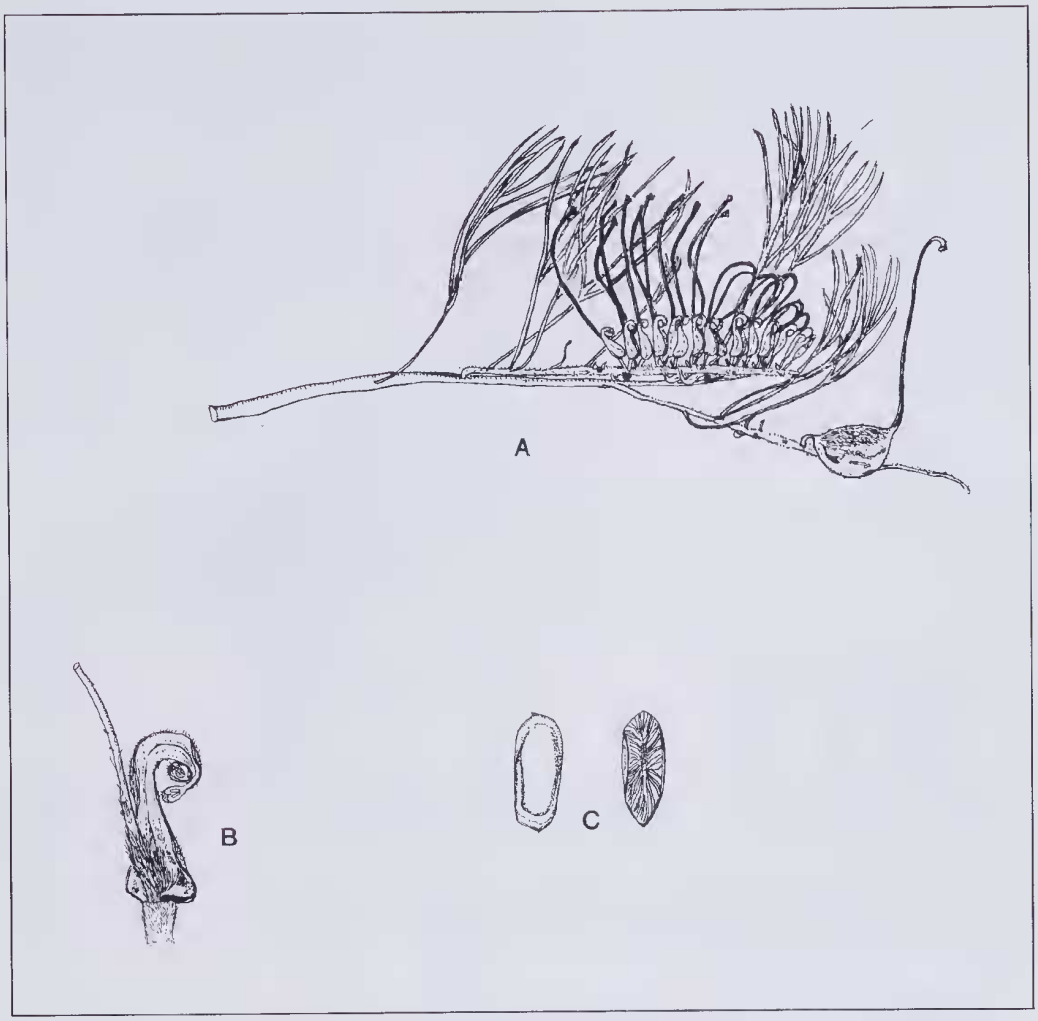


Figure 11. *G. crowleyi* A - habit, B - perianth and pistil, C - seed.

*Affinities. Grevillea crowleyi* is most closely related to *Grevillea calliantha* and *G. hookeriana,* the latter differing in its shorter pistils (19-21.5 mm long) and in its glabrous style. The differences from *G. calliantha* are listed in Table 3 on page 274.

*Conservation status.* A code of CALM Priority One is recommended. We understand that the Type locality is currently being considered as a nature reserve. Direct intervention as a conservation initiative is recommended both by *ex-situ* propagation by horticulturists and *in-situ* protection.

*Etymology.* The epithet honours Mrs Valma Crowley (1937- ), amateur naturalist, of Darkan, W.A. who, with her friend Mrs Janice Smith (1933- ), also of Darkan, discovered the new species in a gravel pit while bushwalking near her home. Mrs Crowley first drew our attention to this species and forwarded specimens from each plant. The ongoing concern of the two co-discoverers for its conservation has enabled this species to be preserved in its natural habitat.

**TABLE 3**

| | G. calliantha | G. crowleyi |
|---|---|---|
| Leaf lobes | >1 mm wide | <1 mm wide |
| orientation | spreading | closely aligned. |
| Peduncle | 5-15 mm long | 2.5-4 mm long |
| Conflorescence | 5-7 cm long | 2-5 cm long |
| Floral bracts | 2.2-2.9 mm long | 2 mm long |
| Stylar indumentum | | |
| biramous trichomes | 1-3 mm above ovary | 3-10 mm above ovary |
| glandular trichomes | sometimes present | absent |
| Fruit indumentum | densely glandular | sparsely glandular |
| Habitat | open heath | *Euc. wandoo* forest |
| Soil | white sand over laterite | laterised brown loam |

**12. Grevillea coccinea** Meissner in Hooker's Journ. Bot. Kew Gard. Misc. 7: 76 (1855), and, Meissner in Lehmann [ed.], Pl. Preiss. 1: 545 (1845) sub *Grevillea concinna* R.Br. (Figure 12)

*Lectotypus (n.v.)* (*fide* McGillivray 1993: 411): "In calculosis confragosis 7 mill. a monte Manypeak 1, Tjilberup", *Preiss* 711, 22 Nov. 1840 (lecto: NY - specimen at right of sheet overlain by lectotype determinavit slip; isolecto: B, G, G-DC, HBG, LE, MEL 47032, NY, P - 2 sheets).

*G. hewardiana* Meissn. in Candolle, Prodr. 14: 366 (1856); lectotype (McGillivray 1993: 411): SW Australia, *Drummond* 404 (lecto: K; isolecto BM, CGE, FI, G, LE, MEL, P, TCD).

*G. concinna* var. *racemosa* Benth. in Fl. Austral. 5: 432 (1870); *lectotype (n.v.)* (*fide* McGillivray 1993: 411): SW Australia, *Drummond* 404 (lecto: K; isolecto: BM, CGE, FI, G, K, LE, MEL, P, TCD).

A spreading, mid-dense shrub; branchlets terete to slightly angular. *Leaves* crowded, shortly petiolate, simple; apex acute to obtuse-mucronate, pungent; upper surface smoothly or angularly convex to flat, usually with 3-5 longitudinal veins, glabrous with minute pitting to sericeous or sparsely so, the hairs often with a sparkling sheen; margin entire, angularly to vertically refracted about an edge-vein; midvein and edge-veins evident to prominent on the upper surface, the midvein prominent below. *Conflorescence* 2.5-6.5 cm long, erect, shortly pedunculate, terminal, secund, simple, scarcely to not exceeding the leaves; peduncles sericeous to pubescent; floral rachises angular, sericeous to tomentose; floral bracts 2.4-4.8 mm long, narrow-triangular with attenuate to subulate apex, sericeous to tomentose, caducous. *Flowers:* pedicels 1.3-2.1 mm long, sericeous to tomentose; torus ± straight, oblong; nectary oblong to thickly U-shaped, entire or lipped; *perianth* greenish-cream to brown, ovoid, glabrous inside; limb revolute, globular to spheroidal; *pistil* 19-23.5 mm long; stipe 0.6-1.6 mm long, villous, partly adnate within the torus; ovary villous; style red, glabrous, papillose or wrinkled on the ventral side, retrorse soon after anthesis, dilating c. 1 mm before the unguiform style-end; pollen-presenter straight or slightly oblique, oblong-elliptic to ± round, flat to convex,

umbonate. *Fruit* 10.5-16 mm long, 5.5-8 mm wide, erect on incurved pedicels, faintly ridged, ovoid, tomentose to pubescent with red-brown striping; style persistent, fragile; pericarp 0.5-1 mm thick. *Seed* 10 mm long, 3 mm wide, elliptic; outer face convex, smooth with a flange-like border, shortly winged at each end; inner face channelled about the margin with an elliptic concave centre; margin recurved.

*Affinities. G. coccinea* is closely related to a number of species including *G. concinna* and *G. cagiana*. *G. concinna* differs primarily in its deflexed inflorescences. *G. cagiana* differs in having its leaves divided with the undersurface enclosed by the margin.

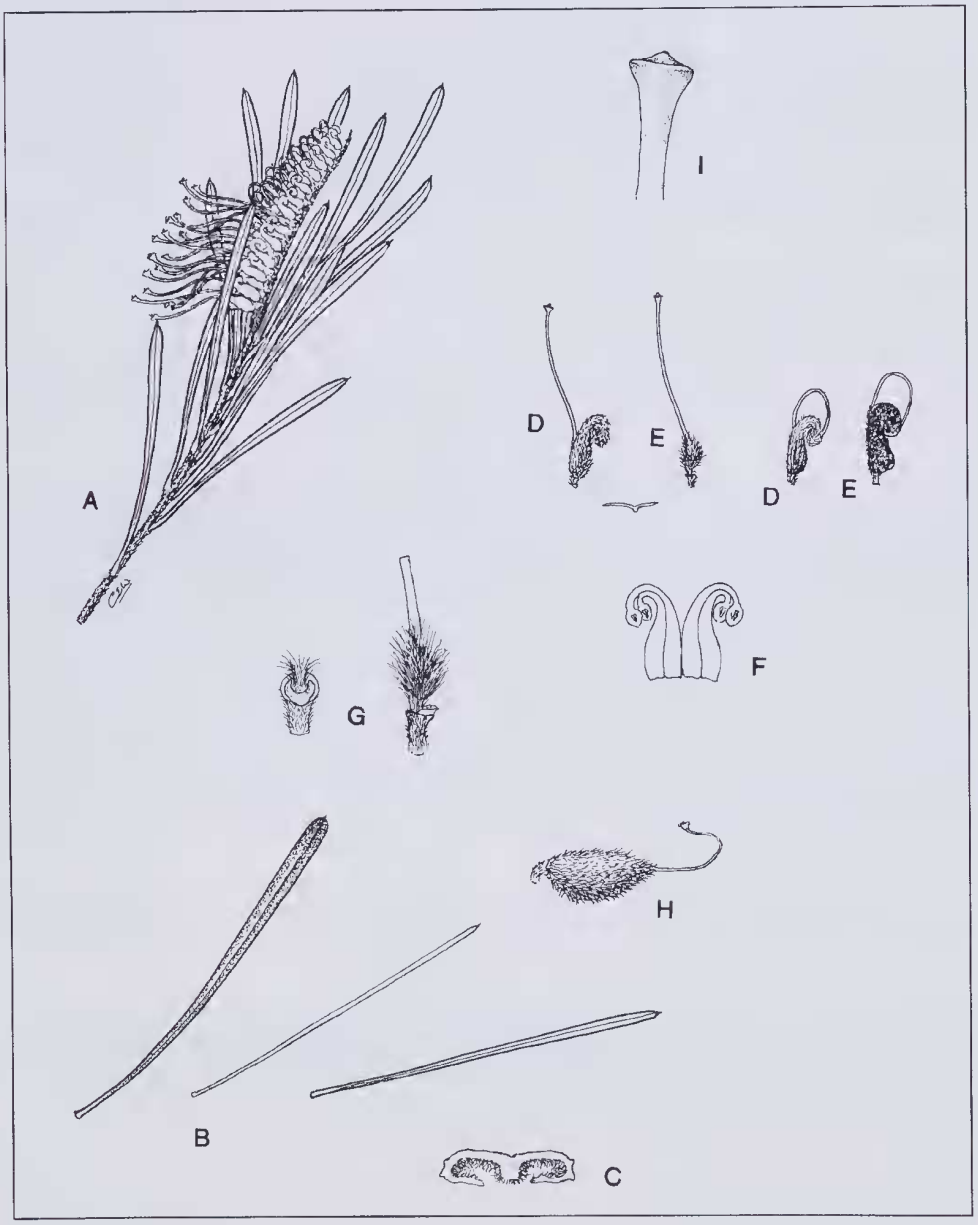


Figure 12. *G. coccinea* A - habit, B - leaf variation, C - leaf in cross-section, D - perianth (subsp. *coccinea*), E - perianth/pistil (subsp. *lanata*), F - inner perianth surface, G - nectary/ovary, H - fruit, I - style end.

*Discussion.* McGillivray (1993: 74) informally recognises three forms in *G. coccinea.* We have conducted extensive field research and herbarium study into this species and conclude that at least one of them, "the woolly-flowered form", should be recognised formally. The taxon is represented in collections by two specimens and is both visually distinctive and morphologically discontinuous from other forms of *G. coccinea* in the characteristics outlined by McGillivray. In addition, both specimens of this form have an exceedingly short ovarian stipe (0.4-0.5 mm long). Further it is geophysically confined to two mountainous areas from which collections of other forms are not known.

**Key to subspecies of *Grevillea coccinea***

1 Perianth 2-3 mm wide, outer surface sericeous to tomentose; torus <1.5 mm wide; ovarian stipe > 0.5 mm long ..... subsp. *coccinea*

1* Perianth 3-3.5 mm wide, outer surface lanate; torus 1.6 mm wide; ovarian stipe <0.5 mm long ..... subsp. *lanata*

**Grevillea coccinea** subsp. **coccinea**

A shrub 1-3 m high; leaves 2.5-12.5 cm long, 1-3(4.5) mm wide; torus 1-1.5 mm wide; floral bracts 2.4-4.8 mm long; perianth 8 mm long, 2-3 mm wide, sericeous to tomentose; pistil 19-23 mm long; stipe (0.5)0.7-1.6 mm long.

*Selected specimens* (55 examined). WESTERN AUSTRALIA: 5 km S along Hamersley Drive from West River Rd, WNW of Hopetoun, *Olde* 86/1126, 10 Nov. 1986 (NSW); 20 miles S of Jerramungup, *Filson* 9142, 2 Oct. 1966 (PERTH); 3 km E of Pallinup River on Hassell Hway, *Olde* 86/1088, 7 Nov. 1986 (NSW); Fitzgerald River NP, Junction of Hamersley Dr. & Telegraph Rd, *J. Fox* 86/074, 3 Jan. 1986 (NSW); East Mt Barren, *Phillips*, 31 Oct. 1962 (NSW); 4 km N of Hopetoun on Ravensthorpe Rd, *Rodd* 5105 & *McCarthy*, 20 Nov. 1985 (NSW, PERTH); 30 km S of Reynolds Hill on road S from Jerramungup, *McGillivray* 3508 & *George*, 25 June 1976 (NSW); 80 mi. from Albany towards Jerramungup, *Wrigley*, 26 Oct 1968 (CANB, NSW); Nr Whoogarup Range, *George* 1928, 2 Dec. 1960 (PERTH); 51 miles Many Peak Rd, Sth Stirlings, *Lullfitz* L3502, 19 Aug. 1964 (PERTH); Elverdton, *Woolcock* G121, 30 Sep. 1985 (NSW); Ravensthorpe, *Andrews,* Oct. 1903 (NSW): Mt Short, N of Ravensthorpe, *Bennett* 2478, 1 Sep. 1968 (NSW, PERTH); 5 mi. from Ravensthorpe, *Wrigley*, 27 Oct. 1968 (PERTH); 16 km S of Ravensthorpe, *Demarz* 135, 24 May 1968 (PERTH); Nr Hopetoun, *Andrews,* Oct. 1903 (PERTH).

*Distribution.* Western Australia, widespread south from the Ravensthorpe Range to the coast and west towards Mount Manypeak.

*Habitat and ecology.* Grey sand over loam in heath, sometimes in granitic loam, or dense lateritic loam. Honeyeaters have been observed frequenting the flowers. Regenerates from seed after fire.

*Flowering period.* All year, peaking in Spring.

*Conservation status.* Not endangered.

**Grevillea coccinea** subsp. **lanata** P. Olde & N. Marriott subsp. nov.

A subspecie typico perianthio latiore (3-3.5 mm lato) extus lanato, toro parum latiore (1.6 mm lato) ovarii stipite plerumque breviore (0.4-0.5 mm longo) differt.

*Typus:* Western Australia: Middle Mt Barren Reserve 24048. 119° 41'E, 34°03'S, *A.S. George* 10104, 16 July 1970 (PERTH).

Differs from the type in its broader perianth (3-3.5 mm wide) with a woolly outer surface, in its slightly longer torus (1.6 mm long across) and in its generally shorter ovarian stipe (0.4-0.5 mm long).

Shrub 1.3 m high. Leaves 8-12 cm long, 1.8-2.5 mm wide; unit conflorescence 3.5-5 cm long; torus 1.6 mm wide; floral bracts 6 mm long; perianth 8-10 mm long, 3-3.5 mm wide, creamy-pink, sublanate; pistil 20 mm long; stipe 0.4-0.5 mm long.

*Specimen examined.* WESTERN AUSTRALIA: Thumb Peak, *George* 7126, 31 Oct. 1965 (PERTH).

*Distribution.* Western Australia, where confined to Fitzgerald River National Park.

*Habitat and ecology.* Recorded from submontane habitats in quartzitic soils in heath. Pollination is probably by nectarivorous birds.

*Flowering period.* Flowers recorded in July and October.

*Conservation status.* The subspecies is contained in two specific areas of Fitzgerald River National Park. Although the specimen base is small, the area is difficult of access and poorly collected. Accordingly, the subspecies may be more common than is indicated. A code of CALM Priority Three is recommended.

*Etymology.* Latin *lanatus* - woolly, in reference to the outer perianth indumentum.

**13. Grevillea pilosa** A.S. George (1966) in W.A. Nat. 10: 32

Replaced synonym: *G. rufa* C.A. Gardner in Journ. & Proc. Roy. Soc. W.A. 27: 168 (1942) *nomen illeg. non* (Warb.) Sleumer (1939).

*Lectotypus* (McGillivray 1993: 434): gravelly rises. Pallarup Rocks. Low woody diffuse shrub. fls. dark red, woolly. *C. A. Gardner*, September 1930 (lecto: PERTH; isolecto PERTH).

A spreading, dense shrub 0.5-2 m high with down-arching branches; branchlets round, villous to silky-tomentose with intermixed glandular hairs, often secund. *Leaves* 2-5.5 cm long, 1-6 cm wide, ascending to retrorse, shortly petiolate, obovate-cuneate to ovate-oblong, the base narrowly cuneate to spreading; rachis straight; upper surface minutely glandular-pubescent, extending even onto the marginal spines, sometimes with scattered biramous trichomes, sometimes also glaucous; lower surface sericeous; margin flat or shortly recurved, dentate to triangular-lobed, the apices pungent; venation craspedodromous, the midvein and lateral veins flat or slightly raised on the upper surface, prominently raised below, the lateral veins terminated by excurrent spines 1-2 mm long, less

prominent lateral veins terminated at the margin with conspicuous tertiary reticulum. *Conflorescence* erect to decurved, usually terminal, sometimes axillary, pedunculate, simple or few-branched; unit confloresence 3-4(10) cm long, secund-globose, development basipetal; peduncles and floral rachises tomentose to villous; floral bracts 3-6 mm long, ovate-acuminate, sericeous to villous outside, caducous. *Flowers:* pedicels 8-16 mm long, villous, slender; torus 2.5-4.5 mm across, oblique, cupuliform; nectary lining the inside of the torus, scarcely evident above the rim; *perianth* 7-15 mm long, 2.5-3 mm wide, oblong, slightly dilated at the base, glandular-pubescent outside with mixed biramous trichomes; limb revolute, globose, densely villous, the segments not visible, coherent after anthesis; *pistil* 20-27 mm long, hairy; stipe c. 3 mm long, adnate for c. 2 mm to the inner face of the torus, refracted perpendicular to the torus at the toral rim and rising c. 1 mm; ovary densely spreading-villous; style villous, terminated by a clavate style-end; pollen-presenter very oblique to lateral, obovate, convex, the stigma distally off-centre. *Fruit* ± 12 mm long, 8 mm wide, erect, subglobose to oblong-ellipsoid, glandular-villous but the hairs soon deciduous; style persistent; pericarp 0.5-1 mm thick. *Seed* 7.5-8.5 mm long, 3.5 mm wide, compressed-ellipsoid to obovoid; outer face convex, smooth, mottled; inner face with a raised, elliptic ridge in the middle, otherwise flat; margin recurved, narrowly winged all round, the wing drawn to a short, oblique apical point extending 0.5 mm beyond the testa.

*Affinities. Grevillea pilosa* is most closely related to *G. dissecta* and *G. insignis.* See Key 3 on page 282.

*Discussion. G. pilosa* currently comprises two subspecies, subsp. *pilosa* and subsp. *dissecta* McGillivray (McGillivray 1986: 12). From our observations in the field, of herbarium specimens and of the group generally, it is our view that subsp. *dissecta* should be recognised at specific rank and that *G. pilosa* should be further divided into two subspecies, subsp. *pilosa* and subsp. *redacta* P. Olde & N. Marriott. Subsp. *dissecta* McGillivray differs very greatly from subsp. *pilosa* in its leaf indumentum and structure, although floristically it is very close to our *G. pilosa* subsp. *redacta.* The minute glandular indumentum on the upper leaf surface is a distinctive character for *G. pilosa,* shared only by one other related species, *G. asteriscosa* Diels. *G. pilosa sens. str.* has a straight leaf rachis with the lamina exposed on the undersurface, reticulate venation evident, a mixed indumentum of glandular and biramous trichomes on the branchlets and a villous floral rachis and pedicels. *G. dissecta*, on the other hand, has divaricately bipinnatisect leaves with the upper surface glabrous and the undersurface enclosed with only the midvein of the leaf and lobes evident, a sericeous to almost glabrous floral rachis and pedicels. The perianth has a sparser and more closely appressed indumentum and slightly different torus than our subsp. *redacta* and differs markedly from the larger, more densely villous flowers of subsp. *pilosa.* Although we have not seen them growing closely together, the distribution of *G. dissecta* overlaps that of our *G. pilosa* subsp. *redacta.* However, it is much more widely distributed than that subspecies.

**Key to subspecies of *Grevillea pilosa***

1 Perianth 3.5-6.5 mm wide, limb 3-4 mm wide, densely villous; most leaves >2 cm wide with base cuneate to truncate and margins with shallow sinuses; flowers either pale pink or red ..... subsp. *pilosa*

1* Perianth 2.5-3 mm wide, limb 2.5-3 mm wide, villous; most leaves much reduced either <15 mm wide and with attenuate-cuneate leaf bases or c. 2 cm wide and the margins deeply dissected; flowers rose-pink ..... subsp. *redacta*

**Grevillea pilosa** subsp. **pilosa** (Figure 13)

Branchlets glandular-villous; leaves 1.5-6 cm wide, oblong, obovate or round, the base cuneate, spreading to truncate, margins sometimes sinuate, rarely entire, usually with 3-11 spine-tipped, triangular teeth with shallow sinuses; peduncle glandular-villous; torus 3-4.5 mm across; perianth 10-15 mm long, 3.5-6.5 mm wide, pale pink or red, moderately to densely hairy outside with red or brown hairs, the limb 3.5-4 mm wide, conspicuously and densely villous; pistil 21-27 mm long; stipe 2-3 mm long; style red with red or rusty hairs.

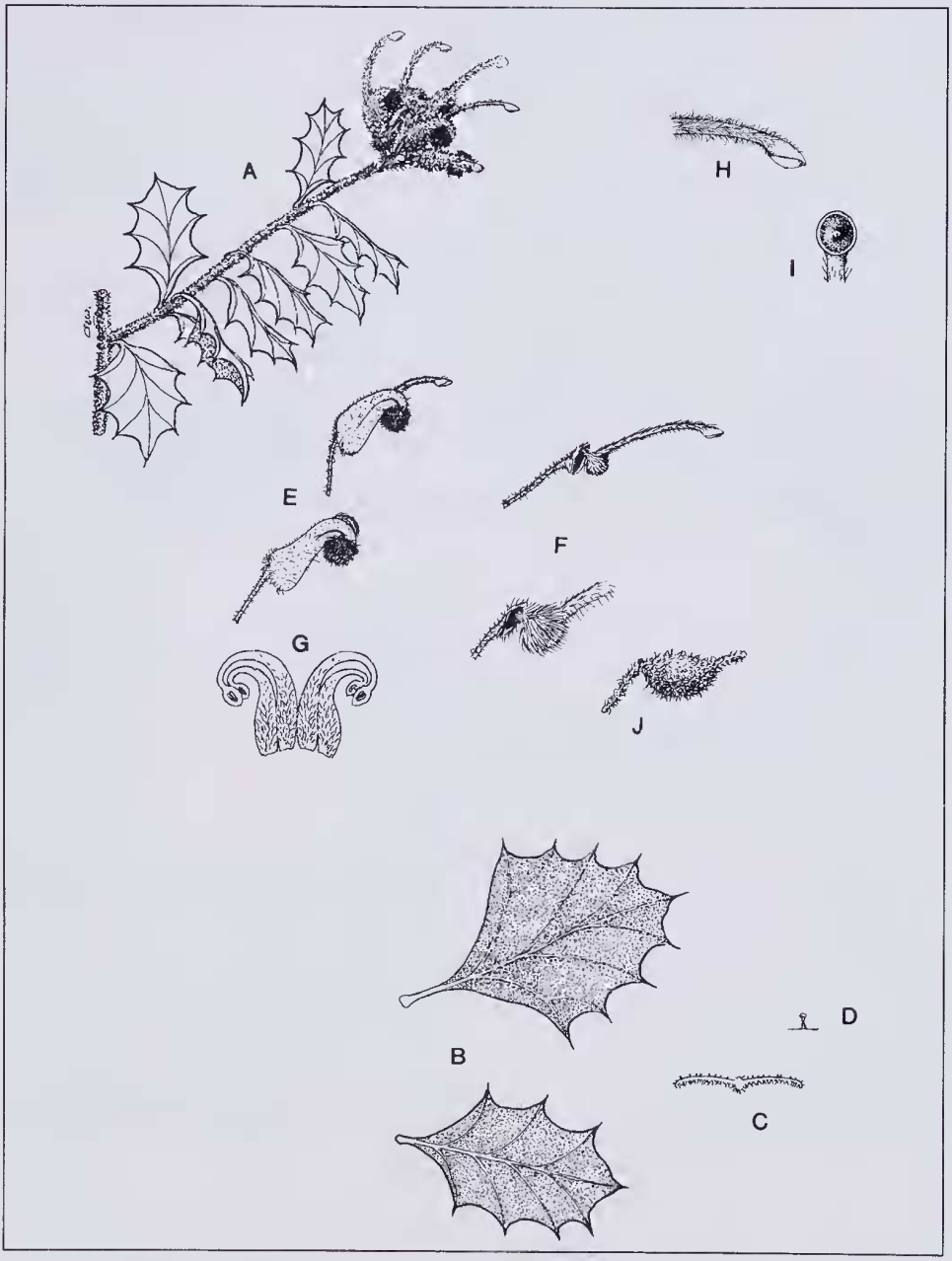


Figure 13. *G. pilosa* subsp. *pilosa* A - habit, B - leaf forms, C - leaf in cross-section, D - glandular hairs on upper leaf surface, E - perianth, F - pistil/ovary, G - inner perianth surface, H - style-end, I - pollen-presenter, J - fruit.

*Selected specimens* (36 examined). WESTERN AUSTRALIA: Near Pallarup, next to Mt Short, *Gardner* 14812, *s.d.* (PERTH); 18.5 km E of Newdegate PO, *McGillivray* 3561 & *George,* 27 June 1976 (NSW); 13 mi. from Lake King, *Wrigley,* 7 Nov. 1968 (NSW); Lake King Rd, 26 km N of Highway, *Ballingall* 2057, 29 Sep. 1985 (PERTH); 130 km W of Daniell, *Kuchel* 1810, 15 Sep. 1964 (PERTH); Towards Diggers Rocks, *Gardner*, 9 Dec. 1964 (PERTH).

*Distribution.* Western Australia, between Newdegate-Lake King-Ravensthorpe area.

*Habitat and ecology.* Grows in sand over laterite or in laterised loam in mallee scrub. Pollination is by nectarivorous birds. Fire response unknown.

*Flowering period.* Winter-Spring

*Conservation status.* Not endangered.

**Grevillea pilosa** subsp. **redacta** P. Olde & N. Marriott subsp. nov. (Figure 14)

A subspecie typica, foliis minoribus, redactis, perianthio cum trichomatis paucioribus extus minore differt.

*Typus:* Western Australia: Lake Cronin, 13 km septentrionalum versus ..., *C.A. Gardner* 15915, 10 Dec. 1964 (PERTH).

Differs from the type in its smaller, reduced leaves and in its smaller perianth with fewer hairs on the outer surface.

Branchlets tomentose, usually mixed with a few glandular trichomes; leaves (0.3)1-2(2.5) cm wide, obovate either with bases attenuated and margins either entire or with 3-5 pungent teeth with shallow sinuses or with base narrowly cuneate and margin deeply dissected into 5-12 linear to narrow-triangular, spine-tipped lobes usually with deep sinuses; peduncle tomentose; torus 2.5 mm across; perianth 7-8 mm long, 2.5-3 mm wide, rose-pink with white or cream hairs, sparsely moderately hairy outside, the hairs white or pale brown, the limb 2.5-3 mm wide, dull-brown, villous; pistil 20-21 mm long; stipe 1-2 mm long; style pinkish-red with white hairs.

*Selected specimens* (12 examined). WESTERN AUSTRALIA: 11.4 km N of Crossroads near Lake Cronin on road to Mt Holland, *Olde* 86/782, 5 Oct. 1986 (NSW); 5 mi. N of Mt Holland, *A.R. Main s.n.,* Dec. 1964 (PERTH); Mt Holland, *Beard* 3870, 28 Aug. 1964 (PERTH); Holt's Rock, *C. Davies* 110, December 1962 (PERTH).

*Distribution.* Western Australia, where confined to a small area from just north of Lake Cronin to Mt Holland.

*Habitat and ecology.* Grows on gravelly rises in brown loam in dense shrubland. Fire effects unknown. Pollination by nectarivorous birds.

*Flowering period.* Spring.

*Conservation status.* A code of CALM Priority Two is recommended. Subsp. *redacta* is known from only a few populations, at least one of which contains few plants. The area is poorly surveyed and populations in greater numbers may be present.

*Etymology.* Latin *redactus* - reduced, in reference to the smaller perianth, reduced leaf size and sparser perianth indumentum.

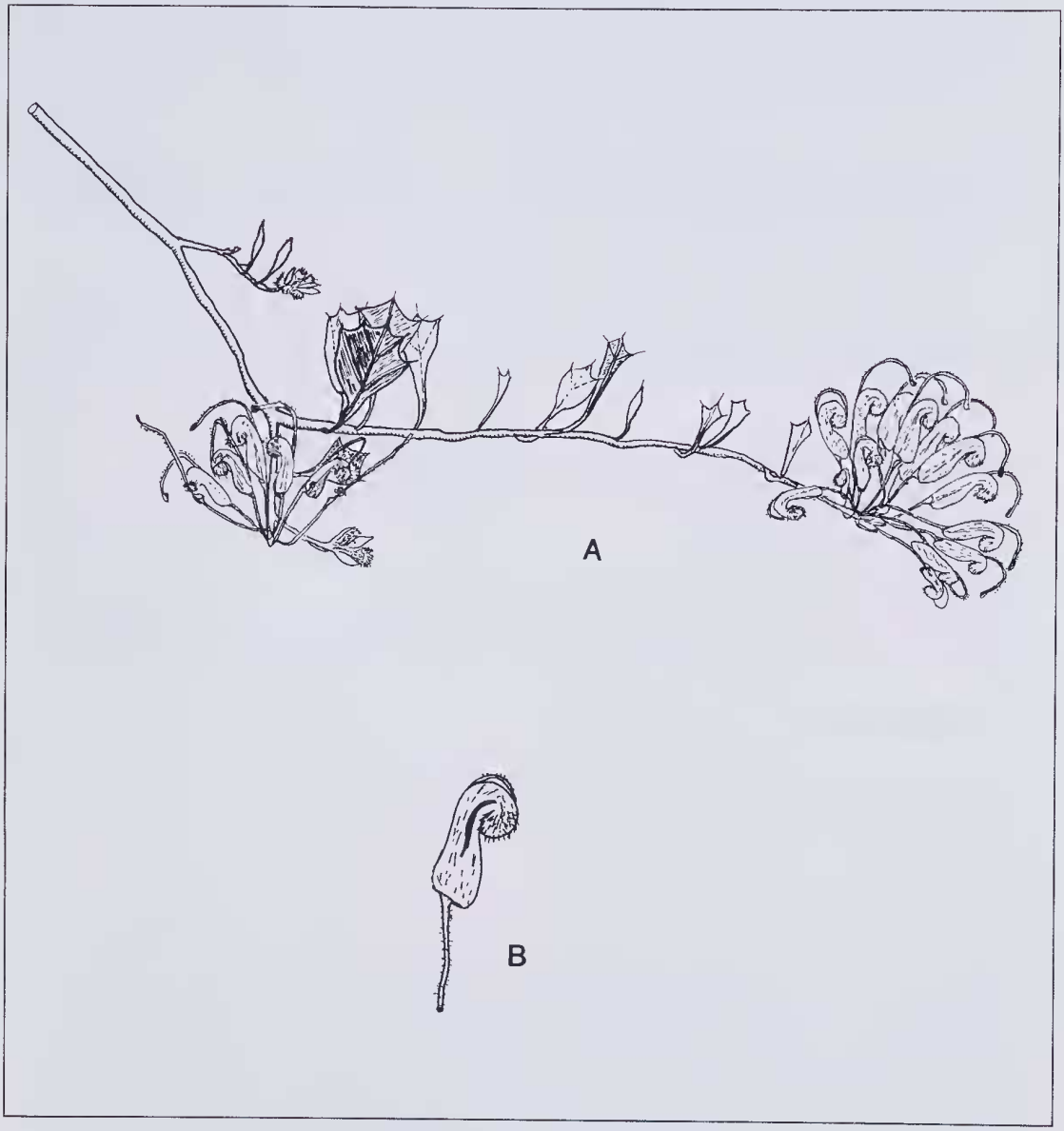


Figure 14. *G. pilsoa* subsp. *redacta* A - habit, B - perianth.

## KEY 3

### Key to species related to *Grevillea pilosa*

1 Unit conflorescence 1-3 flowered
2 Perianth limb glabrous ..... *G. involucrata*
2* Perianth limb hairy ..... *G. fulgens*
1* Unit conflorescence 4 or more flowered
3 Most leaves either entire, or if divided, then lobes >3.5 cm long
4 Undersurface of leaves or leaf lobes not enclosed by the margin ..... *G. longistyla*
4* Undersurface of leaves or leaf lobes enclosed by the margin
5 Ovarian stipe >3 mm long; leaves blue-green ..... *G. erectiloba*
5 Ovarian stipe <2 mm long; leaves green ..... *G. johnsonii*
3 Most leaves either toothed or divided; lobes <2 cm long
6 Leaves divaricately and deeply twice-divided; leaf undersurface concealed, except for the midvein, by the revolute margin
7 Outer perianth surface hairy ..... *G. dissecta*
7* Outer perianth surface glabrous
8 Style glabrous ..... *G. georgeana*
8* Style hairy ..... *G. wilsonii*
6* Leaves toothed or with entire primary lobes, not divaricately twice-divided; leaf undersurface not concealed by the revolute margin
9 Upper leaf surface glabrous ..... *G. insignis*
9* Upper leaf surface glandular-pubescent
10 Leaves sessile ..... *G. asteriscosa*
10*Leaves shortly petiolate ..... *G. pilosa*

**14. Grevillea dissecta** (McGillivray) Olde & Marriott stat. nov. (Figure 15)

*Basionym: Grevillea pilosa* subsp. *dissecta* McGillivray in New Names in Grevillea: 12 (1986).

*Typus:* Western Australia: Lake Barker Area. *W.H. Butler*, 13 Feb. 1973 (PERTH - specimen at lower right of sheet).

A low, rounded, prickly shrub to c. 1 m high with arching branchlets; branchlets round, sericeous. *Leaves* 1-2 cm long, 2-4 cm wide, spreading, ± sessile, divaricately subpinnatisect, sometimes simple, linear; rachis recurved; primary leaf lobes (2)3-7, the lower lobes usually bi- or trisect; ultimate lobes 7-15 mm long, 1-1.5 mm wide, narrow-linear to subulate, pungent; upper surface glabrous, glaucous, sometimes sericeous between the lowermost lobes and the axis of attachment, the midvein evident to slightly raised; lower surface bisulcate, sericeous in the grooves, midvein raised above the lamina but recessed below the level of the margin; margin angularly revolute, enclosing the undersurface except the midvein. *Conflorescence* erect to decurved, pedunculate, terminal, simple or few-branched; unit conflorescence 0.5-2 cm long, secund-umbelliform; peduncle sericeous, subtended by leaf-like bracts; floral rachises sericeous to almost glabrous, development basipetal; floral bracts 3-5 mm long, ovate-acuminate, glabrous or with scattered appressed hairs outside, the margins ciliate, caducous. *Flowers:* pedicels 10-15 mm long, glabrous or sparsely pilose, villous at the base of the

torus, slender; torus 3.5-4 mm across, 2-2.2 mm broad, oblique, cupuliform; nectary spreading over and lining the inner surface of the torus, scarcely evident above the rim; *perianth* 8-9 mm long, 3.5 mm wide, rose-pink, oblong, slightly dilated at the base, sparsely villous with mixed glandular and biramous trichomes outside, bearded inside about the level of the ovary; limb 2.5-3 mm wide, creamy-white, revolute, spheroidal, the segments slightly impressed at the margin, sparsely villous; *pistil* 18-20 mm long; stipe 2 mm long, dorsally villous, ventrally glabrous, adnate within the torus over the basal 1.5 mm, refracted at right angles to the torus at the rim and rising 0.5 mm above; ovary densely villous; style pinkish-red, villous, terminated by a clavate style-end; pollen-presenter very oblique to lateral, convex, the stigma prominent, distally off-centre. *Fruit* 10-12 mm long, 7.5 mm wide, erect, globose to ellipsoid, sparsely hairy; style persistent; pericarp ± 0.5 mm thick. *Seed* 7 mm long, 3 mm wide, ellipsoid, narrowly winged all round; outer face convex, smooth; inner face with a raised, oblong-elliptic centre surrounded by a narrow, marginal, waxy channel.

*Specimens examined* (4). WESTERN AUSTRALIA: 54 km N of Lake Cronin, *Olde* 86/786, 5 Oct. 1986 (NSW); 32.5 km N of Lake Cronin, *Olde* 86/785, 5 Oct. 1986 (NSW); site M, Mt Holland area, *W. Martinick & K. Tinley* 3 (PERTH).

*Discussion.* See under *G. pilosa.*

*Distribution.* Western Australia, between Moorine Rock and Lake Barker and south to Mt Holland area.

*Ecology and habitat.* Grows in low mallee scrub or heath in sand over laterite or in heavily laterised brown loam. Regeneration is from seed after disturbance. Probable pollinator nectarivorous birds.

*Flowering period.* Spring-Summer.

*Conservation status.* A code of CALM PriorityThree is recommended. Much of the presumed habitat remains uncleared and contains few public roads. However, there may be an immediate threat from mining.

**15. Grevillea insignis** Kippist ex Meissner in Hooker's J. Bot. Kew Gard. Misc. 7: 76 (1855).

*Typus:* Swan R., *J. Drummond* Ser. 5, Supp., No. 12 (holo: K, NY; iso: K, MEL, NSW, P, TCD). Only the isotype at NSW has been seen.

A shrub 2-5 m high, 3-5 m wide; branchlets rounded, glabrous, sometimes glaucous. *Leaves* 3-9 cm long, 2-4 cm wide, spreading, shortly petiolate, oblong to obovate, the base truncate to cuneate; rachis straight to recurved; upper and lower surfaces similar to slightly discolorous, glabrous, sometimes glaucous; margin flat or shortly recurved, sinuate, dentate to shallow-lobed; venation craspedodromous, more prominent on the undersurface, the most prominent lateral veins terminated by excurrent spines 1-2 mm long, the less prominent terminated at the margin, conspicuous tertiary reticulum evident. *Conflorescence* erect to decurved, pedunculate, terminal on short axillary branchlets, simple or few-branched; unit conflorescences 2.5-3 cm long, secund-globose to shortly cylindrical, development basipetal; peduncles and floral rachises glabrous, sometimes with scattered, appressed hairs when very young; floral bracts 1.8-2.5 mm long, linear to triangular, tomentose to glabrous except for persistent apical and marginal hairs, caducous. *Flowers:* pedicels 5-10 mm long, glabrous, slender; torus 1.5-3 mm across, oblique; nectary patelliform to annular, overlying the torus and slightly raised above the toral rim, fundibular at the base of the stipe; *perianth* 8-9 mm long, 3-5

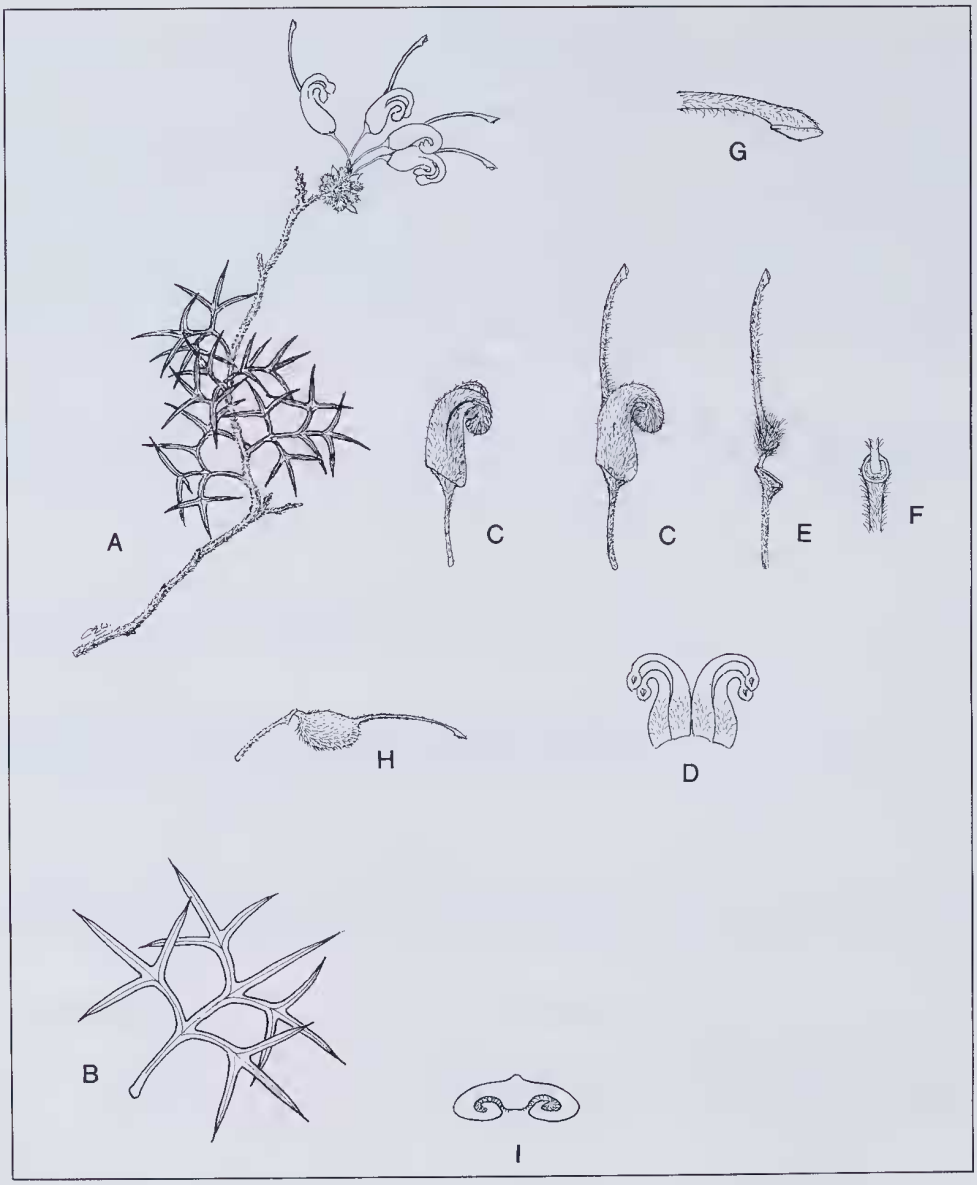


Figure 15. *G. dissecta* A - habit, B - leaf, C - perianth, D - inner perianth surface, E - pistil, F - nectary, G - style-end, H - fruit, I - leaf lobe in cross-section.

mm wide, cream to creamy-pink ageing pink, oblong, dilated at the base, narrowed towards the throat, glabrous and shiny outside, pilose inside about the level of the ovary and slightly above on the dorsal tepals; limb revolute, spheroidal, the segments impressed at their margin; *pistil* 11-20 mm long, hairy; stipe 1.2-2.5 mm long, dorsally villous, ventrally glabrous, inserted perpendicular to the torus on the dorsal margin; ovary densely villous; style reddish-pink, straight, glabrous in the distal half, terminated by a clavate style-end; pollen-presenter lateral, oblong to round, flat with inconspicuous stigma. *Fruit* 10-13 mm long, 9 mm wide, erect, subglobose to oblong-ellipsoid, villous soon glabrous and glaucous; style persistent; pericarp 1.5-2 mm thick. *Seed* 8-9 mm long, 4 mm wide, oblong-ellipsoid; outer face convex, smooth; inner face flat; margin shortly winged with an oblique apical attenuation.

*Affinities. Grevillea insignis* belongs to a group of species for which a key (Key 3) is provided on page 282. Although most species of this group have the stipe inserted perpendicular to the oblique torus, in *G. georgeana* McGillivray and *G. erectiloba* F. Muell. the insertion appears to be secondarily lateral.

*Discussion. Grevillea insignis* is here divided into two geographically disjunct subspecies approximately 200 km apart. Subsp. *elliotii* P. Olde & N. Marriott differs from subsp. *insignis* in its non-glaucous branchlets, its usually shorter, less visibly glaucous leaves which are also usually more deeply dissected and generally have the base cuneate.

**Key to subspecies of *Grevillea insignis***

1 Branchlets glaucous; most leaves with the base truncate to spreading and the sinuses shallow-arcuate ..... subsp. *insignis*

1* Branchlets not glaucous; most leaves with the base cuneate and the sinuses arcuate ..... subsp. *elliotii*

**Grevillea insignis** subsp. **insignis** (Figure 16)

A spreading shrub; branchlets white or pinkish, glabrous, glaucous; leaves 3-9 cm long, bluish-grey, slightly discolorous, rigidly coriaceous, the base usually truncate to spreading, sometimes cuneate, margins dentate with sinuses shallow-arcuate to linear; pistils 15-20 mm long.

*Selected specimens* (45 examined). WESTERN AUSTRALIA: *J. Drummond,* Coll. 5 Suppl. 12, 1849 (*Type*!) (MEL, NSW); 25 km NW of Lake Grace, *Woolcock,* 2 Sep. 1985 (NSW); 19 km W of Quairading on York Rd, *K. Hill* 2974, 30 Aug. 1988 (NSW, PERTH); 5 mi. E of Kukerin, *Phillips,* 29 Oct. 1962 (NSW); Tarin Rock Siding, *Wrigley,* 9 Nov. 1968 (NSW); Narrogin, towards Lake Grace, *D. Clyne,* Oct. 1969 (NSW); Avon district, 20 km SE of Cunderdin on Youndegin Hill, *Crisp* 6198, *Taylor & Jackson,* 27 Sep. 1979 (NSW, PERTH); 4.5 km N of Nyabing, *McGillivray* 3528 & *George*, 26 June 1976 (NSW, PERTH); 22 mi. E of York, *George* 224, 19 Aug. 1958 (PERTH); 6 km N of Balkuling, *Beard* 8100, 13 Oct. 1977 (PERTH).

*Distribution.* Western Australia, where originally widespread in the central and southern wheatbelt regions around Tarin Rock, Nyabing and Tammin.

*Flowering period.* Winter-Summer.

*Habitat and ecology.* Grows in very well-drained, dry sites in sand over laterite, or in rocky lateritic hills, usually associated with low heath to thick scrub.

*Conservation status.* A code of Priority Four is recommended.

**Grevillea insignis** subsp. **elliotii** P. Olde & N. Marriott subsp. nov. (Figure 16)

A subspecie typica ramulis non glaucis, foliis saepe minoribus (3-4 cm longis) cum marginibus profundiore incisis, basi plerumque cuneatis differt.

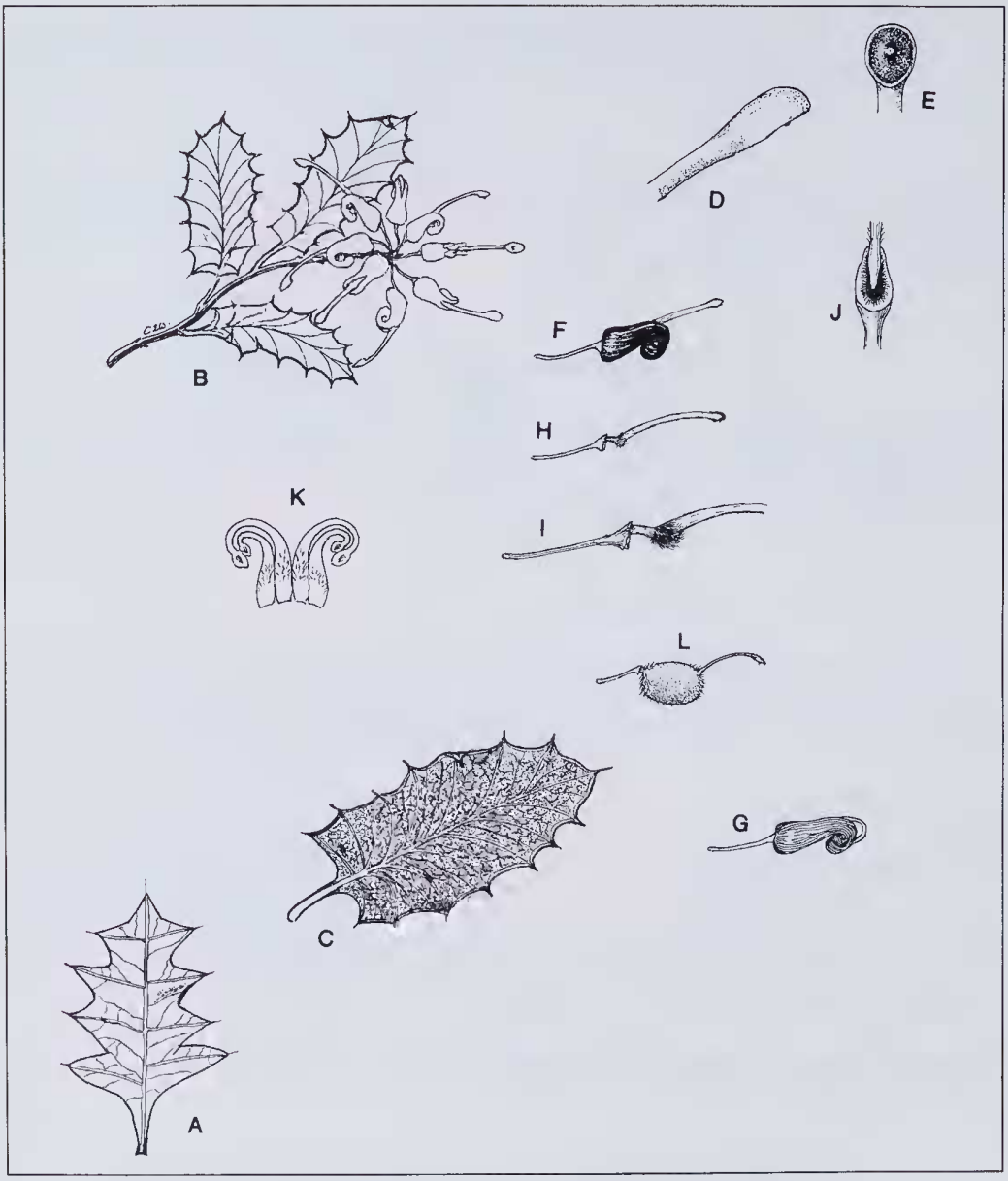


Figure 16. *G. insignis* subsp. *elliotii* A - leaf. *G. insignis* subsp. *insignis* B - habit, C - leaf, D - style end, E - pollen-presenter, F, G - perianth, H, I - pistil, J - nectary, K - inner perianth surface, L - fruit.

*Typus:* Western Australia: Diggers Rocks, 31.5 km E of Varley, *P. Olde* 86/757, 4 October 1986 (holo: NSW; iso: CANB, PERTH).

Differs from the Type in its non-glaucous branchlets, its leaves usually smaller (3-4 cm long) and more deeply divided, with their bases usually cuneate.

A bushy shrub; branchlets glabrous, non-glaucous; leaves 3-4(6) cm long, green, ovate to oblong, discolorous, firmly chartaceous to coriaceous, subglaucous to non-glaucous, the base usually cuneate or narrowly so, sometimes spreading, the marginal sinuses strongly arcuate; pistils 11-17 mm long.

*Selected specimens* (6 examined). WESTERN AUSTRALIA: Hatters Hill, c. 41 km NE of Lake King, *Newbey* 6551, Nov. 1979 (PERTH); South Ironcap, *Olde* 92/252, 10 Oct. 1992 (NSW); Middle Ironcap, SE of Hyden, *Keighery* 893, 12 Oct. 1976 (PERTH).

*Distribution.* Western Australia, confined to laterite outcrops between Hatters Hill and Middle Ironcap.

*Habitat and ecology.* Grows in very well-drained, dry sites in densely laterised loam in eucalypt woodland or medium scrub. Usually confined to hilltops or rises. Regeneration is from seed after fire. Probable pollinator: nectarivorous bird.

*Flowering period.* Winter-Summer.

*Conservation status.* A code of CALM Priority Three is suggested. The distribution of this subspecies is fairly restricted although it is not presently at risk. The area is presently undergoing intensive mining development and may require some protection in the long-term.

*Etymology.* The epithet honours W. Rodger Elliot (1941- ), horticulturist, nurseryman, author on the Australian flora who first drew our attention to this taxon.

**16. Grevillea haplantha** F. Muell. ex Benth. (1870) in Fl. Aust. 5: 451.

*Lectotypus* (McGillivray 1993: 419): "W.A.", *Drummond* (MEL 64510). *Syntype (n.v.):* "E. Mt. Barren, W. Aust., *Maxwell* (K)". The Drummond collection is without locality or date. McGillivray (1993: *l.c.*) states that the syntype is a specimen of *G. disjuncta* F. Muell.

An erect or spreading, rounded, dense shrub 1 m tall, 1-1.5 m wide; branchlets angular to rounded, sericeous. *Leaves* 3-8 cm long, 1-1.5 mm wide, ascending to erect, sessile, simple, linear, relatively stiff and leathery; apex pungent; upper surface minutely granulose, sericeous, longitudinally ribbed, midvein not evident; margin entire, angularly revolute; lower surface bisulcate, silky, midvein sometimes recessed below the margin. *Conflorescence* axillary or cauline, shortly pedunculate (peduncles c. 1 mm long) or sessile, usually simple, often solitary or 2-4(6) flowered in umbel-like clusters; floral rachis c. 1 mm long, villous; floral bracts 0.7-1 mm long, ovate, villous outside, persistent to anthesis. *Flowers:* pedicels 5-9 mm long, villous; torus 2-2.5 mm across, oblique; nectary V-shaped, scarcely evident above the toral rim, entire; *perianth* 6-7 mm long, 3 mm wide, dilated at the base, oblong, conspicuously narrowed at the throat, ribbed, villous outside, bearded inside; limb conspicuous, revolute, densely villous, coherent after anthesis; *pistil* 18-25 mm long, hairy; ovary densely villous, sessile or almost so; style gently curved to straight; pollen-presenter lateral, obovate, convex; stigma distally off-centre. *Fruit* 10-13 mm long, 5 mm wide, erect, ellipsoidal, prominently ribbed, spreading-villous; style persistent; pericarp ± 0.5 mm thick. *Seed* 8-10 mm long, 2.5 mm wide, oblong-elliptic with an apical wing 1.5 mm long, minutely pubescent; outer face convex; inner face flat; margin strongly revolute on one side, shortly recurved on the other.

*Affinities. G. haplantha* is most closely related to *G. disjuncta* F. Muell. and *G. dolichopoda* (McGillivray) P. Olde & N. Marriott both of which differ in the enclosure of the whole undersurface of their leaves by the margin.

Closely related species are treated in Key 4 on page 291.

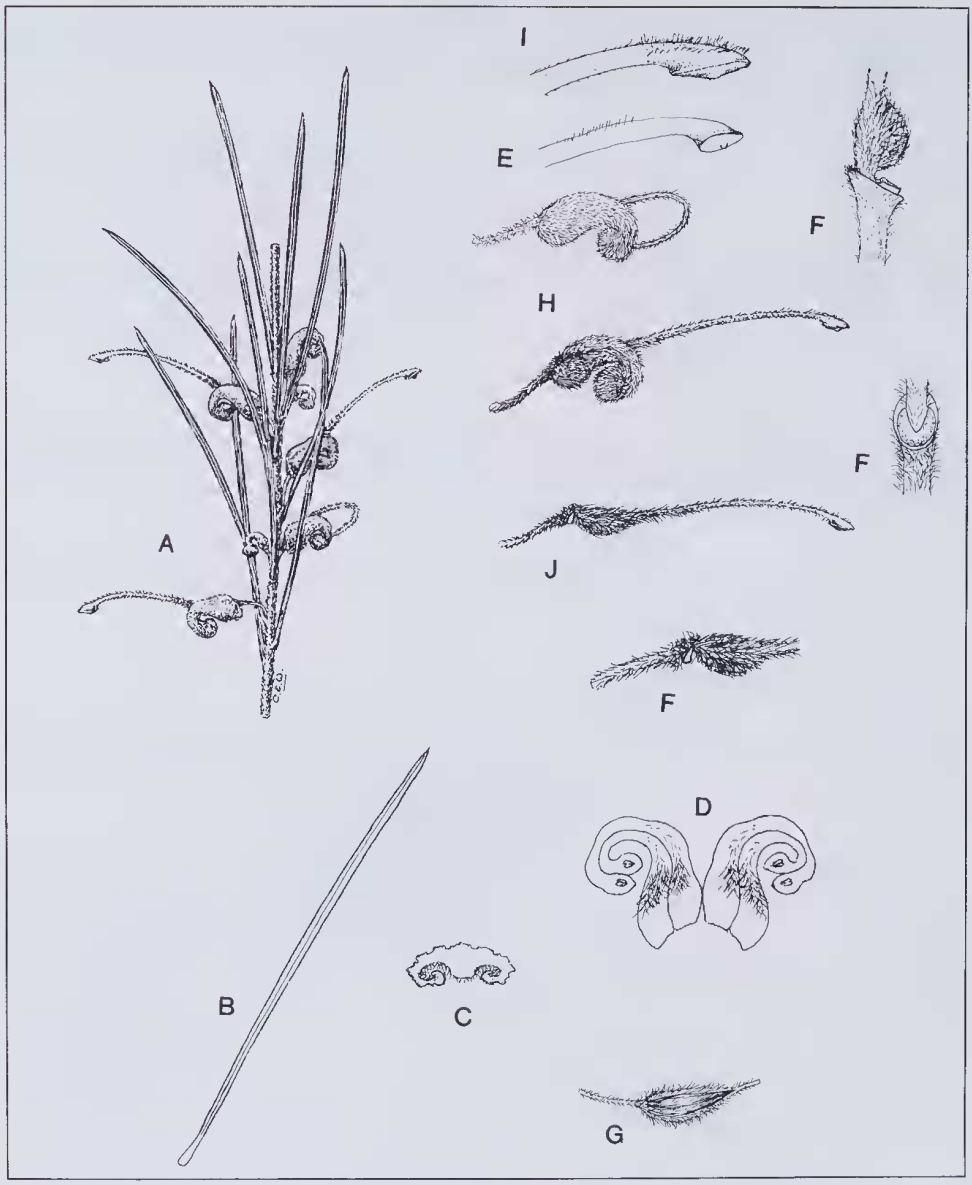


Figure 17. *G. haplantha* subsp. *recedens* A - habit, B - leaf, C - leaf in cross-section, D - inner perianth surface, E - style-end, F - ovary/nectary, G - fruit. *G. haplantha* subsp. *haplantha* H - flowers, I - style-end, J - pistil.

*Discussion.* McGillivray (1993: 300-301) informally recognises two entities in *G. haplantha*, the Coolgardie District Race and the Avon District Race, and has provided distinguishing features which he considered "did not provide an adequate basis for recognition of subspecific taxa at a formal level". While we appreciate that this is a question of judgement and argument as to what degree of discontinuity is required in the recognition of subspecies, we would submit that, in addition to the features noted by McGillivray, the following give an adequate basis for recognition of two subspecies, with our subsp. *recedens* equivalent to the Avon District Race *sensu* McGillivray. The recognition of two subspecies creates an entirely different conservation imperative with respect to subsp. *recedens* which is known from only two recent collections.

Our subsp. *recedens* has been known in cultivation for very many years, mainly in Victoria, where it was frequently misidentified as *G. disjuncta*. It differs from subsp. *haplantha* in its lower, more divaricately branched habit with flowers of a different colour and more concealed within the shrub. Further an examination of the style-end on all specimens at PERTH and NSW showed that for plants referable to our subsp. *recedens*, the apical 2-3 mm was either totally devoid of hairs or they were much reduced in size and that in using this observation rather than presence or absence of indumentum provides the necessary discontinuity. When in combination with features such as shorter pedicels and pistils, flower colour and habit differences, two geographically and climatically disjunct, formally described subspecies are warranted.

Accordingly two subspecies are here recognised, subsp. *haplantha* and subsp. *recedens*.

### Key to subspecies of *Grevillea haplantha*

1 Stylar indumentum extending onto the back of the pollen-presenter, the hairs ± uniform in size throughout; pedicels 7-9 mm long; pistil (22)24-25 mm long ..... subsp. *haplantha*

1* Stylar indumentum either lacking in the apical 2-3 mm or the hairs much reduced in size; pedicels 5-7 mm long; pistils 18-20(22) mm long ..... subsp. *recedens*

**Grevillea haplantha** subsp. **haplantha** F. Muell. (Figure 17)

Shrub 1.5-2 m high, 3 m wide; branchlets erect and ± straight, bearing prominent axillary flowers; perianth dull pink with cream limb, the indumentum consisting of white hairs; pedicel 7-9 mm long; pistil (21)24-25 mm long; stipe c. 1 mm long; style villous over its entire length.

*Selected specimens* (40 examined). WESTERN AUSTRALIA: Comet Vale, *Jutson* 121, Dec. 1916 (NSW); Bet. Callion and Musson Soak, W of Goongarrie, *Beard* 6251, 10 Sep. 1970; Bungalbin Hill, 50 km N of Koolyanobbing, *Olde* 86/190, 2 Sep. 1986 (NSW); 4 km W of Bullabulling, *Olde* 91/12, 6 Sep. 1991 (NSW); 95 mi. N Norseman, *Phillips*, 7 Nov. 1962; 28 mi. S of Coolgardie, *Beauglehole* 13297b, 21 Sep. 1965; 95 km SSW of Coolgardie, 20 km ESE Diamond Rock, *Taylor* 613, *Crisp & Jackson*, 19 Sep. 1979 (CBG7908421, NSW, PERTH); Woolangie, *Cough* 139, 19 Sep. 1963 (PERTH); 6 km NW Scorpion Rock, Walling Rock Station, *Cranfield* 7449, 14 Sep. 1988 (PERTH); 12 km SSE Duri, *Newbey* 6093, 24 Sep. 1979 (PERTH); Queen Victoria Rock, 30 mi. S of Coolgardie, *Filson* 8890, 16 Sep. 1966 (PERTH); Between Dedari and Gilgai, *Gardner* 13495, 7 Sep. 1961 (PERTH).

*Distribution.* Western Australia, in the Coolgardie area where it extends from north of Koolyanobbing to west of Goongarrie up to 50 km south of Coolgardie.

*Habitat and ecology.* Grows in heathland or mallee shrubland, sometimes in tall shrubland in gravelly loam, sometimes in dense laterite. Appears to be killed by fire and is seed regenerative. Pollination is by nectarivorous birds.

*Flowering period.* Winter-Spring.

*Conservation status.* Not presently endangered.

*Notes.* The specimen *Taylor* 613 *et al.* from 95 km south-south-west of Coolgardie differs from others of subsp. *haplantha* in having a shorter pistil (21 mm) with a sparse indumentum in the distal half of the style. However, it retains a strip of long hairs onto the back of the pollen-presenter and is accordingly placed with subsp. *haplantha.*

**Grevillea haplantha** subsp. **recedens** P. Olde & N. Marriott subsp. nov. (Figure 17)

A subspecie typica, habitu humiliore, apice styli aut glabro aut sparsim puberulo, pistillis pedicellisque plerumque brevioribus differt.

*Typus:* Western Australia; Near Manmanning [precise locality withheld], *B.H. Smith* 658, 6 July 1986 (holo: NSW; iso: CBG, HO, PERTH).

Differs from the type in its lower habit, the style-end either glabrous or sparsely and minutely hairy and in its usually shorter pistils and pedicels.

Shrub 0.6-1 m tall, 1 m wide; branchlets divaricate, bearing flowers concealed mostly within the bush; perianth red throughout and usually with a rusty indumentum; pedicel 5-7 mm long; pistil 18-20(22) mm long; stipe c. 0.5 mm long; style villous becoming glabrous or sparsely and minutely pubescent in the apical 2-3 mm.

*Selected specimens* (16). WESTERN AUSTRALIA: Cowcowing, *Koch* 1904 (NSW93154); Cunderdin, *Fitzgerald,* Aug. 1903 (NSW); 3 km directly SE of Manmanning, *McGillivray* 3419 & *George,* 17 June 1976 (NSW); Manmanning Rd, 3.7 km from Dowerin-Kalannie Rd, *Olde* 86/898, 16 Oct. 1986 (NSW); Kodjkodjin Nature Reserve, *Mattiske* HLA 38, 22 Sep. 1986 (PERTH); Cunderdin, *Fitzgerald,* Aug. 1903 (PERTH); Yorkrakine, *Gardner,* 30 Aug. 1920 (PERTH); 13 mi. E of Ballidu, *Royce* 1262, 13 Sep. 1946 (PERTH); Nr Merredin, *Gardner* 728, 30 Aug. 1920 (PERTH).

*Distribution.* Western Australia where it occurs in the Avon district from Mollerin to near Ballidu, extending south to Cunderdin and Merredin.

*Habitat and ecology.* Occurs in heavy clay loams often with a strong lateritic association in open shrubland or woodland. This subspecies is killed by fire and is seed regenerative. Pollination is by nectarivorous birds.

*Flowering period.* Winter-Spring.

*Conservation status.* A code of CALM Priority One is recommended. Subsp. *recedens* has only been collected a few times in recent years, mainly from near Manmanning and there only in degraded verges. However, the collection from Kodjkodjin Nature Reserve is encouraging. This subspecies is considered to be at risk, but a survey of the known populations is necessary to confirm this.

*Etymology.* Latin *recedere* to recede, an allusion to the receding hairs on the style-end.

## KEY 4

### Key to species closely related to *Grevillea haplantha*

1 Leaf undersurface either two-grooved or the lamina exposed beside the midvein
  2 Ovarian stipe >2 mm long ..... *G. extorris*
  2* Ovarian stipe <2 mm long ..... *G. haplantha*
1* Leaf undersurface single-grooved
  3 Leaves with a granular surface ..... *G. dolichopoda*
  3* Leaves smooth and ridged ..... *G. disjuncta*

**17. Grevillea dolichopoda** (McGillivray) P. Olde & N. Marriott stat. nov. (Figure 18)

*Basionym:* *G. disjuncta* subsp. *dolichopoda* McGillivray (1986) in New Names in Grevillea: 5.

*Typus:* Western Australia: "c. 21 km by road N of Ongerup." *D.J. McGillivray* 3521 & *A.S. George*, 26 June 1976 (NSW).

A low, divaricately-branched subshrub; branchlets rounded, sericeous to tomentose to villous, usually secund. *Leaves* (1)2-5(7) cm long, 1-2.5 mm wide, erect to spreading, sessile, simple, linear to ± terete, stiff; apex weakly pungent to obtuse-mucronate; upper surface glabrous, scabrous to granulate, sometimes the granules subdued (Newdegate area), sometimes with faint longitudinal ridges, otherwise midvein obscure; margin entire, smoothly or angularly revolute; lower surface usually unisulcate, obscured by the revolution of the margin, rarely (*Olde* 86/1125) exposed, sericeous with prominent midvein. *Conflorescence* axillary or cauline, 2-4-flowered, often from old peduncles (peduncles absent to c. 1 mm long); floral rachis c. 1 mm long, villous; floral bracts 0.5-0.9 mm long, narrow-triangular, tomentose outside, persistent at anthesis. *Flowers:* pedicels 5-9 mm long, sparsely sericeous; torus 2-3 mm across, oblique; nectary very conspicuous, V-shaped, toothed at the ends, the walls rising 0.5-0.8 mm above the torus; *perianth* 5-7 mm long, 2.2-3 mm wide, dull red, oblong with basal dilation, much narrowed and elongate-patent at the throat, sparsely sericeous to almost glabrous outside, densely bearded inside; limb rusty-orange, tomentose, revolute, spheroidal, distant from the perianth, cohering after anthesis; *pistil* 23-24 mm long; stipe 0.5-1 mm long, inserted on the dorsal rim of the torus; ovary densely villous; style red, villous at the base, sparsely hairy to glabrous near the apex; pollen-presenter lateral, round to oblong, convex. *Fruit* 12 mm long, 5-6 mm wide, erect, ovoid, sparsely villous; style persistent; pericarp c. 0.3 mm thick. *Seed* 7-8 mm long, 2-3 mm wide, oblong-elliptic with a short apical wing, sparsely pubescent; margin strongly revolute.

*Selected specimens* (32 examined). WESTERN AUSTRALIA: Ravensthorpe Range, *Bennett* 2306, 29 Aug. 1968 (NSW, PERTH); Bottle Rock, *George* 9892, 30 June 1970 (NSW); Dunn Rock Nature Reserve, *Atkins* 1730, 7 Oct. 1984 (NSW, PERTH); 1 km W of Needilup, *McGillivray* 3512 & *George*, 26 June 1976 (NSW, PERTH); 13 km W of Ravensthorpe, *Woolcock* G231, 1 Oct. 1985 (NSW); Cnr Lake Bryde Rd & Grant William Rd, SSW of Newdegate, *Olde* 86/724, 2 Oct. 1986 (NSW); 18 km S of Lake King, *Woolcock* G84b, 1 Oct. 1985 (NSW); 5 km E of Kebaringup, *Woolcock* G79a, 3 Sep. 1985 (NSW).

*Distribution.* Western Australia, very widespread in two disjunct localities, between Nyabing and Gairdner River and in the Newdegate-Ravensthorpe-Hopetoun area.

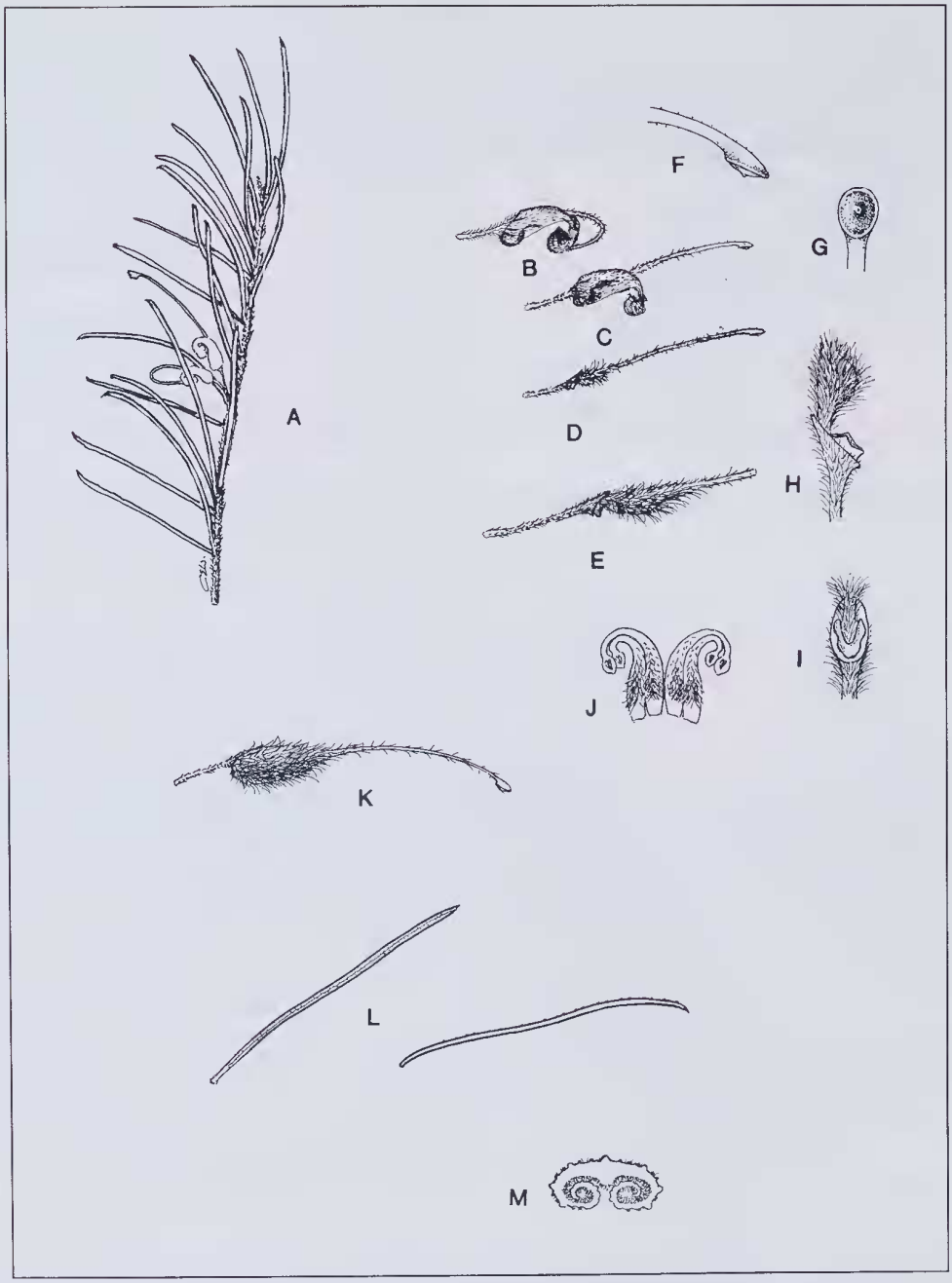


Figure 18. *G. dolichopoda* A - habit, B, C - perianth/flower, D, E - pistil, F - style-end, G - pollen-presenter, H, I - ovary/nectary, J - inner perianth surface, K - fruit, L - leaves, M - leaf in cross-section.

*Habitat and ecology.* Found in open, low mallee shrubland and low, sandy heathland often over laterite, on quartzite ridges, occasionally in clay near granite outcrops and in granitic loam. Regenerates from seed after fire. Pollination by birds.

*Flowering period.* Autumn-Spring.

*Affinities.* *G. haplantha* and *G. disjuncta* are most closely related. *G. haplantha* differs in its more densely hairy outer perianth surface and in its leaf margin revolute but not enclosing the midvein. *G. disjuncta* differs in its smooth, ridged leaves.

*Discussion.* From our observations in the field and our studies of herbarium specimens, the two currently recognised subspecies of *G. disjuncta* F. Muell., subsp. *disjuncta* and subsp. *dolichopoda* McGillivray, should be recognised at specific rank, being, in our opinion, as distinct from each other as they are from *G. haplantha*. McGillivray (1993: 301-303) apparently sees *G. disjuncta sens. lat.* as genetically labile, divides it into two subspecies one of which (subsp. *dolichopoda*) has two forms (rough-leaved form - 'roughly' corresponding to our proposed *G. dolichopoda sens. str.* and smooth-leaved form - a form showing affinity to both subspecies). Plants distributed over a substantial distance (around Newdegate) are unassigned to either subspecies, being somewhat intermediate between the two taxa.

In our arrangement, *G. disjuncta* is more narrowly defined by its smooth, longitudinally ribbed leaves, usually symmetrically crowded around the branchlets. Most collections of *G. disjuncta* also have more robust flowers than those of *G. dolichopoda*. *G. dolichopoda* is defined by its scabrous to granular leaves, usually on secund branchlets. Most collections of *G. dolichopoda* have an elongate torus 2-3 mm long and longer leaves than *G. disjuncta*, but there is some variability in this feature especially on plants from the Newdegate area, treated as unassigned elements of *G. disjuncta* by McGillivray (McGillivray 1993: 302). They are here regarded as *G. dolichoda* because of their granular leaves. Plants assigned as the smooth-leaf form of *G. disjuncta* subsp. *dolichopoda* (McGillivray *l.c.*) are here treated as a long-leaf form of *G. disjuncta* because their smooth, ridged leaves are conformant with that taxon. Bentham cited a specimen of this population as a syntype of *G. haplantha*, which demonstrates the close relationship of all three species. Although the elongation of the torus appears to be significant and more consistent in *G. dolichopoda*, its reduction in plants around Newdegate suggests this is not so.

The broad-species concept of a genetically labile *G. disjuncta sensu* McGillivray is not ruled out as empirically wrong but is, in our opinion, a less acceptable classification at this stage because of the lack of verifiable data, the unassigned populations around Newdegate and the *ad-hoc* assignation of the smooth-leaf form. A classification in which all taxa are assigned through their leaf morphology seems more acceptable.

*Conservation status.* Not endangered.

**18. Grevillea pythara** P. Olde & N. Marriott sp. nov. (Figure 19)

Fruticulus rhizomatosus, villosus, plerumque 6-30 cm altus. Folia simplicia, convexa, linearia vel peranguste elliptica, conferta, 7-16 mm longa, 1.5-4 mm lata cum nervatura obscura, marginibus revolutis, apice minute mucronulata retrocurvataque. Conflorescentiae simplices, terminales, sessiles cum 4-8 floribus. Torus obliquisissimus. Perianthium zygomorphum, rubrum, in pedicello sparse villoso 6-7 mm longo gestum, ad basim dilatatum, extus sparse tomentosum intus dense barbatum cum limbo revoluto, globoso, caeruleo, ad anthesim firme coherenti. Antherae steriles, deformes. Pistillum sparse villosum; stipes 7.5 mm longus stylo crassior; ovarium inconspicuum, dense villosum; praebitor pollinis lateralis, plus minusve planus. Follicula seminaque non visa.

*Typus:* Western Australia: near Pithara [precise locality withheld], *P. Olde* 92/173, 29 Sep. 1992 (holo: PERTH; iso: NSW).

A root-suckering shrub 6-30 cm high; branchlets rounded, villous. *Leaves* 7-16 mm long, 1.5-4 mm wide, simple, villous, linear to narrow-elliptic or sometimes obovate, strongly convex, crowded, sessile, slightly discolorous; venation obscure, the midvein sometimes evident on the undersurface; margin strongly recurved to revolute, entire, sometimes enclosing the undersurface; apex obtuse-mucronate, slightly retrorse. *Conflorescence* erect, terminal, sessile, 4-8 flowered, secund; floral rachis c. 3 mm long, villous; floral bracts 3 mm long, 1 mm wide, subtriangular to linear, villous outside, sometimes persistent to anthesis. *Flowers:* pedicels 6-7 mm long, villous; torus 3.5-4 mm across, lateral to very oblique at 80-85°; nectary prominent, long U-shaped; *perianth* 10 mm long, 5 mm wide, red, blue around the dorsal tepal margins in the vicinity of the limb, strongly zygomorphic, ± oblong, ventrally dilated at the base, sparsely tomentose outside, bearded inside below the level of the ovary and above the somewhat chambered dilation, the hairs strongly reflexed and concentrated mainly on the ventral tepals, glabrous to sparsely villous elsewhere; limb 2 mm long, 3.5 mm wide, revolute, subglobose to spheroidal, firmly cohering at and beyond anthesis; dorsal tepals flared open below the limb before anthesis; anthers misshapen, without pollen; *pistil* 20-22 mm long; stipe 7.5 mm long, adnate to the torus at the base, noticeably thicker than the style, sparsely villous with spreading hairs; ovary relatively inconspicuous, densely villous; style red, curved, pubescent; pollen-presenter 2.5 mm long, 1.8 mm wide, lateral, flat, obovate; stigma distally off-centre. *Fruits* and *seeds* not seen.

*Specimens examined.* Only specimens forming the type collection have been seen, although one of us (Olde) has studied the species in the field.

*Distribution.* Western Australia. Confined to the Type locality where it occurs in two small, populations containing upwards of c. 100 individuals separated by only a few hundred metres. The two populations are most likely reproducing from a single parent rootstock.

*Habitat and ecology.* Grows in gravelly sand in a weedy road verge with *Dampiera* spp. The verge has been partially disturbed. Reproduction is most probably only from root-sucker as no fruits have been seen. Misshapen anthers on the few flowers examined contained no pollen and no pollen has been found on pollen-presenters.

*Flowering period.* May-October but possibly all year.

*Affinities. Grevillea pythara* appears to have no close relatives although *Grevillea singuliflora* F. Muell. or *Grevillea glossadenia* McGillivray may be remotely related. The locality of these species is some 3000 km away and the similarities are more likely a process of parallel convergence than recent common ancestry. The possibility of a relationship with species related to *G. saccata* Benth. is not excluded.

*Conservation status.* A code of CALM Priority One is recommended. This species is seriously endangered by low numbers and weed domination of its habitat. Active conservation measures are recommended using both *in-situ* bush regeneration (weeding), horticultural *ex-situ* intervention and road-verge controls. Propagation should be relatively simple using small root-suckers which are advancing onto the roadside.

*Etymology.* The epithet acknowledges the request of the discoverer of the species, Ms Jan Wellburn, that it be named after her father's farm "Pythara", along one boundary of which this species grows. The epithet *pythara* is used as a noun in apposition, not adjectivally.

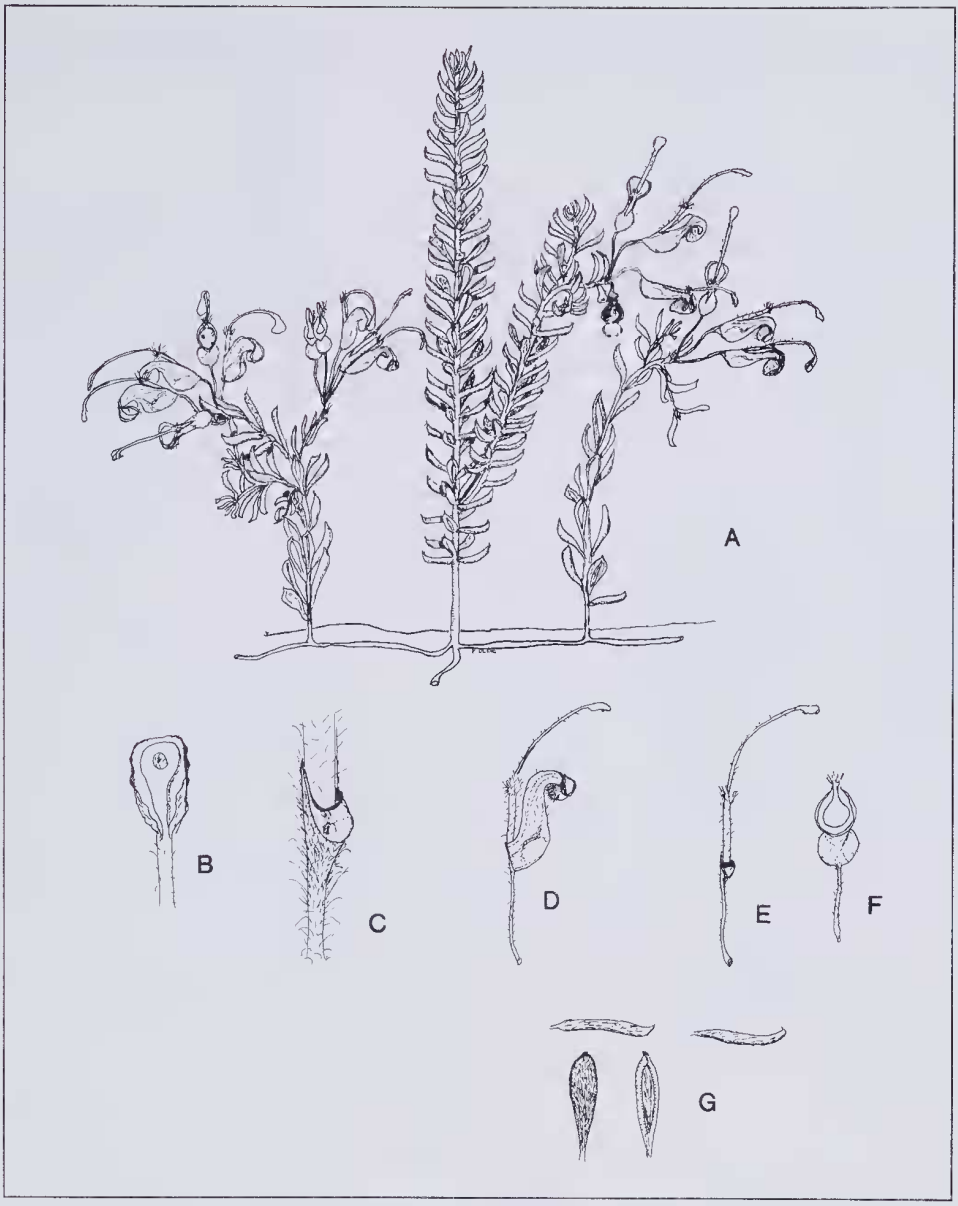


Figure 19. *G. pythara* A - habit, B - style-end, C - nectary, D - flower, E - pistil, F - perianth, G - leaves.

**19. Grevillea althoferi** P. Olde & N. Marriott sp. nov. (Figure 20)

Affinis *Grevilleae rudi* Meissn., sed ab illa foliis pro parte maxima pinnatipartitis cum primis lobis distantibus pinnatifidisque, conflorescentiis laxioribus folia aut vix aut haud excedentibus, perianthio longiore latioreque aut dense papilloso aut breviter barbato intus distinguitur.

*Typus:* Western Australia: near Eneabba, *P.M. Olde* 91/102, 15 September 1991 [precise locality withheld], (holo: NSW; iso: PERTH).

*Aff. G. rudis* but is distinguished from that species by its mostly pinnatipartite leaves with the primary lobes distant and pinnatifid, its looser conflorescences either not or scarcely exceeding the leaves, in its perianth both longer and wider and either densely papillose or shortly bearded on the inner surface.

*Juveniles:* young leaves and branchlets bearing a caducous, dense indumentum of mixed spreading biramous and glandular trichomes. *Adults:* compact, rounded shrubs 0.3-0.5 m high, 0.5-1 m wide; branches flexuose, ascending to spreading, dense to the ground; branchlets round, scabrous to sparsely hirsute. *Leaves* 3-7.5 cm long, 1-5 cm wide, including petioles 1-5 cm long, bluish-green, tangled, persistent after death, secund, ascending to erect, usually pinnatipartite, rarely (confined to foliage at the base of the plant) simple, pinnatifid, obovate-cuneate with 3-4 apical teeth, sometimes with secondary lobing of the apical lobe, sometimes leaves subtending the peduncles simple and entire, 1.8-2.4 cm long, 0.1-0.2 cm wide, linear, often fasciculate near the base of the conflorescence, sessile, usually curved, pungent; primary leaf lobes 3-7 per leaf, 2-2.5 cm long, 1-3 cm wide, obovate-cuneate, distant, cuspidate, apically 3(4)-fid; the ultimate secondary lobes broadly triangular, pungent, the apical lobe often linear, occasionally the secondary lobes bifid; upper and lower surfaces similar, scabrous to sparsely hirsute, concolorous; venation prominent, more conspicuous on the undersurface, mixed craspedodromous with prominent reticulum; margin flat, coincident with a conspicuous, rounded, scabrous vein; texture firmly chartaceous to coriaceous. *Conflorescence* terminal, usually simple, rarely 1-3 branched, erect, sessile, scarcely or not exceeding the foliage; unit conflorescence 2-5 cm long, 1.5 cm wide, cylindrical, loose, development acropetal; floral rachis 1.5 mm wide at the base, arising from a leaf-opposed rosette of bracts, villous; floral bracts 6-7 mm long, 1.5 mm wide, narrowly triangular with apex acuminate, villous outside with mixed biramous and glandular trichomes, glabrous inside, caducous. *Flowers:* pedicel 2-3 mm long, villous, patent; torus ± 1 mm across, straight; nectary not evident; *perianth* 5-6 mm long, 1.5-1.8 mm wide, actinomorphic, reddish when young, ageing dull creamy-yellow, oblong below the limb, villous outside with a mixed indumentum of biramous and glandular trichomes; tepals cohering to anthesis, becoming free and rolling down at anthesis, exposing an inner surface either densely papillose or bearing short papilloid trichomes; limb 1.5-2 mm long, 1.5-2 mm wide, erect, densely villous, subglobose; *pistil* 6-6.5 mm long; stipe scarcely evident; ovary sessile, densely villous with spreading to erect, straight trichomes; style creamy-yellow, kinked or folded above the ovary, glandular-pubescent on the lower filiform portion, papillose on the upper third where continuously dilated to c. 0.4 mm wide below the broadly expanded style-end; pollen-presenter c. 0.8 mm long, 0.6-0.7 mm wide at its base, straight, conico-cylindrical with cupuliform apex. *Fruits* not seen.

*Specimens examined* (3). WESTERN AUSTRALIA: Allied Eneabba Leases, south of Eneabba, *Griffin* 1454, 2 Nov. 1978 (PERTH 01418319); *Griffin* 1448 (PERTH 01418327) from same area.

*Distribution.* Western Australia: restricted to a single known extant population south of Eneabba. Two other specimens (at PERTH) have been seen from sites now known to have been destroyed by sandmining.

*Habitat and ecology.* Occurs in low heath dominated by *Grevillea integrifolia* subsp. nov., *Grevillea shuttleworthiana* and *Eucalyptus* sp. aff. *tetragona* in grey sand with laterite. Pollinators not seen. Regeneration is from lignotuber or root-sucker.

*Flowering period.* September-October.

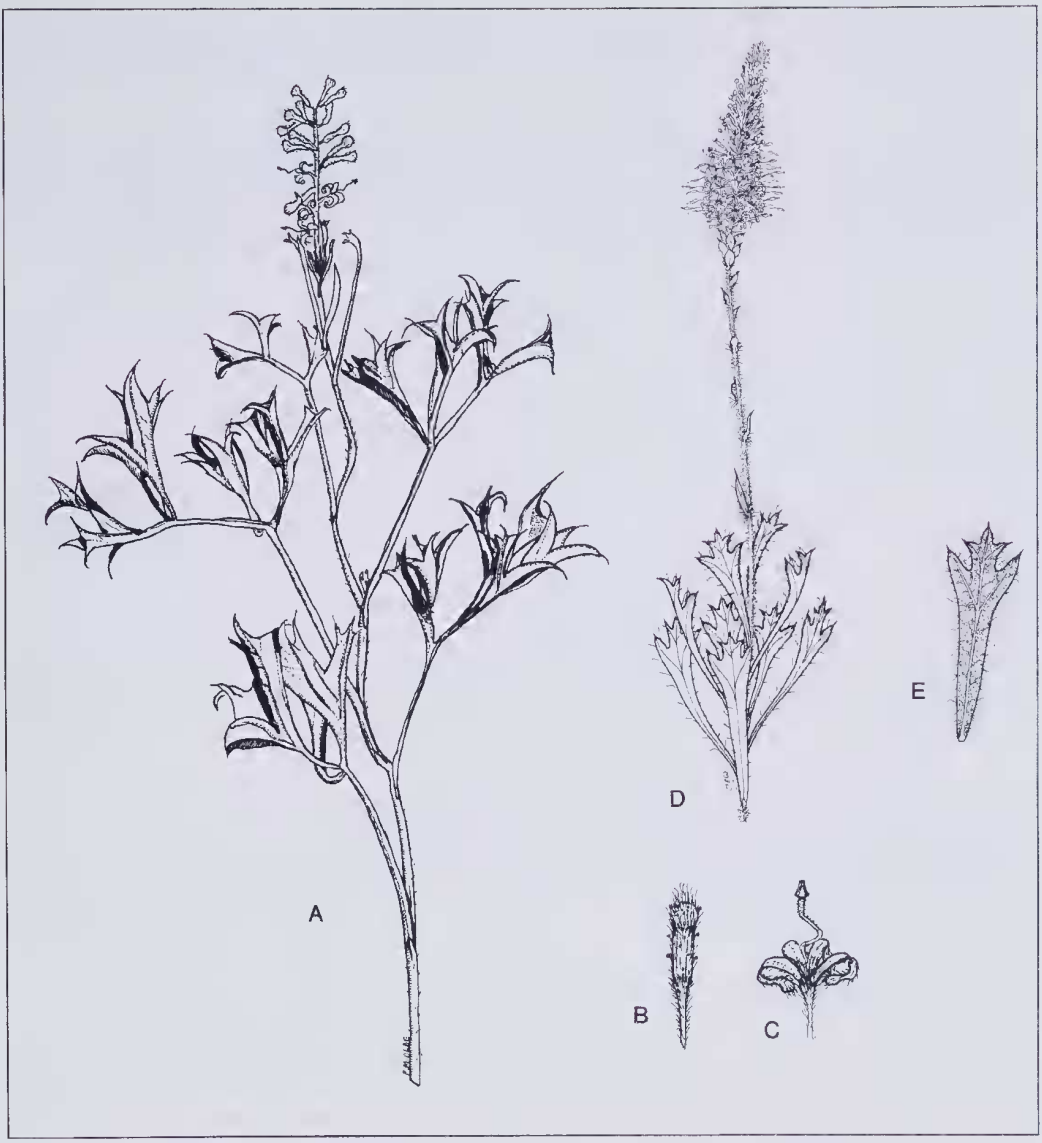


Figure 20. *G. althoferi* A - habit, B - perianth, C - flower. *G. rudis* D - habit, E - leaf.

*Conservation status.* A code of CALM Priority One is recommended. This species is only known from one extant population, growing on a road verge beside the entrance to a paddock gate where some plants have already suffered damage.

*Affinities. Grevillea althoferi* is closely related to four other species (see Key 5 on page 298) some members of which have a complex inflorescence morphology (McGillivray 1993: 375). All have the following features in common; perianth actinomorphic; nectary absent; ovary hairy; style conspicuously folded above the ovary, the lower filiform section glandular-pubescent, the upper half dilated gradually upwards and papillose; pollen-presenter erect, conical or conico-cylindrical. Of these, it is closest to *Grevillea rudis* which differs in its pinnatifid, obovate-cuneate leaves, mostly lacking secondary division, its denser inflorescences borne on peduncles far above the basal foliage, in its

perianth shorter and narrower (3-4 mm long, 0.7 mm wide) and in its perianth glabrous and smooth inside. In addition, the indumentum on the leaves and branchlets is more conspicuous, with trichomes both longer and more densely distributed.

*Etymology*. The epithet honours the naturalist and former curator of Burrendong Arboretum, near Wellington, NSW, Peter McDowell Althofer (1918-1991) and his wife and former assistant, Hazel J. Althofer (nee Johnston), O.A.M. (1920- ), for the inspiration and encouragement provided to the authors by their deep love of the Australian flora.

## KEY 5

### Key to species closely related to *Grevillea althoferi*

1 Leaf lobes terete ..... *G. stenostachya*

1* Leaf lobes not terete

2 Ovary sessile, villous

3 Most leaves pinnatifid (rarely bipinnatifid), usually obovate-cuneate with apical toothing or lobes; perianth 3-4 mm long, smooth and glabrous on the inside ..... *G. rudis*

3* Most leaves pinnatisect with 3-7 distant, secondarily divided lobes; perianth 5-6 mm long, papillose or hairy on the inside ..... *G. althoferi*

2* Ovary stipitate, glandular-pubescent

4 Pedicel <2 mm long; ovarian stipe <1 mm long; floral bracts caducous ..... *G. pulchella*

4* Pedicel >2 mm long; ovarian stipe usually >1 mm long; floral bracts persistent ..... *G. tenuiflora*

**20. Grevillea superba** P. Olde & N. Marriott sp. nov. (Figure 21)

Affinis *Grevilleae plurijugae* F. Muell., sed lobis foliorum plerumque latioribus (usque ad 2.2 mm latis) patentioribusque aut bi- aut tripartitis aut pinnatis infernis, subtus costa ultra marginem haud exserta, pedunculis pro parte maxima fruticis verticem excedentibus, pistillis plerumque longioribus (40-47 mm longis), differt.

*Typus:* Western Australia: Norwood Rd, east of Scaddan, *P. Olde* 91/332, 13 October 1991 (holo: NSW; iso: PERTH).

Aff. *Grevillea plurijuga* F. Muell. but differs in its leaf lobes which are usually broader (up to 1.5 mm wide) more spreading with the lower lobes either bi- or tripartite or pinnate, in the midvein on the lower surface level with the margin, in its peduncles which usually exceed the top of the shrub and in its usually longer pistils (40-47 mm long).

Robust, non-lignotuberous shrub 2-3 m high, 2 m wide with emergent floral branches up to 1 m above the shrub; branchlets rounded, tomentose. *Leaves* 2-7 cm long, secund, sessile or almost so, simple when subtending the conflorescence, otherwise subpinnatisect; rachis usually recurved,

sometimes straight; primary leaf lobes 9-17 per leaf, (1)3-6 mm apart, 5-20 mm long, 1-2.2 mm wide, linear, pungent, the lower lobes bi- to pinnatisect; upper surface glabrous or almost so, smooth or with faint longitudinal grooves, the midvein obscure to faintly evident; lower surface bisulcate, the midvein level with or scarcely prominent above the lamina, glabrous or with scattered appressed biramous trichomes; margin smoothly to angularly revolute, enclosing the undersurface; texture coriaceous. *Conflorescence* usually carried on emergent floral branches above the shrub, sometimes also on short, peduncles at the apex of leafy branchlets, terminal, usually 5-10 branched, sometimes simple; unit conflorescence 4-6 cm long, cylindrical, lax, development basipetal; peduncles tomentose, persistent and becoming glabrous with age; floral rachis 1.5 mm wide at the base, tomentose; floral bracts 1-1.2 mm long, 1 mm wide, ovate, tomentose outside, glabrous inside, caducous. *Flowers:* pedicels 7-10 mm long, ascending to spreading, tomentose; torus 2 mm wide, trapezoid-undulate, slightly cupuliform, reverse oblique at 10-30°; nectary subpatelliform to linguiform, the margin undulate to toothed; *perianth* 7-10 mm long, 2.5-4 mm wide at the base, whitish over olive green ageing creamish-pink to pink or reddish-pink, oblong below the curve, slightly dilated at the base, strongly revolute in the apical half, densely glandular-pubescent with a few closely appressed biramous trichomes intermingled outside, pilose inside over most of the surface, glabrous above the curve; limb 2 mm long, 3 mm wide, spheroidal-subcubic, the segments slightly ribbed; *pistil* (38)40-47 mm long, glabrous; stipe 2-2.2 mm long; ovary rugose with two ventral oncogynous protuberances; style cream or pink with red style-end, gently curved, dilated in the apical 2 mm; pollen-presenter 2.5 mm long, 1.6-1.8 mm wide, lateral, flat to convex, obovate. *Fruits* 17 mm long, 15 mm wide, 9-10 mm deep, erect, obovoidal to subglobose, rugose with two prominent swellings on the upper ventral surface; style persistent, fragile; pericarp 2-3 mm thick at the suture. *Seeds* (*Olde* 86/1189) 10 mm long, 5 mm wide, 2 mm deep, 2 per fruit, oblong-ellipsoidal, outer surface convex, smooth, inner face convex encircled by a wrinkled, membranaceous wing c. 1 mm wide.

*Selected specimens* (30 examined). WESTERN AUSTRALIA: 5 km W of Grasspatch on Grasspatch Rd, *Olde* 91/330, 13 October 1991 (NSW); 2 km N of Grasspatch, *C. & D. Woolcock* 126, 3 October 1985 (NSW); Mt Burdett Rd, near Mt Burdett, *Olde* 86/1189, 13 November 1986 (NSW); N of Mt Ridley, *Aplin* 4006, 15 Oct. 1970 (PERTH); 2.4 km SSE of Mt Ney Rd on Kau Rock Rd, *Nunn* 144, 20 Sep. 1985 (PERTH); N of Scaddan, *A. Ashby* 2779, 2 Dec. 1969 (PERTH).

*Distribution.* Western Australia: extending north to south between Grasspatch and Scaddan east through the Wittenoom Hills to Mt Ney and west a few km from Scaddan. The area is now widely cleared and the full extent of the original distribution is uncertain.

*Habitat and ecology.* Grows in *Eucalyptus* shrubland in white sand over pale-brown, calcareous loam. Nectarivorous birds were seen probing the flowers. *G. superba* appears to be short-lived but regenerates from seed after fire.

*Flowering period.* October to December.

*Affinities. Grevillea superba* is most closely related to species placed by Bentham in his Sect. 1 *Eugrevillea* Series 1 *Leiogyne*, a diverse group, of which only some are closely related. The closely related species, for which Key 6 is provided on page 302, may be described as having inflorescences with basipetal development; a glabrous, stipitate, ovary with strongly developed oncogynous protuberances on the ventral side; a mostly reverse-oblique torus; a zygomorphic, oblong perianth; a prominently exserted style with lateral pollen-presenter.

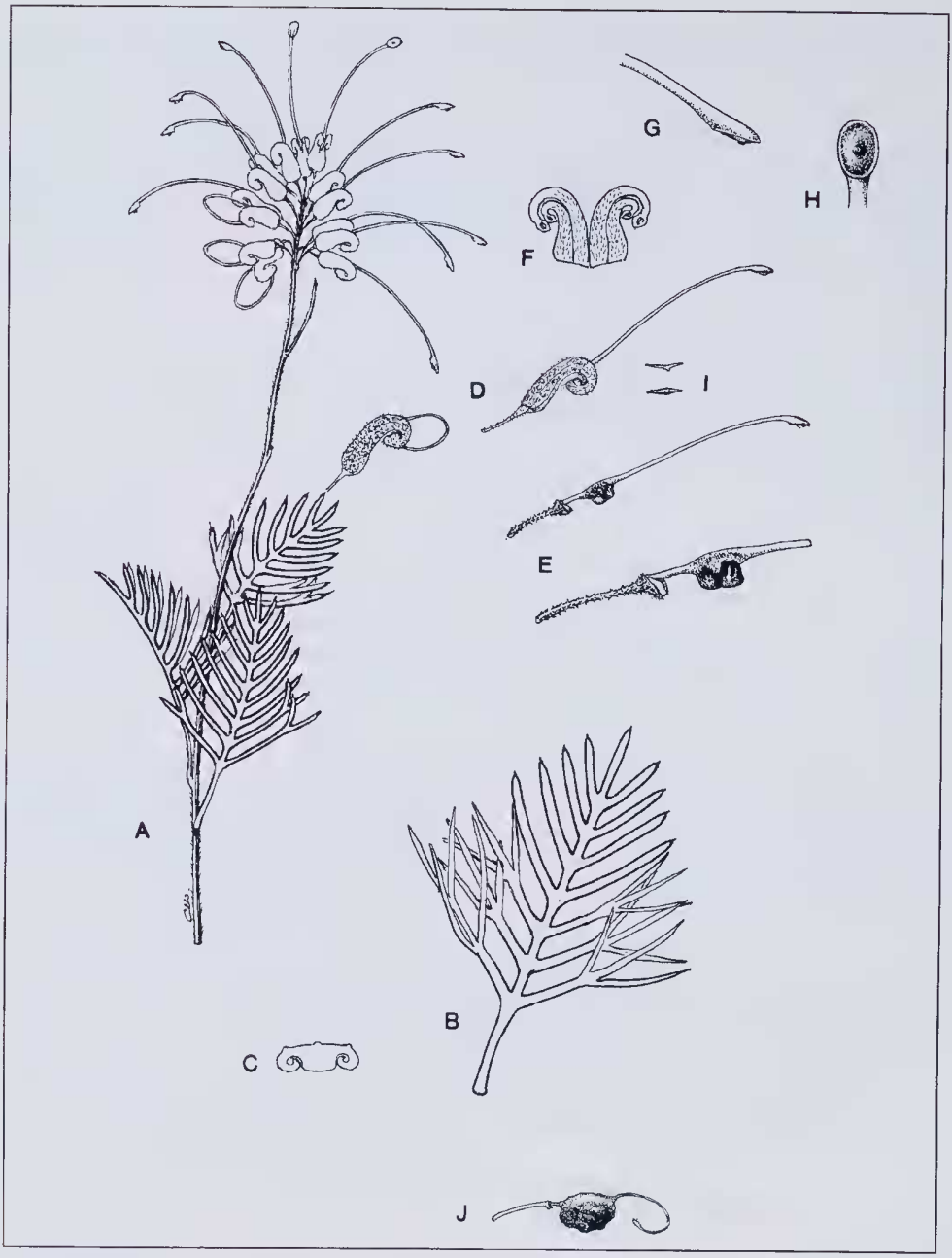


Figure 21. *G. superba* A - habit, B - leaf, C - leaf lobe in cross-section, D - perianth, E - pistil/ovary, F - inner perianth surface, G - style-end, H - pollen-presenter, I - hair types on perianth, J - fruit.

*Discussion.* Plants referable to our *Grevillea superba* have been included by McGillivray (1993) in *G. plurijuga* F. Muell. a species to which, like *G. pectinata*, it is undoubtedly very closely related. The photograph (McGillivray 1993: 241) is of our *G. superba*. *G. plurijuga* differs in its round, dome-shaped, lignotuberous habit, its inflorescences mostly either within the shrub on decurved peduncles or at the base of the bush where erect on prostrate peduncles around the perimeter of the plant (persistent peduncles not exceeding the top of the bush); its leaf lobes 0.8-1.2 mm wide, closely

aligned, trigonous and with the basal lobes undivided; its shorter pistils (35-38(40) mm long). Continuity is observed in that occasional leaves on some specimens of *G. plurijuga sens. str.* have bipartite division of the lowermost lobe. We have also seen a few plants of *G. plurijuga sens. str.* south west of Mt Ragged (e.g. *Olde* 91/04 [NSW]) with occasional peduncles exceeding the top of the bush. However, these plants were always accompanied by other features unifying them with *G. plurijuga* (*viz.* trigonous leaf lobes, short pistils, most flowering at the base of the plant). (Figure 22)

An argument could be mounted that *G. superba* is better included in a conceptually broad *G. plurijuga*, a species thus seen as genetically labile, expressing itself in different circumstances in different ways. However, this highly speculative view must be balanced against the field situation of sympatric occurrence. We would argue that the two entities are distinct and show a level of internal morphological consistency and degree of discontinuity from each other similar to other accepted separations (e.g. *G. wittweri* - *G. tetragonoloba*) and that separation at specific rank is warranted (see Table 4 on page 303). However, we cannot confidently argue full reproductive isolation as there are a number of hybrids (albeit of uncertain parentage but putatively either between these two species or as relicts through a former distribution of *G. pectinata*) in the Scaddan area. The hybrids are restricted, from our observation, to disturbed roadside situations.

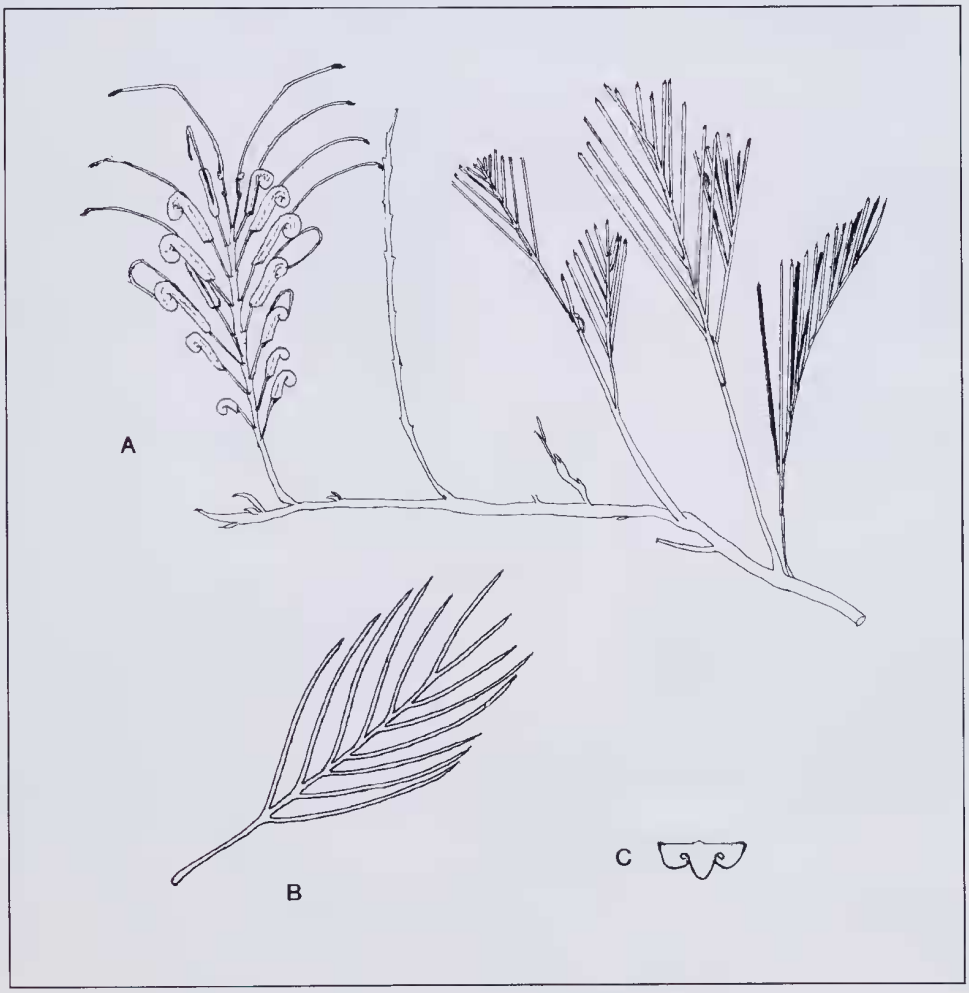


Figure 22. *G. plurijuga* A - habit, B - leaf, C - leaf lobe in cross-section.

*Conservation status.* A code of CALM Priority Three is recommended. *G. superba* is contained in Truslove Nature Reserve. However, many of the plants still extant in roadside verges around Scaddan appeared to be dying in October 1992 and the conservation imperative for this species may be greater than our recommendation.

*Etymology.* Latin *superbus* - proud, in reference to the flowers standing proud of the shrub.

## KEY 6

### Key to some species related to *G. plurijuga* and *G. superba*

Pistils >25 mm long

1 All leaves simple and >5 cm long ..... *G. oncogyne*

1* Some or all leaves either divided or simple and <4 cm long

2 Some or all leaves pinnate, (sometimes the lower lobes with secondary division)

3 Most floral rachises <0.5 cm long; inflorescences decurved ..... *G. pectinata*

3* Most floral rachises >0.5 cm long; inflorescences erect

4 Most leaves with <10 lobes; inflorescences mostly on short peduncles and borne within the leaves ..... *G. oncogyne*

4* Most leaves with >10 lobes; inflorescences on long peduncles exceeding the leaves

5 Leaf lobes trigonous; peduncles decurved within or trailing at the base of the plant; pistils 35-38(40) mm long ..... *G. plurijuga*

5* Leaf lobes with the midvein on the undersurface c. level with the subtending lamina; peduncles emergent above the top of the plant; pistils 40-47 mm long ..... *G. superba*

2* Leaves not pinnate

6 Leaves divaricately lobed

7 Leaf lobes c. 1 mm wide; leaf margins smoothly rounded; leaves sometimes with secondary division; inflorescences usually pedunculate and branched ..... *G. newbeyi*

7* Leaf lobes 1.5-3 mm wide; leaf margins angularly refracted; leaves with primary division only; inflorescences usually sessile or almost so and unbranched ..... *G. tripartita*

6* Leaves not divaricately lobed

8 Pistils >45 mm long; inflorescences subsessile ..... *G. macrostylis*

8* Pistils <40 mm long; inflorescences pedunculate ..... *G. pectinata*

**TABLE 4**

| | G. superba | G. plurijuga |
|---|---|---|
| Habit | erect | dome-shaped |
| Lignotuberous | no | yes |
| Flowering habit: | | |
| peduncles emergent above | usual | rare |
| peduncles at ground level | never | usual |
| Leaf lobes | 1-2.2 mm wide | 0.7-1.2 mm wide |
| | oblong in cross-section | trigonous |
| | spreading | closely aligned |
| Secondary division | usual | very rare |
| Pistil length | 35-38(40)mm | (38)40-47 mm |

## Acknowledgements

We wish to pay special thanks to the late Collin Woolcock who provided numerous illustrations for use and the Directors of the following institutions for providing access to their collections: NSW, PERTH. We deeply appreciate comments on the introductory section of this paper by Dr L.A.S. Johnson, Ken Hill and Gwen Harden. Don McGillivray also gave information and made available a manuscript of his revision of the genus *Grevillea*, from which some typification details of previously named species were drawn. Alex George critically read an earlier draft of the manuscript.

This research was funded by a grant from the Society for Growing Australian Plants (NSW) Limited and by the Sutherland and Menai Groups of the same Society.

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